ARTICLE
Everyday Neuroscience: A Community Engagement Course

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The University of Pennsylvania offers "Academically Based Community Service" courses, which equip college students with real-world problem-solving skills relevant to their discipline of study in the service of the local community. The present report describes such a course called Everyday Neuroscience, in which Penn undergraduates developed ten neuroscience-relevant laboratory activities for high school students attending a nearby under-resourced public high school. For the community service component of the course, students ran these lab activities with small, consistent groups of high school students, based on topics that included traumatic brain injury, vision, reflexes, and attention. The academic component of the course included written reflections, reading scholarly works about education disparities, and making presentations to the class. At the end of the semester, the undergraduates self-reported that the course improved specific professional skills, namely teaching and communication, innovation and creativity, and critical thinking. Results of the before-and-after survey indicated that certain aspects of psychological and social well-being were rated more positively at the end of the semester compared with the beginning. In particular, students experienced a significant increase in confidence to express their own ideas and the feeling that they had something important to contribute to society. Their reflections revealed a theme of increased awareness of social issues, such as educational disparities. In sum, these results suggest that Everyday Neuroscience imparts professional skills related to communication, innovation and critical thinking, as well as improved social awareness.

Key words: Active Learning; Community Engagement; High School Laboratory Activity; Outreach; Service learning

For many universities, having a positive impact on the local community is critical to their academic mission (Benson et al., 2017). Service-learning courses allow students to leave the traditional campus environment and tackle real-world challenges in a meaningful way (Bringle and Hatcher, 2000). In such courses, undergraduates increase their awareness of social disparities and improve their sense of agency to address challenges in society. At the University of Pennsylvania, this approach is manifested in Academically Based Community Service (ABCS) courses (Benson et al., 2008). These credit-bearing educational experiences cover a range of topics, such as anthropology, music, nursing, and physics, and they benefit the community in diverse ways.

Penn's ABCS courses aim to prepare students with discipline-relevant and impactful community engagement that promotes professional skills, social well-being and informed citizenship. Professional skills cover an array of "soft skills" that are not job specific, such as verbal communication, leadership, and teamwork. Social well-being refers to the ability to enjoy meaningful relationships with others. Informed citizenship is the awareness and commitment to the welfare of the broader community. To foster the development of new courses and to improvement of existing courses, it is critical to establish assessments for ABCS courses regarding their ability to promote professional skills, social well-being and informed citizenship.

The present report describes a semester long ABCS course called Everyday Neuroscience. In this course, college students created neuroscience-relevant hands-on activities for high school students who attend a nearby under-resourced public high school to support their science curriculum. The enrollment is limited to 25 undergraduate students per semester. This report describes the execution of the course and presents preliminary evidence regarding the impact of the course on college students' professional skills, social and psychological well-being, and informed citizenship.

THE COURSE

Everyday Neuroscience has run for five semesters thus far; the most recent three semesters have partnered with the same high school. This particular high school is located a few blocks from campus, and the college students traveled by foot. The course met during a regular university time slot (9:00-10:20am), which largely coincided with "second period" at the high school (9:20-10:10am). Thus, the lab activities at the high school lasted approximately 50 minutes.

All participating college students were required to have previously taken "Introduction to Brain and Behavior." Although most of the students were seniors majoring in Biological Basis of Behavior, there were also students from other majors, including Health and Society, Cognitive Science, Psychology, Biology, Life Science Management, and Engineering. The majority of students had numerous college courses in biology, chemistry and/or physics, as well as several neuroscience courses. Everyday Neuroscience did not teach neuroscience content to the college students, but rather focused on teaching already learned basic neuroscience to high school students through interactive lessons. The learning goal for the Penn students, as stated on the syllabus, was to improve their communication skills in enthusiastically conveying neuroscience principles to a

non-specialist audience.

The High School Partnership.

A critical feature of the course was the strong collaboration with the teachers and administration of a nearby public high school. This alliance was brokered by the University of Pennsylvania's Netter Center for Community Partnerships, a university resource that supports a wide range of programs that strengthen the connections between the university and the local West Philadelphia community. Extensive conversations including the high school staff, Netter Center liaisons, and the course instructor were conducted before the course began to agree on the topics of the lab activities, to discuss both groups of students' needs, and to create the general schedule in consideration of the school district calendar, and the teachers' and administrators' other planned activities. Norms were established related to the role of teachers to oversee high school student behavior, including phone use and student participation. The college students were not responsible for managing the high school students' behavior, only teaching them. The partner students were in grades nine or ten. More than 95 percent of the students were minorities and met federal requirements for free or reduced lunch.

The high school students were selected only based on their science class time; specifically, an entire Biology or Earth Sciences class would participate for a given semester. As a concrete incentive for participation, the high school teacher collected the lab activity worksheets, giving high school students credit for their efforts. Most students also displayed genuine curiosity about the neuroscience topics and were easily engaged in the activities. Any supplies that were needed for these activities were funded by the Netter Center.

Preparation for the Undergraduates

At the outset of the semester, the enrolled students were assigned to one of five teams, and all teams were charged with developing lesson plans for two hands-on activities. Some class time was set aside for developing these lesson plans, but students also were expected to work with their teams outside of class.

It is worth noting that the Penn students' own high schools were usually vastly different from the one in which they were about to teach, especially regarding the available science education resources. To give the students a better perspective on the current challenges in American education, these five books were discussed in depth: *Class Warfare* (Steven Brill, 2011), *Between the World and Me* (Ta-Nehisi Coates, 2015), *Improbable Scholars* (David L. Kirp, 2013), *Shame of the Nation* (Jonathan Kozol, 2005) and *The Prize* (Dale Russakoff, 2015). Students were also assigned to write a reflection on the essay, "White Privilege: Unpacking the Invisible Backpack" (Peggy McIntosh, 1989).

The instructor had no formal training in pedagogy for designing high school science labs. Two guest speakers were included to provide such expertise. One guest had extensive experience teaching in urban high schools, and she offered concrete strategies for working with this age group. The second guest speaker had worked as an administrator at a variety of underserved schools. He contributed insights for designing our lessons. In particular, we followed his proposed lesson plan format that included an "Essential Question" and three to five vocabulary terms to be mastered. He noted that many students in our partner school remain below their grade level for most school subjects. Only 11% of students at the partner high school were proficient in Algebra 1 or Biology based on Pennsylvania standardized testing in 2017-2018. These presentations helped the Penn students appreciate the setting for the laboratory activities they were designing. Based on the lively follow-up questions, the college students valued these presentations.

Before the lab sessions began, Penn students were given a tour of the partner high school, making clear the available resources, or lack thereof. After this tour, an ice breaker session was held. A simple game of "Heads Up!" allowed both groups of students to enjoy themselves and appreciate the many points of common interests. Once we began the laboratory activities, the college students were already acquainted with the school and the students, and they could more readily focus on teaching. Likewise, the high school students were more receptive to learning given that the Penn students were no longer strangers.

The Neuroscience Activities

As mentioned above, the course included ten visits to the high school with educational, hands-on activities related to brain science. The activities were not specifically aligned with the science Common Core, but rather were mainly designed to engage the natural interests of the students. A few of these activities were inspired by BrainU materials, namely the sheep brain dissection, the blind spot activity, the prism goggles activity, and the exercise activity (http://brainu.org). Each lesson had an "Essential Question" to be understood and 4-5 vocabulary terms to be mastered. The Penn students tailored all activities with the partner students in mind. Included below are brief descriptions of four of the activities to indicate the level and diversity of the lessons.

The Concussed Brain

This lesson plan began with an informal conversation about whether the student or any friends or relatives had had a concussion. What do they already know about concussions? Three hands-on activities followed. First, an uncooked egg, placed in a jar of water, was accelerated into a hard surface. The resulting broken egg concretely illustrated that the skull and cerebrospinal fluid cannot fully protect the brain from injury. Second, students wore goggles smeared with petroleum jelly to simulate the visual impairments that can occur with a concussion. Wearing these goggles, students experienced the challenge of tracing a simple shape with compromised visual processing. Third, students progressed through a head injury baseline assessment. Specifically, students used saccadic movements to follow a moving target. This activity incorporated the math skill of calculating averages. Taken together, high school students had first-hand experiences of the consequences of head injury and neurological exams

and had a chance to compile data.

Vision
This lesson plan included several experiential activities that highlighted the complexity of visual processing. One activity involved after-images to reveal the opponent process in color vision. The second activity illustrated the existence of the blind spot. The third component of this lab revealed the importance of binocular vision for depth perception. In particular, students had to drop a penny into a moving cup with one eye closed. This activity included data collection and a comparison of accuracy with one versus two eyes open. Overall, this lab provoked curiosity about the biological basis of sensory perception.

Reflexes
This lesson plan considered the underlying simple circuit in a reflex, emphasizing the concepts of sensory neuron and motor neuron. As an opening activity, students practiced the patellar reflex on each other. The main activity was to observe the number of blinks exhibited by a partner student when a cotton ball was tossed at their eyes. The twist in this activity was that the partner was wearing goggles, fully protecting their eyes from the cotton ball. This activity made the point that reflexes are not voluntary. A math problem was included that required students to calculate the percent trials that provoked blinks. In sum, this set of activities established sensory and motor functions as fundamental units of the nervous system.

Attention
This lesson plan began dramatically with students watching a YouTube video in which viewers' attention to counting basketball tosses caused a lack of awareness of a background dancing gorilla. Students then experienced the cocktail party effect, in which they had to listen to two stories being told at the same time. Lastly, students attempted the Stroop test, in which the saliency of written color names competes with identifying their printed color. In this last activity, students collected data on their reaction times and calculated averages and percentages.

The titles of the other six labs were Brain Building Blocks, Drugs in the Brain, Animal Brains, Genes in the Brain, Thirsty Brains and Stressed Out Brains. Taken together, these activities experientially taught the importance of biology in behavior.

Setting for the Lab Activities
An important logistical detail was that the lab activities took place in the cafeteria. The school lacked a more appropriate laboratory facility. But what began as a necessity was soon recognized as an advantage. A benefit of the cafeteria was that it accommodated both groups of students (college and high school students needed approximately 50-60 seats). In addition, the spaciousness was useful for certain hands-on activities. Moreover, the large tables allowed us to have five students from Penn and five from the high school at each table, which created the potential for one-on-one interactions as well as the flexibility for familiar stand-ins when the inevitable absences occurred on either side. All students remained at the same tables for all ten weeks. The near one-on-one, consistent weekly interactions fostered social connections between the undergraduates and high school students, which in turn strengthened the motivation to teach and learn on the part of the college and high school students, respectively.

Survey
At the beginning and end of the semester, the Penn students were asked to voluntarily and anonymously complete a survey largely based on the Mental Health Continuum Short Form (MHC-SF). This instrument was chosen because it has been useful in studying college students, and a previous report showed that low scores were associated with academic impairment in college students (Keyes et al., 2012). The MHC-SF has demonstrated internal consistency and discriminant validity in adolescents and adults (Lamers et al., 2011). The survey did not include MHC-SF items related to positive affect (emotional well-being), but rather, focused on items related to positive function (psychological and social well-being). In particular, the survey contained five questions that pertained to social well-being and two questions that pertained to psychological well-being (see Table 2). The survey also included two original questions that related to civic engagement. Respondents reported the frequency of their positive feelings on each of these nine specific items (ranging from never to every day).

OUTCOMES

Lesson Plans
The college students worked in teams of five to develop novel lessons plans. At the beginning of the semester, lesson plans often included too many vocabulary terms or too many activities for the allotted time. As the semester progressed, worksheets became more level-appropriate, streamlined and visually appealing. This improvement was fostered by in-class presentations of upcoming lab activities which allowed each team to get feedback on their plans from their increasingly experienced peers.

In-Class Discussions
During the class time at Penn, we often had broad discussions about what worked and what did not. This practice uncovered common problems, which led to troubleshooting and the development of best practices. For example, Penn students sometimes struggled with how to balance teaching versus friendship, how much to keep students on task versus explore their interests, and how to manage students learning at different rates. Penn students often struggled to reconcile their perceptions of the high school students having appallingly weak math skills while simultaneously being clever and curious as they engaged in the laboratory activities. The Penn classroom served as a forum for sharing experiences and instructional methods based on collective experience.

Reflections
Critical reflection is thought to allow novel experiences to become integrated with previous knowledge and future informed actions (Dewey, 1916). Thus, reflections were

assigned in Everyday Neuroscience to link these community engagement experiences with students' personal growth. There were four one-page reflection assignments, each worth 5% of the total grade, distributed across the semester. Students were given these four prompts: an essay related to tips for teaching science, an essay related to education inequality, an essay related to social privilege, and a reflection by a former Everyday Neuroscience student. Grading of the written reflections took into consideration a cogent discussion of the reading prompt, a consideration of how the reading pertains to their teaching experiences, and a thoughtful connection to another academic or cultural reference.

Students enrolled in Everyday Neuroscience came from diverse backgrounds, based on geography, socioeconomic status, and ethnicity. Across the four reflections, virtually all students discussed their own personal history in comparison with their high school counterparts. For example, some students mentioned coming from an inner-city school, while others admitted to being previously unaware of urban school issues. They also expressed appreciation for being able to develop social bonds with the high school students, mentioning how the relationship became more comfortable as the semester went along. They often reported joy at watching the development of academic confidence and a feeling of responsibility for delivering accurate and meaningful lessons. As the semester progressed, and the college students became more familiar with the learning styles of the high school students, they communicated a sense that the lessons had a positive educational impact on the high school students.

Survey

By pooling students from two semesters, 43- 44 students completed the survey at the beginning and end of the semester. The survey asked the undergraduates their impressions of the course at the end of the semester, including what contributed to their learning, what was most interesting, and what skills were developed. The Penn students ranked as the top three things that contributed to their learning: 1) working with the high school students; 2) class discussions; and 3) creating labs. They ranked these items as the most interesting in the course: 1) getting to know the high school students; 2) getting involved in West Philadelphia; and 3) addressing inequalities in education. Finally, the students ranked these items as the top three skills developed in the course: 1) teaching/communication; 2) creativity/innovation; 3) critical thinking.

For the survey questions based on the MHC-SF, response choices were grouped as once a week or less versus twice a week or more. As summarized in Table 1, when comparing the beginning versus the end of the semester, no change was seen for four of the five questions related to social well-being. However, at the end of the semester more students frequently thought that they had something important to contribute to society (77% versus 88%, chi-square statistic = 4.3, $p<0.05$). For psychological well-being, no change was seen in the frequency for students feeling challenged to grow. However, at the end of the semester, there was an increase in students reporting frequently feeling confident to express their own ideas (77% versus 96%, chi-square statistic = 6.4, $p<0.05$). There were no significant changes in the questions pertaining to civic engagement.

DISCUSSION

Everyday Neuroscience was designed to allow undergraduates to use their neuroscience expertise to address real-world challenges, specifically by creating laboratory activities for high school students in an under-resourced school. The subjective and qualitative evidence reported here begins to assess the extent to which Everyday Neuroscience promotes professional skills, social and psychological well-being, and informed citizenship in the participating students. In terms of professional development, the students reported improved in communication, innovation, and critical thinking skills. The

In the past month, how many times have you felt...	Once per week or less (%)		Twice per week or more (%)		P value
	Before	After	Before	After	
Social Well Being					
that you have something to contribute to society	23	11	77	88	<0.05
that you belong to a community	12	9	89	91	ns
that our society is a good place	40	44	61	57	ns
that people are basically good	44	30	56	71	ns
that the way our society works makes sense to you	60	75	39	25	ns
Psychological Well Being					
that you had experiences that challenged you to grow	12	9	88	91	ns
that you are confident to express your own ideas	23	5	77	96	<0.05
Civic Engagement					
interest in social issues in the news	14	20	86	80	ns
interest in the next voting cycle	42	32	58	68	ns

Table 1. Results of the survey questions related to social and psychological well-being.

survey data indicated that at the end of the course, students more frequently felt confident to express their own ideas. This confidence was infused into the written reflections. One student was initially self-conscious of being an "imposter" teacher. However, through his experience, he realized there is no such thing as being 'experienced enough' to teach. Regarding social well-being, the survey specifically found that students were more likely to feel that they had something important to contribute to society at the end of the course. As one student put it,

> "This course represents the thought transition we need to transition into future leaders. We may need to relax our unyielding ideals and actually work to make tangible progress. The ideals must still exist, of course, to remind us what we ultimately are striving for."

Regarding informed citizenship, the written reflections sometimes explicitly discussed students' increased awareness of social issues, particularly related educational equality. As representative quotes:

> "As a whole, this experience illustrated the academic inequality that plagues our nation, and emphasized the need for comprehensive educational reform in America."

> "I have a new perspective on the great variability in high school education and the need to ensure that all students are receiving a fair and strong education."

Thus, Everyday Neuroscience may serve as a valuable complement to the traditional content-based neuroscience curriculum by preparing students to creatively and meaningfully deploy their knowledge to benefit society.

The decision for Everyday Neuroscience to support science education in a public school within the Penn neighborhood was made mindful of the educational and resource needs of the Philadelphia School District. Public schools are an asset to the entire community, as they help young people become productive citizens and lead fulfilling lives. Universities have a vital stake in public schools given that young learners are future college students, and universities can deploy their unique academic resources and human capital to support public schools (Benson et al., 2017). In the case of Everyday Neuroscience, lab activities were chosen as the focus of engagement because the partner school did not have the resources to offer them despite the abundant evidence that experiential laboratory activities enhance the understanding of science (Kimbrough 1995; Helm et al., 1999; Richmond and Kurth 1999; Gibson and Chase 2002; Knox et al., 2003; Markowitz 2004; Aydeniz et al., 2011).

As an ABCS course, students were expected to deploy their previous learning in a new way, based on teamwork, creative lab development, and teaching. Such dynamic use of knowledge allows learning to transfer beyond the academic setting, rather than being context bound. Learners construct their own representations of new knowledge as they engage each other with questions, explanations, challenges, and support, and new knowledge has a greater resonance when it has a shared social meaning (Applefield, et al., 2000). In Everyday Neuroscience, the social component of learning was embedded both in the Penn students' team-based lab development and the lab activities conducted at the high school. Previous reports of neuroscience service-learning courses support the view that they enhance content knowledge. For example, such courses included an after-school science education program for 4th and 6th graders, neuroscience presentations to community groups, and volunteering at a center for children with developmental disabilities. Students reported that these activities reinforced their own learning, improved their teaching skills, and helped them make career decisions (Bazzett et al., 2018; Mead and Kennedy, 2012; Yu et al., 2013). Thus, although not directly tested here, it seems likely that the combination of academic tasks and social dynamics in Everyday Neuroscience solidified students' content knowledge.

Everyday Neuroscience was designed to be an authentic learning experience. Students in the course were self-motivated to develop their professional skills. They also were compelled by the transformative potential of improving science instruction at the local public high school. As stated in one student's reflection,

> "Discussing topics of biology as well as life in general with the high school students, I felt I was making a tangible difference. I truly felt part of the West Philadelphia community, rather than just a student at the University of Pennsylvania."

The structured written reflections were designed to reinforce the link between our course activities and the value of community engagement (Bringle and Hatcher et al., 1999). An important factor for student interest was Neuroscience as the subject matter. The integration of the academic content and the community engagement component is known to enhance the educational effectiveness of service-learning courses (Lambright and Lu, 2009). Beyond neuroscience being a favorite topic for the undergraduates, neuroscience-related activities were designed to reinforce key biological concepts, such as cell theory, diffusion and osmosis, protein function, organ structure-function relationships, evolution, and genetics. Many facets of neuroscience also were intrinsically interesting to high school students. A student reflection noted:

> "It was absolutely shocking and frustrating to discover a school with so little resources situated just a block away from Penn's campus. As the semester progressed, I was inspired to see students turn off their cell phones, take out their earbuds, compelled by curiosity to learn more about science."

Thus, the tangible social benefit combined with a task that aligned with their interests and skills were key ingredients for making Everyday Neuroscience a venue for real-world learning.

Several caveats should be noted. For several of the survey items, a ceiling effect made it unlikely that an improvement could be observed. In particular, at the beginning of the semester 89% of the students reported frequently feeling that they belonged to a community, and 86% reported frequently feeling an interest in social issues in the news. Although not significant, there was a trend for students to more frequently feel that people are basically good at the end of the semester. A larger sample may reveal a significant effect on this item. Regarding interest in the next election cycle, responses to this item may be muddied by the timing of the survey in relation to the election calendar. For future directions, the study would benefit from a comparison group of students not enrolled in an ABCS course to rule out non-specific effects of the semester timing. Likewise, a group of students in a non-neuroscience ABCS course would help reveal the extent to which the results can be generalized. Despite these shortcomings, the current findings are promising for the educational benefits of Everyday Neuroscience.

In conclusion, an undergraduate science education should equip students not only with relevant knowledge and analytic skills, but also with broad communication skills and civic awareness to allow their scientific expertise to benefit society. Rigorous course assessments are crucial to the continued development of service-learning courses for the modern undergraduate science curriculum. The present evidence suggests that Everyday Neuroscience prepares students with professional skills, empowers them to improve society, and builds their civic knowledge.

REFERENCES

Applefield JM, Huber R, Moallem M (2000) Constructivism in theory and practice: Toward a better understanding. The High School Journal 84(2):35-53.

Aydeniz M, Baksa K, Skinner, J (2011) Understanding the impact of an apprenticeship-based scientific research program on high school students' understanding of scientific inquiry. Journal of Science Education and Technology 20:403-421.

Bazzett, TJ, Zahid, Z, Brady, MA (2018) Engaging, entertaining and educating under-served and at-risk youth with STEM-based activities. J Undergrad Neurosci Educ 17:A89-A96.

Benson L, Harkavy I, & Puckett J (2008) Universities, schools, communities, and democracy. The Good Society 17:86-94.

Benson L, Harkavy I, Puckett J, Hartley M, Hodges RA, Johnston FE, Weeks J. (2017) Knowledge for social change: Bacon, Dewey, and the revolutionary transformation of research universities in the twenty-first century. Philadelphia, PA: Temple University Press.

Bringle, RG, & Hatcher, JA (2000) Institutionalization of service learning in higher education. The Journal of Higher Education 71:273-290.

Bringle, RG, & Hatcher, JA (1999) Reflection in service learning: Making meaning or experience. Educational Horizons 77:179-185.

Coates, T. N. (2015) Between the world and me. Text Publishing.

Kirp, D. L. (2015) Improbable scholars: The rebirth of a great American school system and a strategy for America's schools. New York, NY: Oxford University Press.

Kozol, J. (2005) The shame of the nation: The restoration of apartheid schooling in America. New York, NY: Three Rivers Press.

McIntosh, P. (1990) White privilege: Unpacking the invisible knapsack. Independent School 49:31-36.

Russakoff, D. (2015) The Prize: Who's in Charge of America's Schools? New York, NY: Houghton Mifflin Harcourt.

Skloot, R. (2017) The immortal life of Henrietta Lacks. Broadway Books.

Dewey, J (1916) Democracy and education: An introduction to the philosophy of education. New York, NY: Macmillan.

Gibson H, Chase C (2002) Longitudinal impact of an inquiry- based science program on middle school students' attitudes towards science. Science Education 86:693-705.

Hatcher JA, Bringle RG, Muthiah R (2004) Designing effective reflection: What matters to service-learning? Michigan Journal of Community Service Learning 11: 38-46.

Helm E, Parker J, Russell M (1999) Education and career paths of LSU's summer science program students from 1985 to 1997. Academic Medicine 74:336-337.

Keyes CLM, Eisenberg D, Perry GS, Dube SR, Kroenke K, Dhingra SS (2012) The relationship of level of positive mental health with current mental disorders in predicting suicidal behavior and academic impairment in college students. Journal of American College Health 60:126-133.

Kimbrough D. (1995) Project design factors that affect student perceptions of success of a science research project. Journal of Research in Science Teaching 32:157-175.

Knox K. Moynihan J, Markowitz D (2003) Evaluation of short-term impact of a high school summer science program on students' perceived knowledge and skills. Journal of Science Education and Technology12:471-478.

Lambright KT, Lu Y (2009) What impacts the learning in service learning? An examination of the project structure and student characteristics. Journal of Public Affairs Education 15:425-444.

Lamers SMA, Westerhof GJ, Bohlmeijer ET, ten Klooster PM, Keyes CLM (2011) Evaluating the psychometric properties of the mental health continuum-short form (MHC-SF). Journal of Clinical Psychology 67:99-110.

Markowitz DG (2004) Evaluation of the long-term impact of a university high school summer science program on students' interest and perceived abilities in science. Journal of Science Education and Technology 13:395-407.

Mead KS, Kennedy S (2012) Service learning in neuroscience courses. J Undergrad Neurosci Educ, 11(1):A90-A96.

Richmond G, Kurth L (1999) Moving from outside to inside: High school students' use of apprenticeships as vehicles for entering the culture and practice of science. Journal of Research in Science Teaching 36:677-697.

Yu HJ, Ramos-Goyette S, McCoy JG, Terrell ME (2013) Community-based, experiential learning for second year neuroscience undergraduates. J Undergrad Neurosci Educ 12:A53-A60.

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A community engagement course requires unique support compared with other types of courses. In the case of Everyday Neuroscience, it is worth emphasizing that the strong commitment and open communication with our partner high school made an enormous difference, especially by optimizing the participation of the high school students. As noted above, the interaction with the high school students was the most valuable part of the course for the college students. To ensure high school students' attendance, the high school staff had to consider numerous scheduling considerations, teacher and classroom goals, individual students' needs, and any impact on various testing requirements. These efforts to collaborate were notable given the pervasive "test-based accountability" that often leads to a strong adherence to a strict standardized curriculum. For this work and open-mindedness, I thank Principal Richard Gordon, Science Coordinator Louis Lozzi, and teachers Milan Neeley and Brian Horn. Their ability to fully collaborate was inspiring. The logistical support of the Penn's Netter Center for Community Partnerships was critical for

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