Christian La
Teaching and Learning Portfolio

This portfolio submitted in partial fulfillment of the requirements for the Delta Certificate in Research, Teaching, and Learning.

Delta Program in Research, Teaching, and Learning
University of Wisconsin-Madison

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Delta Certificate and Portfolio Overview

The Delta Program in Research, Teaching and Learning at UW-Madison is a part of the NSF-funded CIRTL (Center for the Integration of Research, Teaching and Learning) Network, and promotes the development of future faculty in the commitment of implementing and advancing effective teaching and mentoring practices. Based on the foundation of the three pillar principles of Teaching-as-Research, self-sustaining Learning Community, and Learning-through-Diversity, the Delta Program strives to support the ongoing enhancement of its mission.

- *Teaching-as-Research*: Applying research methods—idea, experiment, observation, analysis, improvement—to the challenge of teaching
- *Learning Communities*: Creating a self-sustaining Learning Community that provides fluid leadership and mentorship roles, and support
- *Learning-through-Diversity*: Recognizing the common challenges in teaching and learning and the strength in bringing together diverse views

I have fulfilled the requirements for a Delta Certificate through:

1. Completion of Delta courses

- Teaching in Science and Engineering: The College Classroom (International) - (Fall 2013)
- Delta Internship Seminar - (Spring 2014)
- Teaching Statistics in the Classroom - (Spring 2015)

2. Participation in the Delta learning community

- Research Mentor Training Seminar - (Fall 2014)
- Serving as Graduate Student Representative for the DELTA program
- Attendance to various Delta-sponsored Roundtables & other events

3. Completion of an internship in teaching and learning - (Summer 2014)

Short Description– Like any relationship between individuals, the first minutes in the classroom are determinant for the establishment of a good classroom dynamics. Based on Bybee et al. Five E model of instruction and the known added value of discussion, I believe that promoting student engagement in that time period through conversation will have substantial positive consequences for the following hour or so, and duration of the class. To test this hypothesis, I designed a class where the first 10-minutes are dedicated to a familiarization, acquaintance, and proper context development of the topic to enhance personal connection to the subject matter, and engage in the thinking of topic before the delivery of the material. This project was implemented over the summer of 2014, during a 3-week session as part of the PEOPLE program, a program dedicated to ease students from minorities and various diversity groups, transition into and successfully attend college.

Preface

Over the last few years, I have developed a serious interest in becoming more versed and education regarding teaching and teaching practices, leading to my development as a future academic educator. Joining the Delta program has definitely helped me in that process, shaping my perspective and philosophy through reading and conversing with others of the community with the same goal of advancing education.

As a preface, this portfolio portrays my conviction regarding teaching and learning, residing primarily in the re-empowering of the students in the process of their learning and education, in the construction of their own understanding while having the instructor in a secondary role to provide the stimulating environment and to facilitate such learning. This positive environment includes the implementation of active learning, but also creates a comfortable environment for exchange of ideas and discussion, where they can learn from one another drawing from the added value of classroom diversity.

Learning and Teaching Philosophy

Learning is a journey to satisfy one's curiosity. It is a very personal experience that is unique to each individual. Some learn by mimicking others, replicating the behavior of an authoritative figure of a parent, a brother, a teacher. Others, including myself, learn better through the use of self-projection in mental imagery, while some others opt for an adoption of an even more theoretic approach. Though those approaches offer different strength s and weaknesses, not one approach is universally better, but some approaches working better for a given person at a given time and situation. With the understanding of the uniqueness of the learning experience, my teaching promote learning as a personal experience, where the instructor/teacher/mentor assist the students in forming their own understanding, knowledge and learning, constructing and building from the students' personal cognitive framework.

As Socrates once said: "*Education is the kindling of a flame, and not the filling of a vessel.*", I believe in empowering the student in his/her education and learning process for a growing of the *flame* from within. Because of the diversity of each student, only when one build on the cognitive framework drawing from his/her own prior understanding and experience can new concept be truly integrate into knowledge, a hypothesis that I have revisited as part of my DELTA internship. To assist this process, the teacher holds two key roles: kindling of the interest (the *flame*), and providing the tools (the *filling*) for the student to form proper understanding and succeed.

From Socrates quotes, learning start with a very personal interest. The student, by enrolling in and attending the class, has already expressed their interest. Thus, the instructor's role is not to spark and generate the flame, but to cultivate it. Providing an impersonal interaction between the instructor and the students may hinder this cultivation, imposing an unfriendly hurdle between the students and the field. Such is one of the differences between a lecturer and a teacher. Teaching implies an interest in the development of the student, while lecturing consists strictly of providing the material. Teachers express their investment by getting to know the students, listening to the students' concerns, and responding to students' needs. Implementation of such practices may be difficult in larger classroom, but the value of such attempts cannot be undermined. In the past, I have always set aside time to know my students, usually reserving the full first session for that purpose, addressing the diversity within the classroom, but also students' expectations and concerns. Additionally, in the subsequent lectures, I have always started my class by addressing students' confusion or concerns arisen in the previous lectures. For my DELTA internship, I have added the implementation of a pre-lecture conversation with the intent to build relevance, context, and personal connection with the topic of the day to enhance students' interest, engagement, and learning.

In regards to the second key roles of a teacher, providing the tools for the student to succeed, I believe that the role of a teacher is to guide and assist the student in the building his/her own knowledge. Just as the second part of the Socrates' quote ('*not the filling of a vessel*'), knowledge cannot be imparted with a mere delivery of facts. Connections between those facts and prior knowledge need to be established for proper understanding to be constructed. It is our role as instructor to provide the information, but also to

verify that those newly formed connections are not weak, inaccurate or even misleading. Once established, debunking misconceptions is a much arduous process as new structures would have been constructed on top. Proper understanding of the cognitive process of students' understanding is therefore encouraged. Therefore I stipulate that constant conversation with the students is necessary to ensure proper acquisition of knowledge. Despite my proficiency in the neurosciences and cognitive sciences, learning theories and educational psychology has not been my expertise. However, DELTA has provided me with the opportunity with others with more experience and expertise, such as Dr. Ed Hubbard, primary investigator of the Educational Neuroscience Lab, here at UW-Madison, who helped me bridge my understanding of learning with my expertise of the neurosciences and neural networks. The conversations have also helped me develop insights on the cognitive theories of learning from the neuroscience's perspective, and on how to use them in my classroom.

All in all, I believe that learning starts with the students themselves. The student needs to be empowered in taking responsibility, accept and understand his/her role in learning. The role of the teacher resides in providing a good learning environment, where teachers can be trusted in their implication of and devotion to students' learning and development, but also resides in offering assistance in the building of a solid and sound cognitive framework for the enhancement of knowledge.

Mentoring Philosophy

While teaching teaches the student on how to succeed, mentoring teaches the student how not to be afraid to fail. It is to change the attitude toward failure (i.e. the fear of failing), but ultimately a change in attitude toward learning. Thomas Edison once said: "*I have not failed; I just found 10,000 ways that don't work.*", with such quote illustrating best this positive attitude. Only when a person becomes unafraid to fail can he/she innovate and produce breakthroughs.

School is not only a place where knowledge is being imparted, but also a controlled environment where the students are free and encouraged to take chances and reach new heights. Mentoring incorporates the development of the intellect but also the emotion aspect of the student as well. I believe that teaching the student how to cope with the unexpected and guiding the student through the rough times is an integral role of a good mentor. Life is a succession of successes and failures, two equally important parts of the arduous learning process. However, one also cannot be truly successful if he/she has not experienced failure. These failures are challenges, challenges that need to be overcome, challenges that test and build our character. Though the process of overcoming those challenges might be difficult, in a mentorship environment, the mentee does not have to take on the challenge alone, but with the assistance of the mentor. The mentor has the experience, the skills and the resources to ease the uphill battle.

However, it is also the mentor's role to create challenges for the student to overcome, building the confidence of the student to face the various challenges. Challenges allow for a reaffirmation of the self as presenting argument to others reinforce the authority of your thinking. It is actually one of my most valuable lessons I have taken from school, reflecting back as I am close to attaining my doctorate degree. Formal education is to become an independent thinker and intellectual, who can stand for his/her conviction and provide arguments to defend one's own opinion regardless of the audience, either a peer, a student, or even one's own mentor.

At this point in my career, my mentoring experience remains limited, in which I have only trained colleagues and students, but truly mentoring only one student. It came around my last couple years of graduate school, in which I felt invested and dedicated to the development of the student, making sure that his logical process was sound, but also that his development as a student was healthy. I have done my best to advise him, assist him and educate him on the various life and career opportunities and options that he, the student, will have to make choices on. It is a privilege to mentor a student, a privilege that I honor and take seriously at heart.

Teaching and Learning Artifacts

I personally enjoy teaching and the accommodation of others' learning. In my first few years of college, I have participated in the Math and Science Upward Bound program as an after-school tutor for high-school students. Despite not being fluent in English at the time as a recent immigrant to the United States, and having that as a worry, I was very happy that I was able to help those students who needed the assistance. I knew that with good intentions, no matter if English is my primary, secondary, or tertiary language, my dedication and efforts will be recognized and appreciated. The Upward Bound program is part of the larger federally-funded program geared toward providing better opportunities for attending college for students of low-income families and those with parents who did not attend college. The students that came in to the after-school session were smart and bright, but because of their socio-economic status, may have lacked the same opportunities that others had in constructing a sound knowledge foundation. Some of the students required as little as somebody to revisit their notes with, allowing them more time to digest the information. Of course, some of the instances were more difficult, such as the debunking of previous misconceptions, without such new concepts would not make sense. During that experience, it was a real sense of accomplishment when the students came to me after an exam and shared their excitement after performing well in an exam, and receiving a grade they felt they deserve through hard work. This sentiment was particularly strong when those students went on to graduate. And I have to admit that that sentiment of achievement in those situations was far much greater that the sentiment I had at my own graduation. To benefit the students more, I later took part in the mentoring aspect of the program as well, becoming more invested in their development as an individual.

Teaching and learning do not have to strictly pertain to the classroom and school setting. Teaching and learning can take place in many less formal environments, such as community outreach events and others. Exposure to the neurosciences was very limited when I was growing up. It was not until my junior year in college that I took my first class in the neurosciences; and it was not until graduate school that I got to handle a real human brain. To have the opportunity to provide this exposure to the different members of the community, to share my experience with others, young and old alike, is exquisite. I have regularly participated in various outreach events around the Madison community. I have participated in multiple UW-sponsored Science Expeditions and Family night at the Madison Children's Museum, two great venues for learners and explorers of all ages to explore and discover the sciences. As I walk them through short neuroscience experiments, guide them in the handling of brain tissues as well as handling of real human brain, or have them witness the dissection of an eye, the visitors experience first-hand, or close to first-hand, the wonders of science. Seeing that light in their eyes light-up and seeing their inquisitive mind of a young explorer, touching, feeling, smelling everything that they come in contact with is definitely something special, a satisfaction that learning alone does not satisfy.

I have also partaken in different outreach events to local middle schools, where more time was available for student interaction. My sessions were very informal with no clear or designed lesson structure. I usually start off with a general introduction of myself, where I am from, what do I do, how I got interested in the neurosciences, but also to get to know them a little more as well. Their interests and

questions usually guides where the lesson will go. Typically, I would bring some short activities as well, such as prism goggles to demonstrate active compensation from the cerebellum (motor fine tuning), comparative brain models to exhibit the similarities and differences of the brain structures, and preserved brain tissue for a first-hand experience of handling a real human brain, among other activities. The longer session of the class period does allow for better interaction with the students as I can respond more directly and thoroughly to their interest; but it did allow me to experience how draining the teaching experience can be. I hold the upmost respect for teachers, especially middle-school and high-school teachers. I admire their skills, motivation, patience and stamina.

To gain teaching experience, I have assisted professors in their classes as a teaching assistant at both the undergraduate and graduate levels. However, it is the 3-week instruction over the summers, which provided me with the most comprehensive experience as a teacher. Organized by the PEOPLE program, the summer sessions are geared toward providing a positive experience of higher education to students of low income and students of minority groups, who may be the first in their family to attend college. Their experiences included staying at the residence halls, being on a college campus, and learning and discovering in a premiere academic and research institution such as UW-Madison. For the course that I have taught over two summers, while being conscious of the restrictive budget and the availability of various resources, I was given the liberty to design and structure the course to my liking to contribute to this premiere experience. I have developed a comprehensive curriculum that would let the student explore and discover the various avenues of the neurosciences in line with my knowledge and expertise: neuro-anatomy, physiology of the neuronal cell, genetic mutations, age-related pathologies, etc. With my connections to the medical imaging facility and its staff, I have arranged for a unique demonstration of medical imaging with real-time functional MRI for the two years I have been teaching in the program for them to observe the inferred brain activation in response to task. Over those three weeks, one of the biggest challenges I have encountered is to keep every students interested, motivated and engaged. With the hypothesis that the lack of engagement was due to a lack of proper context and connection to the neuroscience topic, I have devised my DELTA internship to address this issue with an implementation of a guided 10-minute pre-lecture conversation among the peers, with the expectation that it could help elevate the level of relatedness of the neuroscience topic, and therefore elevate their level of interest and engagement. More on the DELTA internship can be found later in this portfolio.

Now learning is not restricted just to the young, but is a lifelong process with no time nor age boundaries. I constantly try to keep up-to date of the novels ideas within my field, attending symposia and conferences locally as well as globally, where the exchange of ideas is strongly encouraged. As a junior scientist, I have the benefit of receiving lots of valuable guidance and feedbacks. But attendance to these meeting has allowed me to be part of a community with the intention of advancing the field together. Currently, I am member of three international organizations: Society for Neuroscience, Organization for Human Brain Mapping, and American Heart Associate – Stroke council, but plan to expand my network in the future. Education does not end there either, as education and learning are processes to fulfill one's curiosity. I have shared my work and views of the functional organization of the cortical system to active retirees as part of the Frontiers in Life Science lecture series organized by PLATO (Participatory Learning and Teaching Organization), demonstrating the learning only ends when curiosity dies.

Artifact 1—UW Science Expeditions

The Health and Science Learning Center (HSLC) hosted the 2014 UW Science Expeditions, an event for the whole family to enjoy. In an atrium full of various interesting displays, I volunteered to share my interest of the neurosciences with children and parents of the Madison community. I presented a display meant to demonstrate cheating our brain system with the use of mirror boxes, where expectations and actions are incoherent (top, right). I also introduced comparative brain anatomy, describing the differences but also the similarities between our brain and that of lower species, such as a sheep, a cat, or a fish (left).

Artifact 2—Family Night @ The Madison Children's Museum

Family Night @ the Madison Children's Museum is a fun event open to family and kids to explore and discover, all in the fun environment of the Children Museum. Here, I am presenting the human brain to a kid and his mom (left), and engaging in more involved conversations with parents and people of the community about current understanding of the neurosciences or the illusive concept of consciousness (right).

Neuroscience 675: Functional Brain Imaging of Cognitive Disorders
Fall 2014. Tues / Thurs, 2:30pm
WIMR 7001A except where noted *

W	DATE	LECTURE TOPIC	FACULTY LECTURER	Room
1	9/2/2014	Course introduction	Barbara Bendlin, PhD	WIMR 7001A
1	9/4/2014	Intro to MRI Physics	Beth Meyerand, PhD	WIMR 7001A
2	9/9/2014	BOLD signal and fMRI study design	Barbara Bendlin, PhD	WIMR 7001A
2	9/11/2014	PET Image Formation and Applications	Brad Christian, PhD	WIMR 7001A
3	9/16/2014	MR image processing and analysis	Bendlin/Starks	WIMR 7001A
3	9/18/2014	Resting BOLD/Functional Connectivity	Rasmus Birn, PhD	WIMR 7001A
4	9/23/2014	Slow wave sleep high density EEG	Brady Riedner PhD	WIMR 3001A*
4	9/25/2014	DTI: theory and applications	Andy Alexander, PhD	WIMR 3001A*
5	9/30/2014	White Matter Imaging and Demyelinating Disease	Aaron Field, MD/PhD	WIMR 7001A
5	10/02/2014	Multiple Regression	Ozioma Okonkwo, PhD	WIMR 7001A
6	10/7/2014	Brain Aging	Barbara Bendlin, PhD	WIMR 7001A
6	10/9/2014	Parkinson's disease	Cathy Gallagher, MD	WIMR 7001A
7	10/14/2014	Epilepsy	Bruce Hermann, PhD	WIMR 7001A
7	10/16/2014	Traumatic Brain Injury	Barbara Bendlin, PhD	WIMR 7001A
8	10/21/2014	Alzheimer's disease: Mapping Preclinical Changes	Sterling Johnson, PhD	WIMR 3001A*
8	10/23/2014	Machine learning approaches to brain mapping	Vikas Singh, PhD	WIMR 7001A
9	10/28/2014	Stroke and Perfusion Imaging	Howard Rowley, MD	WIMR 7001A
9	10/30/2014	Blood flow imaging: pcVIPR (pending)	Oliver Wieben, PhD	WIMR 7001A
10	11/4/2014	Multi-Voxel Pattern Analysis	Brad Postle, PhD	WIMR 7001A
10	11/6/2014	The Lesion Method in Human Cognitive Neuroscience	Mike Koenigs, PhD	WIMR 7001A
11	11/11/2014	Asthma, Emotion, Mind/Body	Melissa Rosenkranz PhD	WIMR 7001A
11	11/13/2014	Stress and Memory	Siobhan Hoscheidt, PhD	WIMR 7001A
12	11/18/2014	**SFN – No class**		
12	11/20/2014	Cognitive Mapping Utilizing fMRI and Stroke Imaging	Vivek Prabhakaran, MD/PhD	WIMR 7001A
13	11/25/2014	Imaging Development and Learning	Edward Hubbard, PhD	WIMR 7001A
13	11/27/2014	**Thanksgiving Break**	**No class**	
14	12/02/2014	Neural Substrates of PTSD in Youth	Ryan Herringa, MD PhD	WIMR 7001A
14	12/04/2014	Pain	Dane Cook, PhD	WIMR 7001A
15	12/09/2014	Neural basis of functional MRI	Yuri Saalmann, PhD	WIMR 7001A
15	12/11/2014	Ethics and Course Synthesis	Barbara Bendlin, PhD	WIMR 7001A

Artifact 3—Teaching Assistantship at a graduate level course

Needless to say, learning happens in the classroom as well. Here is a syllabus for the course the professor and I have developed in the graduate level course regarding functional brain imaging of cognitive disorders. I assisted the professor in the design the course and student assessment methods to reduce the relevance of formal assessments in the classroom, by designing a series of short quizzes to be spread out over the semester, and that they are allowed to retake if not happy with their performance.

## Artifact 4—Teacher for the PEOPLE program

For the last two summers, I have taught the People program 3-week course in Neuroscience. The program itself has motivation to facilitate students into their transition to college and higher education, as early as in their middle school years. Most of these students are the first in their families to potentially attend college. The 3-week course in Neuroscience (shown here) is intended for high school Juniors interested in learning more about the brain and how it works, and is providing them with hands on experience from the use of microscopes, handling pig and cow spinal cord, and dissecting sheep brain.
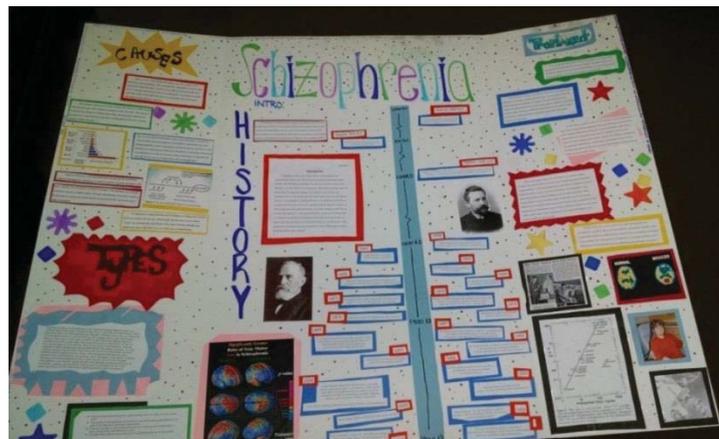
Artifact 5—Sample poster from 3-week PEOPLE program

This artifact is a sample poster that we have our student create and present at the end of the 3-week summer course. This project is done in a group of 2 or 3, presented in an informal poster session in which they teach each other, and allowing them to display their understanding to various program administrators and faculty guest. Best poster presentations receive little prizes.
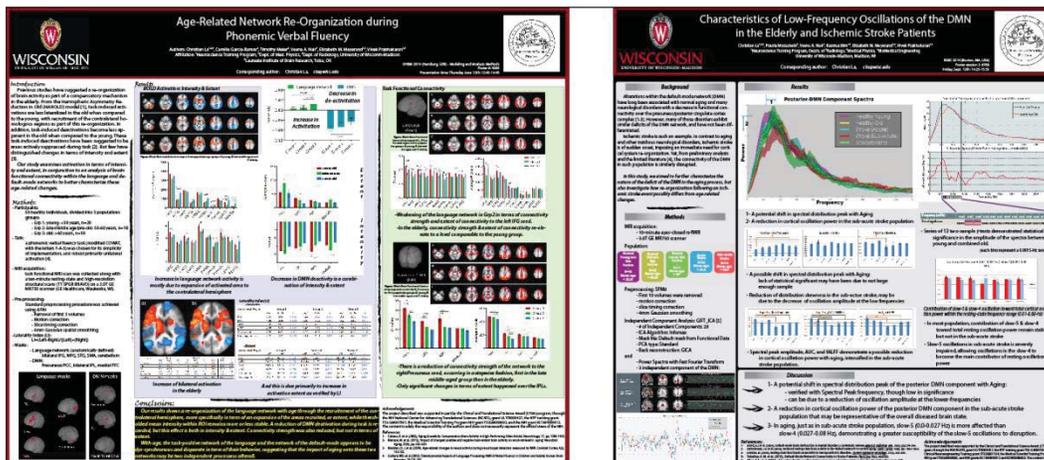
Artifact 6—Presentations to International Science Community

International conferences are a great venue to further learning, from conversing among your peers to attending to lectures from world expert. Here are two scientific posters I have presented at Human Brain Mapping in Hamburg, GER and at the Resting-State Brain Connectivity conference in Boston last year (2014).

Artifact 7—PLATO Frontiers in Life Science (public presentation - 2014)

PLATO is a learning and teaching community that believes in extending University's resources beyond the boundaries of the campus. I was invited to provide a lecture showcasing the current understanding of brain and brain aging, but also navigated to the common avenues of brain and brain aging research, which included a description of functional brain networks as well as functionally significant brain oscillations. These are a sample of slides that I have used for my public presentation at the PLATO Frontiers in Life Sciences lecture series.

Reflective Statement

Teaching-as-Research (TAR):

Teaching-as-Research is a concept which I have previously failed to give much thought on prior to encountering it in the DELTA program. Until then, I have always regarded teaching as a non-empirical science based on reflection, discussion and experience. But the program had opened my eyes on education research, the labor that has been worked to advance teaching and learning with empirical evidence. It has helped me understanding that advancing teaching is not restricted to personal teaching practices, but can be expanded to a larger scale of education where evidence on teaching and learning practices are tested, retested, and shared among various members of the community. Despite being in the field of neurosciences and cognitive sciences, I have previously failed in making the connection between my field and education. But from the Plato of the Greek antiquities to the Piaget and his contemporary learning theories, efforts aimed toward understanding learning have been relentless; and I have started to view learning and education under the same light. Though I am early in my career as educational researchers, my current contribution to the field resides in the small investigation, part of my DELTA internship, where I have investigated the benefit of an implementation of a pre-lecture discussion to provide better context in order to elevate levels of students' interest and engagement. The investigation was rather crude and incomplete with limited and inconsistent data and not the most adequate assessment method, but I do intend to follow-up and better my investigation to ultimately provide strategies to benefit and enhance student learning.

Learning-through-Diversity:

Learning through Diversity has been the subject of many teaching portfolios and teaching philosophies, but its thorough implementation has been rather difficult and limited. The difficulty arises from the definition of *diversity*, which varies from person to person. Some define *diversity* based on cultural background, social-economic statuses and gender. Though I perceive those as definite contributor to diversity, I view *diversity* as so much more, intricate and complex, but also basic and simple. I understand *diversity* as attributes that makes a person unique, that comprise the person's personality, character and individuality. Through DELTA, I have learned to better recognized diversity and its many facets. My interpretation of learning-through-diversity resides in the appreciation of the person, and not the attributes that define that person. In the classroom, diversity is not to be suppressed and homogenized, but to be lauded and integrated as diversity brings to the wealth of the classroom. The difference in perspectives and opinions promote fruitful and enlightening conversations. I believe that getting to know your students and allowing the students to know you, the instructor, viewing and respecting each other as unique intelligent person are few of the ways to integrate classroom diversity.

Learning Community:

In line with my statement on learning-through-diversity, I highly value the integration of diversity in the classroom, as diversity stems conversation. With the differences in perspective and opinion, everybody partaking in the conversation would benefit from the exchange one way or another. Some would benefit a little, some others would benefit more, but conversation allows us to learn from one another and form a more comprehensive and educated opinion, but also strengthen your position regarding the question. In my classroom, the exchange of ideas from discussion and conversation is one thing that I strongly encourage. Through conversation, we also gain the sentiment of learning as a group along with learning within a group, forming a sense of learning community. In my classes and other experience, I have always stressed the importance of learning together, providing support for one another with the goal of better learning. The learning community is also not restricted to the classroom, the concept represent a nexus of different people with a common learning goal. Through DELTA, I have established and expanded my learning community on education science, exchanging ideas with staff and faculty who have dedicated their life to education, from whom I have much more to learn. With this community, I feel supported by colleagues and peers, and believe that we can make a positive difference in education.

Internship Project

Project title:

The Added Benefit of a guided, short pre-lecture discussion

on Students' Motivation and Engagement

Abstract

Lack of motivation from the students is a major hindrance to learning in the classroom, with such lack potentially associated with a lack of personal connection with the discussed topic. With the discussed topic becoming more and more advanced, but also more and more abstract, often enough the student loses the perspective of why or even what they are learning, from the lack of proper context. To attempt to remedy this situation in my classroom, I have designed and introduced a short 5-10 minutes to allow for free discussion regarding the daily topic with the intention to 1) allow the student to open up and become more comfortable with the class, his/her ideas, but also the topic, 2) set a personal contextual environment and connection, and ultimately 3) promote their learning experience. This study investigated whether a 10 minute pre-lecture guided conversation could promote and encourage students' participation and ultimately improve student learning. This investigation took place over a 3-week Neuroscience Session, as part of a summer session from the PEOPLE program, a pre-college pipeline for students of color and of low-income to explore and strengthen academic and career interest in order to successfully bridging the student to attend and achieve higher education. For lack of better practice and measure, students' engagement was assessed by way of self-report. Though many variables can come into play, some of the results have indicated a general appreciation of the 10-minutes as they agreed it provided time to slowly get into the mindset of learning neuroscience. Though 5-10 minutes might seems a lot, especially in the short duration of standard class sessions, I believe that it remain worthwhile to remind the student of the context and purpose of their learning.

Introduction

With the student's curriculum becoming heavier and heavier, class sizes larger and larger, and class material denser and denser, year after year, the classroom has become a dreaded physical confinement where motivation, attention and interest wane. It has become very difficult from the student to learn as part of an enjoyment, learn for the sake of learning, versus learning to accurately reproduce knowledge during the exam. What is happening in today's classroom is due in part to the fast pace of how everything is required of being taught. The time allotted for the development of proper context, re-establishment of a sound cognitive framework is often not being considered in the design of the course curriculum, and is at the pure discretion of the teacher/professor. As a result, more often than not, students become overwhelmed, tired, disinterested, and unmotivated; ultimately detrimenting the learning experience.

Bybee and colleagues (Bybee et al., 2006) have introduced a model of teaching based on the Five Es: Engagement, Exploration, Explanation, Elaboration, and Evaluation. In this model, Bybee et al. presented

engagement as the assessing of prior knowledge to help them transition to the new concept, exploration as the presentation of the question, explanation as demonstrating conceptual understanding, elaboration as challenging of students' conceptual understanding, and evaluation as the assessment of their abilities; together forming a cohesive and comprehensive description of a proper teaching and learning process (Bybee et al., 2006). 'Engagement' is the first item in the five Es model, and when this fails, the other Es of the model cannot operate properly. For this reason, I am attempting in this study to strengthen and elevate the level of engagement of the students to provide a chance for the subsequent teaching/learning process can occur.

Just as Bybee's definition of engagement, which requires the assessment of prior knowledge to build upon for the formation of new conceptual knowledge and understanding, my approach to teaching resides in some basics and fundamentals of growing knowledge and learning, including the time to properly set-up the contextual environment for proper building of the cognitive scaffold. Built on the Vygotskian theory on educational practice, and more specifically to the notion of a zone of proximal development (Vygotsky, 1978), scaffolding represents the helpful interactions between expert and novice that enable the novice to do something beyond his or her independent effort in this zone of proximal development (Wood et al., 1978). As the instructor, it is our role to help the students form the platform or scaffold from which they can develop.

In addition, a different kind of scaffold, cognitive scaffolding refers to the building of an inter-connected system based on the novice's own personal experience and understanding to allow him/her to reach new heights. The zone of proximal development is a zone where the novice can feasibly reach for new concepts, while standing firmly on familiarity of a solid cognitive scaffold. As an instructor, I believe it is my role to facilitate and assist the build-up of the cognitive scaffold within this zone of proximal development, by re-introducing items that could potentially be used to build upon their cognitive framework. Additionally, Yelland et al. have suggested a need for considerations of the scaffolding in terms of its cognitive, technical, and affective qualities (Yelland & Masters, 2007).

In this line of thought, I proposed in this study, through the use of a 10-minutes pre-lecture informal discussion, to build upon the cognitive and affective aspects, a scaffold constructed on a personal relevance, perception, conception or mis-conception, or feelings the students might find helpful toward bringing relevance of the daily neuroscience topic in order to raise the level of student's engagement and interest. I hypothesized that, attention, motivation and engagement levels from the students would be higher in days with the inclusion of such intervention, with the added benefit of better learning community building, contributing to a more pleasant and encouraging learning atmosphere.

My intention for this implementation is to build a stronger and better link/relationship between the student and the material. Implementation of this guided 5-10 minute pre-lecture conversation ensues: 1) building connections between the student and the topic, 2) forming a base for the scaffolding to form, and a secondary goal of 3) starting a conversation where the student commits to opinions and thoughts and where students build a sense of a learning community. All of described goal should generate interest, motivation, and ultimately 'engagement'.

Methods
The Participants

The proposed study has been implemented over summer of 2014, within the setting of a 3-week neuroscience class that a colleague and I have taught as part of the PEOPLE program, a pre-college pipeline for students of color and low-income students, most of whom are the first in their families to potentially attend college. The class consisted of 20 high school sophomores that have expressed some level of interest in the neurosciences. The student body was comprised of an assorted group of individuals coming from various geographical, educational, and economic diversities, working together toward exploration and a further understanding of the neurosciences. All students were informed about the nature of the study and were given the option of opting-out from the evaluative questionnaire. All aspects of the study were deemed minimal risk and the study therefore exempt from Institutional Review Board (IRB) approval.

The Setting

I have designed the course into three tiers [Figure 1]. The first week covered the fundamentals of neuroscience, which consist of the physiognomy of the neuron, brain anatomy and functions. During the second week, the class was guided into the exploration of more advanced neuroscience concepts, such as neural plasticity, cortical development, aging & disease, and brain imaging. The third week was structured for them to explore specific topics of their own interest. In small groups of 2-3 students, they researched, discussed and conversed among their peers and instructors, with their research exploration culminating into the development and preparation for a poster presentation scheduled for the last day of class. On that day, presentations will be giving to one another as well invited guests, various graduate students and faculty in the neurosciences. The poster presentation day was designed so that the students can develop this sense of community, learning from one another, as well as building their presentation skills and confidence. Because the third week followed an unusual format and atypical neuroscience topics like the zombie brain and the inclusion of a panel of faculty guests, including behavior scientist, geneticist, physical therapists and medical physicians, week 3 was not considered in this assessment of the benefit of the pre-lecture discussion. Course curriculum and description of daily lab activities can be found in *Appendix A*.

Figure. 1: Break down of curriculum and syllabus for the 3-week neuroscience session 2014 with first week dedicated to Basic Neuroscience, while week 2 was dedicated to the Neurosciences and Pathology. Days and events highlighted light-green were not considered for the implementation of the intervention. * depicts class sessions where pre-lecture discussions were implemented.

The Intervention

The intervention consisted of the inclusion of a short 10-minute pre-lecture discussion primed with a discussion topic word for the students to get slowly acclimated to the topic, but to also bring more relevance of the topic to the students. Students of the class were encouraged to engage in conversation with their student peers about the topic. The discussion however did not have to pertain to academic or factual knowledge regarding the topic. The class is primed with a topic word written on the white board, and are asked what does the topic word make them think of, a first thought or feeling that comes to mind. The purpose of that exercise is to build and set a perceptual context that we, as instructors, can build upon. The students are encouraged to share personal thoughts and experiences, how they connect with the word written on the white board. An example of that would be a student describing the physical and emotion experience of having their fingers caught in the door when the topic word was 'pain'. Another example would be a student describing his/her grandmother and his/her interaction with his/her grandmother who might have been diagnosed with Alzheimer's disease, when the topic word is 'dementia'. These shared experience build context and relevance of why and what will be study in the lecture, creating a personal investment or an understanding of somebody's personal investment.

These types of informal group discussion also allows the students among the group to know each other a little better, and become more familiar with one another, benefitting the idea of learning as a group, as a community. Free-flowing conversation can be difficult to achieve, especially over the first few days when they are still new to each other. Introverted students may also have a harder time sharing. For those

reasons, my colleague-instructor and I participated in those small groups discussion to prompt and initiate conversation. After a few minutes, some thoughts from the small group discussion were brought into a quick class discussion allowing those you were not able to find a personal connection to hear and appreciate others' connection. No personal experiences were shared without the consent of the person.

The Implementation

The pre-lecture discussion was not implemented every day, but rather on two out of four days of each instruction week. The other two days, no pre-lecture discussion preceded the lecture, and served as a control condition for our intervention. The days when pre-lecture discussions were implemented were chosen randomly, independent of the topic of the lecture. Day 1 of week 1 and day 5 of week 2 were exempt as they pertained to the first day of instruction where a general overview of the class was presented, and served as a way for us to know each other: who we are, how we teach, and how we learn. Day 5 of week 2 was the holiday of July 4th and no instruction was given that day.

The arrangement of two intervention days per week attempted to reduce the various contribution in regards to the measure of time (students getting more comfortable with each other with time, hence favors the sharing of thoughts and ideas in the later class sessions), but also worked toward removing the bias of the general classification of the topics (week 1: Basic Neuroscience, versus week 2: "Neuroscience and Pathology").

The Evaluation

The evaluation remained crude and limited due to the time constraints of the short summer session and the various requirement of the program. Evaluation of the implementation was performed in the form of a anonymous and completely optional self-report questionnaire given to the student in the beginning of the third week of instruction with no time restriction, and were collected by a third-party, an independent non-instructing colleague.

Evaluation was performed in the form of end-of-session summative survey questionnaire, where the students were asked to reflect back on the different sessions of the class of the previous two weeks of instruction. *Likert* scale questions and free-answer responses were used in the design of the questionnaire. (Full questionnaire and summarized responses are provided in *Appendix B*)

The two primary outcome measures pertained to the question of perceived level of interest and engagement from the students. Though not synonymous, interest and engagement often go hand-in-hand, especially in an introductory class meant to showcase the diversity of the field as well as allowing the students to explore the various avenues. Like previously stated, engagement is the first item in the Bybee's Five E model, and without which the teaching/learning process cannot truly be successful.

Secondary measures were assessment of the appreciation of the discussion and perceived benefits. Additional measures, such as students' rating of overall session, content, structure, me as the instructor, and the other instructor, from this year in comparison to the previous year were also recorded (Fig. 2).

This allows for a characterization of the different factors which could have potentially skewed our measures.

Results and Discussion

Interest and engagement are two items that usually goes hand-in-hand, with higher interest generally eliciting higher level of engagement. However, few more factors can contribute to engagement, such as the central dimension of human personality (introvert vs. extrovert), and level of comfort and familiarity between the classroom peers. This second attribute can influence the measure of engagement quite dramatically, especially since the measure records the level of perceived engagement from the student him/herself.

In figure 2, levels of interest in week 1 between with and without discussion were consistent, describing an inability of the discussion to raise interest. However, higher level of interest was found in the second week in the sessions with discussion, suggesting a possible effect of the intervention on the increase in their level of interest. Of course, these results may still be confounded by the lecture topic and content, but we believe that, particularly in week 2, the random assignment of lectures with discussion and without discussion was fairly balanced with early 'development vs. late aging' and 'genetics vs. brain imaging'.

Levels of perceived engagement of the students themselves were considerably lower than for interest. But once again, those two measures are different. While the question of interest asked whether the students were interested, or not, the question of engagement asked how do you feel your level of engagement was in comparison to a self-perceived reference point of what it could have been. This reasoning does support the lower self-report of engagement in comparison to interest.

In terms of engagement between the weeks, without discussion, the level of engagement was the same despite the difference in themes (i.e. 'basic neuroscience' vs. 'neuroscience & pathology'). In week 1, the implementation of the discussion suffered a detrimental effect, demonstrated by the lower level of perceived engagement. In contrast, during the second week, the inclusion of the discussion benefitted the students as they described an elevated level of engagement.

These effects could be explained by two different hypotheses, which may not be mutually exclusive: 1) time is needed for a familiarization of the pre-lecture discussion concept, and 2) the implementation of the pre-lecture discussion works better for some theme/topic. Regarding the first hypothesis, with an absence in familiarity, the inclusion of the student-based conversation may have created a void, where the students may have felt the need to contribute more to the conversation but did not. But ultimately, the combined results from 'interest' and 'perceived engagement' suggested that the inclusion of the 10-minute pre-lecture discussion had probable beneficial effect.

Secondary measures of 'appreciation' and 'perceived benefit' of the discussion support this claim (Fig. 3). 11 of the 20 students reported appreciating the inclusion of the discussion, while 3 students expressed not liking the discussion. 5 were indifferent and 1 decided not to respond. Moreover, when asked about the

perceived benefit of the discussion, independent of whether or not they liked/appreciated it, an overwhelming 14 of the 20 students responded perceiving benefit of the discussion in their overall learning of the material. When asked to score the general use of the discussion, they once again demonstrated positive feelings, with the discussion scoring 7.59 out of 10 (Fig. 4). However, because such measures were acquired through self-reports, and because of the nature of the participants, the results of such secondary measures may have been overly inflated from the presence of an authoritative figure (i.e. the instructor and primary investigator, myself). We attempted to control for this confound by having the response to questionnaire anonymous as well as having a non-instructing colleague collect their responses. But we can deny the presence of a certain response bias.

In comparison to the previous year, where I and another colleague instructed the course, and where no implementation of the 10-minute pre-lecture discussion intervention, overall rating of the 'class', 'content', 'course structure' remained consistent across the two years (Fig. 5). Though it remains difficult to compare two different years because of the different composition of the classroom, these numbers hint at a minimal effect of the inclusion of the intervention to the general outlook of the course. Additionally, I have assessed a rating of the instructor, with my personal rating decreasing in the second year, compensated by a higher rating of the other instructor in the second year. This can be explained by the role I have taken in the instruction. In 2013, my colleague and I, both first year instructors, were happy to share the lead and share the role of the enforcer. In contrast, in 2014, I took on the role of the primary instructor, who had to be accountable for the progress of the class and the discipline. In my opinion, this contributed to my lower rating in the 2014, despite the difference between the years not being significant.

How this increase level of interest and engagement is achieved resides in the value of discussion. A known benefit of a guided discussion time is that it allows for a valuable interaction between the instructor and the students, to help form and guide the establishment of connections that the students may miss to discern themselves, un-assisted, helping the student form a proper context and construct new knowledge. Moreover, discussion offers multiple beneficial attributes toward learning. It exposes the diversity of thoughts, perspective and attitude that resides within the classroom, which creates a creative environment for the creation of new ideas. Discussion offers the avenues of "becoming aware of diversity, appreciating ambiguity and complexity, hunting from assumptions, …, synthesizing and integrating, and transforming ideas and actions" (Brookfield & Preskill, 2005), which are the bases of true learning. In addition, peer discussion was found to enhance understanding even when none of the students in a discussion group originally knows the correct answer to a question (Smith et al., 2009), forging the strength of collaborative learning. With all those benefits to discussion, the inclusion of the pre-lecture discussion has all the right tools to enhance the interest and engagement from the students.
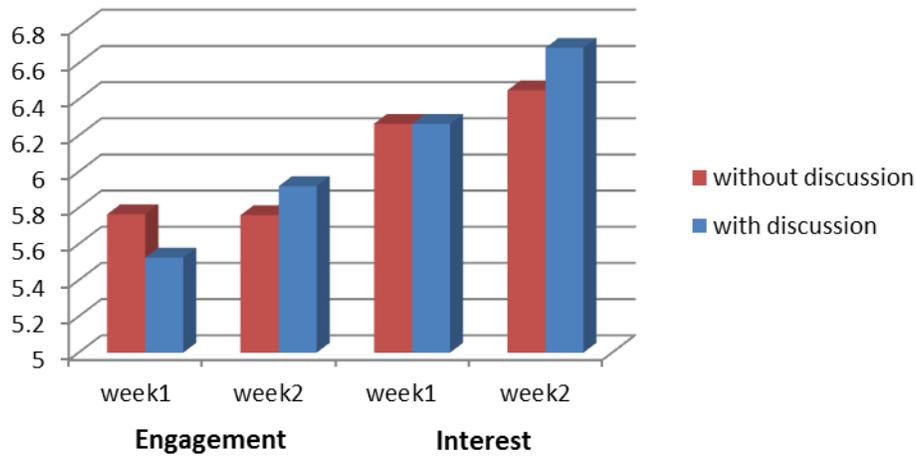
Figure 2. Perception on self-Engagement and Interest on a scale from 1-8 obtained from self-reports.
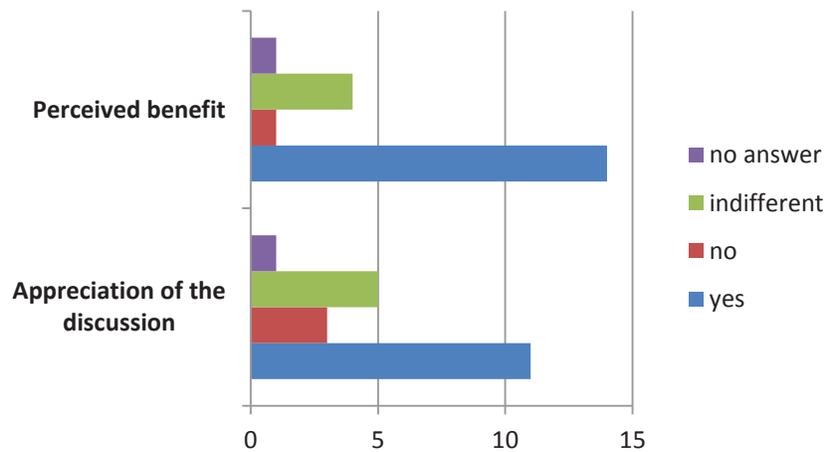

Figure 3. Secondary Measures of *Appreciation* and *Perceived Benefit* of the Discussion. Overwhelming sentiment of appreciation and perceived benefit from the students in regards to the addition of the short 10-minute discussion.
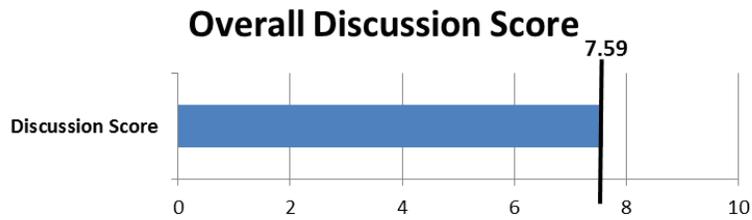
Overall Discussion Score

7.59

Discussion Score

0   2   4   6   8   10

Figure 4. Overall Discussion Score with students rating the discussion with a strong positive score of 7.59 out of 10.

Students' Perception of the Classroom

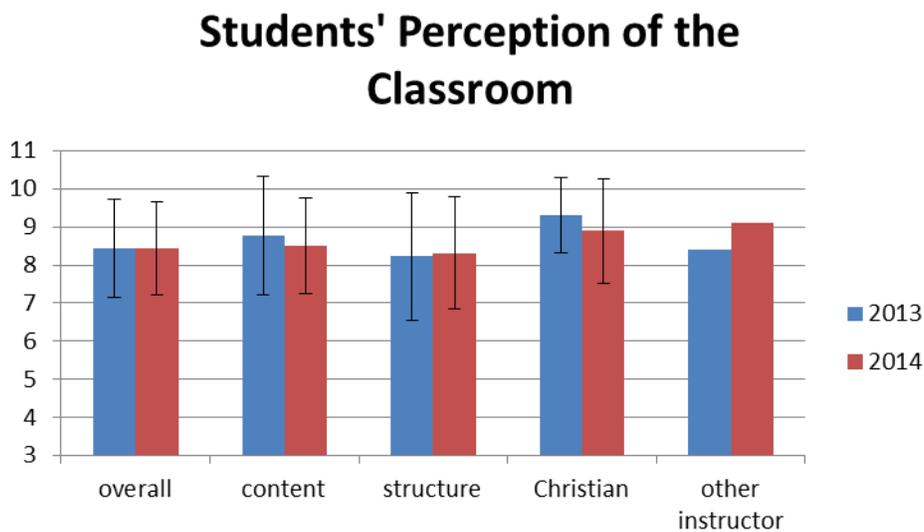overall   content   structure   Christian   other instructor

2013
2014

Figure 5. Students' perception of the classroom. Comparison between 2013 (no intervention) and 2014 (with intervention). Mean student ratings were rescaled to a 1-10 scale (y-axis). No distinctive differences in various classroom attributes between the two years of instructions which may have contributed to study confound.

Conclusion

From our crude and limited dataset, results from this study hint at a general benefit of the inclusion of a 10-minute pre-lecture discussion to establish proper context and build relevance to what is to-be learned. Levels of interest and perceived personal engagement were recorded to be generally higher in sessions with the intervention. However, the intervention may require a time for acclimatization and familiarization from the participants. But regarding the overall process, following the two weeks of instructions, the students did express an appreciation and perceived benefit of the intervention. Despite

the many possible confound that this study may present, my study suggests a beneficial effect of the inclusion of a discussion pre-lecture for the elevation of students' engagement.

Reflection

In retrospect, few things should have been done differently to provide better quantification of the results. Aside from better controlling for the variation within the student population and course material for a consistent environment for comparison, efforts can be made in improving the assessment method. Particular care should direct toward designing of the assessment, including question phrasing, word use, questions order and environment in which the assessment is implemented. Though some thoughts were given to address those concerns, I cannot design that I could have done more to ensure a stability and reliability of the data acquired. Also, self-report questionnaires hold a certain subjectivity which adds to the variability of the data.

One aspect that could be implemented, and which should have been implemented, is the collection of students' assessment through a grading of the final product, their research poster and presentation. As part of the 3-week session, students are required to work within a group to generate a research poster to be presented during the final day to guest attendees, which includes graduate students, faculty and staffs. Though grading is not encouraged as we foster community and collaborative learning, scoring could have been collected for the sake of this investigation, providing an additional outcome that can be assessed with scientific method. Assessment of the students's poster and presentation would serve as a reflection of their development in the field of neuroscience, including the enhancement of their knowledge base and the development of their personal interest. Pure objectivity from such assessment is difficult to achieve, but the use of a rubric for guests' scoring would be a favorable step in that direction.

Altogether, I think that this study, despite its numerous flaws, provides a good first start in my personal development as an education researcher, ultimately attempting to enhance the learning environment and student learning.

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Appendix

Appendix A—Course Syllabus

Week 1:
  Day 1: Class introduction: Material, Goals, and Expectations / LAB: Neuroscience Ice-Breaker
  Day 2: Neuron & Neurotransmission / LAB: Virtual Neuron, Signal Transduction, & Guest speaker Dr. Cyndy Czajkowski
  Day 3: Brain anatomy and divisions—Part 1 / LAB: Brain and Spinal Cord slices (Microscope)
  Day 4: The Senses / LAB: Isolation of the senses
  Day 5: Brain anatomy—part 2 / Sheep brain dissection

Week 2:
  Day 1: Adaptation and Brain Development—Development / LAB: Prizm goggles and Brain adaptation & Presentation of experimental data (presentation skills)
  Day 2: Age-related Pathology / no lab BUT Guest speakers Drs. Barbara Bendlin & Michelle Ciucci
  Day 3: Neurological Disease from Genetic mutations / no lab BUT tour of Dr. Barry Ganetzky laboratory (lab environment)
  Day 4: Brain Imaging / LAB: tour of medical imaging facility with Drs. Rasmus Birn & Mary Meyerand
  Day 5: (4th of July—no class)

Week 3:
  Day 1: Review & Brain Networks / Guest Speakers: Drs. Vaishali Bakshi & Brian Baldo
  Day 2: Neuroscience and Pop culture / Guest Speakers: Drs. Ryan Herringa & Mike Koenigs
  Day 3: The Brain and Sleep / Guest Speakers: Drs. Avtar Roopra & Vivek Prabhakaran
  Day 4: Zombie and Neuroscience
  Day 5: Poster day (presentation skills)

Appendix B—Overall evaluation

Class evaluation:

| **Poor = 1;** | | | | | | **Great = 8** | |

Overall rating for the class:

| 1 | 2 | 3 | 4 | 5(x2) | 6(x6) | 7(x7) | 8(x5) |

Average: 6.75 out of 8

Class content:

| 1 | 2 | 3 | 4 | 5(x2) | 6(x6) | 7(x6) | 8(x6) |

Average: 6.80

Class structure:

| 1 | 2 | 3 | 4(x1) | 5(x2) | 6(x6) | 7(x5) | 8(x6) |

Average: 6.65

Activities:

| 1 | 2 | 3 | 4(x2) | 5 | 6(x4) | 7(x7) | 8(x7) |

Average: 6.10

Guest Speakers

| 1 | 2 | 3 | 4(x2) | 5(x5) | 6(x6) | 7(x3) | 8(x4) |

Average: 6.10

Appendix C—Overall effectiveness of the 3-week session

Has your interest in Neuroscience increased or decreased? And Why?

- Increased (x3)
- Increased – because I learned that the brain is really complicated
- Increased – because there's some interesting topics
- Increased – because the brain is so unique
- Increased – I know and want to know more stuff than before
- Increased – Zombies ☺
- Increased – it seems really interesting

- Increased – a bit because it's somewhat interesting to know how and what it works on
- Increased – I like the fact that there is a lot of parts of the brain and the last guest speaker made it sound really fun
- Increased – I saw many things I didn't know about before that were really cool
- Increased – for the amount of content provided to me
- Increased – because I think working with the brain is cool
- Hasn't changed – didn't catch or take away attention to the class
- Stayed the same – not really for me I don't think
- Stayed the same – I never really showed interest
- Decreased – because I don't want to go into the science field
- Yes, the possibilities of discovering something is great
- Yes because there is a lot to be discovered

Appendix D—Level of Interest

Rate each class: (from 1 to 8) *Note – someone skipped this whole page so the total count is off.

Week1:

The Neuron

| 1 | 2 | 3(x1) | 4(x1) | 5(x5) | 6(x7) | 7(x1) | 8(x4) | Average: 5.95 |

The Human Nervous System

| 1 | 2 | 3 | 4(x3) | 5(x3) | 6(x4) | 7(x7) | 8(x2) | Average: 6.11 |

The Senses

| 1 | 2 | 3(x1) | 4(x2) | 5(x1) | 6(x4) | 7(x6) | 8(x5) | Average: 6.42 |

Brain Gross Anatomy

| 1 | 2 | 3 | 4 | 5(x5) | 6(x3) | 7(x6) | 8(x5) | Average: 6.58 |

Week2:

Brain Development

| 1 | 2 | 3 | 4(x1) | 5(x3) | 6(x7) | 7(x5) | 8(x3) | Average: 6.32 |

Injury & Disease

| 1 | 2 | 3 | 4 | 5(x3) | 6(x3) | 7(x9) | 8(x4) | Average: 6.74 |

Genetics & Mutations

| 1 | 2 | 3 | 4(x2) | 5(x3) | 6(x2) | 7(x6) | 8(x6) | Average: 6.58 |

Brain Imaging Methods

| 1 | 2 | 3 | 4(x2) | 5(x3) | 6(x2) | 7(x5) | 8(x7) | Average: 6.63 |

Appendix E—Level of Engagement

Rate how engaged YOU were in the class: (from 1 to 8)

Week1:

The Neuron

| 1 | 2 | 3(x3) | 4(x1) | 5(x7) | 6(x3) | 7(x3) | 8(x2) | Average: 5.42 |

The Human Nervous System

| 1 | 2(x1) | 3(x2) | 4(x2) | 5(x4) | 6(x3) | 7(x5) | 8(x2) | Average: 5.53 |

The Senses

| 1 | 2(x1) | 3 | 4(x1) | 5(x5) | 6(x4) | 7(x5) | 8(x3) | Average: 6.00 |

Brain Gross Anatomy

| 1 | 2(x1) | 3(x2) | 4(x2) | 5(x4) | 6(x3) | 7(x3) | 8(x4) | Average: 5.63 |

Week2:

Brain Development

| 1(x1) | 2 | 3(x2) | 4(x2) | 5(x3) | 6(x4) | 7(x3) | 8(x4) | Average: 5.63 |

Injury & Disease

| 1 | 2(x1) | 3(x2) | 4(x1) | 5(x2) | 6(x6) | 7(x3) | 8(x4) | Average: 5.84 |

Genetics & Mutations

| 1(x1) | 2 | 3(x2) | 4(x2) | 5(x1) | 6(x4) | 7(x4) | 8(x5) | Average: 5.89 |

Brain Imaging Methods

| 1 | 2(x1) | 3(x2) | 4(x1) | 5(x3) | 6(x2) | 7(x5) | 8(x5) | Average: 6.00 |

Appendix F—Understanding of the word '*Engagement*'

How did you define "Engage"? (Few words or a sentence)
- Caught my attention
- Asked questions, answered questions, added information
- Paying attention, speaking, asking questions
- Paying attention and answering/asking questions
- Staying awake, answering questions, paying attention
- Paying attention, participating
- Paying attention and listening closely
- Listening, paying attention
- Participate in on activity
- Listened and got something from it
- Interested in
- To become involved in activities
- Screaming out answer, or raising my hand with questions
- Engage is to answer questions or to ask questions. Also listening and learning
- Not falling asleep and paying attention to the work
- Listening and trying to take in knowledge
- Very talkative with students?
- Interested and paying attention
- Actively learning with our hands, eyes, and ears
- Keeping up with the class

Appendix G—Appreciation for the Discussion (intervention)

Did you like the 5-10 minutes of pre-lecture discussion? Why or why not?
- Yes – it lets us think
- Yes – because it prepared us for the lecture
- Yes – in a way it woke us up
- Yes
- Yes – because we can have an idea about the subject
- Yes – it brain test
- Yes – it was good to start guessing what stuff is
- Yes – it helped me understand what we were talking about
- Yes – got the class started up
- Yes – because they prepare you for what you're about to learn
- I like the shorter ones, but not the longer ones because they make me sleepy
- Somewhat – because it helps us to know what we talked about
- Somewhat – they were useful at times but ran a little too long
- It's cool
- OK – because we got to talk about it with peers
- OK – unless you didn't know anything
- No – it got tiring; Yes – it was fun learning stuff looking at some slides
- No – because they were boring (x2)
- No – it's not my type of thing since it has almost made me fall asleep

Do you think that was beneficial to you in any way?
- No response
- You review stuff
- Yes – because it prepared us for the lecture
- Yes (x10)
- Yes – because I want to be a lawyer but you always need a plan b
- Yes – I learned more

- Yes – but also backfired for me
- A little bit
- Not sure
- Kind of – some people just talked
- Not really – we just got lectured afterwards anyway

From a scale from 0-10, how would you rate the inclusion of the discussion? (*3 students skipped ?)

5(x1)   6(x2)   7(x4)   7.6(x1)   8(x5)   8.5(x1)   9(x2)   10(x1)

Average: 7.59

What did you think that 5-10 minutes discussion was for?
- No response (x2)
- To talk about what you know
- To prepare us so we knew what the speaker was saying
- To prepare us for what the class was going to discuss
- To introduce us and explain what we were doing for the day
- To get our brains started onto today's topic
- To get you thinking about what we were going to learn about
- To prepare us
- To get our brains started and to leave us thinking or to hear others' thoughts
- To see if we knew the topic
- Get us thinking about the topic
- Refresh our memories
- To teach you stuff about the brain
- To get us thinking about the subject
- Good
- Help us understand the work
- To make us start thinking about the brain
- To start to get a feel for the topic
- To jog our memory on the subject

CIRTL Learning Objective Matrix

Associate Level

Teaching-As-Research Associates can do the following:	How this outcome was met in the Delta Certificate:
Know that a body of literature and knowledge exists concerning high-impact, evidence-based teaching practices.	Demonstrated by completing the Delta Internship. Submitted a project proposal and draft of final summative report that includes literature reviews.
Define and recognize the value of the Teaching-as-Research process, and how it can be used for ongoing enhancement of learning.	Met by completing the project proposal and final reflection of Internship.
Know how to access the literature and existing knowledge about teaching, learning and assessment, in a discipline or broadly.	Demonstrated in College Classroom course, researched the literature for an assignment.
Describe and recognize the value of realistic well-defined, achievable, measurable and student-centered learning goals.	Addresses in Delta internship, TA-ship and as an instructor for the PEOPLE program.
Describe several assessment techniques and recognize the value of their alignment with particular types learning goals.	Demonstrated through the use of artifacts in this teaching and learning portfolio, development of learning modules for stats 324, as well as development of assessment for my Delta internship project.
Describe and recognize the value of evidence-based effective instructional practices and materials.	Evidence-based effective instructional practices have provided empirical evidence on the effectiveness, or lack thereof, of commonly believed effective teaching strategies, which prevents us from replicating redundant applications to find out the answers. This also provides us with tested tools that are known to work in various situations though each classroom is different.
Describe a "full-inquiry" cycle	Helen Timperley: - What knowledge and skills do our students need? - What knowledge and skills do we need as teacher? - Deepen professional knowledge and refine skills - Engage students in new learning experiences - What has been the impact of our actions? - This was met by completion of the internship in which I develop a course curriculum, emphasize the material I believe would benefit them the most. Final assessments served as data for my reflection.

Learning Communities Associates can do the following:	How this outcome was met in the Delta Certificate:
Know that a body of literature and knowledge exists associated with learning communities and their impact on undergraduate learning.	- Smith et al Science 2009. Peer discussion enhance learning - Papers discussion in Delta classes (*the College Classroom* and *Teaching Statistics*)
Define the characteristics of undergraduate learning communities (LCs).	The definition of a learning communicate isn't as clear as one may think. Though many believe that a learning community requires consistent active participation toward learning, I define learning community as the personal perception of the person in the belonging of group toward the common goal of learning. I acquire this understanding while conversing with others in the Delta community.
Describe the impact of LCs on student learning.	Learning communities provides a support system, either emotional or intellectual toward achieving and enhancing learning.
Describe and recognize the value of LC strategies that promote positive interdependence between learners so as to accomplish learning goals.	- Developing peer relationship, trust, and interdependence as side-effects of learning communities. - Presence of study sections and study groups - Working together on hw and problem sets
Describe and recognize the value and issues of establishing LCs comprising a diverse group of learners.	- Different perspective to stimulate discussion - Different learning styles forcing reformulation of understanding in order to present our understanding
Describe techniques for creating a LC within a learning environment.	- Use of group projects: homework, problem sets, presentation
Recognize the value of and participate in local professionally-focused learning communities associated with teaching and learning.	- Conversation with others about teaching and learning enhance and revise our current approach to learning and teaching - Participated at Delta Sponsored dinners and roundtables - Attendance to *NextProf Science 2015* workshop at the U of Michigan

Learning through Diversity Associate can do the following:	How this outcome was met in the Delta Certificate:
Know that a body of literature and knowledge exists associated with diversity and its impact on accomplishing learning goals.	- Evangellos-Vagelis (2007) Through the eyes of a "third country" faculty - Zhao (2005) Difference in academic engagement of foreign-born and US-born undergraduate students - Anderson & Adams (1992) Acknowledging the learning styles of diverse student populations … - Nelson (1996) Student diversity requires different approaches to college teaching …
Define and recognize the scope of diversity in learning environments, of both students and instructor. [1]	- Background (race, ethnicity, gender, socio-economic) - Learning experience - Learning styles - Learning expectations - The bias of traditional taught courses

Recognize the impact of diversity on student learning, in particular how diversity can enhance learning, and that inequities can also negatively impact learning if not addressed.	Good: - Offers different perspectives, stimulating conversation and discussion - Forces one to address the various learning style by rephrase, re-delivering material in a new form Bad: - Selective bias of standard assessment techniques - Predetermined stereotypes & preconceptions
Describe how an instructor's beliefs and biases can influence student learning.	- Steele (1997) How stereotypes shape intellectual identity and performance - Sometimes it is not only how people view others of diversity, but also how diversity students view themselves, and the risks of falling into the complacency of the derived stereotype
Recognize the value of drawing on diversity in the development of their teaching plans (including content, teaching practices and assessments) to foster learning.	- Diversity students faces additional challenges in the classroom if not address early - And stereotypes must be debunked before it perpetrate into the classroom - Teachers need also to take into consideration of the impact of diversity in the way the class learn best
Describe several learning-through-diversity (LtD) techniques and strategies (e.g. creating a welcoming environment, learning communities).	- Creating a welcoming environment in which segregation does not appear in the classroom while leaving diversity group having their voice, with mixing of group formation, but also encouraging conversation between diversity groups - Help learning communities incorporate diversity in their thinking development - Having rotating leader within the group to allow equal voice to all students

Practitioner Level

Teaching –As-Research Practitioners can do the following:	How this outcome was met in the Delta Certificate:
Develop a deeper understanding of the knowledge concerning high-impact, evidence-based teaching practices.	- Conversation with seasoned teaching oriented faculty, including faculty from the department of education research - Started reading books on learning: - Bain's *What the best college professor do* - Wiggins & Tighe's *Understanding by design* - Huba & Freed's *Learner-Centered assessment on college campus* - Leamnson's *Thinking about teaching and learning* - McKeachie's *Teaching tips*
Develop a Teaching-as-Research plan for a limited teaching and learning project	- Satisfied by completion of the Delta internship - But also constant evaluation of how to develop a better classroom

Execute a Teaching-as-Research plan for a limited teaching and learning project	- Satisfied by completion of the Delta internship - But also constant evaluation of how to develop a better classroom for future execution
Show the integrated use of Teaching-as-Research, Learning Community and Learning-through-Diversity to accomplish learning goals.	- Assembling my teaching and learning portfolio

Learning Communities Practitioners can do the following:	How this outcome was met in the Delta Certificate:
Develop a deeper understanding of the knowledge concerning LCs and their impact on undergraduate student learning.	- Discussion with people (such as Janet Batzli) from Biocore, an honor program promoting active learning communities
Integrate one or more LC strategies into a teaching plan so as to accomplish learning goals and learning-through-diversity	- In the planning for future classes - Preparation of teaching modules for teaching statistics in Stats 224
Implement one or more LC strategies for students in a teaching experience.	- Delta Internships - Module in the College Classroom - Module for Stats 224
Contribute to local professionally-focused learning communities associated with teaching and learning.	- Helping developing a stronger sense of learning community within the UW Neuroscience Training Program - Delta graduate students representative
Show the integrated use of Teaching-as-Research, Learning Community and Learning-through-Diversity to accomplish learning goals.	- Assembling this teaching and learning portfolio - Design of my future classroom

Learning through Diversity Practitioners can do the following:	How this outcome was met in the Delta Certificate:
Develop a deeper knowledge of the body of literature concerning diversity and its impact on accomplishing learning goals.	- Participation to the College Classroom – International, which had an emphasis on diversity.

Examine own beliefs and biases, including how they may influence their students' learning.	- *Reflection of the self in regards to learning differences and how that impacted my education, how that impacted others* - *Discussion with others of diversity and non-diversity population to stimulate an discussion and understanding between the groups*
Determine the diverse backgrounds among a group of students, and consider the opportunities and challenges of the findings on each student's learning.	- The Delta internship in the People program setting, a program aimed at helping students of diversity - My involvement in the People program in the last 2 years
Create a teaching plan that incorporates content and teaching practices responsive to the students' backgrounds.	- Development of the 3-week PEOPLE program neuroscience curriculum for 2 years straight. - Design of learning modules to be implemented for stats 324 (intro to applied statistics for engineers)
Integrate one or more LtD techniques and strategies in a teaching plan so as to use students' diversity to enhance the learning of all.	- Encourage and stimulate conversation and discussion in and out of the classroom
Implement one or more LtD strategies in a teaching experience.	- Teaching for the People summer program for the last 2 years
Show the integrated use of Teaching-as-Research, Learning Community and Learning-through-Diversity to accomplish learning goals.	- Combination of my Delta Internship project and the 3-week PEOPLE program

Curriculum Vitae

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Madison, WI 53705-2275

RESEARCH INTEREST

- ❖ Understanding the aging of the cortical system, in terms of the integrity of functional networks, and in particular the default-mode network (DMN)
- ❖ Identifying the implication of disrupted DMN to other functional networks, in terms of network interactions, potentially leading to observed decline in cognitive functions in aging and various clinical populations
- ❖ Developing an appreciation of spectral characteristics of resting-state network (RSN) oscillations in aging, advanced aging, and clinical populations toward an understanding of the mechanism underlying the network disruption
- ❖ Distinction between neural and non-neural, such as vascular, contributions to BOLD

PROFESSIONAL MEMBERSHIP

- ❖ Society for Neuroscience
- ❖ Human Brain Mapping
- ❖ American Heart Association

EDUCATION

- ❖ **University of Wisconsin, Madison**　　　　　　　　　　　　October 2015
    - Ph.D in Neuroscience (focus: System Neuroscience)
        With Ph.D minor in Clinical Investigation
- ❖ **University of California, Berkeley**　　　　　　　　　　　　August 2005
    - B.A. in Molecular and Cellular Biology (MCB)
        with NeuroBiology emphasis

TRAINING

- ❖ **University of Wisconsin, Madison – The Graduate School**　　Jun 2011 – Sep 2015
    Neuroscience Training Program
    　　Graduate Student co-mentored by:
    - Elizabeth M. Meyerand, PhD; Professor of Biomedical Engineering and Medical Physics, Chair of Department of Biomedical Engineering.

- Vivek Prabhakaran, MD, PhD; Director of Functional Neuroimaging in Radiology
- Project: Project: Characterization of impairment of the default-mode network (DMN) in aging and clinical populations, specifically in terms of spectral distributions of the intrinsic functional network oscillations by way of resting-state fMRI.

❖ **University of California, Davis – School of Medicine**   May 2009 – May 2011
    Dept. of Psychiatry
        Junior Specialist at the Translational Cognitive and Affective Neuroscience Lab with:
            - Michael Minzenberg, MD; Associate Professor of Clinical Psychiatry at UC Davis Medical Center
            - Cameron S. Carter, MD; Professor and Director of Imaging Research Center at UC Davis Medical Center
- Project: Prefrontal Cortex cognitive function modulations by the ascending Locus Coeruleus in task-positive fMRI in normals and patients diagnosed with schizophrenia using fMRI.

❖ **University of California, Berkeley – School of Optometry**   Jan 2006 – Jul 2007
    Dept. of Vision Science
        Research Assistant Lv.2 at the Visual Processing Lab with:
            - Stanley A. Klein, PhD; Professor and Chair of the Vision Science Department at UC Berkeley
- Project: Source localization and target discrimination assessed by high-density electro-encephalogram (EEG).

❖ **University of California, Berkeley – Brain Imaging Center**   Nov 2004 – Jul 2006
    Helen Wills Neuroscience Institute, Berkeley
        Research Assistant at the D'Esposito Lab with:
            - Anthony J-W Chen, MD; Alumni Research Fellow at the D'Esposito Lab, Current Assistant Professor of Neurology at the University of California, San Francisco (UCSF)
            - Mark D'Esposito, MD; Professor of Neuroscience and Psychology, Director of Henry H. Wheeler Jr. Brain Imaging Center at UC Berkeley
- Project: Project: Modeling of top-down modulatory control of the PFC in the PFC-parietal network in working memory paradigm using fMRI; and Verification of such model through the use of transcranial magnetic stimulation (TMS).

SKILLS

Imaging:	MRI, fMRI (task & resting), ASL perfusion, EEG, TMS
Environments:	Windows & Linux
Productivity:	MS/Windows Live/Open Office, Adobe Acrobat / Illustrator / Photoshop
Analysis & Modeling:	Matlab, SPM, AFNI, FSL, GIFT, DPARSF, REST, EEGLab, Freesurfer, SurfRelax, WinVis, MRICro, VoxBo, E-prime, Brainsuite, MarsBar, Jim
Statistical & other:	R, SPSS, MySQL, Brainsight Frameless

FELLOWSHIP & AWARDS

❖ UW CNTP Training Fellowship   Jul 2014—Jun 2016
❖ UW ICTR Pre-Doctoral Training Fellowship   Sep 2012—Jun 2014
❖ UW-Madison NTP Training Fellowship   Aug 2011—Jul 2012
❖ UW-Madison Biological Sciences Scholar Award   May 2011

PUBLICATIONS & PRESENTATIONS

Peer-Reviewed Publications:

- **La C**, Nair VA, Mossahebi P, Stamm J, Birn R, Meyerand EM, Prabhakaran. (under Review) Recovery of Slow-5 Oscillation in Longitudinal Study of Ischemic Stroke patients.
- **La C**, Mossahebi P, Nair VA, Young BM, Stamm J, Birn R, Meyerand EM, Prabhakaran. (under review) Differing Alteration in Slow-5 Oscillations in Ischemic Stroke and Aging.
- **La C**, Mossahebi P, Nair VA, Birn RM, Meyerand ME, Prabhakaran V. (under Review) Age-related Changes in Inter-network Connectivity by Component Analysis.
- **La C**, Nair VA, Mossahebi P, Young BM, Sattin J, Chacon M, Jensen M, Birn R., Meyerand EM, Prabhakaran V. (under review) Implications of the Slow-5 Oscillations in the Disruption of the DMN in the Elderly and Ischemic stroke patients.
- **La C**, Garcia-Ramos C, Meiers TB, Nair VA, Meyerand EM, Edwards D, Prabhakaran V. (in preparation) Age-related Changes in the Processing of Language Production: an Investigation of Activation, Functional Connectivity and Psychophysiological Interactions.
- Minzenberg MJ, **La C**, Soosman S, Yoon JH. (under review) Transcranial Magnetic Stimulation over Dorsolateral Prefrontal Cortex Alters Decision Speed in a Process-Selective Pattern During Cognitive Control.
- Zeng H, Garcia-Ramos C, Nair VA, Hu Y, Liao J, **La C**, Chen L, Gan Y, Wen F, Hermann B, Prabhakaran V. (in press) Regional Homogeneity (ReHo) changes in new onset versus chronic benign epilepsy of childhood with centrotemporal spikes (BECTS): A resting state fMRI study. Epilepsy Research.
- Nair VA, **La C**, Young BM, Reiter P, Nadkarni T, Song J, Vergun Swyatoslav, Addepally NS, Mylavarapu K, Jensen M, Chacon M, Sattin J, Prabhakaran V. (in press) Resting Functional Connectivity in Language Network in Early and Late Stages of Stroke Recovery in Non-Aphasic patients. Stroke.
- Nair VA, Young BM, **La C**, Reiter P, Nadkarni T, Song J, Vergun S, Naga SA, Mylavarapu K, Swartz J, Jensen MB, Chacon MR, Sattin JA, Prabhakaran V. (2005) Functional connectivity changes in the language network during stroke recovery. Ann Clin Trans Neurology, Vol. 2, Issue 2: 185-195.
- Yoon JH, Larson P, Grandelis A, **La C**, Cui Edward, Carter CS, Minzenberg MJ. (2014) Delay Period Activity of the Substantia Nigra during Proactive Control of Response Selection as Determined by a Novel fMRI Localization Method. J Cog Neuro. 2014 Dec 16: 1-11. Epub. PMID: 25514657
- Zeng H, Pizarro R, Nair VA, **La C**, Prabhakaran V. (2013) Altered Regional Homogeneity in Mesial Temporal Lobe Epilepsy Patients with Hippocampal Sclerosis. Epilepsia. 2013 Apr; 54(4):658-66. PMID: 23294137
- Prabhakaran V, Nair VA, Austin BP, **La C**, Gallagher TA, Wu Y, McLaren DG, Xu G, Turski P, Rowley H. (2012) Current Status and Perspectives of Magnetic Resonance High-Field Imaging: A Summary. Neuroimag Clin N Am. 2012; 22: 373-397. PMID: 22548938
- Minzenberg MJ, Watrous AJ, Yoon JH, **La C**, Ursu S, Carter CS. Response to Comment. Modafinil shifts Human Locus Coeruleus to Low-Tonic, High-Phasic Activity During Functional MRI. Science, 16 April 2010, Vol. 328. No. 5976, p. 309. (Technical Comment)

Book Chapters:

- Zeng H, **La C**, Nair V., Prabhakaran V, Rowley HA. Chapter 71: Migraine and Seizures. MR and CT perfusion and Pharmacokinetic Imaging. Stanford University. (in press)
- **La C**, Gaggl W, Prabhakaran V. Chapter 14: Imaging of Alzheimer's Disease, Part 2. Imaging of Neurodegenerative Disorders. Thieme (in press)
- **La C**, Young BM., Garcia-Ramos C, Nair VA, Prabhakaran V. Chapter 20: Characterizing Recovery of the Human Brain following Stroke: Evidence from fMRI Studies. Imaging the Human Brain in Health and Disease. Elsevier 2014.

- Prabhakaran V, Nair VA, Austin BP, **La C**, Gallagher TA, Wu Y, McLaren DG, Xu G, Turski P, Rowley H. Current status and future perspective of magnetic resonance high-field imaging. Neuroimaging Clinics of N. America. Vol 22. Num 2. May 2012.

Invited Oral Presentations:

- **La C**. Implication of Slow-5 Oscillations in Network Disruption in Aging & Stroke (NTP Seminar Series. September 14, 2015)
- **La C**. Disruption of the Intrinsic Low-Frequency Oscillations (LFOs) in Aging & Stroke (Memory and Aging Center, UCSF, Suzee Lee MD & William Seeley MD – August 28th 2015)
- **La C**. Disruption of the Intrinsic Low-Frequency Oscillations (LFOs) in Aging & Stroke (Poston Lab, Stanford University, Kathleen Poston MD, MS – August 27th 2015)
- **La C**. Disruption of the Intrinsic Low-Frequency Oscillations (LFOs) in Aging & Stroke (Center for Vital Longevity, UT Dallas, Denise Park PhD – July 30th 2015)
- **La C**. Category Representation in the Brain. (NTP Seminar Series. November 3rd 2014)
- Gupta J, Young BM, La C, Reiter P, et al. Localized Gray Matter Changes in Acute Stroke. O-502. (ASNR2013)
- **La C**. TMS: a Powerful Tool for the Investigation of the Human Neurosciences. (NTP Seminar Series. March 12th 2012)

Poster Presentations:

- **La C**, Mossahebi P, Nair VA, Birn R., Sattin J, Chacon M, Jensen M, Meyerand EM, Prabhakaran V. Characteristics of Low-Frequency Oscillations in the impairment of the DMN in the Elderly and Ischemic Stroke Patients. Poster 76B. (RSBC2014)
- **La C**, Mossahebi P, Nair VA, Sattin J, Chacon M, Jensen M, Meyerand EM, Prabhakaran V. Low-frequency fluctuation characteristics of the DMN components in aging and ischemic stroke. Poster 1736. (OHBM2014)
- **La C**, Garcia-Ramos C, Meiers TB, Nair VA, Meyerand EM, Edwards D, Prabhakaran V. Age-related network re-organization during phonemic Verbal Fluency task. Poster 4365. (OHBM2014)
- **La C**, Mossahebi P, Nair VA, Sattin J, Chacon M, Jensen M, Meyerand EM, Prabhakaran V. Differential distribution of low-frequency fluctuations in the elderly and stroke population contributing to the deterioration of the default-mode network. Poster 27A. (WARF Discovery Challenge Symposium 2014)
- **La C**, Garcia-Ramos C, Meiers TB, Nair VA, Meyerand EM, Edwards D, Prabhakaran V. Age-related cortical network restructuring during phonemic Verbal Fluency task. Poster 27B. (WARF Discovery Challenge Symposium 2014)
- **La C**, Mossahebi P, Nair VA, Sattin J, Chacon M, Jensen M, Meyerand EM, Prabhakaran V. Differential Effect of Aging and Ischemia on Low-Frequency Fluctuations of the DMN. Poster 21. (Alzheimer's Research Day 2014)
- **La C**, Garcia-Ramos C, Meiers TB, Nair VA, Meyerand EM, Edwards D, Prabhakaran V. Age-Related Cortical Network Restructuring in Phonemic Verbal Fluency task. Poster 22. (Alzheimer's Research Day 2014)
- Nair VA, **La C**, Young BM, Andreoli M, Jensen M, Chacon M, Sattin JA, Prabhakaran V. Task-fMRI based functional connectivity in Acute Stroke patients with and without motor impairments. P18.P45. (ISC2014)
- Song J, Nair VA, **La C**, Sattin JA, Prabhakaran V. Asymmetrical Fractional Anisotropy (FA) correlates with Verbal Fluency task performance at different stages Post-Stroke. (ISC2014)
- Young BM, Nair VA, **La C**, Gupta J, et al. Regional Specific Cortical Thickness Differences in Acute Stroke. (ASNR2013)
- Gupta J, Nair VA, **La C**, Jensen M, Chacon M, Sattin ., Prabhakaran V. Localized Gray Matter Changes in Acute Stroke. P05.244. (AAN2013)
- **La C**, Nair VA, Sattin JA, Jensen M, Chacon M, Meyerand ME, Prabhakaran V. Brain Areas Affected by Severity of Vascular Disease as Characterized by fMRI measure. TP44. (ISC2013)

- Nair VA, **La C**, Song J, Reiter P, Nadkarni T, Jensen M, Chacon M, Sattin JA, Prabhakaran V. Resting State Functional MR Connectivity in Acute and Sub-Acute Stroke. TP31. (ISC2013)
- Nair VA, **La C**, Nadkarni T, Reiter P, Chacon M, Jensen M, Sattin J.A, Prabhakaran V, Functional Recovery in Stroke: Performance on Verbal Fluency Task. TP50. (ISC2013)
- Song J, Nair VA, **La C**, Jensen M, Chacon M, Sattin JA, Prabhakaran V. Brain Plasticity Changes in Default Mode Network after Stroke. TP42. (ISC2013)
- **La C**, Nair VA, Zeng H, Sattin JA, Meyerand ME, Prabhakaran V. Regional Homogeneity after acute ischemic stroke using resting state fMRI. Poster 251.01. (SfN2012)
- Zeng H, Pizarro R, Nair VA**, La C**, Prabhakaran V. Altered regional homogeneity in mesial temporal lobe epilepsy patients with hippocampal sclerosis. Poster 160.22. (SfN2012)
- Yoon JH, Larson P, Grandelis A, **La C**, Soosman S, Minzenberg M. A novel high resolution fMRI method to measure substantia nigra pars function reveals up-regulation of its activity during cognitive control. Poster 195.03. (SfN2012)
- **La C**, Nair VA, Zeng H, Sattin JA, Meyerand ME, Prabhakaran V. Resting State Functional Connectivity and Spontaneous BOLD Fluctuation Disturbed in Stoke Patient. Poster 132. (OHBM2012)
- Chen A, **La C**, Thompson T, Dissociable Effects of Attention Practice on Prefrontal and Visual Cortex Activity. Poster G-29. (CNS2006)

LANGUAGE

- ❖ Native in: French & Chinese-Cantonese
- ❖ Fluent in: English & Chinese-Mandarin

TEACHING EXPERIENCE

- Delta Certificate in Research, Teaching, and Learning—Summer 2015
- Teaching Fellows in Neuroscience (TFN)—Spring 2015
- Teaching Assistant, NTP675-Functional Brain Imaging of Cognitive Disorders, Univ. of Wisconsin-Madison—Fall 2014
- Instructor in Neurosciences, 3-week PEOPLE program, Univ. of Wisconsin-Madison—Summer 2014
- Instructor in Neurosciences, 3-week PEOPLE program, Univ. of Wisconsin-Madison—Summer 2013
- Tutor and Academic Mentor, Math & Sciences Upward Bound, Pasadena City College—(Nov 2001-Jun 2003)
- Teaching Assistant, CHEM1A-General Chemistry, Sacramento City College—Spring 2001

LEADERSHIP EXPERIENCE

- ❖ Delta Graduate Student Representative (2014-2015)
- ❖ NTP Recruiting Committee (2014-2015)
- ❖ NTP Steering Committee (2013-2014)