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## STUDENTS

# Using Neuroscience and Positive Psychology to Enhance College Teaching and Learning

*Yvette M. Alex-Assensoh*

Anxiety is a silent obstacle limiting many college students' ability to thrive. Nearly three out of four college students experience overwhelming anxiety. In wake of the COVID-19 pandemic, a recent study found that 80 percent of United States' students reported negative mental health effects. As educators, we cannot simply sit back, watch our students suffer and hope things will eventually get better. We must be proactive.

L.A.C.E.—love, authenticity, courage and empathy—is a comprehensive approach that can address a wide variety of threats, fears and anxieties that students face. At the center of this approach, which I developed to improve the overall climate on my campus, is an understanding that universities are not ends to themselves but mechanisms to educate and create better societies. L.A.C.E. empowers college teachers and students to co-create successful learning environments and a sense of belonging for everyone.

## Scientific Foundations of L.A.C.E.

L.A.C.E. is strongly based in scientific research. Social neuroscience research shows that when students feel threatened or fearful, their brains focus on that fear rather than learning (Steimer, 2002; Steele, 2010). In fact, students' fears about stereotyping, anxiety, their relative status, sense of belonging, autonomy and fairness (Rock, 2008) reach the amygdala hundreds of milliseconds before other parts of the brain can process them. This puts the brain in survival mode (Arnsten, 1998).

Further research demonstrates the beneficial impact of positive emotions on the human brain (Davidson, 1992; Urry et al, 2004; Machado & Cantilino, 2017), including increased dopamine levels and positive changes in cognition, especially when people are in positive moods (Ashby, Isen & Turken, 1999). Specifically, positive emotions loosen the hold of negative


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ones, while building resilience (Fredrickson & Levenson, 1998).

Social neuroscience also helps us better understand the correlation between faculty mindsets and racial achievement gaps in science courses. This scholarship (Canning, Muenks, Green & Murphy, 2019) incorporates building a sense of belonging into the learning process (Binning, 2019) to undo emotional and disciplinary obstacles (Middendorf & Shopkow, 2018). Furthermore, it sets the stage for deeper exploration into how to better leverage the neural processes in ways that create more expansive, connected and transformational learning experiences. This is where L.A.C.E. comes in.

In L.A.C.E., love is wholehearted and selfless concern about the welfare of others. Authenticity is self-awareness and aligning personal values with behavior. Courage is *being* who we are afraid to be and *doing* what we are afraid to do. Empathy is recognizing that someone else's emotions and experiences have value too. More specifically, it's the ability to be present with and hold space for the emotions and experiences of others, even when we don't understand or agree with them.

These concepts provide the foundation for college teachers to reflect on and apply the approach to themselves before modeling it for students. From there, they can use L.A.C.E. in the classroom, resulting in more holistic course descriptions, syllabi, assessments, reading materials, buddy systems, group projects, class codes and other resources.

## In Classroom Teaching and Learning

L.A.C.E. situates the course description and syllabus as early opportunities for college teachers to express love for the subject as well as their students. This helps to strike the right tone and models L.A.C.E. over the term and beyond. For example, in a homework assignment during the first week of class, students were asked to describe how college teachers can demonstrate love in the classroom. A biology major offered that college teachers express love for their students when they are "welcoming and excited for what each individual student brings to the group. It could take the form of encouragement and a positive attitude, or honesty and constructive criticism" (Barton, 2020). Ultimately, this assures students that faculty and peers are holding space to support intellectual and personal growth.

> L.A.C.E. provides the opportunity for the connection and deliberative democracy we desperately need.

L.A.C.E. also encourages faculty to develop authentic evaluation, which brings the "messy, complicated situations to the surface, and ask[s] students to apply what they have learned [to address] them" (Wiggins, 1998). It compels students to consider how their learning resonates with the world around them, including civic and social life.

## A Tool for Constructive Learning

L.A.C.E. is an incredibly effective tool for sparking cognition, which is important when students are encountering new information. Every faculty member and student has either given or received love, authenticity, courage and empathy in their lives. That is why L.A.C.E. invites students to practice this approach as individuals, so that they can build mental muscle and apply the principles to themselves and others.

For example, my co-instructor and I asked students to explore the concept of African political leadership through the lens of empathy. Students were asked to think and write about what it will take for them to expand the borders of their personal "circles of concern."

A junior studying media offered the following reflection: "On a


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broader scale, I have noticed that for some complicated political issues, even if they involve life or death situations, I avoid learning about them despite knowing there are thousands of victims worthy of empathy…I'd like to change the mindset of avoiding what I don't understand…I'm going to stop being scared off by complicated politics…" (Novella, 2020).

L.A.C.E. positions college teachers and students to co-create an environment for discovery, curiosity and awareness. According to one student, "I believe the components of L.A.C.E. have specifically helped with community building, class discussions toward growth and community and new connections within the actual class material" (Burian, 2020).

As educators, we must prioritize individual and community wellbeing. In a world where reaching out across social boundaries is increasingly rare, L.A.C.E. provides the opportunity for the connection and deliberative democracy we desperately need. ❖

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**ACTIVE LEARNING**

# ALPHA: Active Learning Platform for Hands-on Antenna Designing

*Ashanthi Maxworth*

Last year, I developed a course creatively named "ALPHA: Active Learning Platform for Hands-on Antenna Designing," at the University of Southern Maine, for fourth-year engineering undergraduates. The course covers the concepts of electromagnetic wave propagation through a medium, how to design an electrical antenna to receive those electromagnetic waves, the different types of antennas and how we can design an antenna for a new application, such as measuring the blood glucose level.

My goal was to give students insight into practical applications. Very soon, I realized there is not enough in-class time to guide them through applications. Therefore, I introduced an online component to supplement the face-to-face instructions. My structure for ALPHA integrated concepts and applications efficiently to better prepare my students for the real world.

Having an online component integrated into the course from the beginning helped students to adapt quickly to the online pivot due to the pandemic. When the course needed to be fully taught online, there were few changes to make and less "new normal" for students to get used to. Once a course is designed to be similar to ALPHA, it can be pandemic proof.

Based on my discipline this course is designed for STEM majors, but the concepts of ALPHA are universal.

The first step is identifying the challenges for your individual course. Every instructor faces different challenges while teaching a course. For me, there are two:

- **Mathematical complexity.** This course and the other courses that I teach in engineering are highly mathematical. Based on my previous experiences, even mathematically sound students struggle at the beginning of these courses.
- **Visualizing.** In this course, we cover very theoretical concepts, such as how electromagnetic waves radiate from an antenna. Students need to visualize this process, which is not an easy task.

I designed the course to assist students in overcoming common challenges and rely upon multiple evidence-based practice methods: team-based learning, virtual experimentation, real experimentation, supplemented learning and problem-based learning. These methods inform the three main components of ALPHA: face-to-face, virtual and hands-on.

## Face-to-face

This component includes the instructor and 10 peer leaders and is grounded in team-based learning. Each peer leader heads up a group of three students. At the beginning of each semester, I select peer leaders based on their previous scholarship, service and leadership record.