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Teaching statement

I believe people are a culmination of their experiences, and each day is a new rendition of themselves. My teaching philosophy follows this model. I concentrate on nurturing students' mental and physical needs, employ effective teaching methods, and constantly adapt to the learning environment.

Quality mentorship

Navigating the unfamiliar terrain of higher education can be a daunting task filled with confusion, uncertainty, new responsibilities, and unknown expectations. These elements confounded me when I first started at Western Michigan University as an undergraduate. The entirety of the advice passed down to me could fit on one line: pick a major that will get you a job, attend lectures, and do well on exams. I had no actionable advice on how to approach those objectives.

Only when I met Dr. Brian Young, my undergraduate mentor, did I stop stumbling around in my education. He treated students not as products the university churns out but as growing individuals who need guidance and mentorship. For example, during his bioprocess engineering class, he asked me if I was familiar with the Louis Stokes Alliances for Minority Participation (LSAMP) program. I was not, but he saw potential and encouraged me to apply with his help.

What followed that conversation were two years of mentorship that illuminated the transformative potential of higher education. My experience with Dr. Young put me on a path where I can repay his investment and provide mentorship and guidance for others. Students often need to be made aware of the available resources and possibilities. They do not have to take every opportunity offered, but I want to ensure they are prepared for the right opportunity when it presents itself. Hence, I tailor my mentoring to the unique level of each student and emphasize being welcoming, compassionate, and patient.

Sense of belonging and cultural capital

Worthwhile teaching is more than disseminating knowledge and skills to students. Students must feel safe, welcome, and valued to thrive in higher education.[1] One personal example was during my general education art class at Western Michigan University. The instructor, Jim Hopfensperger, learned through an introductory questionnaire that I had no previous experience with drawing or painting. He instructed us to use our non-dominant hand so everyone was at a similar disadvantage. This small gesture helped me feel welcomed in a foreign environment as a STEM major.

These ideas touch on the students' need to feel a sense of belonging, which is their perceived social support, acceptance, and value to the higher education community. I use a two-layer approach to foster a sense of belonging. The first layer is broadly building both professional and personal relationships with students. This includes hosting office hours in common areas where they feel comfortable, chatting with students before and after class, and directing students to cultural navigators. The second layer of my approach involves using different approaches and amounts of assistance based on the individual needs of each student. I always pay attention to subtle behavior and work habit changes to identify which students I should reach out to.

Part of providing individualized resources to students is being aware of their cultural capital, which is the knowledge, skills, and behaviors inherited from their family's status.[2] This is important because students who lack significant cultural capital have difficulty succeeding in higher education and require additional resources.

I first identify common missing cultural capital at the start of each course and provide additional materials to improve academic literacy to the whole class instead of singling out a group of students. Some resources include training for computer literacy and web-based learning management systems, detailed guidelines for writing, and awareness of campus resources. These approaches will improve the struggling student's grit and, ultimately, their success.[3]

The discussion above explains why effective teaching is important and fulfilling to me. Education is one of the most potent factors for social mobility,[4] and I have experienced this firsthand with my grandfather being a Mexican migrant worker in Dimmitt, Texas. Students who could benefit the most from higher education tend to have the least resources for success. I want to ensure that the opportunities I have afforded are available to those behind me.

Employing constructivism

Literature asserts that long-term learning optimally occurs in the learner's zone of proximal development.[5] In other words, new information is more frequently stored in long-term memory when they can incrementally build upon their knowledge and experience. This, in turn, avoids surprises that disrupt the learning process. Constructivism guides my teaching style in two ways. First, I must be continually aware of what each learner can confidently do without assistance. For example, I would want to know the extent of their Python experience for a computational modeling and simulation course. I plan on giving students no-risk assessments to gauge their prior knowledge.

Second, I explicitly write meaningful learning objectives derived from overarching course objectives. I can then create a scaffold upon the knowledge foundation that guides students to the desired outcomes. I must be aware of potential cognitive biases (e.g., the curse of knowledge)[6] and maintain an appropriate amount of guidance to avoid making the scaffold too distant (i.e., not enough support where necessary). I will accomplish this by anticipating errors and keeping my scaffold flexible if unexpected difficulties arise. For example, students often had difficulty understanding how to compute expectation values from partition functions when I was a teaching assistant for graduate thermodynamics. In response, I started my next office hours with a worked-out example using a magnetically weighted die to explain each magnet's strength as the energetic weighting factor of a partition function.

Active learning

It is well established that true learning results from doing things and reflecting, not passively absorbing information through lectures.[7] The key to success with active learning is to pair it with the above two sections: make it relatable and purposeful. I used this extensively in my INVESTING NOW course with high school students (e.g., building a water filter using rocks and sand). Students learn by practicing, receiving feedback, and reflecting. A real-world, overarching project with periodic due dates can also promote long-term retention of core class materials. For example, Dr. Karl Johnson and I used class projects in graduate thermodynamics to connect core concepts to a real research problem.

Employing only a few active learning strategies at a time is essential to maintain their effectiveness. One of my favorites is brain dumps; at the end of class, I ask them to write everything they learned or need clarification about a topic we covered and compare it with other students. This helps gauge what material I should clarify at the beginning of the following lecture. For example, during a lecture in graduate thermodynamics about the van der Waals mixture partition function, I solicited three brain dumps about some key takeaways they had just learned.

Scholar-practitioner

As with many fields, best practices for teaching are continuously changing. Unfortunately, formal training in pedagogy is rare in STEM degrees, and it is up to the individual to seek resources and feedback. For the past few years, I have embraced the scholar-practitioner mindset where I have sought guidance from inspiring educators in my field. When offered the instructor position for INVESTING NOW, I was directed to our Undergraduate Academic Advising Manager, Emily Kerr, who introduced me to pedagogy and mentored me while preparing for the new course. I have further sought additional guidance from Professors in chemical engineering, such as Dr. Karl Johnson, Dr. Tarn Bayles, and Dr. Joaquin Rodriguez. These resources have been invaluable for developing my teaching philosophy and confidence in the classroom. I will continue seeking mentors and working toward my Center for the Integration of Research, Teaching, and Learning (CIRTL) certifications.

Furthermore, I will continue to be aware of what skills employers and academic disciplines desire in candidates. The landscape is constantly changing, and students should obtain the necessary skills and capability to be competitive in the job market. For example, Python is great for general programming and machine learning, but R is heavily used in bioinformatics. Both should be taught in courses while developing complementary project portfolios online (e.g., GitHub) to showcase transferable technical skills.

References

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