Ideological Stance

My Ideological Stance in Science/Physics education

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Literacy, ***Resilience*** and ***Authenticity*** are the three key concepts of the philosophies that guide my teaching practices.

Literacy Stance

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Literacy does not sound like a pedagogical stance, but to foster a literate adult is the whole world for me as a teacher candidate. For students in our community, teachers are the role models of being educated and literate. To foster literacy development, educators should reflect on ourselves whether we demonstrate accountabilities to be a literate adult.

As a future teacher, I envision myself to be a coach to facilitate classroom literacy practices, an advocate to explore the essence of literacy of the era, and a model of being literate.

Story

Before referring to learning theories, I begin to rationalize my stance by a quote from Confucius, "Among really educated men, there is no caste or race-distinction."

Rationale

Among many interpretations behind this famous quote, I would decipher the "no caste and race-distinction" as being ***literate*** means that we ***foster an empathetic and self-reflective mindset*** to appreciate the "complexities of identities(Oakes et al., 2018, p.13)", validate and embrace every individual's funds of knowledge. Gay(2018) also pointed out, "diversity is a productive resource(p.172)" and teachers should use them in the teaching practices. Such practices not only showed promising academic results, but also encouraged these minority students to gain self-esteem, embrace their heritages, and parents to be more involved.

Implementation Plan

As an educator, I enact this philosophy to facilitate ***an equitable learning environment*** that everybody will have the chance to learn and become literate. I will appreciate the funds of knowledge the students bring into the classroom and make the best of them. For example, I will proactively assess learners' FOK using the KWL chart (Grant et al., 2015) and use the results to incorporate authentic activities that are closely connected with the students' daily lives. The physics textbook is historically Eurocentric filled with names like Newton, Galileo, Kepler, etc. However, not just the formulas named after these great Physicists are physics, the Mayan pyramids are, cencerro and laud, two Hispanic musical instruments, are rich Physics resources as well.

I will also write teaching journals to critically examine the unreasonable assumptions of my students. A Spanish subtitle might not help the Latino/Latinx students understand the content at all if they have not learned the vocabulary in Spanish. Instead, I would keep in mind that there is no single way to construct the meanings, to make sense of content, and to present the big ideas.

One strategy I have been working on during the student teaching and will continue applying in my future teaching is to take notes of how students explain the content to each other. By assessing the student sense-making process, this strategy provides evidence of the student's current knowledge and cues to bridge the gap between the prior knowledge and what is written in the curriculum.

Resilience Stance

Resilience Stance

Scientists seem like the experts to upset the general public, especially at this moment that we are so desperate to discover a medication or a vaccine of COVID-19. The history of Science consistently reassures that it takes a long time and generations to get closer to the essence of nature and it seems that modern Science has never reached the real truth.

As a Science teacher, I strive to become a resilient, effective educator to foster resilient learners to be able to adapt to the uncertain future.

Story

I began to think of building resilience in my Physics class from the idea of thinking like a scientist. Many times when I asked a challenging question in my student teaching, I found that many students instantly responded to me that they had no idea. Or other cases, if they created a claim and I replied with a question, some of them lost the confidence to defend their ideas.

Rationale

However, ***scientists form and revise their theories through iterative cycles of scientific investigations together with asking and answering scientific questions*** (Zygouris-Coe, 2014). Zygouris-Coe (2014) stated, "Students need to experience science as a living, ongoing, exciting and highly relevant body of knowledge and process of making sense of the world(p.44)." In a rapidly changing society, cultivating resilience through scientific practices will prepare our students to acquire flexibility, critical thinking, and courage to get through the uncertainties. A science class that expects failures and difficulties is also an ideal place to cultivate resilience if the teacher can facilitate an open-minded environment. In such a classroom, students will learn to appreciate rather than blame the mistakes and form a deeper understanding. This applies the social cognitive theory that the environment will affect the student's behavior and cognition(Ormrods, 2014). They will internalize the positive feedback from their peers and the teacher to establish self-esteem and self-motivation. From the teacher's perspective, the idea to build resilience means that I will dynamically assess my students' zone of proximal development(ZPD) and figure out the appropriate challenge to allow a gradual release autonomy(Vygotsky, 1978).

Implementation Plan

Fostering resilience guides my planning of lessons. I will first identify the big ideas that are worth teaching and eliminate the scientific facts/terms that "don't cohere into a bigger picture for learners(Windschitl et al., 2018, p.19)". In this way, students will not get lost in memorizing irrelevant concepts. Instead, they will have more opportunities to explore complex and puzzling core scientific ideas in meaningful ways.
After selecting the big science ideas, I will apply the Three-Tier Model to sort the vocabulary and plan the instructions (Zygouris-Coe, 2014, p.141). In everyday instruction, I will maintain a stable discourse of using Tier one vocabulary to lower the affective filter of English learners(Krashen, 1982). ELs may feel frustrated if the instructor shifts the usage of vocabulary frequently, while a stable discourse will allow them to anticipate what is going on in the classroom and be more willing to participate. For Tier Two vocabulary, I will check their prior knowledge to decide whether to teach them explicitly and keep the consistency with their other Science and Math teachers. For Tier Three, key content area vocabulary, I will provide tiered reading materials, graphic organizers, such as the Frayer Model(Windschitl et al., 2018), to promote students to construct their understanding.
To scaffold students to construct meanings of scientific theories, I will elicit their science talks using scientific modeling(Windschitl et al., 2018, p.111). At the beginning of each unit, students will generate an initial model of an anchoring scientific phenomenon based on their prior knowledge. They will process their idea, revise their model, review, and evaluate their theories throughout the unit. They will also establish resilience by proactively responding to peer feedback and teacher's back-pocket questions. By engaging students in scientific modeling, all students will have the opportunities to engage in content learning, scientific discourse plus writing with appropriate differentiation. Language learners can formulate their ideas and demonstrate their understandings using multimodal platforms. They can acquire disciplinary language by communicating with their peers through modeling activities. Gifted and high-performing students can be challenged by requesting more details or mathematical representations to clarify the modeling. I can chunk the bigger picture into different components and provide templates for students with learning disabilities to summarize the data and ideas. With all differentiations, the scientific model will help me maintain the high expectations of content learning because it reflects higher cognitive demand through explaining, designing, evaluating the models(Windschitl et al., 2018, p.53).

Authenticity Stance

Authenticity Stance

The word "authentic" connects to many big ideas in teaching. Authentic caring(Valenzuela, 1999) is a reciprocal and humane process that the teachers care about their students as independent individuals, not learning machines. Authentic assessments(Heineke & McTighe, 2018) are assessments that are embedded in contexts and provide evidence of student mastery of both knowledge and skills. Authentic learning is an instructional strategy to empower students to discover and solve real-world problems.

As a Science teacher, I will always keep the word "authenticity" in my mind to empower all students to enact the roles of scientists and scientifically literate citizens to solve real-world challenges.

Story

A few weeks ago, our science cohorts were discussing how difficult it was to request students to write a complete lab report. After the discussion, I asked myself why we requested students to write a lab report. Then, I did an anecdotal data collection with

my researcher friends on social media, asking, "what was the thing that benefited you the most in the researcher career to write a lab report in high school or college?" Surprisingly, many of these young scientists, they did not like to write lab reports. The top-ranking reasons are

- "it is boring since we already know the answers/results"
- "We just followed the procedure the teachers provided, not designed by ourselves."

But many of them also mentioned that error analysis in the lab report was the most significant thing that helped develop critical thinking and abilities to find the root cause.
Simply put, science classrooms can be extremely boring if the learning activites are inauthentic.

Rationale

To know how to read, write, and talk about science means that you are enabled as an active participant in establishing and maintaining communities that are healthy, productive, and sustainable.

(Grant et al, 2015, p.15)

A scientifically literate person demonstrates a deep understanding of big ideas across the disciplines and the maturity of Science and Engineering practices(Grant et al., 2015). Students will not only memorize Newton's Laws of Motion and solve the word problems, but also they will learn how to interpret the data and derive the mathematical representations. Authentic learning activities will engage students with authentic reading materials and writing tasks that they can learn to "obtain, evaluate and communicate information(Next Generation Science Standards, 2013)." These authentic practices will foster the college and career readiness of our students for the abilities to "research, identify and use appropriate strategies and methods(Zygouris-Coe, 2014, p.333)" to communicate. Enacting authentic learning experience also employs the constructivism theory that students make sense of content by actively constructing meanings through authentic science and engineering practices(Ormords, 2014).

Implementation Plan

My implementation plan to enact this theory begins with "Not to Dos." I will not water down materials or simply practice and drill to reach pure automaticity without understanding the meaning. Instead, I will promote science learning by doing science. The first aspect of doing science is to carry out investigations to explore scientific theories rather than verify the theories. Every semester, I will make sure that students have at least one opportunity to conduct investigations based on their own questions and their designs. Before that, I will gradually introduce each component of scientific investigations and offer opportunities to practice the investigations to build background knowledge for all students. The second aspect is to read authentic scientific journals and interpret data. I will regularly select latest journals and articles that are connected to the curriculum. I will model the think-aloud for students and teach the grammatical features of scientific articles. For students who have special learning needs, I will also create note-taking templates and text-dependent questions to help them organize their idea(Grant et al., 2015). The third aspect is to expand the type of written tasks and shift the focal point from the completion of the procedure to the analysis and explanation. I will introduce the Toulmin's model(2003) to scaffold students to organize evidence and claims. I will also incorporate quick writings to allow language learners to draft their idea without the concern of grammatical errors (Zygouris-Coe, 2014, p.355).

Closing Reflection

Science or Art of Teaching

When I first saw this question, my intuition was questioning the assumptions of the question itself. Why Science and Art are two dissimilar things? Both Science and Arts are the co-constructed artifacts by all human-beings to describe, interpret, predict the world. When we try to say that I am more for the Science of the teaching or Art of the teaching, we might fall into the fallacy of man-made polarization and even worse, employ this polarization as an excuse of division and antagonism. Admittedly, learning theories and pedagogical strategies seem to offer us a world of "Science" with rationales and evidence. However, we should never forget that teaching is human interaction, emotional, empathetical, and empirical.
After years of science and engineering training, I admit that my overly developed pattern thinking nerves incline to look for the data, claims, rationales when I attempt to apply some strategy. I will not get rid of it, neither. But, it is Art of teaching that motivates me to continue making a difference even after knowing the cruelties of reality.

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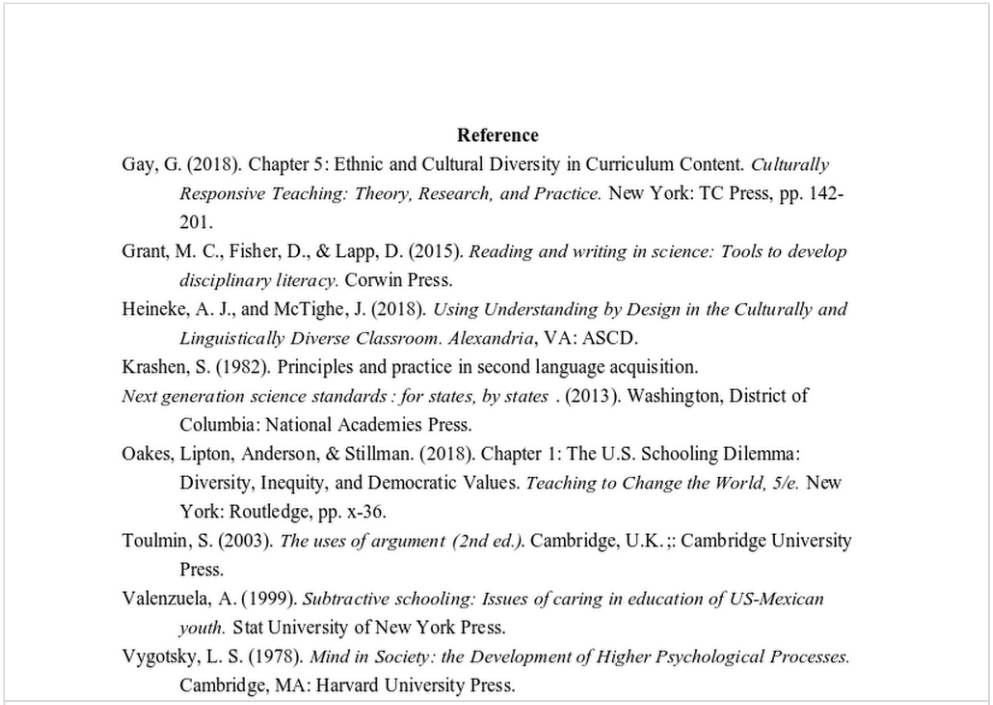

Reference

Gay, G. (2018). Chapter 5: Ethnic and Cultural Diversity in Curriculum Content. *Culturally Responsive Teaching: Theory, Research, and Practice.* New York: TC Press, pp. 142-201.

Grant, M. C., Fisher, D., & Lapp, D. (2015). *Reading and writing in science: Tools to develop disciplinary literacy.* Corwin Press.

Heineke, A. J., and McTighe, J. (2018). *Using Understanding by Design in the Culturally and Linguistically Diverse Classroom. Alexandria*, VA: ASCD.

Krashen, S. (1982). Principles and practice in second language acquisition.

Next generation science standards : for states, by states . (2013). Washington, District of Columbia: National Academies Press.

Oakes, Lipton, Anderson, & Stillman. (2018). Chapter 1: The U.S. Schooling Dilemma: Diversity, Inequity, and Democratic Values. *Teaching to Change the World, 5/e.* New York: Routledge, pp. x-36.

Toulmin, S. (2003). *The uses of argument (2nd ed.).* Cambridge, U.K. ;: Cambridge University Press.

Valenzuela, A. (1999). *Subtractive schooling: Issues of caring in education of US-Mexican youth.* Stat University of New York Press.

Vygotsky, L. S. (1978). *Mind in Society: the Development of Higher Psychological Processes.* Cambridge, MA: Harvard University Press.

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Word document

PADLET DRIVE

> ***May you return with a young heart after years of fighting.***

Beyond

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