

How The Scientific Method Inspired My Teaching Approach

As scientists, we are continuously learning how to understand the world around us. We observe, collect data, ask questions, analyze the answers, look from different perspectives, create new scientific advances and constantly seek new challenges. We use the scientific method to tackle new research questions and; this methodology has also influenced and inspired my teaching approach. As a teacher, I look at the world around us, thinking about what piece of information will help my students to understand the new concepts that I will deliver in the next lesson.

As a scientist, I always ask a question and formulate a hypothesis before carrying out an experiment. As a teacher, I state the learning objectives at the beginning of the lesson to help the students maintain a clear target during the lesson. I write the learning objectives on the blackboard, introduce them to the class and revisit them at the end of the lesson. Setting the learning objectives creates the foundation of the student's intellectual development. The students gain a vast understanding of the specific aims which help them to construct a solid knowledge between the different topics covered in the course.

As a researcher, I test a hypothesis and analyze the data. As a teacher, I assess my student's learning and reflect on my teaching strategy using classroom assessment techniques such as the minute paper and the muddiest point. I ask my students to write a brief response to questions such as: "What is the most important concept you learned during this lecture?" or "What is the muddiest point of the homework?". Those simple and non-graded activities provide me with useful feedback on the teaching-learning process occurring in the class and encourage the students to monitor their own learning.

As a scientist, I stay current with the forefront of scientific advances. As a teacher, I enjoy creating innovative lectures where my students are up to date. I include recent literature searches related to the topic of the class, to connect my students with cutting-edge advances. I also use examples to link the course contents with real life situations. In my Thermodynamics course, I taught my students how the change in the boiling point of water at different atmospheric pressures, described by the Claysius-Clapeyron equation, can affect the taste of a cup of tea prepared at the top of the Everest or prepared in Chicago. At higher altitude, the water boils at lower temperature due to lower atmospheric pressure, making a difference in the tea brewing time, and affecting the flavor.

As a scientist, I draw conclusions from the collected data and analyze it to test the hypothesis. During graduate school, I presented my experimental progress in weekly lab meetings. These presentations were very fruitful to measure my progress. Organizing my findings, presenting and discussing them with my lab mates, developed my critical thinking and make me progress more quickly in my project. As a teacher, I use discussion strategies during my lessons. The group

answers technique is a guided discussion, which allows everybody in the class to participate at the same time by forming small groups. Each group discusses the proposed question, and develops its answer. Randomly, I pick one of the groups to present to the class. Then, I can keep the discussion of each question going longer, by asking another group to compare its answer with the one just presented. These guided discussions are introduced into my class to engage the student's interest, further the student's understanding and develop the student's critical thinking.

As a researcher, I disseminate my research findings to translate the knowledge into effective communication tools. As an educator, I embrace the communication and writing skills of my students. For example, by preparing a mock conference where the students have to write an abstract and present a topic in front of the class. This activity will afford students a better understanding of the topic and potentially impact their own future work environment as well as reinforce the important writing skills in science.

As a scientist, I make collaborations with other researchers to expand my knowledge and create an interdisciplinary scientific approach. As a teacher, I encourage collaborative learning in class to develop a higher-level of thinking and to expose the students to diverse perspectives. I use group activities such as catch-up, where the teacher pauses the lesson and allows the students to compare notes and ask clarifying questions. Cooperative learning exercises allow the students to state their own views, try new solving techniques ("should we try this?") and practice their argumentative skills.

Being a scientist has influenced my teaching effectiveness and inspired me as an educator. Like in an experiment that follows the scientific method, I teach a course as an ongoing process of questioning and testing if the students are learning well. As a scientist, I want to encourage my students to go into STEM fields and show them how these disciplines can impact society and our lives. As a teacher, I want to instill the creativity and the resilience that researchers have; to prepare them for real life social and employment situations.