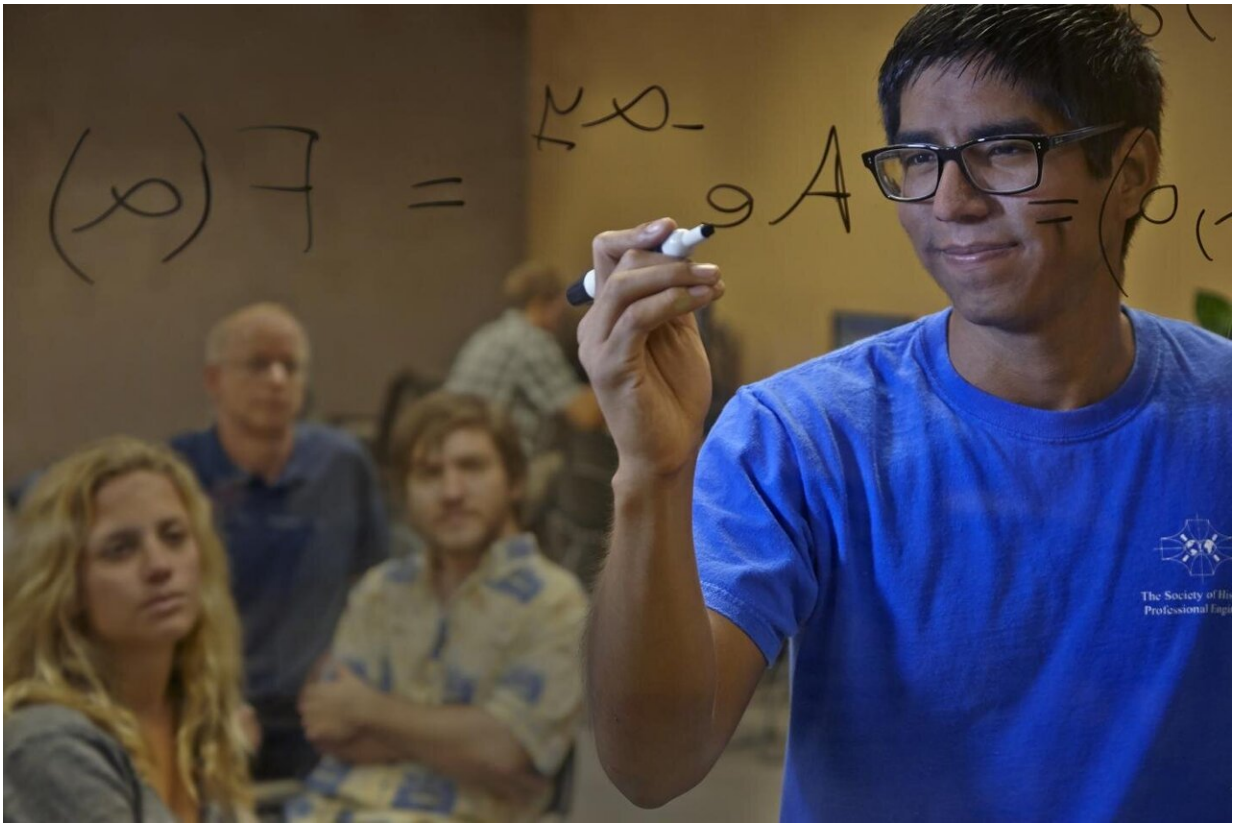
In response to Stephen Colbert, professor says 'spice it up'

February 17 2021



In one of his courses, Dr. Isaac Elishakoff conducts a simple test to check the knowledge retained by his students from differential equations. It turns out that most never got the subject and only one or two students could solve simple differential equations. Credit: Florida Atlantic University

To provoke more interest and excitement for students and lecturers

alike, a professor from Florida Atlantic University's College of Engineering and Computer Science is spicing up the study of complex differential mathematical equations using relevant history of algebra. In a paper published in the *Journal of Humanistic Mathematics*, Isaac Elishakoff, Ph.D., provides a refreshing perspective and a special "shout out" to Stephen Colbert, comedian and host of CBS's The Late Show with Stephen Colbert. His motivation? Colbert previously referred to mathematical equations as the devil's sentences and an unnatural commingling of letters and numbers—with the worst being the quadratic equation—an infernal salad of numbers, letters and symbols.

In response to Colbert's hilarious and satirical observations of mathematical equations, Elishakoff, lead author and a distinguished research professor in the Department of Ocean and Mechanical Engineering, suggests that mathematics education needs to be enlivened so that students will recognize that this discipline is not merely a necessary evil, but a vibrant, exciting and fascinating subject.

"Of course we know that Stephen Colbert was joking. However, as an avid fan of his show and a reader of his book, we have heard that 90 percent of every joke is truth—or 'truthiness'—a term ingeniously coined by Colbert himself," said Elishakoff. "One means of eliminating boredom and apathy in the classroom is presentation of mathematics in its historical context."

All joking aside, Elishakoff says that introducing the elements of history into the classroom will make the experience more meaningful and lively to encourage a deeper learning experience. In particular, history of differential equations will show students that not unlike themselves, famous mathematicians also have made mistakes. History also helps students see clearly that what seemed "impossible" to a great mathematician is now quite possible and straightforward.

"Building on the mistakes, confusions, and frustrations of mathematicians sensitizes both students and teachers," said Elishakoff. "Another potential benefit of using history of mathematics lies in sensitizing the teacher to possible difficulties of students' understanding; and may yield clues on how to respond and help the student overcome these obstacles. In addition, history can provide a feeling, for example, for how standards of rigor evolved."

In his research, Elishakoff views mathematics of the past as common heritage and values its serious study for its own sake. However when teaching mathematics, the history coming into the classroom is often supportive rather than central. He suggests introducing some of the historical examples in his published paper into the classroom.

"When students make an analogous mistake, they are in good company, committing for example, the mistake of the famous Greek mathematician Heron. The fact that students make this mistake 2,000 years after Heron lived is not that important," said Elishakoff. "Somehow this fact consoles them as it were, and spurs them to do better. They do not feel lonely in making the mistake. 'Don't worry,' I tell a student. If Heron of Alexandria was allowed to make a mistake, you are entitled to make it, too. The difference is that you can correct it and try to avoid it in the future."

In one of his courses, Elishakoff conducts a simple test to check the knowledge retained by his students from differential equations. It turns out that most never got the subject and only one or two students could solve simple differential equations.

"I continuously try to develop various materials to cure the mathematical state of students who possibly suffered as a result of dull and uninspired teaching to potentially put unhappy memories behind them," said Elishakoff. "Young learners of mathematics share a common experience

with the greatest creators of mathematics: hitting a wall, meaning, first frustration, then struggle, and finally, enlightenment and elation."

Preliminary results of Elishakoff's research incorporating mathematics of the past as a heritage appear to be extremely encouraging.

"Understanding complicated differential equations is an integral component of almost every discipline in engineering and computer science," said Stella Batalama, Ph.D., dean of the College of Engineering and Computer Science. "Professor Elishakoff has identified an innovative and effective method to generate interest, increase confidence, provide encouragement and make a difficult subject more fun for our students as well as other students across the country."

More information: Isaac Elishakoff, Response to Steven Colbert: Spicing Up the Exposition of Differential Equations via Engaging with Relevant History of Algebra, *Journal of Humanistic Mathematics* (2021). DOI: 10.5642/jhummath.202101.16

Provided by Florida Atlantic University