# Teaching with Insights

TOP HAT

DALHOUSIE UNIVERSITY

How Top Hat Improves Student Engagement in Large Classes at Dalhousie University

Background

Dalhousie, with 18,500 students, is the largest university on Canada's Atlantic coast. Students enrol in an eclectic range of courses, including a history class titled "Lies and the Lying Liars Who Tell Them" and a Western philosophy seminar on "The Good Life." One of the most provocative undergraduate courses, on human sexuality, is also one of the largest, with 450 students. Professor Matt Numer covers biological, cultural, ethical, historical, psychological, religious and semantic aspects of sex, and ventures into subjects that can be uncomfortable for some students.

Challenge

Every semester, Numer noticed how students in his large class held back from answering questions. On the one hand, the course's sensitive subject matter made students feel awkward about participating. On the other, it was simply a logistical challenge for Numer to assess whether his lessons were clear and

understood in class by every one of the 450 students. In a class where participation makes up 20 percent of the final grade, student engagement is a high priority. He began to explore ways to evolve and improve his lecture style to make the class more engaging and to break through students' silence.

Solution

Numer decided to use the Top Hat engagement app in his classes, which would allow his students to anonymously answer multiple choice or true/false questions on their own personal devices, and to contribute to forum discussions. Instead of viewing smartphones and other internet-connected devices as a distraction, Numer saw them as an opportunity for increased engagement: since his students were already bringing their devices into class, and were accustomed to interacting with one another through those devices, the Top Hat app would help him to better connect with them and capture their interest.

Students could examine sensitive issues without having to speak out in front of hundreds of peers. And when students engage with the class and each other, their analysis of the subject improves.

Results

Numer immediately noticed that his students had grown more engaged and eager to participate. With a teaching assistant, he conducted a study of the impact of using Top Hat, which they later published in an article in the peer-reviewed *International Journal of Technologies in Learning.* Over three semesters, they ran surveys and focus groups with some 1,100 students using Top Hat. They found that Top Hat succeeded in promoting undergraduate engagement, including by making students more comfortable with the course material.

The students gave their experience of Top Hat a high rating. When asked how much they valued Top Hat for its ability to let them use their own devices, see the perspectives of classmates and facilitate engagement in the classroom, students ranked the platform 9.2 on a scale of 1 to 10. "I think it makes people more comfortable to be able to answer freely without having to raise their hand," said one undergraduate interviewed in a post-course focus group. Another added, "I thought this was the most engaging course I have ever been in...the environment of the class allowed for students to be open about their opinions."

More impressively, the integration of Top Hat in the course had a noticeable impact on the quality of education. On a scale of 1 to 10, students gave Top Hat an 8.4 when asked if they agreed that it improved their critical thinking. "An opportunity to engage at a deeper level enables critical thinking," says Numer. "Together with all the measurements we did, it was evident that students increased critical thinking skills through Top Hat and the course more broadly."

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Professor Matt Numer,
Dalhousie University

SCALE OF 1 TO 10

9.2

Rating that students gave Top Hat when asked whether it made them more engaged in class

SCALE OF 1 TO 10

8.4

Rating that students gave Top Hat when asked if it improved their critical thinking
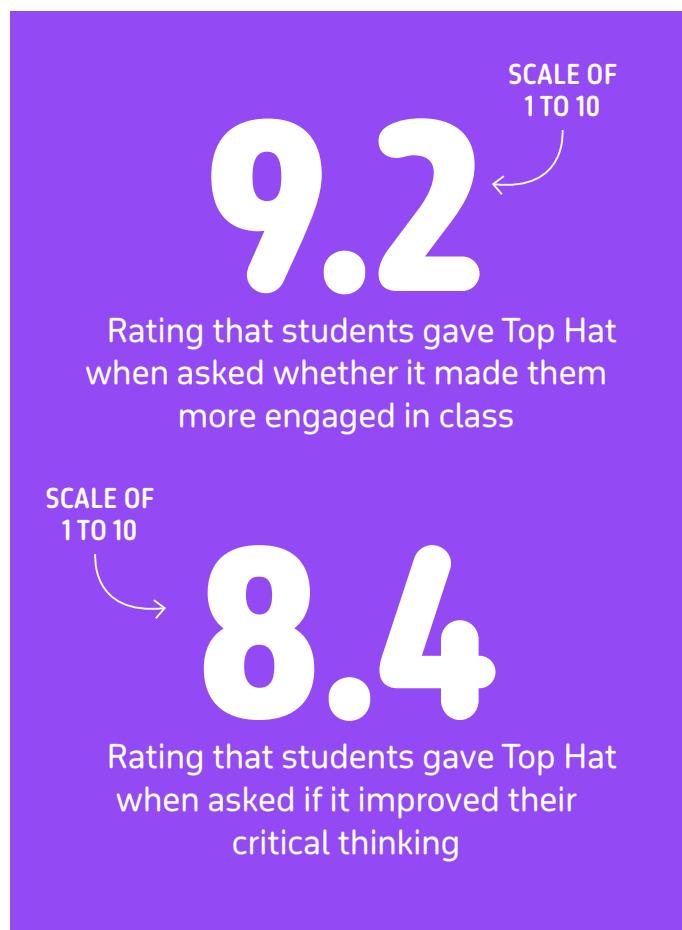
How Top Hat Assessment Tools Helped a Chemistry Professor Save Time

Background

West Virginia University is a public institution situated on the Monongahela River in Morgantown, WV. Founded in 1867, it boasts an undergraduate population of approximately 22,000 students. Joshua Osbourn is an associate professor in the Department of Chemistry, where he lectures throughout the fall, winter and summer semesters. "I teach organic chemistry courses to undergraduate students. Many of them are pre-medical, pre-pharmacy, or engineering students, who have to take my courses as a requirement," says Osbourn. "The class size fluctuates, ranging from 150, to over 300 students in any one semester."

Challenge

Osbourn noticed his students weren't arriving to class primed to learn. "There was a lack of preparation on their part," he says, noting what tends to happen when the course isn't one a student elects to take purely for interest's sake.

To address the issue, he introduced regular quizzes as a means of creating more accountability and gauging student's comprehension, but found it was an onerous task. "It was so time consuming," Osbourn says. Between printing out copies, which wasn't good for the environment and spending a couple of hours grading hundreds of quizzes, he found "it wasn't a sustainable way to do things."

> **"Before, it was this long process to run quizzes. With Top Hat, I can launch the quiz, have it auto-graded and students receive results automatically. It's a huge time-saver."**

Solution

Thankfully, Osbourn found Top Hat's all-in-one teaching solution provided options that allowed him to monitor comprehension and increase accountability in far less cumbersome ways.

Osbourn came to rely on Top Hat Test for regular, low-stakes summative assessments. He administered a short quiz at the end of each unit with questions streamed straight to students' devices, eliminating the need for paper. The automatically-graded quizzes would help him evaluate student's knowledge, and the results would be used to inform future lectures. Osbourn also doesn't worry much about cheating since he introduced Top Hat Test, despite students being packed in pretty close together in the lecture hall. The software's capabilities to identify and lock out test-takers suspected of cheating and to create multi-version questions were enough to discourage students copying off one another, he suspects.

Osbourn would also leverage Top Hat Classroom for formative assessments, pausing his lectures and asking questions every few minutes. Doing so enabled him to keep students actively engaged for the length of each lecture, while monitoring learning in real-time and getting feedback on the fly, allowing him to better prepare them for the coming quiz.

2-3 hours

grading before using Top Hat Test

TOP HAT
Test

0 hours

after introducing Top Hat Test

Results

Overall feedback from students since Osbourn started using Top Hat has been positive. "The students like how it keeps them engaged in the material." And perhaps more significant than the verbal feedback Osbourn received from students, he noticed that after he started running quizzes on Top Hat Test, students would often linger outside the classroom post-lecture waiting for the instantaneous feedback on their performance. "They would wait for me to update the gradebook. They loved that they could get their [quiz] results instantaneously."
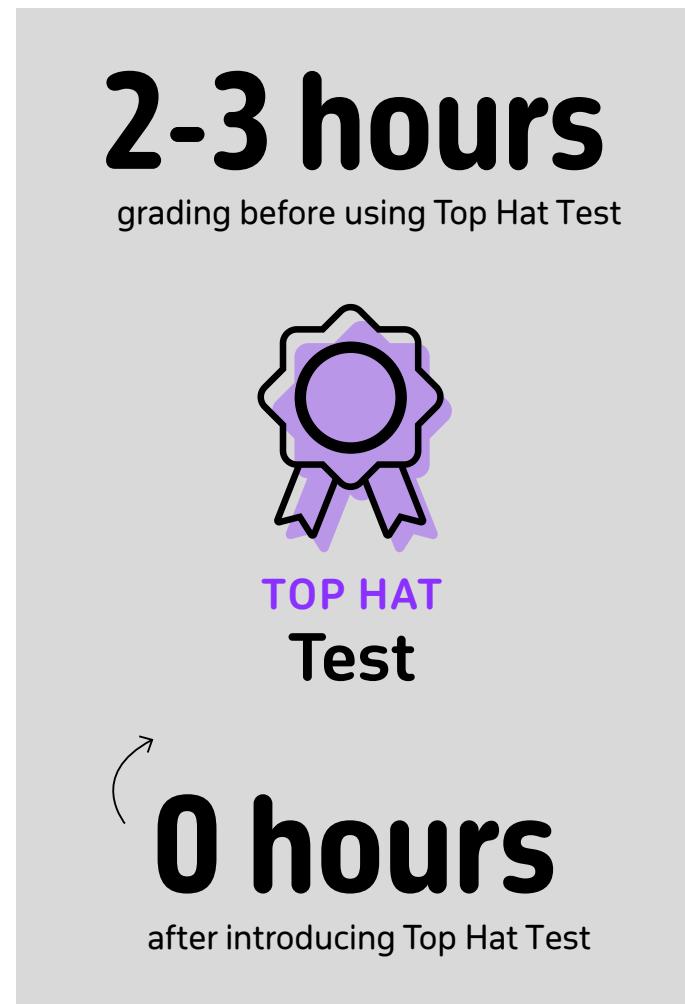
Apart from knowing that his students are benefiting from using the platform, Osbourn himself loves how Top Hat has helped him manage his own teaching load. "Before, I was writing out all my questions, and it was this long process to run quizzes. With Top Hat, it takes a bit of upfront work to put the questions into the platform, but once that's done, it's done. I can launch the quiz, have it auto-graded and students receive results automatically. It's a huge time-saver."

How Top Hat Helped NC State Educators Improve Average Exam Grades

Challenge

North Carolina State University's office of Distance Education and Learning Technology Applications (DELTA), identified a growing need from students and faculty for an easy-to-use student response system that could measurably improve classroom engagement and build comprehension.

From Fall 2015 to Spring 2016, the staff of DELTA conducted an evaluation of classroom tool options. A total of 21 faculty members, representing 18 fields of study, participated in the evaluation.

Solution

Top Hat emerged as the favorite classroom response tool among the test group. Using Top Hat's teaching platform also drove a measurable improvement in

average test scores and received overwhelmingly positive feedback from both instructors and students. Top Hat performed better overall on all four key categories: Ease of Use, Classroom Integration, Customizability, Gradebook.

As well, DELTA's staff surveyed approximately 1,800 students in courses using Top Hat during the pilot study. Overall, the majority of students said that Top Hat was easy and fun to use, helped them track and evaluate their own understanding of in-class material and helped them to better stay focused during lectures. As a result, 81% of students preferred Top Hat versus other student response tools.

One notable participant in the study, Professor Elaine Bohórquez, teaches two graduate Physiology sections. She compared her test scores pre- and post-

Students who used Top Hat performed better and saw an average increase in exam grades by 3 to 4 percent

TOP HAT IMPROVED PHYSIOLOGY TEST SCORES

adoption of Top Hat and saw positive outcomes. In every instance, students in her lectures who used Top Hat performed better and saw an average increase in exam grades by 3 to 4 percent.

Bohórquez compared test scores between two years for each section. In the graph on this page, the darker color on each bar chart represents the improvement in mean test score [%] as a result of implementing Top Hat in class versus a traditional lecture format where Top Hat was not used. Bohórquez concluded that using Top Hat made a positive difference in increasing average test scores.

Results

Adopting Top Hat resulted in an overall improvement to mean test scores, increased engagement, attendance and preparedness for class. The majority of instructors agreed they would "definitely continue" to use Top Hat if the university decided to purchase a campus-wide license for students.

As a result, in May 2017, NC State opted for an institution-wide Top Hat license, with a goal of implementing and scaling these same successes to reach all students. Top Hat and NC State continue to work closely to gather additional feedback from both faculty and students to monitor and measure improvements in learning outcomes.

FACULTY COMPARISON OF TOP HAT VS OTHER CLASSROOM RESPONSE TOOLS

	A little better	Much better	Overall better
Ease of use	41%	41%	82%
Classroom integration	35%	35%	70%
Customizability	41%	29%	70%
Gradebook	29%	24%	53%

81%

of students preferred Top Hat versus other student response tools
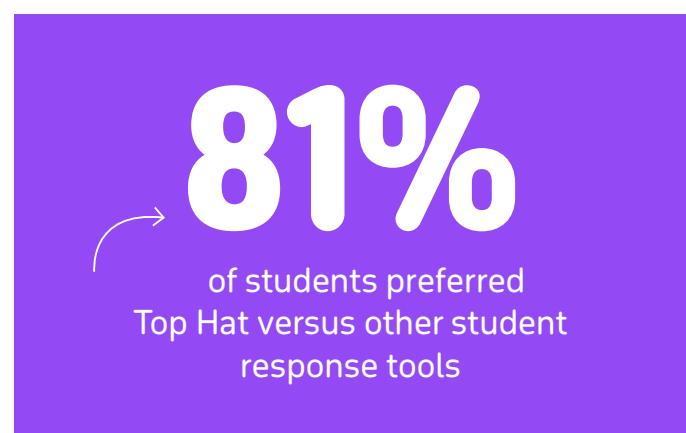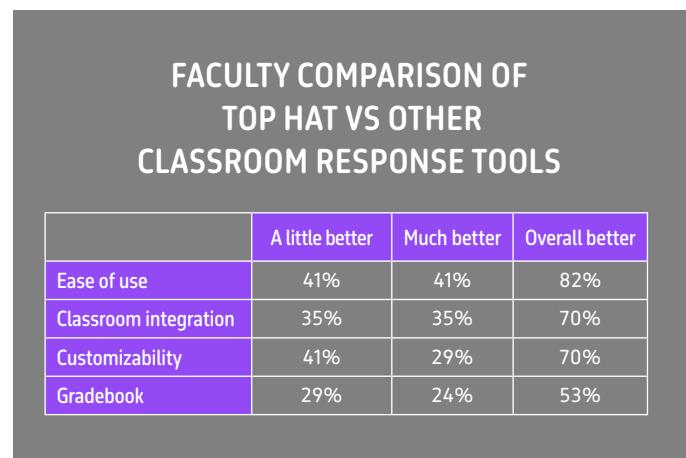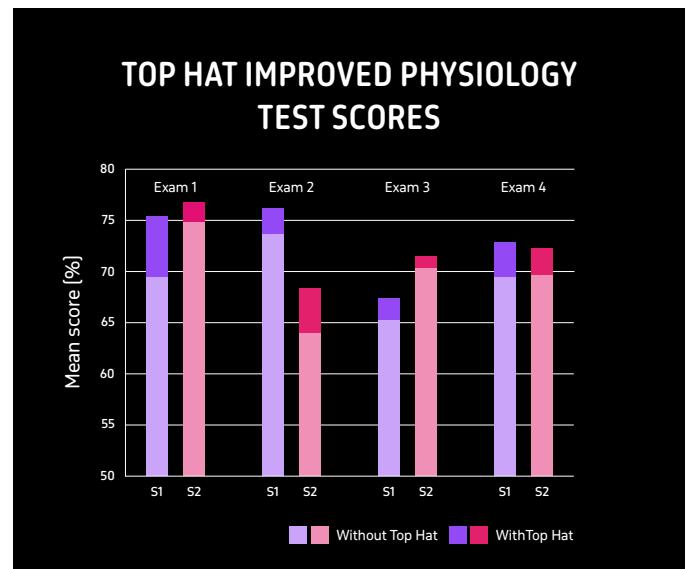
NC State, impressed by how Top Hat helps improve education, opted for an institution-wide license, with a goal of implementing and scaling these same successes to reach all students

CASE STUDY

Top Hat Was Essential to Student Success in This Massive Class

Challenge

Professor Ricardo Nogueira was having trouble with student engagement in his large class

The senior lecturer in Geosciences at Georgia State University (GSU) was responsible for teaching massive classes of non-science majors, including Introduction to Weather and Climate with an enrollment of upwards of 500 students. "In classes that big, it's easy for students to get distracted," he said. "They can sit at the back, talk to their friends or just be on their phones." Grade distribution was too heavy on the low end and the professor knew he needed to make class more interactive to get students performing better.

Nogueira first introduced iClicker in an attempt to improve student engagement, but encountered some issues: students chronically forgetting the clickers, bringing their friends' clickers—resulting in cheating and grade inflation—and, ultimately, students remaining distracted by their devices.

The breakthrough for Nogueira came when he asked successful students how they did well in class: "To my surprise, they just said: 'I pay attention.'" He started using Top Hat in order to get all students as engaged as his most successful ones.

> "There's no curving in my class…
> the difference between a B- and an A is paying attention
> and answering the questions correctly."

Solution

Nogueira started using Top Hat for every part of his course, including authoring a textbook on the platform, in order to improve engagement in learning and student success

Nogueira's approach with Top Hat was to make information retention a priority in the classroom: every 4-6 slides (or, about every 5-10 minutes) he would pose questions to the class to ensure they were keeping up with the material.

"There's no curving in my class—students earn their grades," he said. "So the difference between a B- and an A is paying attention and answering the questions correctly." Nogueira used attendance in Top Hat to ensure students were showing up to class and the tournaments feature to let students compete with each other—and review the material at the same time—in a fun and engaging way. He also opted to use Top Hat to run secure tests and quizzes, streamlining the assessment process. "It cut down on a ton of paper, students could take the test in class using a secure code and they got their grades almost immediately," he said.

Finally, the professor used Top Hat to author an interactive textbook—*Weather, Climate and Beyond: An Introduction to Physical Geography*—in order to make his class content more relevant and to save his students much-needed money. "There are so many textbooks out there and I didn't want to reinvent the wheel," he said. "But when I realized I could customize the textbook to make it more specific to my classroom, I was able to make the textbook an extension of my lecture."

10 minute
intervals between Top Hat learning checks

$140
savings to students after switching to Top Hat textbook

3.4%
decrease in DFWs with transition to Top Hat end-to-end course

Results

Student grades improved and Nogueira won an instructional innovation award at GSU

After using Top Hat, the grade distribution in Nogueira's class improved. He noticed that students who previously got Ds started getting Cs and students who had earned Cs started getting Bs. The drop, failure and withdrawal rate (DFW) also fell by over 3% once the whole course was facilitated on the Top Hat platform, from the time the professor began using digital tools. Nogueira's use of the Top Hat gradebook, which houses all student assessment and attendance data, and Top Hat's Weekly Course Report, which sends professors a summary of insights into student progress, helped him track and reach out to struggling students to ensure they got extra attention on material they were finding difficult to comprehend.

The textbook he authored through Top Hat was also a big hit: it helped align lecture material and course content more closely, *and* it saved his students $140 compared to the previous textbook. In fact, his integrated use of Top Hat—for formative assessment in class and reading assignments at home—was so successful he was awarded a prestigious instructional innovation prize from GSU for embracing new technologies. "I thank Top Hat for doing a great job helping professors engage with their students faster and more easily," he said.

School background

Founded in 1785, Georgia State University (GSU) is one of the oldest public research institutions in the United States. Although centrally located in Atlanta, Georgia, the university spans across seven campuses with more than 51,000 students enrolled annually.

About the professor

Ricardo Nogueira is a Senior Lecturer in the Department of Geosciences at GSU and oversees and teaches the Introduction to Weather and Climate course. Currently, he teaches more than 500 students in the fall and winter semesters. With such large classes—and with the majority of students as non-science majors—Nogueira needs to be creative in his lectures in order to teach effectively and drive learner outcomes.

The Impact of Participation on Exam Scores

Background

The University of Connecticut is consistently ranked one of the best public colleges in the United States. At UConn, John Redden, Assistant Professor of Physiology and Neurobiology, is tasked with teaching an introductory anatomy and physiology course. "This course is a prerequisite to a lot of professional programs—so we have pre-med, pre-pharmacy and nursing students to name but a few." The mix of backgrounds, coupled with class sizes up to 400, means Redden has to approach teaching creatively in order to facilitate student success.

Challenge

Redden's challenge was two-pronged. First, the tiered, stadium-style seating of his physical classrooms didn't lend itself to creating an environment of inclusiveness and engagement. In order to make his large classes feel more personal, he was looking for an affordable student response tool that complemented both his teaching practice and the digital lives of his students. Redden had previously used iClicker and Poll Everywhere in his lectures, but the price point and lack of customization available prompted him to seek out a different solution.

The second challenge came from his students. A number of them were eager for extra coursework to help improve their grades, thereby increasing their chances of gaining entry to competitive professional programs. Redden wondered if a technology-based solution was the answer.

> In Redden's class of nearly 400, students in the top 25% for Top Hat participation also earned the highest average exam grades

Solution

To address these challenges, Redden decided with a colleague to author an interactive Anatomy and Physiology textbook on the Top Hat platform. In the process, he decided to implement Top Hat Textbook and Top Hat Classroom together to comprehensively address the issue of participation across both at-home and in-class learning environments.

Following a successful summer pilot, Redden started using Top Hat Classroom in the fall semester of 2017. He liked how students were able to use devices they already owned to answer questions, and participate in polls and discussions. Addressing his students' wishes, he also began assigning the textbook he co-authored as a means for students to complete additional readings and assignments to earn extra credit. Redden then used Top Hat's gradebook to give each student a score that combined their in-class participation and the work they completed from the textbook.

Results

In the above graph, Redden took student scores from Top Hat's gradebook and plotted them against the average exam scores to see if there was any correlation between the two.

When Redden contrasted the group who scored well on the exam and looked to see if they'd also participated in class and completed extra credit work, he found a positive two-way relationship.

"[Grades aside] I also think there is something to be said for the fact that students are more enthusiastic and are exhibiting a more positive attitude towards the course materials. Based on what we're seeing, it seems that Top Hat has had a positive effect on them."

Redden also took non-Top Hat factors into consideration. He wanted to know if a student's major, or the time they spent studying had an impact on their exam scores. "I was surprised to find that a student's major had no impact on whether or not they performed well. I was even more surprised to find

**EXAM SCORES VS. TOP HAT PARTICIPATION GRADE**
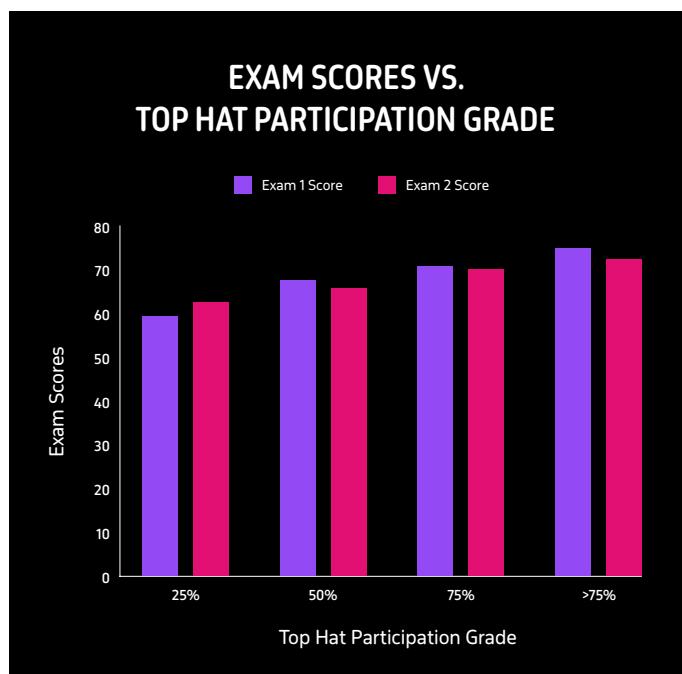
that beyond two hours, the length of time spent reviewing wasn't related to students' exam scores."

Redden surmises that this last finding has to do with the way students learn. "It's not necessarily the length of time but how they use that time [to learn]. Passive actions, such as reading and re-reading a slide or study guide over and over won't yield the results they're looking for." But an active studying approach—like the one Top Hat facilitates—will, says Redden.

As for the textbook Redden trialed in class: "Students overwhelmingly have said they prefer it. They've not only responded to the in-text questions, but also the narrative style of writing." And then there's the cost. When he tells them the cost of the book, the reaction is usually 'Wow.'

Finally, Redden stresses that an improvement in grades only says so much. "There is so much that can't be captured in a grade. Hearing students get excited about anatomy—to the point that some of them consider switching majors because they've developed a passion for the subject as a result of the textbook and in-class learning exercises—that's a great feeling."
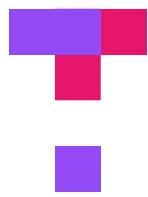
The All-in-one Teaching Platform

Top Hat helps thousands of college and university instructors create their perfect course—one that engages students and builds comprehension inside and outside the classroom.

TOP HAT
CLASSROOM

Leverage students' devices to increase in-class engagement and get real-time feedback

TOP HAT
TEXTBOOK

Adopt and customize affordable, interactive textbooks, or create your own

TOP HAT
ASSIGNMENT

Create and personalize homework to build student comprehension

TOP HAT
TEST

Securely administer exams and quizzes directly on students' devices

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