

Large-scale study reveals true impact of ASU VR lab on science education

Dreamscape Learn program found to improve student outcomes, engagement in science and retention of STEM majors

By Mary Beth Faller, ASU News

April 7, 2025

Students at Arizona State University love the Dreamscape Learn virtual reality biology experiences, and the intense engagement it creates is leading to higher grades and more persistence for biology majors, according to new data.

ASU's Dreamscape Learn Biology 181 course debuted in the spring 2022 semester, and now the experience is offered in both Biology 181 and 182, which are intended for students in STEM majors and required for graduation.

These biology courses include 15-minute virtual-reality scenarios every week that have students traveling through space to an intergalactic wildlife sanctuary where they encounter intriguing scenarios they have to solve through science. After the weekly Dreamscape Learn experience, students attend a three-hour lab where the storyline continues, and they solve the unique problems using careful reasoning.

The experience is straight out of Hollywood, created in a collaboration with Dreamscape Immersive, a company co-founded by Walter Parkes, a writer and producer of hits including "WarGames," "Gladiator" and "Twister."

And while its roots are in Hollywood, the technology — and the engagement with storytelling — is an innovative new way for students to learn scientific principles that they apply to the real world.

ASU's Action Lab, which researches the efficacy of teaching and learning strategies, studied more than 4,000 on-campus students from the two courses over four terms — from fall 2022 through spring 2024 — and found [exciting results](#):

- Students rated all the virtual-reality experiences highly, with a median rating of 5 out of 5 across all semesters.
- Regardless of student demographic background students performed well on lab assignments, with average grades of 90% or higher across all groups.
- Students who took BIO 181 after the implementation of DSL had a 1/4 letter grade improvement in their final course grade in BIO 182 relative to their final course grade in BIO 181.
- Students who took Biology 181 and 182 after the addition of Dreamscape Learn labs had higher grades in subsequent 300-level genetics courses than students who took the courses before Dreamscape Learn was added.
- Students taking Biology 181 after the addition of Dreamscape Learn labs were more likely to remain in School of Life Sciences majors than students who took the course before Dreamscape Learn was added.

Annie Hale, executive director of the Action Lab, said: “It’s a great shining star of pedagogy and curriculum coming together with advanced technology to make an experience not only engages students but provides them with a set of transferable skills that map to future courses,” she said.

The research was expansive, involving more than 4,000 pre- and post-course surveys, more than 14,500 engagement surveys completed three times per term, 91 hours of student interviews and 87 hours of classroom observation.

“The improvement in course grades is more than a letter on a transcript, it represents confidence in their ability to learn new and complex materials which could be one reason that more students are staying in School of Life Sciences majors,” Hale said.

The Action Lab found that in academic years 2018–22, before Dreamscape Learn, 29% of Biology 181 students switched their majors outside of the School of Life Sciences. By comparison, between fall 2022 and spring 2024, only 24% of the students who experienced Dreamscape Learn switched majors.

"In STEM, a 5% retention gain isn't just a number — it's more future scientists, healthcare professionals and engineers staying in a field where every mind matters," Hale said.

“That confidence and engagement — feeling really immersed in what's happening, and drawing relevant connections to the course materials and the new skills they are learning — not only with the assignments but in other areas — is paying off for them by being successful by staying in the degree and also being more successful in the program,” she said.

Another reason is the high engagement with both the VR and related assignments, according to John VandenBrooks, a professor in the School of Applied Sciences and Arts and associate dean of immersive learning at [EdPlus at ASU](#). He creates course content in collaboration with Michael Angilletta, President's Professor in the School of Life Sciences and associate dean of learning innovation at EdPlus¹.

Dreamscape Learn is also available to non-major students who take Biology 100, and separate research has found positive results there, too, with students reporting a higher sense of “science identity” at the end of the course..

“In a traditional class, you might learn about what other scientists did, but our goal was to make the students solve novel problems the very first day,” VandenBrooks said.

VandenBrooks said that he’s often asked whether Dreamscape Learn technology will be introduced in 300- and 400-level courses.

“Of course, it could be used in those classes, but by that time, you’ve already lost many of the students along the way,” he said. “That’s why when we design Dreamscape Learn experiences, whether it be in biology, chemistry, or art history, we develop them for large introductory classes because that’s where the intervention can be most impactful.”

One of the most important takeaways from the research is the self-reported level of engagement by the students during the virtual-reality experiences. That intense immersion in the task strengthens learning.

Tyler Struver, a biological sciences major, received an A in both Biology 181 and 182 and said she sees promise in the Dreamscape Learn technology.

“I thought it was a very engaging way to learn the core concepts in biology without having to focus on learning lab techniques,” she said.

“Being able to see it like it’s a movie but also experience it like it’s a lab at the same time made a lot of that information stick.”

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Struver, who will soon be applying to medical school, said she would recommend Dreamscape Learn for further science courses.

“It holds a lot of potential to explain concepts that are even more difficult than we learn in general biology,” she said.

The narratives within the experience are designed to drive that emotional connection and prepare the students for the lab work after they take the headsets off, according to Angilletta.

“We’re giving students a novel problem that there’s an urgency to solve,” he said.

“Part of that happens in virtual reality where I’m immersed inside of the experience and I’m controlling my mobile podflying around collecting data while interacting with all the creatures. But part of that is when I come outside of VR, I’m given very clear instructions about how to work through a problem.

VandenBrooks and Angilletta are now building courses in chemistry, astronomy and art history with different storylines.

ASU is also working with community colleges in California and K–12 schools in Arizona to offer the technology, including the [Pendergast Elementary School District](#) in the West Valley, which built a Dreamscape Learn Lab at Villa de Paz Elementary School.

This story originally appeared on [ASU News](#).

¹ EdPlus is the ASU unit that designs digital teaching and learning models to increase student success.

Main image



Students take part in the Dreamscape Learn VR experience at Arizona State University. ASU photo

Text image(s)



During the VR lab, students travel to an intergalactic wildlife sanctuary where they solve biology problems. ASU photo