

FINDINGS FROM AN INDEPENDENT EVALUATION OF THE AMNH's ONLINE SEMINARS ON SCIENCE COURSE: SPACE, TIME AND MOTION

Inverness Research studied the AMNH Seminars on Science program for eight years, from its inception in 1998 to 2006. Below we present teacher survey ratings for *Space, Time and Motion*, along with profiles of three teachers who took the course.

SURVEY RATINGS FOR SPACE, TIME AND MOTION

Course takers report on our annual follow-up surveys that ***Space, Time, and Motion*** has benefited them personally and professionally, and that their students also profit. We present below a small sample of our findings based on the responses of the 74 learners from 14 states who have completed follow-up surveys about the quality and value of the course. The majority of survey takers (68%) are K-12 teachers, but informal science educators and preservice teachers have also provided feedback about how the courses have benefited them personally and as educators.

What do teachers gain for their own learning from *Space, Time and Motion*?¹

- *"additional background knowledge of science"* (82%)
- *"a rekindling of my passion for science and the work of scientists"* (68%)
- *"a bank of resources for my own learning"* (66%)
- *"motivation to continue learning about the course topics on my own"* (64%)

How do teachers apply the course directly to their classrooms? ²

- *"I used what I learned to create a unit for my students"* (66%)
- *"I made some course resources available to my students"* (52%)

How does the course help strengthen teaching?

- *"It introduced me to new kinds of materials and media such as simulations and websites that I can use in science"* (55%)
- *"It helped me to learn a new content area that I may teach in the future"* (55%)
- *"I am better able to assist students in meeting our state or district standards"* (37%)

¹ Unless noted otherwise, percentages represent teachers who marked 4 or 5 on a 5-point scale where 1 = Not at all, 3 = Somewhat, and 5 = A very great deal.

² For questions regarding student impacts, percentages represent teachers who checked "yes."

How do teachers say that this course helps their students?

- *“Students have better access to and knowledge of latest research” (54%)*
- *“It made the work of scientists more understandable to students” (46%)*
- *“Students better connect science in school with the real world” (41%)*
- *“Students gain a better understanding of scientific inquiry” (31%)*

How does the course compare with other professional learning opportunities?

- *“The course was more valuable than other professional development available to me locally” (67%)*
- *“The course is more valuable than other distance learning courses I have taken” (56%)*

Do teachers recommend the course?³

- *“I have recommended the course to colleagues“ (56%)*

TEACHER PROFILES FOR SPACE, TIME AND MOTION

On the pages below, we have profiles for the following three teachers:

A teacher uses online materials from the SoS course to introduce her non-scientific but technology oriented high school students to cosmology.

A 7-12 Special Education teacher’s expanded understanding of science helps her better meet the needs of her students.

A former second grade teacher applies her experience in the SoS course to after-school tutoring for students in grades 3-6

A teacher uses online materials from the SoS course to introduce her non-scientific but technology oriented high school students to cosmology

Ms. Maguire teaches an elective astronomy course for 11th and 12 graders in a big urban high school with a large and mixed immigrant population. The course meets the science requirement for graduation for students who will not take the regents physics course.

Gaining new teaching resources. In her classroom she makes extensive use of the video clips which were introduced in the SoS class. The students are “hooked” not only by the material, but also because it comes to them electronically.

³ Percentages represent teachers who checked “yes.”

The best part about it is the up-to-date information about current cosmology and the use of technology to bring it to the students. We are teaching a different generation of kids. Their attention level is different so the video clips have been useful to keep them interested. This is the world for these kids—sound bites and snippets. Theirs is the world of five minute increments. I use the technology to present the information and then we talk about it.

Gaining content knowledge in an engaging course. The SoS course updated her own knowledge of space. It helped her “*move beyond steady state theory where most high school astronomy courses are still stuck.*”

The course was comprehensive and challenging. A lot of reading and work, but it was all useful—no busy work. The instructors who did the back and forth with us were terrific. They were very engaged, and their responses were current and informative.

The book, One Universe, was particularly good and well adapted for the course. I have used it in my classes and the students have enjoyed it. It is written at a lay-person level and some of my self starter students have borrowed it to read on their own.

Having access to scientists’ thinking around popular ideas. Ms. Maguire particularly appreciated the ability of the scientists to bring a different perspective to current conceptions of happenings in space.

For instance, we talked about the possibility of colliding planetary bodies, and the instructor gave this illustration: If there were four snails scattered across the surface of the United States—each one at some place in this country—they would have a greater likelihood of bumping into each other than these stars do.

A 7-12 Special Education teacher’s expanded understanding of science helps her better meet the needs of her students.

Ms. A. teaches science in a residential special education school, grades 7-12, for the emotionally disturbed in a suburb outside New York City. She has been teaching for 13 years and at this school for the past six years.

The *Space, Time and Motion* course was the third SoS course that she has taken. The school in which she works needed a science teacher and she was the most qualified. She needed science certification in addition to her special education certification.

Gaining new tools for teaching special needs students. Ms. A. found that her increased content knowledge added to her teaching repertoire.

Special ed students often have limited vocabulary, poor reading skills and short attention spans. They need to have the concepts explained in

several different ways. This course increased my content knowledge and gave me different ways to explain things.

The wealth of intriguing topics and tidbits that were a part of the *Space, Time and Motion* course were useful in her classroom.

I used lots of bits of information as a hook to get my students interested in the science—black holes, other universes, effects of the speed of light, how time is different if you travel in a space capsule. These ideas were new to my students, and I could slip them in, and the students found them engaging.

A rewarding online course. In summation, Ms. A. said:

The information was good, although some of it was over my head. Some things were too advanced to be useful in my class, but it opened my eyes to the concepts that were presented. Each successive course was better than the previous one. The discussion groups were downsized and that improved the quality of the dialogue among the participants and there was better access to the instructors. In all cases the instructors were extremely knowledgeable and willing to answer questions and to offer multiple explanations.

A former second grade teacher applies her experience in the SoS course to after-school tutoring for students in grades 3-6

Ms. P. is currently working as an after-school tutor in the school where she formerly taught second grade for four years. She is dividing her time between being a stay-at-home Mom with a baby and a toddler, and being a tutor. She tutors children in grades 3-6 mostly in reading and math, but also helps them with their other homework.

Gaining content knowledge in science. Ms. P's college science background was limited but she found the SoS course to be an excellent learning experience.

The content was advanced; it felt like a college level course. It helped me to understand in a deep way about space and time. Since it was based on Einstein's theories, it opened my world in terms of science. Some of it was way beyond my thinking, but I got enough out of it so that it was very worthwhile. The ideas about gravity and force and motion are useful even in thinking about teaching simple machines in second grade

A "safe space" to learn with other teachers. Ms. P. gained from the experience of taking the course with teachers who have a range of science backgrounds.

The instructor would propose a discussion question after the reading, a question you were supposed to answer. You would try to answer it and you could ask your own questions, and others would respond to your posting. Some of the participants were high school science teachers and other people in the class took responsibility for helping you learn. They would explain things and talk about

your questions. In this course there was interaction with other student-learners. Lots of different levels of expertise. They gave me a different perspective.

As a novice science learner, Ms. P. felt comfortable with her online learning community.

I felt safe saying I don't understand something. The prof said at the beginning, this has to be a safe place where you feel okay asking questions. There can be no criticism. It was strange that you didn't know the other learners, but were comfortable asking for help.

The convenience and efficacy of online learning. Ms. P's science background was weak and she needed re-certification credits. The options available to her for continuing education were limited. The nearest college was almost an hour's drive away, and in-district professional development was provided infrequently. The flexibility of the online course allowed her to complete coursework and still meet the other demands of her work and her young family.

Comparing this course to other online courses that she has taken, Ms. P. noted the depth and variety of experiences and opportunities this course provided, and the richness of the resources

Gaining experience and resources to support her tutoring role. Although she is not currently working in a classroom setting, Ms. P. has found the course useful in her work as a tutor.

I help my students with their science homework and sometimes they have questions that they cannot answer with the available materials. Because of this course, I learned to use the web differently, and so I am able to help them use it also. I have always wanted students to look for their own answers, rather than me giving them the answers, and the way this course was structured reinforced that. It might not have occurred to me to use the web in this way [prior to this course] and it gave me ways to help them do better research. It may not have helped me directly with content my tutor students need, but in terms of process, it did.