and what requires further investigation. Online courses can
• help teachers develop or refresh their knowledge about content and instruction;
• provide a means for teachers in rural areas or with otherwise limited access to professional learning experiences to refresh their knowledge about content and instruction;
• allow teachers who use their face-to-face professional development time for hands-on scientific research opportunities the chance to connect with other teachers around teaching; and
• impact student learning. If the professional learning opportunity occurs over a sufficient amount of time.

Combining the characteristics of powerful professional development with what’s effective in online learning is a strategy that allows promise. Teachers in many schools, districts, and states are

wondering if online professional learning experiences to refresh their knowledge about content and instruction;

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MANY OF YOU HAVE ASKED MANY OF THE QUESTIONS ABOUT ONLINE PROFESSIONAL DEVELOPMENT AT HELPING TEACHERS LEARN, AND WHAT IS THE IMPACT ON THEIR STUDENTS? This question loomed large in the minds of many administrators, policy makers, and developers of professional learning experiences for teachers when we began our study of online professional development in 2007. And it remains an issue today, in an era of new standards, new regulations, and tightened budgets.

In order to help answer this question, a group of researchers at the Education Development Center, Inc.’s Center for Children and Technology set out to understand the impact of an online course on high school biology teachers’ understanding of two focal content areas–genetics and evolution–their understanding of how to teach these topics, and how to use digital resources to support teaching and learning. We also investigated whether taking the course had an impact on their students’ learning about genetics and evolution.

The study showed that teachers who took the course increased their knowledge of genetics and evolution, science instruction, and how to use digital resources. This increase in knowledge did not lead to correspondingly larger gains for their students.

With the Common Core and Next Generation Science standards on the horizon, along with new regulations about measuring teacher effectiveness, teacher professional learning is more critical than ever.

• Online courses such as Teaching High School Biology show promise in helping teachers, especially those in rural areas, develop or refresh important knowledge about content and instruction and connect with other teachers.

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One-hundred and forty-four teachers signed on to participate in the study and take the online course. The high school biology teachers—new and veteran—hailed from cities, suburbs, and rural areas from around New York State. Their students and schools represented the broad racial, ethnic, linguistic, and economic diversity that exists in New York. Twenty-eight teachers in the treatment group and 33 in the control group completed the online course and all data collection. Results are based on data from these 61 teachers and their 2,532 students.

The study used an experimental design to answer the research questions, meaning we randomly assigned teachers via a lottery either to a treatment group, who took the course in summer 2008, or to a control group, who took the course in the summer of 2009. We also randomly assigned teachers to take a short or long version of the course (see About the Course, below). In the 2009-2010 school year, eight teachers volunteered to participate in case studies of their genetics and evolution units.

**RESEARCH QUESTION 1**

Does participating in the online course result in increased teacher knowledge of genetics and evolution?

**FINDING**

We found no statistically significant difference in students’ learning based on their teacher’s participation in the online course.

**HOW WE ARRIVED AT THESE RESULTS**

At the beginning and end of the school year, the students took a 20-item test on genetics and evolution. We used a statistical technique commonly known as multilevel modeling, which takes into account the fact that multiple students share the same teacher. Multi-level modeling allowed us to test whether a teacher’s participation in the online course was associated with their students’ learning. Students also completed a questionnaire about their attitudes toward science; our preliminary analyses showed no correlation between attitudes toward science and achievement on the genetics and evolution knowledge test.

**RESEARCH QUESTION 2**

Does the length of the course make a difference?

**FINDING**

We found no significant differences on any of the outcome measures between teachers who took the long or short versions of the course (see About the Course).

**HOW WE ARRIVED AT THESE RESULTS**

Teachers were randomly assigned to take one of two versions of the course. We wanted to investigate whether the duration and content of the online course and the type and amount of information had any influence on teacher learning. Figure 1 shows the content of the two course versions.

**RESEARCH QUESTION 3**

Does teachers’ participation in the online course lead to increased student knowledge of genetics and evolution?

**FINDING**

We found no statistically significant difference in students’ learning based on their teacher’s participation in the online course.

**HOW WE ARRIVED AT THESE RESULTS**

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