How does e-learning software change the classroom experience?

A research project investigates on the effects of e-learning apps on young students

by Henning Hermes
July 29, 2016

During the past weeks I visited several primary schools in Germany to conduct a small lab-in-the-field experiment. The first thing you notice is that schools differ tremendously – in the outward appearance of the buildings, the number of rooms available, the student population (in terms of social, cultural and ethnic background), sanitary conditions, you name it.

These enormous differences obviously pose certain challenges. But I also noticed a prominent common denominator: No matter which classroom you enter, computers, notebooks, and tablets are omnipresent nowadays, even in primary schools. Teachers use computers to support children with individual learning deficits, they challenge highly gifted children by assigning additional exercises, or they simply teach their pupils how to use the internet to search for (reliable) information or how to write a simple text document.

Nothing is wrong with that. Indeed, the integration of media and IT into everyday teaching is fundamental for an educational system that strives to facilitate personal development and individual fulfillment in today's digitalized world. Yet we know very little about how this massive change in education technology is affecting the development of our children.

One obvious reason is that computers are used in the classroom in so many different ways – to improve individual abilities, to teach computer-specific skills, or to enhance subject-specific knowledge in areas like math, just to name a few examples. But even if we look only at a very specific case, such as the use of e-learning software for practicing mental arithmetic, numerous questions arise:

- Is e-learning software more likely to improve educational outcomes than traditional approaches?
- Does e-learning software increase or decrease children's motivation to learn? How about over the long term?
- Might the use of software – with its frequent feedback, ability to provide transparency regarding "performance" (although its measurement of performance may leave a lot to be desired), etc. – place additional stress on schoolchildren?
- How do the above-mentioned potential effects on outcomes differ across the ability distribution? In other words: Does the use of e-learning-software attenuate or reinforce existing inequalities?
- How does the explicit display of information within e-learning software (on individual performance but also social context) affect individual as well as classroom outcomes?

Clearly, this list is non-exhaustive. Seeking to answer at least one of the many questions that

present themselves, however, I worked with three colleagues (Martin Huschens, Franz Rothlauf, and Daniel Schunk) to design a research project aimed at identifying the causal effect of the transparency e-learning applications offer with regard to individual performance on several of the aforementioned outcomes.

The project is based on the observation that many e-learning applications in the school context provide lists of students' scores in a given classroom. Children receive full information on their own performance, their rank within the class distribution, and also the gaps between their scores and those of their peers. Even without e-learning software, of course, children have some idea of their relative position within their classroom. But the lists generated by e-learning software make this information very explicit, salient and (seemingly) objective.

This may have a positive effect on motivation and learning outcomes – as well as negative effects on classroom outcomes, since an improvement in others' performance will negatively affect a given child's rank within the distribution. And, of course, the effects of such lists will presumably differ greatly depending on a child's current ranking.

In a randomized controlled field experimental study, we will try to identify the causal impact of a classroom ranking list (compared with individual feedback on performance) for primary school children, using an e-learning application in the math classroom over the course of five weeks. Starting in autumn 2016, we will evaluate effects on learning outcomes, motivation, and perceived stress, as well as investigating whether transparency on performance outcomes in classrooms may affect prosocial behavior or risky choices.

More information on the study (in German) can be found here.

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