Technology, Distractibility and the Classroom

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This is the third in a series of three posts, which all focus on a different type of noise and distraction, and their effects on learning.

I recently had the opportunity to observe instruction in a first-grade classroom. The teacher was

giving a vocabulary lesson in which she taught children words that could be divided into two categories: words that contained the "*AU*" vowel sound found in the word "couch", and words that contained the "*AW*" vowel sound found in the word "crawl". To teach this distinction, the teacher used an activity that involved a smartboard. The board showed a bank of words that the children were asked to assign to one of the two vowel sound categories by dragging the word to the right or left side of the screen. In general, it seemed to be a good, educational activity—the teacher was providing many examples of words containing those sounds and breaking them down into their smaller sound components, and sometimes calling on children to assign a particular word to one of the two groups. The children seemed generally engaged. But one thing immediately caught my attention: the two locations on the smartboard that corresponded to the two different word categories (*AW* and *AU* words) were marked by a hypnotic swirling black and white whirlpool animation. Presumably, this animation was picked because it was attention-grabbing and visually appealing, but there can be a fine line between designing an activity to be fun and child-friendly, and potentially distracting children from the main point of the lesson. I can only imagine that if I as an adult had trouble tearing my gaze away from this animation, the first-graders likely found it even more difficult.

Technology is in many ways a double-edged sword. It can be used to create remarkable interactive lessons that can adapt flexibly to a learner, which can be a particularly powerful tool considering how many children an instructor must try to simultaneously teach. But, when incorrectly applied, it can involve many flashy distractions that are extraneous to the fundamental lesson at hand. This is supported by research. For example, as I mentioned in a previous post, a study that looked at 3-year-olds' ability to understand and remember a story presented in an e-book found that children struggled to follow and remember the story when extraneous "bells and whistles" were included compared to a simpler version *(*1 (https://onlinelibrary.wiley.com/doi/full/10.1111/mbe.12028)*)*. This phenomenon is not restricted to more advanced technology: a different study found similar results when comparing letter learning in 30- to 36-month-olds. Children who read a standard, relatively plain type of children's book learned more letters than children who encountered a book with many manipulative features such as flaps, levers, and textures. Evidently, although children may have enjoyed playing with the flaps and levers, it appeared to distract them from really engaging with learning the letters *(*2 (http://journals.sagepub.com/doi/abs/10.1177/1468798411430091)*)*. Thus, although there may not be anything unique about the potential for cutting-edge electronic technology to serve as a source of distraction, its power and flexibility to create attention-grabbing images and multimedia may make it particularly distracting and damaging to student engagement.

Despite the potential dangers for distraction, correctly leveraged technology can be a tremendous asset to teachers and classrooms. Well-designed computer activities and lessons can provide support to teachers who must simultaneously address the needs of many different students with limited resources. Take as an example the cognitive tutors that are continuing to be developed and refined, which adapt to the needs of individual students by tracking the kinds of mistakes they make to support and strengthen whatever skills may be weak (for a review of early research on cognitive tutors, see *(*3 (https://www.tandfonline.com/doi/abs/10.1207/s15327809jls0402_2)*)*). As these technologies become more and more sophisticated, the potential for technology to aid education will presumably only grow. However, as cautioned by Hirsh-Pasek and colleagues *(*4 (http://journals.sagepub.com/doi/abs/10.1177/1529100615569721)*)* in a recent article about the proliferation of tablet and phone apps marketed as educational, it is critical to use insights from the science of learning to guide the design of these apps if they are truly to support education. Just as the Food and Drug Administration has a set of guidelines foods must meet to be labeled "low-fat", perhaps an analogous set of standards should be developed to regulate the use of the word "educational" to describe apps marketed toward parents of young children.

Four Pillars of Learning

As put forth by Hirsh-Pasek and colleagues (http://journals.sagepub.com/doi/abs/10.1177/1529100615569721) to guide responsible creation of "educational" apps, humans learn best when they:

- Are actively involved, or "minds-on" with the task or learning materials
- Are engaged with the task or learning materials rather than distracted by peripheral elements
- Derive meaningful experiences that connect to their lives
- Have high-quality social interactions connected to the task or learning materials within the context of a clear learning goal

Image credit: Max Pixel

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