Chapter 15
Harnessing Technology to Help Students Reveal an Authentic Research Process: Pictorial and Video Research Steps

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ABSTRACT
Screencasting and screen capture technologies have been used extensively by teachers in flipped instruction, placing students as passive recipients of knowledge. This chapter proposes a way to engage students as users of screen recording software in order to learn the research process. By visually recording various steps as they conduct research, students reveal authentic successes and mistakes in their research, ultimately resulting in an experiential understanding of an effective research process. The purpose of this chapter is to prepare teachers to implement this strategy as they teach students how to conduct research, and it includes software comparisons, suggestions for overcoming challenges, and benefits to students.

INTRODUCTION
Technology has played a significant role in flipped instruction primarily through instructor use for creating video lectures and tutorials, and for communicating with students outside of the classroom (Bergman & Sams, 2012; Berrett, 2012; Datig & Ruswick, 2013). Students, however, have traditionally been on the receiving end of technology rather than engaged users. The methodology proposed in this chapter seeks to transform the student role in technology from passive receiver to active user for the purpose of revealing the student’s research process via screen capture or screencast. In addition to flipping the context of flipped education from instructor-driven to student-driven, this methodology promotes learning of specific research skills in a more transparent way than that provided by traditional textual assignments.

Several years of experience teaching writing online have had a radical impact on this author’s instructional practices in the face-to-face classroom. Those experiences, paired with the influences of

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the principles of flipped instruction, resulted in adapting many of the teaching strategies that proved effective in online classes into traditional classroom classes. Of those techniques emerged one of the most effective: requiring students to use screen capture methods and screencasting software to show their work in progress as they completed various steps in the research process. For example, students are commonly required to learn how to search a library database as well as a search engine such as Google (Datig & Ruswick, 2013; Ris, O’Shea, LaVecchia, & Malek, 2012-2014). While those early steps are crucial in the research process, they are also steps where students tend to falter, misunderstand, or get lost in cyberspace, therefore possibly derailing the entire research project. Visually recording those steps in progress transforms the assignments from written work completed in solitude to interactive, engaging pictorial or video discoveries that make students’ methods, mistakes, and successes transparent to themselves, the teacher, and classmates. Visually recording rather than writing about research methods flips the instruction (Berrett, 2013) and the student’s work. Doing so also creates a learner-centered environment (Weimer, 2013) and better accommodates visual learners (Mayer, 2009).

This method was developed to help address two primary concerns. First, it was hoped that applying this philosophy specifically to students’ research processes prior to writing would address some of the problems evident in those processes, such as copying passages from Web sources directly into an essay or project with little concern for proper contextual explanation or citation, using only the first sources in search returns without further examining all of the results, and considering only opening paragraphs (The Citation Project, 2013).

Secondly, it was intended to emulate the philosophy of teachers in many disciplines who assess student learning by examining various steps in the learning process. For example, Cyr, Smith, Broyles, and Holt (2014) developed a rubric for assessing medical students’ writing, evaluating such process components as logical sequencing, depth of knowledge, and use of references in a paper. Barbera (2009) required her educational psychology students to create “netfolios,” essentially collections of e-portfolios, in order to assess student learning and conduct peer review through series of interconnected collections of work. Seeing students’ work and revision isn’t isolated to disciplines in the sciences. Hoffman Davis (2005) argued that teachers in other disciplines can learn a lot from art teachers, who regularly assess student artists’ processes from creation through revision and reflection.

To simplify a bit for students, the assignment explains this reasoning only in the context of math instruction, as such: “Your task, before you begin to write the research essay, is to explore, discover, and engage with a controversy through a series of research and writing steps. These steps are designed to guide you towards developing a clear and focused research question and hypothesis for your essay. These assignments require you to explain your research process in both written and visual form. Math teachers are well-known for the phrase ‘show your work,’ meaning that they want to see not just your answer but how you solved a particular problem or arrived at a determination. That same principle applies here – I want to see your research process in action. You may submit the visual Research Steps in any form that shows your work: via a vlog or video, a series of screen capture (print screen) images, or a series of photographs.” As explained to students, this approach in math, for example, helps the teacher identify how the student arrived at a particular solution and where the student went wrong in calculation or formula. Likewise, showing work helps the student to learn the calculation or formula more so that simply memorizing.

The pedagogical issues related to teaching research skills might differ in each discipline, but at many levels, from elementary through college, teachers have assigned homework assignments of varying complexity to scaffold students’ learning about the research process. In writing instruction, the National