Chapter 26
Using Automated Feedback to Improve Writing Quality:
Opportunities and Challenges

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ABSTRACT

Writing skills are essential for success in K-12 and post-secondary settings. Yet, more than two-thirds of students in the United States fail to achieve grade-level proficiency in writing. The current chapter discusses the use of automated essay evaluation (AEE) software, specifically automated feedback systems, for scaffolding improvements in writing skills. The authors first present a discussion of the use of AEE systems, prevailing criticisms, and findings from the research literature. Then, results of a novel study of the effects of automated feedback are reported. The chapter concludes with a discussion of implications for stakeholders and directions for future research.

INTRODUCTION

In the 21st century, writing skills are essential for academic success, college acceptance and completion, and stable gainful employment. Writing skills support the development of academic skills such as reading ability and higher-level thinking (Graham & Hebert, 2010; Langer & Applebee, 1987), and writing skills are frequently relied upon as a means for evaluating learning in content area classrooms (Graham, Capizzi, Harris, Hebert, & Morphy, 2014; Kiuhara, Graham, & Hawken,

2009). In addition, writing skills are regarded as one of the best predictors of college success (ACT, 2005; Noeth & Kobrin, 2007; Norris, Oppler, Kuang, Day, & Adams, 2006), and they serve as a "gatekeeper" in the workplace—weak writing skills prevent applicants from being hired and employees from being promoted (National Commission on Writing for America's Families, Schools, and Colleges, 2004, 2005).

Despite the importance of writing skills in each of these contexts, in the United States more than two-thirds of students in grades four, eight,

and twelve fail to achieve grade-level proficiency in writing (National Center for Educational Statistics, 2012; Persky, Daane, & Jin, 2002) and an estimated 6-22% of school-age students meet diagnostic criteria for specific learning disabilities in the area of written expression (Hooper et al., 1993; Katusic, Colligan, Weaver, & Barberesi, 2009). Present K-12 academic reform efforts in the United States aim to change these outcomes. The adoption of the Common Core State Standards (CCSS, 2010) and its associated assessment systems—those developed by the Partnership for the Assessment of College and Career Readiness and Smarter Balanced Assessment Consortia—are intended to serve as levers to raise writing achievement by requiring educators to focus greater instructional resources on improving writing skills. For example, the CCSS expects students to compose well-organized texts in multiple genres for multiple purposes (i.e., to persuade, to inform, to narrate); to engage in the processes of planning, revising, editing, and rewriting; to use writing to gather information and build understanding about topics; and, to use technology while completing independent and collaborative writing projects. Technology applications in writing instruction include, but are not limited to, the use of word processing programs, the use of the internet to gather information and publish texts, and the use of automated essay evaluation (AEE) systems as learning tools to support revising and editing processes. It is this latter application which comprises the focus of the current chapter.

PURPOSE OF THE PRESENT CHAPTER

Recent reform efforts have moved writing instruction, and the application of technology within instruction, to the forefront of stakeholders' minds in a way hitherto unseen in the 21st century. Consequently, AEE systems are increasing their visibility and adoption as learning tools within school settings. However, there are mixed findings from empirical research on the effects of automated feedback on writing quality. Thus, to aid stakeholders interested in the use of AEE and automated feedback for improving writing skills, the remainder of this chapter will:

1. Describe AEE and automated feedback, the underlying theory associated with their use, and praise and criticisms of this technology.
2. Review results of previous studies of automated feedback on writing quality and report results of a novel study by the chapter authors of a formative AEE system called Project Essay Grade (PEG™) for scaffolding improvements in the writing quality of students in grades 4-8.
3. Discuss results of the present study in light of previous research and theory, discuss implications for stakeholders, and discuss areas of future research for the field.

AUTOMATED ESSAY EVALUATION (AEE) AND AUTOMATED FEEDBACK

AEE is a term used to describe any number of computerized essay evaluation programs designed for use in educational settings. Such programs have been in continuous development since the pioneering work of Ellis Page and colleagues during the late 1960's. While AEE is beginning to be applied outside of the domain of educational testing companies, the state-of-the-art of this technology is represented by systems developed by such companies. Widely known examples of such systems are ETS's *e-Rater* and *Criterion* system (Attali & Burstein, 2006; Burstein, 2003; Burstein, Chodorow, & Leacock, 2004), Pearson's *Intelligent Essay Assessor* (IEA; Landauer, Laham, & Folz, 2003) and *Summary Street* systems (Franzke, Kintsch, Caccamise, Johnson, & Dooley, 2005; Wade-Stein & Kintsch, 2004), and Measurement Incorporated's *Project Essay Grade* system (PEG;

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