Electronic Feedback

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Electronic Feedback and Second Language Writing

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Abstract

This chapter summarizes and analyzes three main strands of research on computer-based feedback on second language writing. The first area examines research on the potential usefulness and cost-effectiveness of software-generated feedback to replace or enhance direct human feedback. The second strand is comparative, evaluating the effect of computer-mediated human feedback on ESL writing when compared with more traditional face-to-face feedback. Researchers examine how to best provide grammar and stylistic feedback, how to help students become more autonomous in correcting their own errors and in reflecting on their writing, and how to foster the development of students’ writing strategies. A third strand of research, often framed by a sociocultural perspective, examines differentiation within electronic modes and the feedback provided in cross-cultural and cross-linguistic exchanges through online collaborations. The chapter concludes by summarizing lessons from these three strands of research for instruction and future inquiry.
Electronic Feedback and Second Language Writing

Introduction

The rapid pace at which educational technologies are growing creates a broad spectrum of ways in which technology can be integrated into classroom instruction. These multiplying points of contact between technology and second language writing converge on the concept of electronic feedback. Writers who are linked to the screen are connected as well to the certainty of receiving some form of reply, whether that feedback comes as an interpersonal e-mail note about favorite movies from a keypal located at a considerable geographic distance, as a holistic score generated by an automated essay processing algorithm designed to evaluate high-stakes writing assessments, or as a compendium of comments from a classmate peer helping make final revisions on an academic essay.

Instructors are finding less convergence, however, on the pedagogical recommendations made by researchers who examine technology and second language writing. As we demonstrate in this chapter, “electronic feedback” is a slippery term that is used across a range of often dissimilar approaches to the teaching of writing. Just as the purposes of literacy take on different meanings and uses in a range of contexts, so do the uses of technology come to bear in a variety of ways depending on the research lens and pedagogical frame. Those who teach writing mainly as mastery of a compendium of sub-skills, electronic feedback often refers to automated feedback provided by a computer. Sophisticated software systems are readily available that can generate immediate evaluative feedback on student writing. For those who view writing as a social practice, the term “electronic” indicates the means by which human feedback is provided. Instructors might choose, for example, to integrate technology-mediated peer response groups
into their classrooms or to match their students with native-speaking keypals using Internet-based communication platforms.

This variance in what is meant by electronic feedback can be misleading for practitioners. Not all uses of technology for teaching writing are equal; they are borne out of locally and institutionally construed notions of what constitutes writing and what is considered quality feedback. As instructors turn to research-based evidence for answers about how best to use technology for providing feedback, they deserve a critically informed, empirically based inquiry that makes explicit both how, specifically, electronic feedback was used, as well as what criteria were used to evaluate its effectiveness. Justification for the new uses of technology must be based, not on unmitigated, unrealistic optimism, or on uninformed, a priori rejection, but on empirical data matched to particular uses in specific contexts.

We argue in this chapter that certain uses of technology, particularly those that promote social interaction and communicative purpose, are more favorable than others, and that certain technology-mediated contexts are more likely to generate helpful feedback, particularly when an interested reader provides detailed comments across several iterations of student writing. In the following sections, we traverse the terrain of technology and writing instruction to map out how the concept of electronic feedback plays out in different areas of research and instruction. We examine areas of overlap in issues and concerns that cross a wide range of educational contexts, and in so doing, we keep a close eye on how the variable goals of each setting highlight different key issues and make use of technology in diverse ways with differential outcomes.

We begin by addressing in turn three strands of research on electronic feedback for second language writing. First, we examine research on the potential usefulness and cost-effectiveness of software-generated feedback to replace or enhance direct human feedback. The
second strand is comparative, evaluating the effect of computer-mediated human feedback on ESL writing when compared with more traditional face-to-face feedback, particularly in post-secondary composition classes. A third strand of research, often framed by sociocultural and sociocognitive perspectives, examines differentiation within electronic modes, expanding from a specific focus on academic modes of second language writing to a notion of feedback that encompasses other communicative modalities, such as online chatting, email telecollaboration, and multimedia authoring. We conclude by summarizing lessons from these three strands of research for instruction and for future inquiry.

Strand One: Automated Feedback and Writing Assessment

Interest in automated electronic feedback on essay writing has been blossoming in the last 10 years. Much of the current research on automated feedback is undertaken by institutions developing commercial testing or teaching materials and tends to focus on the individual and performative aspects of writing. Although to date there is a paucity of research on the social or communicative dimensions of automated feedback, its proponents argue that over time automated feedback can help illuminate our understanding of the varied cognitive and social processes involved in writing (Kukich, 2000).

The impetus for creating automated essay evaluation tools is rooted in considerations of both human and monetary resources. Systems that generate feedback on written work through sophisticated computer-generated models have been promoted as cost-effective ways of replacing or enhancing direct human input. These programs provide a range of feedback from individualized reports on grammatical errors for ESL students (Bolt, 1992; Dalgish, 1991; Liou, 1994; Warden & Chen, 1995) to holistic evaluations that attend to many of the content, organizational, and mechanical aspects of essay writing for both first and second language
writers (Brock, 1990, 1993; Burston, 2001; Ferris, 1993; Leacock, 2004). As class sizes continue to grow and as instructors are expected to provide more rigorous evaluations than multiple-choice tests can provide, automated essay evaluation is touted as a viable, economically feasible alternative to the expensive endeavor of wide-scale assessments. The kind of feedback generated by automated essay evaluators differs strikingly depending on what view of writing informs the particular curricular objectives and instructional outcomes.

Cost-Effectiveness of Replacing Human Raters with E-raters

A major justification for turning to automated feedback grows out of needs cited by large-scale educational testing organizations to test content knowledge and writing competence. For national and international language performance evaluation companies, large-scale testing that employs any form of written response entails a high cost. Teams of graders must be given interrater reliability training, and grading must be regulated with reliability checks. These necessary protocols are costly, which makes automated essay evaluation appear as an attractive, economically viable, alternative because replacing human raters with automated raters reduces the overall cost of evaluation.

The most well-known automated evaluation system is the Criterion e-rater (Burstein, Chodorow, & Leacock, 2003) developed by the Educational Testing Services (ETS). The e-rater is trained to look for lexical complexity, syntactic variety, topical content, and grammatical errors in order to provide feedback in the form of both holistic scores as well as specific feedback in grammar, organization, style, and usage. Using an automated web-based system, students can choose from a range of practice essay topics that are leveled by grade. The database also includes prompts that provide practice in such high-stakes tests as post-secondary writing placement essays and TOEFL exams. To develop a model for a single essay question, two
human raters must score up to 500 essay responses, and the e-rater is then trained on this scoring model until it consistently arrives within one point of agreement with the human raters. Even in cases in which a third human rater must resolve the score, the agreement rate is typically 97% between e-raters and human raters. In a study conducted by Chodorow and Burnstein (2004) on a data set of approximately 10,000 essays from student responses to seven exam prompts on the TOEFL exam, e-raters differed little from human readers in achieving agreement on holistic scores.

Another automated electronic feedback program, MY Access!, developed by Vantage Learning (Eliot & Mikulas, 2004), has also found its way into a growing number of public schools. Like the e-rater, students can post multiple essays and receive holistic scores on their final drafts. Unlike the e-rater, it currently does not have as sophisticated a system for providing individualized feedback, although it does provide a potentially useful range of writing tools, including online portfolios, a writer’s checklist, scoring rubrics, word banks, spell checkers, and graphic charts. In four separate studies, researchers documented significant gains in fifth-eleventh grade student writing skills as measured by student performance on statewide writing assessments (Eliot & Mikulas, 2004). The findings are preliminary, however, because the subjects were not randomly assigned to the treatment condition of using the MY Access! program. In a survey given to 94 eighth-grade students using this program, over 80% rated their satisfaction with the feedback provided by this automated program as both helpful and accurate.

The Impact of Automated Electronic Feedback on Writing Instruction in the Classroom

On the instructor’s end of automated electronic feedback, the sheer number of hours spent commenting on student papers is reduced dramatically when instructors can rely on automated electronic feedback systems. Without question, the speed with which a computer can
provide individualized feedback outstrips even the fastest turnaround that a human reader could manage. Arguably, by using such systems, instructors can free their time to turn their attention to other aspects of teaching in the process writing approach (Chen, 1997; Yao & Warden, 1996). Questions surface, however, about the efficacy of the “more is better” and “faster is better” tenets in writing instruction. To date, we have not found any studies that directly examine the question of whether or not immediacy is more effective in strengthening student writing in the long term than the normal feedback turnaround provided by instructors.

Despite the advantage of the timesaving capabilities of automated feedback, many developers of this software nonetheless insist that computer-generated feedback should only be considered a supplement to classroom instruction (Burstein, Chodorow, & Leacock, 2003; Burstein & Marcu, 2003). Although they do not give a clear indication of what the core instruction might include, we would propose that the importance of social interaction cannot be underestimated. These automated programs are theoretically grounded in a cognitive processing model of the human brain, which fails to account entirely for the learning that takes place on the social and interactional plane.

Summarizing Issues of Automated Electronic Feedback

In many ways, programs like the Criterion e-rater and MY Access! are relative newcomers to the field of second language writing, and their impact has yet to be systematically evaluated across a range of contexts, particularly those in which second language learners receive instruction. In the field of second language learning in the past, studies examining the impact of automated software systems that provide grammatical feedback have reported quite mixed, inconclusive results on the improvement of student writing (Dalgish, 1991; Healey, 1992; Liou, 1994; Nutta, 1998; Warden & Chen, 1995), and it remains unclear what advantages
these new products will offer. Currently, these programs hold up rather static models of what is considered “good writing.” The e-rater, for instance, currently evaluates student writing against a single static model, the prototypical five-paragraph essay. In order for the usefulness of programs like the e-rater to be assessed, second language researchers will need to become more involved in developing more rigorous evaluative criteria that reach beyond these formulaic models.

Further, despite the favorable reports of student performance cited above, such accolade of automated feedback often carries a message with a subtext that makes many writing instructors uncomfortable. In the automated environment, writing is construed as primarily a performance piece designed to evaluate student mastery of the grammar, usage, and organization. It has yet to be modeled on real interaction or purposeful writing. Questions arise about the authenticity of the writing: are students who post revision after revision, as in the case of high school students practicing for their statewide essay exams, actually becoming stronger writers, thinkers, and communicators? Or might they merely be applying the same kinds of test-taking strategy skills so often used to outwit multiple-choice exams?

A lesson learned in the 1990s in the fields of foreign and second language education offers added weight to this cautionary perspective. In foregrounding software-generated approaches as the preferred path for teaching language and second language writing, the computer was viewed primarily as a tutor (Kern & Warschauer, 2000) that could offer an untiring source of practice opportunities for students by generating individualized error feedback and grammatical explanations. When technological developments later inspired a rush of software development designed to enhance classroom language learning, computers also became tutees (Kern & Warschauer, 2000). Using closed-system CD-Rom technology, students could
navigate through large databanks of culturally and linguistically rich material such as video clips, translations, glosses, and quizzes. The shortcomings of such systems included the lack of meaning negotiation in real world contexts, and the emphasis paid to highly individualized learning that paid little attention to social processes.

Ultimately, though, the potential of automated essay evaluation for improving student writing is an empirical question, and virtually no peer-reviewed research has yet been published that examines students’ use of these programs or the outcomes. With the certain growth of such software in coming years, this will be a prime area of research related to electronic feedback.

Strand Two: Technology-Enhanced Peer Response and Writing Instruction

In this strand, we turn to an area of writing research that tackles head-on the attempt to integrate technology into the writing classroom in ways that exploit the social interactive potential of technology. In the studies we highlight here, electronic feedback refers to the means by which human feedback, particularly peer response, can be provided via technology. For these instructors, the central question is how computer-mediated peer response might mimic or even enhance the positive outcomes cited by research on face-to-face peer review. Many such studies have been comparative in design in an attempt to ascertain the viability of transferring the familiar classroom practices of peer response groups into the electronic medium. Teachers often conduct research in their own classrooms and use as their evaluative measure both holistic evaluations of essay writing as well as qualitative analyses of student attitudes.

Matching Technology to Second Language Writing Pedagogy

In classrooms that value idea sharing and group work through participation in a community of writers, technology-enhanced environments can provide rich resources for promoting student collaboration by making student papers more widely available and by
fostering a sense of community and collaboration in the classroom (Kahmi-Stein, 2000; Plass & Chun, 1996). Electronic discourse also provides an audience of peers beyond the instructor, which helps heighten awareness of audience and of communicative purpose (Ware, 2004).

Other researchers have found that online discussions provide spaces for students to practice their literacy skills in a non-threatening environment (Colomb & Simutis, 1996). Non-native speakers, in particular, have been found to participate more actively and with greater motivation when provided the opportunity to share their writing through online discussions (Greenfield, 2003; Sullivan & Pratt, 1996; Warschauer, 1996a, 1996c). From an instructional perspective, the use of technology makes the exchange of student drafts more efficient (Palmquist, 1993), and teachers are better poised to monitor peer feedback on the screen than they can in a large number of face-to-face small group clusters (DiGiovanni & Nagaswami, 2001).

In a study examining the potential transfer effect of emailing to students’ academic writing, Biesenbach-Lucas and Weasenforth (2001) used a functional analytical approach to compare the variation found between email writing and word-processing writing. Because of the assertion that email writing has both oral and written features, they examined what kind of linguistic transfer might occur between email writing and formal academic writing. They analyzed ESL student writing for how cohesive features were used, how much text was produced, and how students contextualized their writing. Their findings indicated that students tended to write shorter texts in their emails and to provide more contextualization in their word-processing documents. In another study of the impact of word processing on ESL student writing, Pennington (1993) found that successful implementation relies on assessing many factors, including the students, the context of use, and the software chosen.
Another body of research examines more specifically the linguistic advantages of computer-mediated discussion formats in second and foreign language classes. Although these studies do not focus specifically on improvement of writing through direct feedback per se, they attempt to identify how peer interaction online might enhance the overall accuracy and complexity of second language writing. Research in this area has produced mixed results when comparing technology-enhanced to face-to-face contexts of instruction (for extended reviews see Ortega, 1997; Warschauer, 1996b). Kern (1995), for example, found that there were a higher proportion of simple rather than complex sentences in online discussions, while Warschauer (1996a) found that students wrote with greater complexity and a higher lexical range in their online writing. Pellettiere (2000) gave evidence of greater attention to form, to negotiation of meaning, and to linguistic modification in online writing. Sotillo (2000) compared synchronous with asynchronous modes and found that ESL students tended to write with greater syntactic complexity when writing in asynchronous discussions, which she attributed to the increased amount of composing time students had available.

Up to this point, we have reviewed only those studies in which researchers perform post-hoc analyses of the downloaded transcripts of computer-mediated peer reviews and peer interactions. Another substantial advantage of this form of electronic feedback, however, includes the large database of student writing that computers can store. Many instructors actively use these transcripts for in-class discussion and analysis. They print out transcripts of student writing and work with them to build students’ metacognitive awareness of particular linguistic, interactional, organizational, and rhetorical features (Sengupta, 2001; Swaffar et al, 1998). Asynchronous discussion formats, in particular, are believed to combine the interactive aspect of written conversations with the reflective nature of composing. Lamy and Goodfellow
(1999) call this “reflective conversation” (p. 43) and cite its strength in instructional contexts for drawing students’ conscious attention to linguistic function and form.

In a small case study designed to examine the effectiveness of working with students’ own writing to develop metalinguistic awareness, Yuan (2003) showed how two students actively analyzed transcripts of their own writing and thereby became more attentive to the errors they produced when writing. For a ten-week period, Yuan met with these two in-service teachers on a weekly basis. In their face-to-face discussions with the instructor, the students discussed the errors found in their transcripts and over the semester became more effective at monitoring and self-correcting their own writing. In this case, students provided their own feedback on their writing; the electronic mode was simply a useful way to store their writing for analysis during in-class sessions.

Revising Essays: Peer Feedback and Technology

Another group of comparative studies examine how well peer response groups, popular in traditional face-to-face environment, can be transferred to computer-mediated interaction. Using a control group experimental design, Schultz (2000) compared face-to-face with computer-mediated peer feedback by examining the revisions that intermediate and upper-intermediate French students made across their writing in a classroom with a process-oriented approach. She used the Daedalus Interchange package which allows for real-time interaction on a local area network. Students wrote comments about one another’s essays in real time, and they also received a written transcript of these online sessions so that they could more easily draw upon their peers’ comments. She then analyzed essays from a pool of 54 students and conducted attitude surveys across 106 students. Her unit of analysis was the number and type of changes that students made between their rough drafts and their final essays following two types of
feedback: that provided in face-to-face discussion, and that provided in online real-time discussion. She found that students made more *specific, local* changes in the online mode, as writers were able to save and follow the detailed suggestions made in writing. However, students made more *global* changes in the face-to-face mode, which seemed to facilitate more rapid back and forth interaction and thus better exploration of the writer’s intentions and goals. Students who received feedback in both modes made the most productive overall use of feedback.

Schultz’s findings were to some extent replicated in a study by Tuzi (2004), who examined how electronic feedback impacted the revisions that first-year university second language writers made to their academic compositions. Although Tuzi found in interviews with the student participants that they preferred oral feedback, they actually made more revisions in response to e-feedback than either to oral feedback or to feedback provided at the writing center. He suggests that this preference for oral feedback may stem from the familiarity of oral feedback as a classroom practice, or from students’ beliefs that there was a substantial difference between oral and written feedback. Nonetheless, he found that the changes made in response to e-feedback were more frequent, and that they tended to be at the clause, sentence, and paragraph levels, rather than at overall global organization.

DiGiovanni and Nagaswami (2001) showed that students were more focused and on task when providing feedback during real time. In a brief questionnaire that followed up on students’ perceptions of both oral and electronic feedback, reactions were generally evenly divided between the two modes as useful. Instructors, however, indicated that advantages to the electronic medium included the ability to monitor peer response conversations and to utilize
printouts of transcripts. They suggest an indirect positive impact for students who may feel that this kind of teacher oversight is appropriate (see also Sengupta, 2001).

Braine (1997, 2001) and van der Geest and Remmers (1994) point out potential negative features of using technology for peer response groups. Braine, for example, found that the several features of the medium made peer response groups less effective than they could be. In studies designed to compare writing instruction for EFL students in LAN-mediated and face-to-face classrooms, he argued that the use of LAN has not been shown to improve the quality of students’ final essays. For three consecutive semesters on three separate cohorts of students, he consistently found that students in the face-to-face classroom condition produced better quality essays by the end of the semester than students in the LAN-mediated class. He attributes this finding in part to the difficulty students faced in navigating the multiple, simultaneous discussion threads of a large quantity of online writing. van der Geest and Remmers (1993) also indicated that the system of computer-mediated peer review was made difficult because of technical difficulties and because of their dissatisfaction with a distance learning environment. While illustrative of potential barriers, these studies are inconclusive because many of the difficulties cited can be resolved through better navigation software and instructional design.

Summarizing Computer-Mediated Peer Response

Of course, judgments about good writing are locally influenced, making the results of these studies somewhat difficult to compare across contexts. Similarly, results in studies of student attitudes and of pedagogical integration differ depending both on how instructors integrate the face-to-face and electronic forms of feedback into the class assignments, as well as on how familiar students are with technology (Greenleaf, 1994; Hyland, 1993; Phinney & Khouri, 1993; Ware, 2004; Warschauer, 1999).
Strand Three: Differentiation Among Forms of Electronic Feedback

The tools of technology, as with many instructional strategies and innovations, provide the most beneficial results when integrated into a strong curriculum and when clearly matched to instructional purposes. There is a great deal of variety in what constitutes purposeful writing, and as Warschauer (1999, 2002) has demonstrated previously, the underlying assumptions that teachers hold about literacy are integral players in how they choose to integrate technology as a resource into their writing classrooms. As the studies that follow show, the resource of technology is providing fruitful opportunities for second language learners to write both inside and outside the classroom.

One Size Does Not Fit All: Differing Notions of Academic Essay Writing

In the study cited above, Warschauer (1999, 2002) embarked on an ethnographic action research project that examined how three different writing teachers integrated technology into their second language writing classrooms. Each of the teachers took a different theoretical stance on what constitutes academic writing: formalist, constructivist, and social constructivist. In the formalist approach, academic writing was seen as mastery of a set of subskills that led to a grammatically-correct product, usually in the form of a traditional five-paragraph essay. In this classroom, computers merely provided the means to meet a singular end of training students to produce this type of writing. Students used the computer to complete grammar exercises and formulaic writing tasks common to many basic writing classrooms. In the constructivist approach, writing is viewed not just as an academic task, but as having personal meaning and practical applications. The instructor in this classroom used computers to engage her students in genres such as multimedia authoring that opened up a range of literacies, not just formal academic writing.
In the classroom with a social constructionist approach, Warschauer (1999, 2002) documented an important shift away from viewing technology as the means by which conventional beliefs about writing and the teaching of writing could be made more efficient, and toward a vision of technology as driving new approaches to literacy instruction. The instructor saw in technology unique opportunities for students to collaborate with one another and to engage in a tutor-tutee apprenticeship with the instructor. By requiring the creation of professional web pages and participation in academic listservs, she also helped them connect to the academic communities relevant to their studies. Drawing on a similar view of literacy, Kasper (2000) demonstrated how new technologies could be used in focus discipline research to engage students in multiple literacies both in ESL writing instruction as well as in professional, social, and personal realms beyond the classroom.

Electronic Feedback in Two Languages: Online Language and Culture Exchanges

“Feedback” in many foreign language education contexts does not always refer in the strictest sense to writing instruction that focuses only on academic writing development. Instead, feedback, particularly electronic feedback, is construed to serve the larger purposes of fostering overall communicative competence and language development. We end by briefly turning to a review of studies that use electronic feedback, primarily in the form of online interaction, as a way for students to write in a second language to accomplish a range of interactionally meaningful purposes (for an extensive review, see Liu, Moore, Graham, & Lee, 2002).

The Internet allows for the creation of meaningful, rich contexts of interaction that allow students to engage in personal communication (Kern & Warschauer, 2000; Warschauer, 1999). These electronically-mediated interactions provide them with peer feedback from native-speaking peers; through this form of electronic feedback, they gain experience as writers who
use language, not just to perform a skill, but to communicate across linguistic and cultural barriers. Findings have consistently reported that students produce more output and report being more motivated to do so when communicating in the target language with native language partners on the Internet (Kern, 1996; Meagher & Castaños, 1996; Ware, 2003; Warschauer, 1996c). Through online websites, students have access to resources and materials that give insight into the issues and controversies that are pertinent to a particular group of people in the country of study (Richter, 1998). “Key pals,” or one-to-one email partners who communicate in their respective target languages through writing, can offer personalized feedback and meaningful communication in the online medium (Brammerts, 1996). In her ethnographic study of high school students in Finland and England communicating over email, Tella (1992) showed that having real-world native speaking peers as their audiences made a positive impact on student writing (see also Barson, Frommer, & Schwartz, 1993). Students wrote in a wider range of genres, and they focused more on content, which allowed them to utilize a larger vocabulary and more idiomatic expressions. Classroom instruction was no longer teacher-directed, but instead class time was used for more individualized and learner-centered workshops.

Using a sociocultural lens in foreign language research (Lantolf, 1994; van Lier, 2000), many researchers have begun to address the complex interplay of language and culture with the online context, in which peers provide one another feedback on writing as intertwined with language and culture (Belz, 2002; Furstenberg et al, 2001; Kramsch & Thorne, 2002; Ware, 2004; Warschauer, 1999). Kramsch and Thorne (2002), based on findings from a joint French-American writing exchange, suggest attending to genre and discourse in the online context. Belz (2002) addresses issues relating to social and institutional constraints in an international e-mail exchange. Through one-to-one writing over email (O’Dowd, 2003) and asynchronous
discussion groups (Belz, 2002, 2003; Thorne, 2003; Ware, 2003), students writing and responding over the Internet can gain intercultural understanding. These studies have in common the call, echoed across an array of disciplinary fields, for more research that examines online social interaction in its cultural, historical, and social dimensions (Belz & Müller-Hartmann, 2003; Chapelle, 1997).

**Conclusion**

As the research findings from all three strands have shown, and as writing instructors have long demonstrated, the task of evaluating writing and providing quality feedback is complex. In the first strand of research that examined computer-generated feedback, such complexity is largely dealt with by creating large-scale systems that provide efficient, automated individualized feedback loops. These systems tend to emphasize formulaic writing, because it better lends itself to systematic codification. While these systems seem to hold promise, they are currently focused mainly on finding ways to ease the human load of assessing large amounts of student writing. Studies that examine the potential benefits of such systems are still attempting to uncover conclusive advantages to software-generated feedback, and interest in this area is sure to continue.

In the second strand, evidence strongly points to the advantages of combining both oral and computer-mediated feedback when using peer response groups in the writing classroom. Regarding the quantity of output, the greater amount of writing and of revisions produced in classrooms offering some form of computer-mediated feedback is a positive outcome that has been replicated across several studies. Qualitative measures suggest that computer-mediated feedback is especially beneficial at the word, sentence, or paragraph level, as students attend to the very specific suggestions that are recorded in the online mode. In contrast, students often
prefer face-to-face feedback for generating ideas and exploring arguments. The dynamics of oral interaction allow for more free-flowing discussion and thereby result in more global changes to writing, such as a general refocus of direction, purpose, or organization.

The research agenda in the third strand is in many ways still in its early stages. As researchers and educators look for new ways to use computers in the classroom, second language writers will actively shape new genres, and educators will develop innovative approaches to meet the demands of these new areas of written expertise. From the studies reviewed here, several tendencies are already beginning to take shape. First, notions about conventional forms of literacy and feedback are expanding as second language writers shift their audiences from a single classroom teacher to peers and professionals across contexts. Second, contrary to early speculation, the instructor’s role in technology-enhanced classrooms does not seem to be diminishing; rather, pedagogical framing and instructional guidance play a powerful role in shaping the success of online learning. Finally, cultural aspects of second language writing are increasingly foregrounded in research, particularly in projects that examine written interactions between native and target language writers.

Research is sure to continue in all three areas we have addressed. To some extent, the questions currently asked about electronic feedback will continue to focus on how educators might enhance conventional forms of writing, or how students might become more autonomous learners through increasingly sophisticated computer-generated feedback software. However, future research will most likely also explore questions related to novel forms of writing and new ways of teaching and conducting research. These newer forms of electronic literacy (Warschauer, 2002; 2004) are sure to push the boundaries of the forms and functions of electronic feedback in ways that pose new areas for inquiry.
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