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SURVEYS OF PH.D./ED.D. THESES

Doctoral dissertations on second language writing and technology in the USA (2010–2019)

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Abstract

This paper reviews 20 representative Ph.D. dissertations on second language (L2) writing and technology completed in the USA over the past decade (2010–2019). These dissertations were selected using advanced search via ProQuest Dissertations & Theses. Five thematic categories were examined: (1) computer-mediated teacher/peer feedback; (2) automated writing evaluation; (3) computer-based collaborative writing; (4) technology-based writing instruction/assessment; and (5) digital composing/literacy. Each dissertation study was closely reviewed, with the presentation of illustrative tables. After analyzing and discussing the research designs, findings, and contributions of these studies, the authors identified the research trend and highlighted directions for future dissertation research in the field of L2 writing and technology.

1. Introduction and selection criteria

With the development of digital technology tools, L2 writing has witnessed innovation in teaching and research. New technologies have revolutionized the ways we communicate and construct knowledge, and have also reshaped the traditional notions of writing and literacy (Li & Storch, 2017). As Hyland (2016) reminds us, the new technologies have impacted 'the ways we write, the genres we create, the authorial identities we assume, the forms of our finished products, and the ways we engage with readers' (p. 40). In response to the new directions in writing, an increasing amount of dissertation research has been identified in relation to L2 writing and technology. As the role of technology in L2 writing will continue to be a heated topic for future research (Godwin-Jones, 2018), the authors reviewed 20 doctoral dissertations on L2 writing and technology completed in the USA during the past decade, in the hope to provide timely research synthesis and shed light on research directions, particularly for doctoral research.

The authors identified dissertations via the database ProQuest Dissertations & Theses Global. Under the advanced search option, 'L2 or ELL' (English Language Learner) AND 'writing or literacy' AND 'technology or computer' were input for abstract, and the manuscript type 'Doctoral dissertations' was selected. Meanwhile, 'English' was chosen for language and 'Last 10 years' (2010–2019) was chosen for publication date. As this study focuses on dissertations within the USA, all the dissertations conducted outside the US were removed. We also excluded work which did not explicitly report the trustworthiness of the study or validation strategies. Taking the breadth of research approaches and language learning contexts into consideration, we finally selected a total of 20 Ph.D. dissertations for close review. Afterwards, the corresponding author examined the abstracts of the twenty dissertations and derived five thematic categories, which were then verified by the co-author. The thematic categories include (1) computer-mediated teacher/peer feedback; (2) automated writing evaluation; (3) computer-based collaborative writing; (4) technology-based writing instruction/assessment; and (5) digital composing/literacy. Table 1 displays an overview of the dissertations reviewed in this study.

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Table 1. Overview of dissertations

Thematic category	Author	Year	Institution	Study context	Research approach
Computer-mediated feedback	Voborel	2013	University of South Florida	High school English as a Second Language (ESL) program	Qualitative-Multiple-case study
	Cunningham	2018	Iowa State University	Tertiary-level ESL writing class in an intensive English program	Quantitative-Descriptive
	Han	2019	University of South Florida	Tertiary-level Chinese as a Foreign Language (FL) class	Qualitative-Multiple-case study
Automated writing evaluation	Choi	2010	University of Virginia	Tertiary-level ESL writing class	Quantitative-Experimental
	Cotos	2010	Iowa State University	Graduate-level ESL writing class	Mixed methods
	Link	2015	Iowa State University	Tertiary-level ESL writing class	Mixed methods
	Alsallami	2017	Iowa State University	ESL students at tertiary level	Mixed methods, including a lab experiment
Computer-based collaborative writing	Li	2014	University of South Florida	Graduate ESL students in an English for Academic Purposes (EAP) program	Qualitative-Multiple-case study
	Alshalan	2016	Wayne State University	Tertiary-level ESL students in an intensive English program	Quantitative-Quasi-experimental
	Yim	2017	University of California, Irvine	Middle school ELA class with bilingual students	Mixed methods
Technology-based writing instruction/assessment	Park	2010	Penne State University	Tertiary-level ESL writing class	Quantitative-Corpus analysis and descriptive study
	Kyeu	2014	University of Wisconsin-Madison	Tertiary-level Swahili FL class	Quantitative-Descriptive
	Oh	2018	Columbia University	ESL speakers at tertiary/graduate levels	Mixed methods
	Tseptsura	2019	University of New Mexico	Tertiary-level ESL sections of online writing courses	Mixed methods
	Zhi	2019	University of Texas at San Antonio	Tertiary ESL students in an EAP program	Mixed methods
Digital composing/literacy	Chen	2012	University of Arizona	ESL students at graduate level	Qualitative-Case study
	Bauler	2012	University of California, Santa Barbara	Tertiary-level ESL writing class	Qualitative-Discourse analysis
	Jiang	2013	Michigan State University	High school ESL program	Qualitative-Multiple-case study
	Dzekoe	2013	Iowa State University	Tertiary-level ESL writing class	Qualitative-Case study
	Moore	2017	Bowling Green State University	ESL students at tertiary level	Qualitative-Grounded theory

The research approaches of the chosen dissertations range from qualitative studies to quantitative and mixed-methods studies. The participants were students in various learning settings. Of the total dissertations, five were conducted by students from Iowa State University and three from the University of South Florida, as the two institutions offer a doctoral degree program with a focus on Computer-Assisted Language Learning (CALL). The majority of dissertations on automated writing evaluation were written by graduates of Iowa State University.

In the following sections, the authors discuss the twenty Ph.D. studies in relation to five thematic categories, focusing on the research designs, findings, and contributions. Illustrative tables (Tables 2–6) are presented, including information on context and participants, technology, theoretical/pedagogical frameworks, writing tasks, research focus, and research data.

2. Computer-mediated teacher/peer feedback

Teacher feedback and peer feedback in the Computer-Mediated Communication (CMC) context is a growing research area in applied linguistics. Teachers, beyond grading obligations, provide constructive feedback to help students in achieving their writing goals. Meanwhile, peer feedback has been widely implemented to allow peer scaffolding to occur during co-learning of writing (de Guerrero & Villamil, 1994). With the development of technology tools, electronic feedback via MS Word or Google Docs and screencast feedback have captured increasing attention in the field of L2 writing (Tuzi, 2004; Elola & Oskoz, 2016). The following three dissertations address the theme of computer-mediated teacher/peer feedback, ranging from typed text and coded written feedback through digital mediums to feedback using screencast technology and video chat. Cunningham (2018) examined the use of screencast as a medium to provide feedback on ESL students' writing, while Han (2019) addressed different types of computer-mediated teacher feedback in a Chinese as an FL class. Vorobel (2013) researched ESL students' peer feedback in the K-12 setting. Regarding the three dissertations, research and instructional methods are examined, and teacher and student reception to this relatively new and changing way of pedagogical interaction is explored (summary displayed in Table 2). Effective feedback using different modes and technologies in an online learning environment is suggested, as well.

In line with previous research (e.g., Elola & Oskoz, 2016) drawing our attention to multimodal feedback, Cunningham (2018) examined the role of feedback modalities by comparing screencast video feedback using Snagit and text feedback using MS Word Comment across four ESL writing assignments. Results showed that students preferred video feedback for its efficiency, clarity, and ease of use. Cunningham (2018) also explored the differences in video and text feedback in terms of the use of interpersonal language, drawing on the Systemic Functional Linguistics-informed Appraisal Framework (Martin & White, 2005). Appraisal is useful in capturing interpersonal considerations of linguistic choices through the three systems of attitude, engagement, and graduation (White, 2015). Results revealed that textual feedback was more likely to point out deficiencies and weakness in students' writing, while video feedback provided a more balanced evaluation, with a larger number of responses, both positive and negative. Video feedback was also found to have encouraged student agency: Students were able to play, pause, revise, and then re-watch the video until they felt they had addressed each teacher comment. This dissertation initially explored the differences between multimodal feedback and text feedback, with a fresh new focus on the use of language for interpersonal considerations. The Appraisal Framework has proven to be an effective construct for L2 research into student identity, perception, and ownership, and can be adjusted for multiple feedback contexts in future studies.

Informed by Ferris's (2010) finding that direct and indirect teacher feedback may deliver different but complementary results on student writing, Han (2019) applied a multiple-case study design to investigate the effects and students' perceptions of both direct and coded Written Corrective Feedback (WCF) in an online, multiple-draft Chinese as an FL writing environment. Six intermediate-level Chinese as an FL learners completed four writing drafts, four revisions, four surveys, and four

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Table 2. Computer-mediated teacher/peer feedback

	Context and participants	Technology	Theoretical/ Pedagogical framework	Writing task	Research focus	Research data
Cunningham (2018)	12 intermediate ESL students at a midwestern university	Snagit for screencast video feedback and MS Word for text feedback	Appraisal framework across attitude, engagement, graduation	TOEFL essays of 200–300 words each	Teacher video vs. text feedback	Surveys, interviews, and screencast comments
Han (2019)	6 intermediate Chinese FL learners at a southeastern university	Course management system and MS Word	Vygotsky's Zone of Proximal Development (ZPD) and scaffolding	Four Chinese essays on Chinese traditional stories and current events	Computer-mediated teacher WCF and error correction	Interview and survey data
Vorobel (2013)	4 adolescent ELLs peer review in online and face-to-face environment in a southeastern high school	Web 2.0 (i.e., Wikispaces)	Ecological perspective – looking at context and examining components, ZPD	English essays on symbols of a Mandala circle and life goals	Peer feedback in online vs. face-to-face environments	Observations, interviews, e-journals, Wikispaces archives

interviews. Student responses to computer-mediated feedback were evidenced through acquisition and writing accuracy reflected in error changes over the semester. Students' attitudes to computer-mediated WCF were also examined. Based on an analysis of the participants' responses, the researcher identified cross-case patterns on how the students viewed indirect and coded WCF and the computer-mediated WCF in the course management system. The results of the survey indicated that student attitudes played an important role in writing, and that a clearer understanding of WCF and its purpose was significant in the reduction of error rates. Focused, coded error feedback in particular was found to be useful and effective. However, it took time for students to become familiar with feedback codes and task specifics. Immediate pedagogical implications of this study are students' enhanced ability to transfer feedback knowledge to new writing assignments, and that students may be better served if they have the opportunity to discuss errors with teachers, further increasing student motivation. This dissertation study is one of the first studies that examined the effect of computer-mediated WCF on Chinese L2 writing, which shed light on future research and pedagogy regarding computer-based teacher feedback in an FL context.

In addition to computer-mediated teacher feedback, online peer response has been increasingly implemented in L2 contexts due to its advantages of facilitating interactive textual exchange and enhancing student participation (Guardado & Shi, 2007). Vorobel (2013) examined the peer response practices of four ELLs in relation to two essays in the K-12 setting, using both face-to-face and online formats. Triangulated data sources included researcher and student e-journals, and written artifacts, including peer comments and students' writing revisions. The four participants perceived peer scaffolding beneficial to their writing performance and incorporated most of the peer feedback during the revision process. Moreover, students found peer reviewing in the online context easier than in face-to-face sessions due to the convenience of the technology and the technology affordance of working at one's own pace, in contrast to the time constraints and pressure during face-to-face peer review. This dissertation explored the positive role of Web 2.0 tools in L2 literacy practices of adolescent ELLs, and discussed how computer-mediated peer review can be beneficial in the online context from an ecological perspective (van Lier, 2004): how the learner makes meaning out of and employed affordances in their writing and makes revisions accordingly as an active agent.

3. Automated writing evaluation

The research on automated writing evaluation (AWE) has been developed with the fact that automated essay scoring (AES) systems have grown in sophistication and effectiveness since first being introduced in 1966, and later developed at Massachusetts Institute of Technology and Harvard University (Keith, 2003; Wang & Brown, 2007). With this initial exploration into the feasibility of such a system, and the ubiquitous presence of computers and online ecosystems in the current learning environment, AES systems such as IntelliMetric, the Educational Testing Service's Criterion system, and other specialty systems developed across universities and businesses have been increasingly used in the US. From high stakes testing such as Graduate Records Examinations to the quotidian tasks of grading daily essays of L2 students, AES systems such as IntelliMetric and Criterion have the potential to assess student writing fairly and accurately, while at the same time relieving educators of some of the more time-consuming and subjective tasks of L2 teaching and evaluation (Shermis & Burstein, 2003).

The four dissertations (see Table 3) provided valuable insight into teacher and student perceptions of AES systems, the impact of AES on student writing, as well as novel systems developed using free online software, which can be customized for specific student populations and learning goals. Alsallami (2017) examined students' perceptions of automated writing evaluation compared with traditional feedback. Choi (2010) investigated actual improvements in student writing following the use of automatic writing evaluation. Cotos (2010) examined the nature of Intelligent Academic Discourse Evaluator (IADE), which produces immediate automated feedback on writing samples, while Link (2015) developed and evaluated another new AES engine, CAFFite.

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Table 3. Automated writing evaluation

	Context and participants	Technology	Theoretical/Pedagogical framework	Writing task	Research focus	Research data
Alsallami (2017)	30 college ESL students in the intensive English program at a Midwestern university	Automated writing evaluator *wTutor,* CyWrite Analyzer	Sociocultural Theory, ZPD	Prompted texts targeting the grammatical structure (i.e., simple past tense)	Graduated automated written feedback, student perceptions and preferences	Dialogue states of iTutor, questionnaire, stimulated recall, and semistructured interviews
Choi (2010)	118 college ESL students at an eastern university	Criterion integrated AES	Social constructivism, ZPD, scaffolding, Interaction hypothesis	Three essay tasks: narrative, expository, and persuasive	Impact of AES on English writing quality across different levels of integration	Criterion automated essay scoring, written texts
Cotos (2010)	105 graduate ESL students at a midwestern university	Moodle, Wordsearch concordance tool, IADE (Intelligent Academic Discourse Evaluator)	Systems Functional Linguistics, Interactionist views on second language acquisition (SLA), Skills Acquisition Theory	Prompted academic essay: Research article introductions	The role of AWE in genre-based learning in L2 writing contexts	IADE records, Likert-scale questionnaire, pre-test, and post-test
Link (2015)	154 students in ESL classes at a midwestern university	CAFFite (AWE) assessing complexity, accuracy, and fluency	Complexity Theory, System Functional Linguistics	Comparison of texts responding to writing prompts	Development and evaluation of the reliability and effectiveness of an AES	English placement tests, CAFFite scores, and human rating scores

Alsallami (2017) examined 30 college ESL students' experiences of automated corrective feedback (CF) via a lab experiment, supplemented with a survey. Descriptive statistics of the surveys and exploratory factor analysis were used to identify relationships between writers' attitudes toward automated written CF and their preferred frequency of feedback. The results indicated students' strong preference for direct correction, with metalinguistic CF, identification of errors, and graduated CF (from implicit to explicit) following respectively. A close association between perceived clarity and usefulness of comprehensive CF and direct correction was identified. Also, CF preferences are primarily shaped by the time required to use CF successfully; students overall preferred more frequent and comprehensive CF, and the amount of time dedicated to a learning task influenced their preferences the most. This study suggested that when developing AES, developers should consider learner concerns and partiality, as well as their language proficiency and purpose of the specific writing task, rather than using the one-size-fits-all strategy of design. This dissertation was particularly strong because of the author's development of an automated graduated CF, wTutor, which was not offered by any commercial or free AWE at the time of writing.

Choi (2010) explored the impact of AES on ESL students' writing quality across different levels of integration of Criterion (i.e., No-AES, Optional-AES, and Integrated-AES with the mandatory use of Criterion) via a quantitative study. Data were collected through student essays, student surveys, instructor interviews, and course artifacts. Students were randomly assigned, and pre- and post-tests were given involving a writing task on a given topic for 40 minutes. Students' writing performance was assessed by measuring writing quality across three dimensions: holistic view of quality, accuracy, and fluency. Two types of statistical analysis (i.e., ANOVA and ANCOVA) were used to determine if different levels of AES integration impact students' performance over time. Results showed better performance from the Integrated-AES group in the writing quality of their essays than other two groups. Results indicated that the high performance of the Integrated-AES group was directly attributed to features of Criterion, e.g., timely feedback, recursive and multiple drafting processes, and comprehensive feedback. This dissertation highlighted the positive effect of AES on students' writing performance and provided valuable pedagogical insights on integrating AES as an instructional process.

Relating to genre knowledge, Cotos (2010) investigated the effectiveness of another AWE technology, IADE, which is a web-based program that analyzes research article introductions. IADE provides immediate, individualized feedback in relation to writing tasks specific for graduate students in multiple disciplines. A mixed-methods approach was used, and multiple data sources were analyzed, including surveys, automated and human scores for drafts, pre-/post-test scores, students' writing drafts, think-aloud protocols, screen recordings, observations, and interviews. The study found IADE to be an effective formative assessment for targeted instructional contexts and also to scaffold learning and writing through learner noticing/focusing on discourse form, understanding, and output modification. The results showed that learners repeatedly modified their output through engagement with the program's Help options, producing higher-quality research article introductions, with better and more appropriate rhetorical moves. While previous studies have investigated AWE, such as Choi's use of Criterion, Cotos's line of research added important insights to the field, as it shed light on genre-specific AWE in L2 classrooms. Furthermore, IADE's colorcoded and numerical feedback was shown to be a successful method for enhancing students' awareness of academic writing discourse.

In the fourth dissertation, Link (2015) developed and validated an AES engine named CAFFite, utilizing measures of complexity, accuracy, fluency, and functionality (CAFF). CAFFite was built into computer algorithms using natural language processing (NLP), Standford CoreNLP, which uses an annotation-based processing pipeline that can be integrated with student writing to give linguistic annotations (Manning et al., 2014). This dissertation used a mixed-methods triangulation design addressing different parameters within the AES engine and used qualitative and quantitative data in a complementary manner to produce a comprehensive analysis of the validity of CAFFite. Essay responses were collected and input into the engine for multiple phases of analysis to detect the accuracy of CAFFite compared with human raters, and consistency of the relationship between

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human raters and the CAFFite scoring engine across different writing prompts. Results of the study showed a mixed set of validity evidence, mitigating both for and against the use of CAFFite measures for assessment. This dissertation research, informed by the knowledge in computational linguistics (i.e., NLP), innovatively offered detailed methods and procedures for evaluators and developers of ASE, and created a novel hybrid approach with first statistical parsing of students' text and then developing rule-based algorithms from the parsed text.

4. Computer-based collaborative writing

As technology has continued to evolve, the use of web-based applications has offered increased opportunities for students and teachers to take advantage of collaborative writing activities across variable locations and time (Bikowski & Vithanage, 2016; Li, 2018). Different tools afford different options for collaboration, and students develop their own processes to perform their collaborative tasks. Although the importance of teachers in the collaborative process cannot be overlooked, computer-based collaboration allows for more student agency and increased autonomy as students take control of the collaborative process of content creation and revision.

The three dissertations (i.e., Li, 2014; Alshalan, 2016; Yim, 2017) examine computer-based collaborative writing from different learning settings, using different research approaches (summaries displayed in Table 4). Alshalan (2016) investigated the effect of collaborative writing on individual writing performance, while Li (2014) and Yim (2017) examined the nature of collaborative writing in the asynchronous CMC and synchronous CMC (S-CMC) context, respectively.

Alshalan (2016) utilized a quasi-experimental study (with a pre-test and post-test comparison) to examine the effects of wiki collaboration on the development of writing skills, as well as the undergraduate ESL students' perceptions of using Wiki for collaborative writing. Eighteen students in the experimental group received the wiki-based intervention, in which they collaboratively wrote three essays in pairs on wikis, while the twelve students in the control group received the individual writing strategy, in which they completed the three essays individually. After examining the timed essays graded on a rubric via the Wilcoxon Signed-Rank Test, the researcher found that wiki-based collaborative writing significantly improved individual student performance across five measured areas: content, organization, vocabulary, grammar, and mechanics. While many studies have highlighted the role of wikis in the collaborative writing processes and students' perceptions, this dissertation implemented an intervention for a close examination of ESL writing improvement and language development, and also provided important implication on technology use. As the researcher noted, the absence of synchronous communication and only single access at a time involving wikis may prove a hindrance for student communication, and Google Docs can be an alternative tool for CMC collaborative writing, which allows for synchronous multiple edits by multiple students.

Differently, Li (2014) and Yim (2017) explored peer interactions as students worked on joint online writing tasks in small groups. In Li's (2014) multiple-case study conducted in a graduate EAP class at a public southeastern university, small groups of ESL students worked on two collaborative writing tasks using the wiki: a research proposal and an annotated bibliography. Li (2014) examined the patterns of interaction across two wiki tasks, the joint wiki writing products, and factors mediating the peer interaction. Informed by Storch's (2002) model that analyzed indexes of 'equality' and 'mutuality' to derive patterns of face-to-face interaction, Li (2014) developed an analytical framework to examine wiki-based interaction drawing on wiki records, including three focused aspects: (1) language functions (initiating vs. responding), (2) writing change functions (self vs. other), and (3) scaffolding strategies. The results revealed distinct dynamic patterns of interaction in relation to four focal groups: Collective-Active/withdrawn; Expert/novice, Dominant/defensive-Collaborative, and Cooperating in parallel. After examining the wiki papers, graded according to the rubric, the researcher found that the group demonstrating a collective interaction pattern produced a wiki paper of the best overall quality while the group exhibiting a cooperating-in-parallel pattern produced a paper of the lowest quality. Moreover, content analyses of interviews and reflection papers revealed that peer interactions were

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Table 4. Computer-based collaborative writing

	Context and participants	Technology	Theoretical/ Pedagogical framework	Writing task	Research focus	Research data
Alshana (2016)	30 undergraduate students enrolled in an advanced writing course at a northern university	Wikis	Sociocultural Theory, ZPD, Interaction hypothesis, and Output hypothesis	Wiki-based collaborative writing, pre- and post-intervention essays	The effects of wiki-based collaborative writing on individual writing performances	Timed writing essays and demographic survey
Li (2014)	12 graduate ESL students in an EAP class at a southeastern university	Wikis	Sociocultural Theory, ZPD, scaffolding, collective scaffolding, and activity theory	Two collaborative wiki writing tasks: research proposal and annotated bibliography	Interaction patterns across two wiki writing tasks, and connections between interactions and writing products as well as students' perceptions	Questionnaires, interviews, reflection papers, wiki records
Yim (2017)	102 students from eighth grade ELA classes in middle schools in California	Google Docs	Sociocultural Theory, Communities of Practice (CoP)	Three collaborative writing tasks on Google Docs: narrative, argumentative, and informative tasks	Effects of grouping and language proficiency levels on interactions in online collaborative writing tasks	Individual and group focus interviews, Docuviz data, student essays and reflections, online discussion

mediated by factors such as goals, agency, and emotion. Li (2014) contributed methodologically to the field of collaborative writing in that the study developed a systematic way to evaluate equality and mutuality in CMC contexts, with respects to language functions, writing change functions, and scaffolding strategies. This dissertation also initially examined the links between online interaction patterns and qualities of wiki writing products (i.e., rhetorical structure, coherence, and accuracy), which extended research (e.g., Storch, 2002) exploring connections between interaction patterns and student learning gains in the face-to-face collaborative writing environment. Moreover, drawing on the activity theory, this study innovatively interpreted group dynamics in the online collaborative writing task environment.

In the K-12 setting, Yim (2017), via a mixed-methods study, examined bilingual adolescents' collaborative writing experiences and how students' English proficiency and grouping status may influence their interaction and learning experience, as they worked on three collaborative writing tasks (i.e., narrative, argumentative, and informative essay) using Google Docs. Specifically, Yim divided the students into different groups: the same ability Proficient groups, and mixed ability groups consisting of Proficient + Advanced and Proficient + Basic groups. Based on the interview data, the researcher found that collaborative writing practices were seen as relevant to cultural practices by the students, in that digital literacies practiced in the collaborative writing activities have significant overlap with out-of-school literacy practices. In particular, Yim innovatively implemented computational analysis through text mining via Docuviz to determine the group dynamics (regarding students' writing/revision history across various scales of participation and collaboration). Along with the grading rubric, the Coh-Metrix text analysis tool was used to analyze writing quality in terms of lexical diversity, grammatical complexity, and textual cohesion. Results indicated that group dynamics of norms and agreed-upon rules of interaction, shared responsibility, and conflict resolution were important in developing consensus among peers. Echoing the finding of Watanabe (2008) examining the role of proficiency grouping in face-to-face collaborative writing, the researcher found that proficiency gaps present in some groups was less important than group dynamics when assessing the benefits of collaborative writing using Google Docs. For instance, mixed ability groups in this study were detected to provide more opportunities for students to edit, and what matters most is the ability of the group to negotiate and maintain cohesion. This longitudinal study highlighted the value of synchronous collaborative writing as a new literacies practice for secondary school students. In particular, it makes an important methodological contribution to L2 writing in that it shows how a text mining approach can be integrated to enhance research capacity, suggesting patterns and trends of students' interaction via statistics.

5. Technology-based writing instruction/assessment

Technology-assisted writing instruction/assessment has become increasingly important in writing pedagogy, including the wide use of online corpora to assist in the writing process. Early corpus research was frequently limited to the creation of classroom materials and perhaps grammar references, but recently researchers and instructors are beginning to fully use corpora in the context of writing instruction (Yoon, 2008). Researchers (e.g., Yoon & Hirvela, 2004; Lee & Swales, 2006) have examined ESL students' use of corpora and found that online corpora aid students in common usage of words, as well as in investigating lexicon-grammar patterns and genre analysis. While corpora are widely regarded as a valuable tool for writers when they navigate genres and registers, how corpus linguistics can be best implemented to writing pedagogy is still an emerging area of inquiry. Moreover, the effect of technology-based writing assessment is still under-examined.

The following dissertations investigated the use of technology for L2 writing tasks in diverse learning contexts (summaries displayed in Table 5). Oh (2018) and Park (2010) examined ways of using technology and corpora (e.g., Corpus of Contemporary American English (COCA)) in and out of class to assist ESL students' academic writing. Kyeu (2014) examined how synchronous computer-mediated communication (S-CMC) and face-to-face communication impacted individual essay

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Table 5. Technology-based writing instruction/assessment

	Context and participants	Technology	Theoretical/ Pedagogical framework	Writing task	Research focus	Research data
Oh (2018)	120 adult students (undergraduate, graduate, visiting scholars) in US universities in the New York area	Microsoft Word	Kane's Argument-based Approach to validation (2004)	Genre-based writing tasks	The effect of learning tools for spelling, grammar, and reference (dictionary/ thesaurus) on ESL students' writing performances across proficiency levels and genres	Writing samples, surveys, proficiency test
Park (2010)	12 students (three focal students) in an undergraduate ESL class at an eastern university	iShowU screen recording software, Google custom search engine	Distributed Cognition Theory, ZPD	Genre-based writing tasks: summary and reaction paper, research report	Use of corpus-based resources to improve lexicogrammatical performance in genre-based writing	Query log and MySQL computer database, oral and written reflections, screen recordings, and stimulated recall
Kyeu (2014)	10 Swahili as an FL students at a midwestern university	Facebook instant messenger	Sociocultural Theory, Interactionist and Collaborative learning theories	Five 30-minute essay writing tasks based on the preceding Facebook chats	Impact of student Facebook interactions on essay writing in Swahili	Essays, student interviews, holistic rating scales
Zhi (2019)	60 graduate/ undergraduate students at a southwestern university	Word processing	Test authenticity	Two prompted essays adapted from TOEFL	Authenticity of computer-based assessment compared with paper-based assessment	Pre-survey, typing test, cognitive processing questionnaire, pre- and post-interview
Tseptsura (2019)	15 multilingual students in an online writing class at a midwestern university	LMS eComp Online Writing Course (OWC)	Community of Inquiry Framework, Sociocultural Theory	Variety of genres and portfolio creation	Usability of OWC and online identity formation	Student discussion posts, student writing and multimodal work, questionnaire, student interviews

writing in Swahili as an FL. Tseptsura (2019) explored multilingual writers' experience with technology, identity construction, and the online learning community in a fully online college composition class. Different from the other four studies, which addressed writing instruction, Zhi (2019) thoroughly examined computer-mediated writing assessment.

Oh (2018) used a mixed-methods design to examine how adult students (e.g., undergraduate students, graduate students, visiting scholars) use linguistic tools, namely spelling, grammar, and reference resources, in the process of L2 composition. These tools were frequently used for confirmation of spelling or linguistic choices, often through the use of online spell checks, thesauruses, or dictionaries, with free and accessible online word processing, as well. Via the writing assessment based on a coding scheme, Oh (2018) aimed to examine how access to different linguistic tools impacts ESL learners' writing performance on three tasks (i.e., email, online review, and discussion post) across three language proficiency levels (Basic, Advanced, Proficient). The tasks were chosen specifically to assess grammar form and meaning, lexical form, topical meaning, intended meaning, and implied meaning under different assessment conditions and linguistic tools. The results indicated that the spelling tool and reference tool (dictionary/thesaurus) were shown to have great potential in facilitating L2 students' writing, with distinctions in test-taker performance less pronounced across proficiency levels for those who used linguistic tools. This study provides empirical evidence that can be of value to test developers, and also has important implications for educators, causing teachers to recalibrate the common perception that linguistic tools can be a form of distraction, while in fact they may be beneficial in developing students' overall writing ability.

Park (2010) examined corpus-based learning, with a focus on improving the lexicogrammatical aspect of writing from L2 academic writers. Rather than using concordance programs such as COCA, Park (2010) innovatively employed a customized search engine, the Google CS, and developed discipline-specific corpora, used for both instruction and research in academic writing. The academic corpus for this study was a virtually compiled corpus of hyperlinks to academic journals. Specifically, the study examined undergraduate ESL students' lexicogrammatical performance, their evaluations of the system, and the effect of the system on writing performance. Data were collected from screen video clips, oral and written reflections, and the query log. The results revealed that the writer interaction with the corpus was highly structured and interactive, and the custom corpus played a facilitative role in improving students' lexicogrammatical performance, thus providing teachers with a potentially effective means to help students engage in independent academic writing tasks. Park's (2010) study made an important contribution to the field, highlighting and confirming the role that corpora can play in the improvement of students' lexicogrammatical performance. This dissertation sought to bypass the 'long enculturation processes' (p. 195) of genre writing by directly using genre-specific corpus databases to reflect on the target genre, thus leading to students' enhanced awareness of genre knowledge.

Theoretically grounded in interactionist and collaborative learning theories, Kyeu (2014) examined how S-CMC and face-to-face communication impacted individual essay writing in Swahili as an FL at the tertiary level. While S-CMC chat research is not new, what makes this study unique is that it investigates how participants transfer written aspects of their chat into essays written in Swahili (Sotillo, 2016). The students took part in five 50-minute computer-mediated pair interactive sessions as well as five face-to-face pair interactive sessions, followed by 30-minute timed essays on topics previously discussed. Interviews and perception questionnaire were used to derive student perceptions. Results indicated that students using S-CMC transferred aspects of their communication more frequently than when they participated in face-to-face communication. Participants noted that the S-CMC enabled more time to think about the interactions, while face-to-face allowed little reflection. Moreover, students did not transfer as many of the ideas and syntactic structures from their face-to-face communication into their essays as they did with chat. This study pointed to the value of collaborative practice in writing with students with limited linguistic resources and informed us that speaking-to-write activities stimulate social learning and the opportunity to think deeply about a topic. Integrating two digital media environments into learning tasks, this dissertation addressed pedagogical innovation on teaching Swahili as an FL.

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Tseptsura (2019) employed a mixed-methods case study design to explore the experiences of linguistically diverse students in an online writing class, with participants recruited from an online composition program. Through student interviews and written work, as well as instructor interviews, the researcher examined L2 writers' experience with technology, identity construction, and the online learning community built for multilingual writers. The usability and engagement aspects of the Learning Management System (LMS) were viewed through the lens of the Community of Inquiry Framework, a social constructivist model of learning in online and blended environments, built on cognitive, teaching, and social presence (Garrison, Cleveland-Innes, & Fung, 2010). Results revealed important aspects of students' peer interactions and identity construction, particularly how students' unwillingness to disclose their language background may impact instructor decisions, as well as student-student interactions and creation of social presence. The findings are particularly useful for online composition instructors when developing instructional materials, specifically the call for the use of multimodal video or audio instructions, additional guidance on the LMS, and frequent usability tests to help students master English writing skills.

Zhi (2019) re-examined the delivery mode of writing assessment, which was reported to have an important influence on student assessment performance in previous research (e.g., Lee, 2004). Zhi's study compared the authenticity of computer-based and paper-based academic writing, expanding validity to include test takers' perceptions of the assessment, which may influence measurement. Specifically, each participant completed two writing tasks with separate prompts (adapted from TOEFL) in computer-based and paper-based modes. Immediately after the writing tasks, a cognitive writing process questionnaire was adapted to capture participants' writing processes while writing. Trained raters assessed the essays according to rubrics, with high inter-rater reliability determined. Overall findings point to the advantage of the computer-based tests in the assessment of advanced ESL students' writing proficiency for a higher degree of authenticity, while simultaneously exposing potential issues of validity and fairness. Test takers perceived themselves performing better and had more confidence in test validity with the test mode they were most familiar with. If students were not accustomed to computer-based writing tasks, it was perceived as less valid because they felt disadvantaged due to lower computer literacy skills. Contrary to previous research by Li (2006), which showed that paper-based writing led to higher-level revisions of ideas and structures, this study showed more high-level revisions in the computer-based writing. Moreover, a correlation was identified between scores and computer literacy. Computer familiarity and computer availability at school produced the highest correlation with computer-based essay scores. The results informed us that equal access and use of computers in school for academic work are an important factor in learning outcomes, and students from settings with limited computer availability are at a disadvantage that needs to be addressed by teachers and administrators in order to close the digital divide. This dissertation is expected to capture researchers' wider attention to validity and reliability of computer-based writing assessments, which plays an increasingly important role in the digital era.

6. Digital composing/literacy

Given the development of digital technologies and radical changes in the communication environment, digital practice captures increasing attention in L2 writing contexts. The digital age provides rich opportunities for writers to deploy multiple resources to make meaning, construct knowledge, and express self-identity (Li & Storch, 2017). The following five dissertations examined students' digital composing practice from different perspectives (summaries displayed in Table 6). Dzekoe (2013) examined college students' computer-based multimodal composing activities and their effect on revisions and writing development. Moore (2017) examined the ways in which college ESL students' interaction with technology influences their understanding and implementation of multimodal writing practices. Bauler (2012) examined online forums specifically, and the role they play in the development of academic literacy and language learning in college ESL writing classes. Jiang (2013) examined high school ESL students' school-sponsored and self-sponsored digital writing practices

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Table 6. Digital composing/literacy

	Context and participants	Technology	Theoretical/ Pedagogical framework	Writing task	Research focus	Research data
Bauler (2012)	23 ESL students in a college writing course at a midwestern university	Moodle LMS, online forums, discussions	Sociocultural Theory, Critical Discourse Analysis	Persuasive essays, online discussion	The role of online forum discussions as practices of digital literacy in college-level ESL writing	Written texts from online postings
Chen (2012)	2 multilingual writers, international graduate students at a southwestern university	Facebook and SNS	Sociocultural Theory	Online texts in class and SNS posts out of class	ESL students' participation in networking communities and types of literacy practices over time	Background survey, field notes, participants' Facebook pages, semistructured interviews
Dzekoe (2013)	22 undergraduate ESL students at a midwestern university	Google Docs, Glogster, and NaturalReader 10.0	Noticing Hypothesis	Four multimodal expository essays	The effect of multimodal composing activities on revisions and writing development	Stimulated recall interview, Google Docs archives, and exit survey
Jiang (2013)	4 high school students in a western urban community	Facebook, Twitter, forums, etc.	Sociocultural and socio-critical view of literacy, New Literacy Studies	Self-sponsored out-of-class writing and in-class writing tasks (e.g., term paper, multimodal self-advertisement)	Divergence of individual school-sponsored and self-sponsored writing tasks	Web logs, literacy logs, Facebook posts, field notes, videos, and taped classroom interactions
Moore (2017)	14 ESL students at a midwestern university	Email, Facebook, and WhatsApp	Grounded theory	Variety of student composition tasks	An ESL student's perspective on digital literacy and composing practices	Interviews and online survey

with new media/social networking. Chen (2012) researched digital literacy practices of college ESL students and explored the relationship between SLA and social networking.

First, Dzekoe (2013) conducted a case study on six ESL students' using computer-based multimodal composing activities integrating multiple language skills to facilitate writing revisions in a college ESL composition classroom. Specifically, 'multimodality' refers to transforming written text to poster form, and 'Text-to-Speech' (TTS) refers to hearing the written texts to help identify errors, using the TTS software (NaturalReader). Data were collected from students' written drafts and final copies of four expository essays (via Google Docs), posters (using Glogster), screen records of their editing activities in the revision process, as well as reflections, survey responses, and stimulated recall interviews. The research findings indicated that computer-based multimodal composing helped students independently evaluate linguistic and rhetorical elements, organizational structure, and specific information that they used in the revision process. Students reported a greater sense of agency and voice, while also performing more content-level revisions than surface-level ones, which contrasts with previous studies by Chambers (2011) and Suzuki (2008). Dzekoe showed that the use of computer-based multimodal composing activities, particularly listening-writing connections, could help students self-revise academic writing, while simultaneously developing their own writing voice. Another valuable takeaway from this research was the need for teachers and researchers to focus more on revision history and strategies than the changes of writing products.

Via an ethnographic multiple-case study, Jiang (2013) conducted a year-long research project with four high school ELLs in an urban community in the western US. Jiang sought to understand the relationships, links, and gaps between the school-sponsored writing practices and self-sponsored writing practices through the use of different media. Jiang collected data from multiple sources, including in-class writing, formal and informal interviews, field notes, writing samples, and recorded classroom interactions. Inductive analysis drew out important themes related to negotiation and construction of identity, socialization, and language use across different platforms. To compare school-sponsored writing and self-sponsored writing, Jiang (2013) analyzed writing activities (including writing topics, genres, and audience) and student engagement, respectively. The study uncovered that no clear boundary was identified between the two types of writing practices, with overlapping between various environments and communities, but each maintaining a distinct circle of friends. With reading and writing in online digital environments being the norm now, as evidenced with participants in this study, teachers should encourage digital multimodal writing both in and outside classrooms. This dissertation highlighted the connections of the digital literacies practices in in-school and out-of-school contexts and motivated researchers to conduct further inquiry on this topic in broader language learning contexts (e.g., Vandommele, van den Branden, van Gorp, & de Maeyer, 2017).

Bauler (2012) examined the role of digital media, particularly online discussion forums, in college ESL students' literacy practices. Bauler (2012) explored different discourse practices and collected data from online discussions and argumentative essays produced in writing classes. Results revealed that online forums offer a space with greater variety combined with increased student engagement. Online discussions contribute to L2 learning via meaningful language use and language negotiation with peers. Moreover, the study revealed that the online discussion forum can be a valuable place, if connected to curriculum design, to create a participatory multimodal environment for student engagement and idea generation, which provides a low-stakes setting for social and cultural mediation with peers. The ideas generated in online discussions contributed to construction of follow-up persuasive essays. Building on work by Snyder and Bulfin (2008), who uncovered gaps in school preparedness to integrate technology in learning environments, and Warschauer and Grimes (2007), whose research further highlighted the importance of collaboration through sharing of content, Bauler (2012) adds to the field of online collaborative learning by providing a detailed analysis of the digital literacy practices of college-level ESL students' collaborative discursive interactions while negotiating meaning in online forums.

Chen (2012) explored the use of multimodality through digital media and the relationship between social networking and L2 learning in and out of school among graduate L2 students. The research

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consisted of three components: (1) a survey-based study of social networking sites (SNSs) and literacy practices in SLA (data from questionnaire and interview); (2) a case study addressing two L2 users' SNS-mediated identity and community relationships (data including a background survey, Facebook and SNS usage analysis, and semistructured interviews and field notes); and (3) genre awareness through SNS-enhanced instruction (data from reflective journals and student-teacher conferences). Results revealed that SNSs served an important role in connecting with home country discussions as well as new discourses. The study provided illustrative examples concerning two focal students who negotiated multiple identities and affiliations across varied networks. Moreover, Facebook and SNSs were found to become a hybrid third space where multiple languages, identities, and literacies are navigated, and which raises a sense of engagement and awareness of rhetorical features, audience, contexts, and genre. This dissertation highlighted the value of learning L2 writing in informal ways, which is increasingly discussed in the current body of literature (e.g., Lehtonen, 2017; Zheng, Yim, & Warschauer, 2018).

The last dissertation discussed in this section, Moore (2017), aimed to fully understand how ESL undergraduate students interacted with digital resources in the writing process through a grounded theory approach. Moore examined the technologies that students used and their attitudes toward various media. This dissertation involved a survey phase, in which an online questionnaire was used to explore students' composing process and engagement with social media, and two interview phases, in which ten students discussed the kinds of compositions they were comfortable sharing, who they were as digital composers, and the role of technology in the writing classroom. Results of the study indicated that participants were highly digitally literate, yet still were apprehensive of the situation of adopting digital literacy in place of traditional practices. As ELLs attempt to negotiate their way and become members of a community, their language use/fluency either makes them a member of the institutional community, or can cause them to feel excluded. This dissertation attempts to add to a small but growing body of research exploring the attitudes of ESL students toward digital writing practices. This study enhanced our understanding of how students approach a video composition compared with text-dominant composition, and how the teachers navigate the pros and cons while integrating these different modes into the classroom.

7. Conclusion and future directions

This article has reviewed 20 Ph.D. dissertations on L2 writing and technology completed during the last decade (2010–2019) in the USA. It has addressed five relevant thematic categories: computer-mediated teacher/peer feedback, AWE, computer-based collaborative writing, technology-based writing instruction/assessment, and digital composing/literacy. We specifically analyzed and discussed the research design, research results, and contribution for each dissertation study. Overall, these dissertations conducted rigorous inquiries of significant research topics, using different methodological approaches. They have collectively made an important contribution to the scholarship in the fields of L2 writing and CALL.

Based on the close review, we highlight future directions for Ph.D. research on L2 writing and technology, within the US and beyond. Regarding study contexts and participants, the majority of participants in the dissertations (17 out of 20) were at the tertiary level. Only three dissertation studies were conducted in the K-12 setting, but with no elementary school students. Regarding the language context, dissertation research was mainly conducted in the English as an L2 setting (18 out of 20). Only two addressed a foreign language, namely Chinese and Swahili, respectively. Research in the contexts of teaching and learning modern languages other than English are still largely under-represented. Dissertations addressing more diverse language learning contexts would definitely be welcome in the future.

The 20 dissertations employed qualitative, quantitative, and mixed-methods design. Studies of some thematic categories tended to rely on a certain research design more than others. For instance, most of the data analysis in relation to computer-based collaborative writing and digital composing/literacy tended to be more qualitative, drawing on data such as writing archives, observation,

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questionnaire, and interviews. Thus, mixed-methods design is to be encouraged, since this offers strengths that will offset the weaknesses of either quantitative or qualitative research and at the same time provides a comprehensive picture of the role of technology in L2 writing. In addition, it should be noted that the majority of the qualitative dissertation studies used the case study approach, while just one utilized discourse analysis and one grounded theory. Other qualitative approaches such as narrative inquiry and phenomenological research are largely missing. Therefore, narrative inquiry telling stories of students' digital literacy practice and phenomenological research exploring students' lived experiences of learning writing through corpora, for example, can be potential directions for future dissertation research, due to the increasing role of narrative and digital rhetorics in composition classrooms (Sundvall, 2019).

Moreover, the dissertation research reviewed in this paper has been informed by various theoretical/pedagogical frameworks, such as Sociocultural Theory, the Interactionist approach, Systemic Functional Linguistics, Complexity Theory, and the study of new literacies. With the increasing attention to interdisciplinary research, future dissertation studies are expected to draw on diverse theoretical constructs for the inquiry of research issues from multiple lenses. With the reiteration of technology development, more thematic strands are likely to occur in the following decade, such as exploring the effectiveness of computer-assisted writing instruction. In particular, given the pandemic, more future studies will respond to the need for research in online pedagogy addressing synchronous teaching environments, such as the virtual classrooms facilitated by Zoom or Google Classroom, which have taken on increased importance due to social distancing guidelines and imposed school shutdowns (Gunawan, Suranti, & Fathoroni, 2020). The continuously changing situations for learning will call for future doctoral research studies that will continue to shed new light on research and pedagogy worldwide in the field of L2 writing and technology.

References

Alsallami, N. (2017). *L2 learners' perceptions and preferences of automated corrective feedback* (Doctoral dissertation). Iowa State University. Retrieved from https://lib.dr.iastate.edu/etd/15244

Alshalan, A. (2016). *The effects of Wiki-based collaborative writing on ESL student's individual writing performance* (Doctoral dissertation). Wayne State University. Retrieved from https://lib.dr.iastate.edu/etd/15244

Bauler, C. V. (2012). *Examining online forum discussions as practices of digital literacy in college-level ESL writing* (Doctoral dissertation). University of California, Santa Barbara.

Bikowski, D., & Vithanage, R. (2016). Effects of web-based collaborative writing on individual L2 writing development. *Language Learning & Technology*, *20*(1), 79–99.

Chambers, L. (2011). Composition and revision in computer-based written assessment. *Research Notes*, *43*, 25–32.

Chen, H. (2012). *Social networking, socialization, and second language writers: The development of new identities and literacies* (Doctoral dissertation). University of Arizona. Retrieved from https://repository.arizona.edu/handle/10150/232494

Choi, J. (2010). *The impact of Automated Essay Scoring (AES) for improving English language learner's essay writing* (Doctoral dissertation). University of Virginia. Retrieved from https://www.learntechlib.org/p/116200/

Cotos, E. (2010). *Automated writing evaluation for non-native speaker English academic writing: The case of IADE and its feedback* (Doctoral dissertation). Iowa State University. Retrieved from https://lib.dr.iastate.edu/etd/11630/

Cunningham, K. J. (2018). *Modes of feedback in ESL writing: Implications of shifting from text to screencast* (Doctoral dissertation). Iowa State University. Retrieved from https://lib.dr.iastate.edu/etd/16336/

de Guerrero, M. C. M., & Villamil, O. S. (1994). Social-cognitive dimensions of interaction in L2 peer revision. *Modern Language Journal*, *78*, 484–496.

Dzekoe, R. (2013). *Facilitating revision in the English as a second language (ESL) composition classroom through computer-based multimodal composing activities: A case study of composing practices of ESL students* (Doctoral dissertation). Iowa State University. Retrieved from https://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=4156&context=etd

Elola, I., & Oskoz, A. (2016). Supporting second language writing using multimodal feedback. *Foreign Language Annals*, *49*(1), 58–74.

Ferris, D. R. (2010). Second language writing research and written corrective feedback in SLA. *Studies in Second Language Acquisition*, *32*(2), 181–201.

Garrison, D. R., Cleveland-Innes, M., & Fung, T. S. (2010). Exploring causal relationships among teaching, cognitive and social presence: Student perceptions of the community of inquiry framework. *The Internet and Higher Education*, *13*(1–2), 31–36.

https://doi.org/10.1017/S0261444820000403 Published online by Cambridge University Press

Godwin-Jones, R. (2018). Second language writing online: An update. *Language Learning & Technology*, *22*(1), 1–15.
Guardado, M., & Shi, L. (2007). ESL students' experiences of online peer feedback. *Computers and Composition*, *24*(4), 443–461.
Gunawan, G., Suranti, N. M. Y., & Fathoroni, F. (2020). Variations of models and learning platforms for prospective teachers during the COVID-19 pandemic period. *Indonesian Journal of Teacher Education*, *1*(2), 61–70.
Han, J. (2019). *The effects and students' views of teachers' coded written corrective feedback: A multiple-case study of online multiple-draft Chinese writing* (Doctoral dissertation). University of South Florida. Retrieved from https://scholarcommons.usf.edu/etd/7802/
Hyland, K. (2016). *Teaching and researching writing* (3rd ed.). New York, NY: Routledge.
Jiang, P. (2013). *Learning to write in the digital age: ELLs' literacy practices in and out of their Western urban high school* (Doctoral dissertation). Michigan State University. Retrieved from http://www.proquest.com/en-US/products/dissertations/individuals.shtml
Kane, M. (2004). Certification testing as an illustration of argument-based validation. *Measurement*, *2*(3), 135–170.
Keith, T. Z. (2003). Validity of automated essay scoring systems. In M. D. Shermis & J. Burstein (Eds.), *Automated essay scoring: A cross-disciplinary perspective* (pp. 140–160). New York, NY: Lawrence Erlbaum.
Kyeu, D. W. (2014). *The impact of interactive discussions on essay writing in Swahili as a Foreign Language* (Doctoral dissertation). The University of Wisconsin-Madison. Retrieved from https://www.academia.edu/10439467/The_Impact_of_Facebook_Chat_on_Swahili_Essay_Writing
Lee, D., & Swales, J. (2006). A corpus-based EAP course for NNS doctoral students: Moving from available specialized corpora to self-compiled corpora. *English for specific purposes*, *25*(1), 56–75.
Lee, H. K. (2004). A comparative study of ESL writers' performance in a paper-based and a computer-delivered writing test. *Assessing Writing*, *9*(1), 4–26.
Lehtonen, T. (2017). You will certainly learn English much faster at work than from a textbook. *System*, *68*, 50–59.
Li, J. (2006). The mediation of technology in ESL writing and its implications for writing assessment. *Assessing Writing*, *11*(1), 5–21.
Li, M. (2014). *Small group interactions in wiki-based collaborative writing in the EAP context* (Doctoral dissertation). University of South Florida. Retrieved from https://scholarcommons.usf.edu/etd/5254/
Li, M. (2018). Computer-mediated collaborative writing in L2 contexts: An analysis of empirical research. *Computer Assisted Language Learning*, *31*(8), 882–904.
Li, M., & Storch, N. (2017). Second language writing in the age of CMC: Affordances, multimodality, and collaboration. *Journal of Second Language Writing*, *36*, 1–5.
Link, S. (2015). *Development and validation of an automated essay scoring engine to assess students' development across program levels* (Doctoral dissertation). Ohio State University. Retrieved from https://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=5574&context=etd
Manning, C. D., Surdeanu, M., Bauer, J., Finkel, J. R., Bethard, S., & McClosky, D. (2014). The Stanford CoreNLP natural language processing toolkit. In *Proceedings of 52nd annual meeting of the Association for Computational Linguistics: System demonstrations* (pp. 55–60).
Martin, J. R., & White, P. R. (2005). *The language of evaluation: Appraisal in English*. London, UK/New York, NY: Palgrave/Macmillan.
Moore, J. S. (2017). *Digital literacy and composing practices of second language students: A student perspective on writing, technology, and privilege*. (Doctoral dissertation). Bowling Green State University. Retrieved from https://etd.ohiolink.edu/!etd.send_file?accession=bgsu148715983643726&disposition=inline
Oh, S. R. (2018). *Investigating test-takers' use of linguistic tools in second language academic writing assessment* (Doctoral dissertation). Teachers College, Columbia University. Retrieved from https://academiccommons.columbia.edu/doi/10.7916/D8B00HDQ
Park, K. (2010). *Enhancing lexicogrammatical performance through corpus-based mediation in L2 academic writing instruction*. (Doctoral dissertation). Penn State University. Retrieved from https://etda.libraries.psu.edu/files/final_submissions/3583
Shermis, M., & Burstein, J. (Ed.). (2003). *Automated essay scoring*. New York, NY: Routledge. Retrieved from https://doi.org/10.4324/9781410606860
Snyder, I. A., & Bulfin, S. A. (2008). Using new media in the secondary English classroom. In J. Coiro, M. Knobel, C. Lankshear, & D. J. Leu (Eds.), *Handbook of research on new literacies* (pp. 805–837). New York, NY: Lawrence Erlbaum
Sotillo, S. M. (2016). An update on discourse functions and syntactic complexity in synchronous and asynchronous communication. *Language Learning & Technology*, *20*(2), 166–171.
Storch. (2002). Patterns of interaction in ESL pair work. *Language Learning*, *52*(1), 119–158.
Sundvall, S. (2019). *Rhetorical speculations: The future of rhetoric, writing, and technology*. University Press of Colorado.
Suzuki, M. (2008). Japanese learners' self-revisions and peer revisions of their written compositions in English. *TESOL Quarterly*, *42*(2), 209–233.
Tseptsura, M. V. (2019). *Multilingual writers and online writing instruction: Expanding our theoretical and instructional frameworks* (Doctoral dissertation). University of New Mexico. Retrieved from https://digitalrepository.unm.edu/cgi/viewcontent.cgi?article=1273&context=engl_etds

https://doi.org/10.1017/S0261444820000403 Published online by Cambridge University Press

Tuzi, F. (2004). The impact of e-feedback on the revisions of L2 writers in an academic writing course. *Computers and Composition*, *21*(2), 217–235.

Vandommele, G., van den Branden, K., van Gorp, K., & de Maeyer, S. (2017). In-school and out-of-school multimodal writing as an L2 writing resource for beginner learners of Dutch. *Journal of Second Language Writing*, *36*, 23–36.

van Lier, L. (2004). *The ecology and semiotics of language learning: A sociocultural perspective*. Boston, MA: Kluwer Academic.

Vorobel, O. (2013). *A case study of peer review practices of four adolescent English language learners in face-to-face and online contexts* (Doctoral dissertation). University of South Florida. Retrieved from https://search.proquest.com/docview/1430500718

Wang, J., & Brown, M. S. (2007). Automated essay scoring versus human scoring: A comparative study. *Journal of Technology, Learning, and Assessment*, *6*(2). Retrieved from https://www.learntechlib.org/p/103259/.

Warschauer, M., & Grimes, D. (2007). Audience, authorship, and artifact: The emergent semiotics of Web 2.0. *Annual Review of Applied Linguistics*, *27*, 1.

Watanabe, Y. (2008). Peer-peer interaction between L2 learners of different proficiency levels: Their interactions and reflections. *The Canadian Modern Language Review*, *64*(4), 605–663.

White, P. R. R. (2015). Appraisal theory. In K. Tracy, C. Ilie, & T. Sandel (Eds.), *The international encyclopedia of language and social interaction*, (1st ed., pp. 1–7). New Jersey: John Wiley & Sons.

Yim, S. (2017). *Digital literacy in academic settings: synchronous collaborative writing among linguistically diverse students* (Doctoral dissertation). University of California. Retrieved from https://escholarship.org/uc/item/0bh1s43v

Yoon, H. (2008). More than a linguistic reference: The influence of corpus technology on L2 academic writing. *Language Learning & Technology*, *12*(2), 31–48.

Yoon, H., & Hirvela, A. (2004). ESL student attitudes toward corpus use in L2 writing. *Journal of Second Language Writing*, *13*(4), 257–283.

Zheng, B., Yim, S., & Warschauer, M. (2018). Social media in the writing classroom and beyond. In J. I. Liontas (Ed.), *The TESOL encyclopedia of English language teaching* (pp. 1–5). New York, NY: Wiley-Blackwell.

Zhi, M. (2019). *Investigating the authenticity of computer-and paper-based ESL writing tests* (Doctoral dissertation). The University of Texas at San Antonio. Retrieved from https://search.proquest.com/openview/5636f1642915659d132c64d9e1624f59/1?pq-origsite=gscholar&cbl=51922&diss=y

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