Available online at www.sciencedirect.com

ScienceDirect

Computers and Composition 55 (2020) 102542

Computers and Composition

www.elsevier.com/locate/compcom

# Technology-Mediated Writing: Exploring Incoming Graduate Students' L2 Writing Strategies with Activity Theory

Matt Kessler [1]

*Second Language Studies, B-220 Wells Hall, Michigan State University, East Lansing, MI, 48823*

**Abstract**

Despite the sizable body of research investigating L2 learnersö technology use and/or digital composition practices, scholars have noted that such studies have been predominately researcher-led intervention studies as opposed to descriptive, qualitative accounts that investigate learner-initiated technology use. To better understand existing learner practices surrounding digital composition, this study uses a case study design to explore two, Chinese L2 English writers as they compose assignments during their first semesters as doctoral students in an Applied Linguistics and Teacher Education program, respectively. An Activity Theory (Engeström, 1987, 1999) framework is utilized to investigate studentsö writing strategies in general, but particular emphasis is given to writersö personal, *artifact/tool-mediated* uses of technology to assist in their writing. Data sources consist of: artifacts such as course syllabi and studentsö writings; process logs; screen-recordings of studentsö real-time writing; and also, semi-structured interviews and stimulated recalls. Findings show that studentsö writing processes were influenced by numerous factors, which were *rule-*, *community-*, and *artifact-mediated*. The *artifact-mediated* strategies are discussed in relation to three categories that emerged from the data, including: (1) multimodal strategies; (2) tool-mediated strategies for content development; and (3) tool-mediated strategies for language development. Pedagogical implications of writersö *artifact-mediated* strategies involving technological tools are discussed.
Published by Elsevier Inc.

*Keywords:* CALL; case study; corpus; multimodal; strategy; video

The past few decades of second language (L2) writing research have seen considerable interest in exploring L2 learners' writing processes and strategies, especially within an academic context. Previous explorations—both descriptive and experimental in nature—have detailed writers' engagement in various stages and/or facets of the writing process (e.g., Cunningham, 2019; Hirvela & Du, 2013; Hyland, 2003; Manchón & Roca de Larios, 2007; Ong, 2014; Petrić, 2012). While such a diverse spectrum of research has begun to paint an illuminating picture of L2 writers' social and cognitive processes, to date, there has been minimal research exploring writers' personal uses of technology during the writing process. As other scholars have noted, studies involving L2 learners' technology use and/or digital composition have been predominately researcher-led intervention studies as opposed to descriptive, qualitative approaches that investigate learner-initiated technology use (Levy & Moore, 2018; Ma, 2017). For researchers and educators alike,

*E-mail address:* kessle72@msu.edu
[1] Tel.: +1 740-331-1494.

https://doi.org/10.1016/j.compcom.2020.102542
8755-4615/Published by Elsevier Inc.

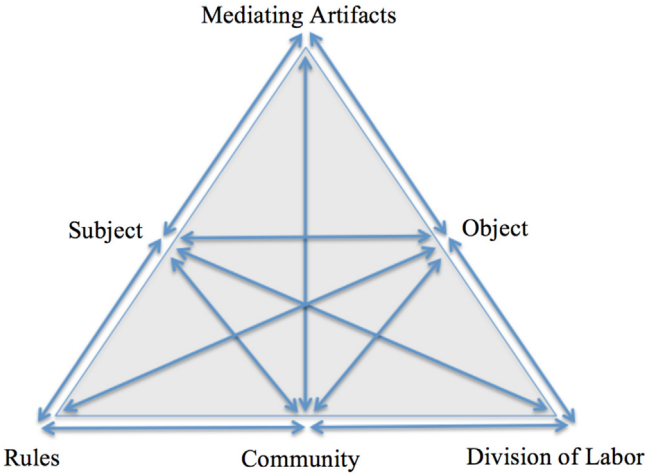


Fig. 1. Activity system (Engeström, 1999).

gaining a detailed understanding of preexisting learner-strategies is important; such insights are critical because continued innovations in social tools and technologies have not only brought about substantial changes to many learners' writing processes, but also, as well, to how L2 writing pedagogy is subsequently approached by instructors (Elola & Oskoz, 2017; Hafner, 2013; Zheng & Warschauer, 2017). Clearly, this issue is particularly vital within academic contexts, especially since many higher education programs continue to experience increasing diversity and enrollment from L2 English learners (Khadka, 2018; Seloni, 2012). Importantly, however, most research involving the intersection of L2 writing and academia has tended to focus on undergraduate students, leading Kirkpatrick (2019) to note that doctoral students have become an understudied population. Though they are typically more linguistically advanced when compared to their undergraduate peers, many L2 graduate students still face numerous struggles with academic writing and require instructional support (Cotterall, 2010).

The current study attempts to address this need for research to explore L2 writers' personal uses of technology, and also, the need to further investigate the graduate/doctoral student population. Following researchers' calls for more descriptive, qualitative approaches to explore such issues, this research employs a multiple-case study design. Adopting an Activity Theory framework (Engeström, 1987, 1999), I utilize numerous data sources (e.g., artifacts, process logs, screen recordings, semi-structured interviews, and stimulated recalls) to examine two, Chinese L2 English writers' personal uses of technology as they compose different assignments during the first-semesters of their respective doctoral programs in Applied Linguistics and Teacher Education. In keeping with the Activity Theory framework, I explore facets related to the various social dimensions surrounding the doctoral students' writing strategies and processes; however, particular emphasis is devoted to highlighting the writers' *artifact/technology-mediated* strategies during the composition process.

## Literature Review

### *Activity Theory*

Activity Theory (AT) is a sociocultural approach rooted in the seminal work of Vygotsky (1978). Formally developed by his colleague, Leontöev (1981), the theory itself was then further developed by Engeström (1987, 1999, in which Engeström characterized human activity as a complex, interconnected social system with multiple elements. In this activity system (visualized in Fig. 1), there is a *subject* or agent of an action. This *subject* acts with the intention of achieving a goal or outcome, which is known as the *object*. In the *subject's* pursuit of this intended *object*, he/she may utilize *mediating artifacts* in some manner. As Park and De Costa (2015) illustrate—specifically in the context of writing—the writer is the *subject*, and the text he/she produces is the *object*. This *subject's* activity of composing the text is often supported by *mediating artifacts*, which may include language (e.g., the writer's L1) or the use of tools (e.g., a computer, mobile programs/applications, a dictionary, etc.).

However, additional factors are at-play within an activity system, including *rules,* a *community*, and a *division of labor*. As Kitade (2014) notes, in the system *rules* may guide a *subject's* behavior, which (for writing purposes), might include teacher preferences, grading rubrics, and conventions of academic writing that the *subject* is inclined to follow. This *subject* is not just influenced by these *rules* though, as he/she may also be influenced by a *community* (e.g., the peer social environment) to which he/she belongs; thus, the social nature of the *subject's* interactions may spur internal changes. Finally, in the *subject's* pursuit of the *object*, a *division of labor* may also occur in which the task load is distributed in some way. For example, when writing a paper, the *subject* may consult peers, professors, or writing tutors who then assist in the composing process in some manner.

Because an individual activity system typically has multiple interacting elements, it is possible that contradictions (sometimes referred to as tensions) may occur between different factors (Fujioka, 2014; Lantolf, 2004). For instance, in the *division of labor*, it is possible a *subject* might receive assistance or feedback from a writing tutor that conflicts with the *rules* or assignment requirements given by the instructor. As Fujioka (2014) notes though, these contradictory interactions or tensions may appear negative at first, but they may also serve as the impetus for a *subject's* growth and transformation. Russell (1997), too, stresses that activity systems are not static representations, but instead, are dynamic and constantly evolving through interactions.

### *Activity Theory, CALL, and Writing Strategies Research*

As a framework, AT has been utilized by computer-assisted language learning (CALL) and educational technology researchers to investigate a range of topics, including: blended learning contexts (Barab, Schatz, & Scheckler, 2004; Keengwe & Kang, 2013), teacher agency and identity (Feryok, 2012; Kitade, 2014), and web-based tools for L2 learning (Isbell, 2018; Juffs & Friedline, 2014), among others. The framework has been particularly suitable for these contexts because of AT's inclusion of technological tools through the category of *mediating artifacts*, in which these tools have the capacity for facilitating language learning, and additionally, because of AT's focus on the social, interconnected dimensions in which *subjects* engage with tool-use as part of a *community*.

Likewise, AT has been used as a framework—though to a much lesser extent—by L2 writing strategy researchers as a means of exploring both the cognitive and social aspects of the L2 writing process. Three notable examples include studies by Lei (2008), Li (2013), and Park and De Costa (2015). Lei (2008), for example, explored two undergraduate English majors' writing strategies in China, as they composed 400-word essays for a class assignment. To identify participants' strategies, Lei collected a combination of interviews, process logs, and stimulated recalls, which were conducted following video-recordings that captured the participants as they wrote in a lab/room. Following the data analysis, Lei noted that the learners' writing processes were strategically mediated by multiple resources; these included processes that were *rule-mediated* (e.g., driven by the teacher's grading criteria), *community-mediated* (e.g., influenced by the teacher and students), and *artifact-mediated,* (e.g., writing guided by Internet use, print dictionaries, English literary works, and participants' L1).

Like Leiös (2008) research, a study by Li (2013) explored L2 English learners' writing processes with AT. In the study, Li detailed the processes of three, Hong Kong university students as they wrote an assignment for a public policy course. Utilizing similar data sources, Li reported that his participants also used numerous *artifact-mediated* strategies during the writing process, through considerably more so than the participants in Leiös (2008) study, (which, given the advances in technology over the two studies' timespan, is not surprising). In addition to performing basic searches to assist with content and source integration in their papers through Google, Google Scholar, Wikipedia, and the university library's webpage, Li's participants utilized numerous web-based tools for facilitating their L2 use: the Chinese search-engine Baidu, the China National Knowledge Infrastructure, YouDao (an e-dictionary), and the built-in Microsoft Word thesaurus. Finally, in a study by Park and De Costa (2015), the authors examined a Nepalese master's student in her first-semester in a TESOL program, and specifically, her strategies for coping with the writing demands placed on her by her academic program. Numerous themes emerged from Park and De Costa's data, including strategies that were: *rule-mediated* (e.g., driven by the grading rubric and a strong desire to avoid plagiarism), *community mediated* (e.g., writing influenced by teacher/peer feedback), and *artifact-mediated* (e.g., the use of a grammar book along with basic Google searches for generating ideas).

All three studies had different motivations for exploring students' writing processes/strategies: Lei (2008)'s primary goal was a general exploration of strategy-use within the AT framework; Liös (2013) focus was predominantly on student source use/integration; and a large portion of Park and De Costaös (2015) work was dedicated to exploring

their participant's socialization and the writing strategies she used to cope with programmatic demands. However, despite these varied foci and the differences in students' proficiency levels, backgrounds, and contexts, it is important to note that all three researchers found technology to be a constant, mediating tool in the writers' actions.

### *Understanding Learners' Digital Composing Processes and The Current Study*

Beyond those L2 writing studies specifically involving the AT framework, there has been considerable interest in understanding various aspects related to students' digital literacy and composing processes. Such studies have spanned numerous topics and phenomena, including (but not limited to): learners' collaborative engagement with digital composing tools such as Google Docs (e.g., Bikowski & Vithanage, 2016); distraction-free writing tools such as OmmWriter and ZenPen (e.g., Ching, 2018); students' uses of and engagement with websites such as Wikipedia for writing assignments (e.g., Vetter, McDowell, & Stewart, 2019); and also, a growing surge of interest surrounding learners' engagement with multimodal texts/writing (e.g., Dzekoe, 2017; Yang, 2012). Although the totality of this research on L2 learners' digital composing practices is beyond the scope of this article, one common thread that unifies these studies and more is that educators are now attempting to grasp how the rapid expansion of social tools and technologies has affected L2 learners' writing processes (Elola & Oskoz, 2017; Hafner, 2013). Zheng and Warschauer (2017) have noted that as technology has advanced, these advancements have subsequently altered how students write, both in and out of the classroom. Kirkpatrick (2019) further explains that in the case of university students such as graduate/doctoral students, in order to better support them, educators need to understand students' current abilities, practices, and what skills they bring with them into the classroom. Educators, especially, need to better understand such phenomena if they are to construct writing curricula that reflect students' current abilities and strategies (Khadka, 2018), as research by Mina (2019) and others has shown that there is a sizable gap between students' current technological practices and teachers' awareness of and/or ability to use those technologies.

Thus, inspired by previous research exploring students' writing strategies (Lei, 2008; Li, 2013; Park & De Costa, 2015) and in conjunction with scholars' calls for more qualitative approaches investigating learner-initiated technology use (Levy & Moore, 2018; Ma, 2017), the current study utilizes an Activity Theory framework (Engeström, 1987, 1999) to examine two, Chinese L2 English doctoral students' writing processes/strategies during the first semester of their respective doctoral programs. The study is guided by the following research questions:

1 What writing strategies do two, L2 English learners employ when writing assignments in the first semester of their doctoral studies?
2 In what ways do these learners utilize *artifact/tool-mediated* strategies (specifically involving technology) to support their writing?

## Method

### *Participants*

Two doctoral students participated in this study, which took place at a large, U.S. university called Springfield University (pseudonym). The researcher recruited the first participant, Rebecca (pseudonym), who was an acquaintance from previous academic study. At my request, Rebecca then approached her friend, Nat (pseudonym), about her potential interest in participating. Both Rebecca and Nat were enrolled in different academic programs at Springfield University, and their data were collected separately. Participant profiles are found below.

**Rebecca.** At the time of the study, Rebecca was 24-years-old and beginning her first semester in an Applied Linguistics-related Ph.D. program. Having grown up in Mainland China, Rebecca started learning English sometime during middle school, and she later attended a university in China where she majored in Textile Engineering. Despite completing the engineering degree, during her undergraduate studies, Rebecca discovered she was uninterested in her major. Having previously visited the U.S. during high school—and recognizing English was something she enjoyed—she decided to change fields post-graduation and applied to serve as an English teaching assistant in China. After one-year as a teaching assistant, Rebecca applied to graduate schools in the U.S. to pursue a master's degree in TESOL. She completed her master's at Springfield University. Enjoying her experiences there, she decided

to stay at the university to pursue a Ph.D. Rebecca stated her ultimate goal was to remain in the U.S. post-graduation and to obtain a position teaching or working at a language testing company.

**Nat.** During the study, Nat was 29-years-old and was also starting her first-semester as a doctoral student at Springfield University. Like Rebecca, Nat, too, came from Mainland China and began learning English during middle school. Nat received her undergraduate degree in China with a major in Chinese Language and Literature. Following this, she earned a graduate degree in Teaching Chinese to Speakers of Other Languages. Her graduate degree eventually led her to the U.S., where she had the opportunity to teach Chinese in various capacities at American public schools. Then, she returned to China, where she worked for an education company and as an English test-preparation tutor for three years. Concluding that she did not enjoy this line of work, Nat returned to the U.S. to pursue another master's degree, this time in Secondary Education. She completed her degree and was then accepted into a Ph.D. program in Teacher Education at Springfield University. After graduation, Nat hoped to stay in the U.S. and work, preferably within academia.

### *Research Setting and Writing Assignments*

This research followed Rebecca and Nat as they completed their first writing assignments in their respective Ph.D. programs. Both the Applied Linguistics and Teacher Education programs were similarly constructed, in that students were expected to take coursework for two-to-three years before moving on to the dissertation stage. In Rebecca's first semester of the Applied Linguistics program, she enrolled in three courses: (1) a first-year Ph.D. student seminar designed to "provide an overview of current topics" in the field and "to prepare students to conduct independent research" (*excerpt from course syllabus*); (2) a course on language learning individual differences; and (3) a course on quantitative research methods. Both the seminar and individual differences courses required writing assignments, including: journal abstract writing, research project proposals, and a final paper reporting on pilot research data.

In Nat's first semester of the Teacher Education program, she enrolled in two courses: (1) a first-year Ph.D. student seminar on the history of power and privilege in the American education system, which was designed to introduce students to "foundational work in education literature" and "research integrity practices, analytical reading, and academic writing" (*excerpt from course syllabus*); and (2) a course on educational qualitative methods. Each course contained multiple writing assignments, including: reflective/analytical critique papers, a mini-research project, an educational book review, and a synthesis paper analyzing a major issue in the field.

### *Researcher Positioning*

As mentioned, Rebecca was an acquaintance of mine prior to the study, and she introduced me to her friend, Nat, the second participant. Because of this preexisting relationship, I attempted to maintain my partial-emic (insider) perspective throughout the study. This was also facilitated by the fact I was not far removed from my first-year as a Ph.D. student and close to the participants in age, so I could share similar experiences and encourage them to do likewise. Additionally, in an effort to engage in reflexivity and "to treat the [research] exchange as being more than a transaction" (De Costa, 2015, p. 249), I attempted to serve as a *researcher-as-resource* (Sarandi & Candlin, 2003) by offering services to Rebecca and Nat in exchange for their time spent on the study, such as future tutoring and participating in their research endeavors.

### *Data Collection*

While each participant had multiple writing assignments for their coursework, only the participants' first assignment scheduled for submission was chosen for analysis. This way, I could analyze what existing processes/strategies the first-year students brought with them into their programs. For Rebecca, this writing assignment came from a course on individual differences, which was intended to explore various factors that may affect one's L2 acquisition such as age, socioeconomic status, working memory, etc. Her "Project Proposal" assignment was a two-to-five page research proposal outlining an empirical research project of Rebecca's choosing. For Nat, the assignment came from her seminar for first-year Ph.D. students. Her "Short Analysis Paper" was a five-page paper responding to a particular set of two-to-three readings assigned in class. In the paper, students were to integrate the assigned readings and to assess the "authors' argument (claim) and evidence (data or information) and methods of analysis" (*excerpt from course syllabus*).

Table 1
Rebecca's data collection timeline.

| Task sequencing | Dates | Data collected |
|---|---|---|
| *Before* beginning semester assignments | Sept 7, 2018 | Interview #1 – (Background info) |
| *Before* writing Project Proposal | Oct 7, 2018 | Process Log 1 completed online |
| *While* writing Project Proposal | Oct 7, 2018 | Screen recording of writing |
| *After* writing Project Proposal | Oct 12, 2018 | Interview #2 + Stimulated recall |

Table 2
Nat's data collection timeline.

| Task sequencing | Dates | Data collected |
|---|---|---|
| *Before* beginning semester assignments | Sept 7, 2018 | Interview #1 – (Background info) |
| *Before* writing Short Analysis Paper | Oct 3, 2018 | Process Log 1 completed online |
| *While* writing Short Analysis Paper | Oct 4, 2018 | Screen recording of writing |
| *After* writing Short Analysis Paper | Oct 12, 2018 | Interview #2 + Stimulated recall |

To examine portions of participants' writing processes from beginning-to-end, I collected multiple data sources, including: artifacts, process logs, screen-recordings of students' writing, semi-structured interviews, and stimulated recalls. These data sources are described in what follows, and participants' data collection timelines are further outlined in Tables 1 and 2.

**Artifacts.** To better understand participants' writing assignments, multiple artifacts were collected. Artifacts included course syllabi and participants' completed writing assignments. Five course syllabi were collected—(three from Rebecca, two from Nat)—and this information was used to schedule data collection, to understand their assignment guidelines, and to ask participants specific questions about the target assignments. Completed writing assignments were collected to enhance the researcher's understanding of changes that occurred between students' real-time screen recordings and the submitted paper.

**Process logs.** Prior to writing an assignment, participants completed an online *process log* in GoogleDocs. Adapted from Lei (2008), the process log captured participants' thoughts surrounding the nature of the assignment itself; participants' existing knowledge of the topic; their goals and audience for writing; and whether they had sought assistance from others in preparation for the assignment. (See the Appendix for an example process log). Process log responses were also used in semi-structured interviews for clarifying comments and pursuing topics of interest.

**Screen recordings.** *Screen recordings* were utilized to capture students' writing processes in real time. This data source was created in response to an observation by Lei (2008): In her study, Lei utilized video cameras positioned in a room to record writers' real-time writing strategies while Lei also sat nearby, observing the participants. However, Lei noted that this environment reflected rather artificial and imposing conditions. Thus, this study's screen recordings were an attempt to afford more "naturalistic" conditions, allowing participants to write whenever and wherever they felt most comfortable. To obtain the screen recordings, participants used the program QuickTime on their personal laptops to record approximately 1.5 -h blocks or instances of when they were composing their assignments. Participants were told to "do what you normally do" in terms of writing processes and habits. For instance: if a participant typically writes for some time and then intermittently checks Facebook, YouTube, other Internet sources, or, needs a five-minute break, she should do just that and attempt not alter any habits as a result of the recording. Based on subsequent interactions and interviews with each participant, it appeared as if neither participant had difficulty doing so. For example: on one screen recording, the participant Rebecca stated that she forgot she was recording her writing session, and the final 11 minutes of the video revealed her checking her email and surfing the web before finally noticing the recording was still active. Once a video had been recorded by each participant, she then uploaded/linked the video to a digital, password-protected folder in Google Drive, where I could later watch and review the writing session(s). Screen recordings were also utilized later in the stimulated recalls.

**Semi-structured interviews.** Two, audio-recorded, semi-structured interviews were conducted with each participant during the semester. Interview #1 lasted approximately one-hour and occurred at the beginning of the semester to

understand participants' backgrounds, education/work experiences, current coursework and scheduled assignments, and to gain insights into participants' own perceived writing processes. Interview #2, which lasted approximately 30-40 minutes, was conducted following the screen recording and completed writing assignment. In Interview #2, participants were asked to elaborate on their process log responses and whether or not their responses had changed now that the assignment had been completed (e.g., "Before you began writing, you said you consulted your teacher to get ideas. What did she help you with? Did you end up consulting anyone else after you started the assignment?").

**Stimulated recalls.** Immediately following Interview #2, a 30-minute, audio-recorded stimulated recall occurred. Prior to the recall, I had prepared questions with related timestamps based on the screen recordings. The participants and I watched portions of the screen recording together, and they were asked to describe their actions, why they used certain tools, and what they were thinking at specific moments (e.g., "Let's look at the 2:30 minute mark. [*Participant and researcher watch recording together*]. You do a basic Google search here for the phrase 'on a regular basis'. What exactly are you looking for here? Why did you choose to use Google?").

### *Data Analysis*

Semi-structured interviews and stimulated recall sessions were uploaded to YouTube in a private channel and transcribed using YouTube's automatic video-captioning feature; then, these rough transcriptions were reviewed and updated/corrected as necessary. All data sources for the study were analyzed following a two-cycle coding approach (Miles, Huberman, & Saldaña, 2014). In the first round of coding, I assigned codes based on (a) emergent themes, and (b) in relation to the AT framework provided by Engeström (1999) (e.g., mediating artifacts, rules, community, etc.). For example: In one of the screen recordings, I noted that one of the participants, Rebecca, occasionally navigated away from her writing to visit the website COCA (the Corpus of Contemporary American English). During the subsequent stimulated recall, Rebecca revealed that she engaged in this action of visiting COCA for the purpose of checking her language use, specifically for learning and examining collocations. Because of this, I coded such an instance based on the purpose of Rebecca's action, which ultimately fell under the AT category of *mediating artifacts* and became labeled as "tool-mediated strategies for language development," since the purpose of the tool use was to assist Rebecca in her language learning of English collocations. During the first round of coding, this process was repeated for all of the participants' actions and their comments in the process logs, semi-structured interviews, and stimulated recalls. After this first round, the second round of coding consisted of taking those codes generated in the first round and then grouping and organizing them accordingly for subsequent analysis.

## Findings

Throughout the course of composing their assignments, Rebecca and Nat's actions were influenced or mediated by a variety of factors, many of which were *rule-, community-,* and *artifact-mediated*. Likewise, both individuals were heavily influenced by factors that were sometimes contradictory. Rebecca's activity system is outlined first below, followed by Nat's, and particular emphasis is paid to the writers' *artifact-mediated* strategies specifically involving technological tools.

### *Rebecca*

**Object.** For her first Ph.D. writing assignment, Rebecca wrote a three-page research proposal, with an additional five, attached pages that included references and materials. Her paper's focus was on exploring the International English Teaching Assistant (ITA) proficiency test, specifically:

> . . .to investigate how the individual differences in foreign language learning experiences and current English teaching experiences affect raters' perceptions when they are evaluating non-native English speakers' language proficiency. (*final paper*)

**Goals.** Rebecca stated she was originally intimidated by the assignment, especially since she knew little about the topic of the class. However, after starting to read, she became motivated to complete the assignment:

> As I read more. . .I feel, 'Okay. There is something that I. . .need to do and I want [to do].' (*interview #2*)

Not only did Rebecca wish to complete the assignment, but she desired to create a proposal that could actually be researched later on. Though her immediate goal was to create a high-quality proposal that would serve as a foundation for something more, she stated her ultimate goal was to one day submit her paper to a journal and to receive—(or in this case, to *not* receive)—a specific response from journal reviewers:

> I don't want them to say: 'Okay. That seems to be [like] speech.' (*interview #2*)

Thus, Rebecca was driven by two goals: (1) to create a proposal that would benefit her later in her Ph.D. studies, and (2) to ultimately submit that research to a journal and for her writing to be perceived as academic rather than speech-like.

**Division of labor.** In the process log, Rebecca indicated her course instructor had helped her generate ideas for the proposal. As mentioned, Rebecca was originally intimidated because she felt she had little knowledge of the course content. Since the proposal was due early on in the semester, her instructor directed her to specific readings that ultimately aided her in selecting a topic, and thus, reduced her workload and stress. Apart from the instructor, Rebecca indicated no others had assisted her.

**Rules.** During the first moments of her screen recording, Rebecca opened the proposal assignment sheet/guidelines before writing. When I asked her if this was a typical practice, she remarked:

> Yeah. I don't really want to misunderstand anything, and I don't want to miss out something that's the instructor would like us to do but I forgot to do that's clearly stated in the syllabus. (*stimulated recall*)

Rebecca said she always carefully considered every requirement. However, though she tried to adhere to this specific assignment's criteria, she found it to be rather difficult. This was not because of the content/assignment itself, but instead, because the scope of the assignment conflicted with her ambitions and pressures from her graduate community.

**Community.** The course instructor told Rebecca and other students to keep their project proposals manageable in the sense they should not be overly ambitious in aspects such as large participant-pools, innovative designs, etc. Likewise, Rebecca's Ph.D. seminar instructor also reiterated this advice to her concerning keeping her proposals manageable. Despite receiving this advice, Rebecca stated she felt immense pressure from her community of graduate student-peers to do otherwise:

> I think that makes sense [*the advice from the instructors*], but sometimes we also feel pressured—peer pressured—like, 'Wow! My cohort is doing something that is likely to turn into a publication to like XXX [*a top-tier journal*]. . .but what am I doing? I'm writing something that nobody cares. . .Sometimes the pressure from your peers may send you a message in a wrong way. (*interview #2*)

Despite the scope of the guidelines and being told to create a manageable project, there was a conflict. This conflict or contradiction in Rebecca's activity system occurred between the *rules* of the assignment criteria versus Rebecca's own graduate *community*, which she felt imposed additional pressures on her to go beyond the stated criteria.

**Mediating artifacts.** In addition to these influential factors, while composing her paper, I observed Rebecca's use of numerous artifacts to mediate her computer-based writing in Microsoft Word. She elaborated on these artifacts during the stimulated recall. Rebecca's *artifact-mediated* strategies are sorted into three categories, including: (1) multimodal strategies; (2) tool-mediated strategies for content development; and (3) tool-mediated strategies for language learning.

***Multimodal strategies.*** In writing her proposal and in reading/incorporating relevant literature, Rebecca used different colors with fonts and highlighting to signal different meanings.

**Red font.** In the midst of writing her paper, Rebecca paused momentarily to change a phrase's font color from black-to-red. Then, she continued writing in the standard, black font. When I asked her about this practice, (which she repeated later), she stated:

> [This red font means] I would like to go back to this point and maybe change the wording. . .so I know this one is not acceptable in the finalized version of this paper, but I don't really want to be stuck [now]. (*stimulated recall*)

Thus, Rebecca used the mode of color: (1) to facilitate time management, enabling her to continue writing without being held up, and (2) to serve as a placeholder, reminding her to return to a portion of the text during revisions.

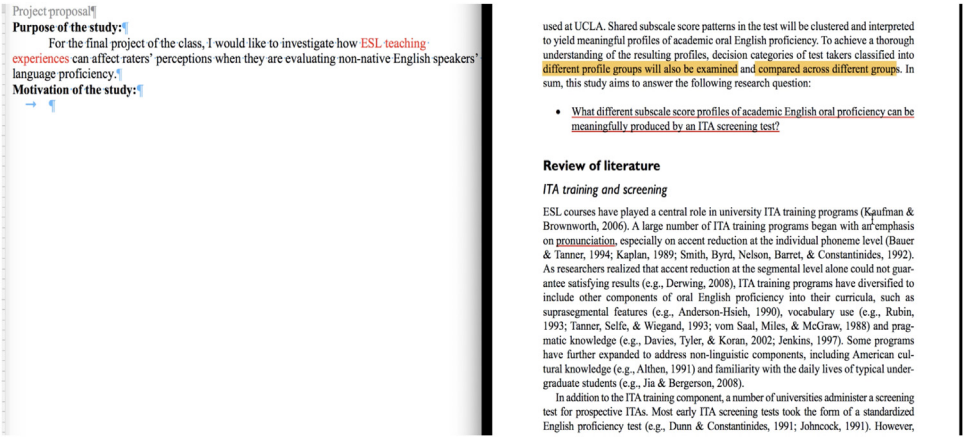


Fig. 2. Screenshot showing multimodal color use and *Shift-It* widget.

**Red underlining and yellow highlighting.** Rebecca also utilized red underlining and yellow highlighting in the PDF journal articles she had downloaded and previously read. When I asked her about the differences between the two, she indicated:

> For the yellow ones, it's specifically about the studies—like what the researchers would like to investigate. But for the red ones. . .it's just like for general ideas. Like if I want to do ITA [research], I have to know something about this. (*stimulated recall*)

While writing her proposal, red underlining in the PDF articles served as a reminder these were concepts she needed to understand in-depth. Similarly, Rebecca used yellow highlighting in the articles, but this was for indicating general information about the study's purpose, methodology, results, etc. These multimodal practices assisted her in quickly finding relevant information, which could then be summarized/integrated into her document while writing. (See Fig. 2 for a screenshot showing Rebecca's multimodal color use, along with her use of the widget *Shift-It*, outlined below).

***Tool-mediated strategies for content development.*** Beyond the use of PDF journal articles, which Rebecca regularly consulted throughout the screen recording, her writing and content development were mediated by two tools: (1) Shift-It, and (2) Wikipedia.

**Shift-It.** Throughout the recording, Rebecca used a widget (an application) she had downloaded to her laptop from the Internet. She used this widget, "Shift-It", to easily split-screen her Microsoft Word document and an accompanying PDF journal article. This, she said, made it easier to scan back-and-forth between her writing and the source she was referring to/pulling from. While Shift-It can be utilized in additional ways, Rebecca used it only for this split-screen feature during her screen recording.

**Wikipedia.** Apart from Shift-It for easily viewing and integrating content, Wikipedia was also consulted multiple times. Despite many professors' objections to using Wikipedia for research, Rebecca disagreed, saying she consulted it frequently:

> When I research articles, if I come across some terms I was not familiar with. . .I think Wikipedia is like a very official. . .[It] can give you answers that are likely to be the right one. So, I trust it. If one day it got shut down, I would be sad. (*stimulated recall*)

Rebecca used Wikipedia to look up basic, background information on topics. In the screen recording, one such occasion occurred when she began writing the acronym "ETS" in her paper, but was then uncertain of what "ETS" meant. Using Wikipedia, she discovered that "ETS" was short for "Educational Testing Service," and she incorporated into her paper appropriately.

***Tool-mediated strategies for language development.*** When writing, Rebecca employed three *tool-mediated strategies* for facilitating her language learning/development, including using: (1) YouDao, (2) BYU's COCA, and (3) Google.

**YouDao.** On two occasions, Rebecca consulted YouDao, a Chinese dictionary application available for laptops and mobile phones. One instance occurred when she was searching for a word that could represent the idea that some universities develop their own internal language tests, independent of testing agencies like ETS. Therefore, she used YouDao to look up the word 自主的 "zizhude", saying:

> In Chinese, I would put the sentence in that way, [with the word] 自主的, but I don't know in English how should I say that? (*stimulated recall*)

After discovering the English equivalent meant "autonomous" and by looking at examples in use, Rebecca decided the usage of "autonomous" was inappropriate for her context; thus, she decided to rephrase her sentence.

**BYU's COCA.** Numerous times, Rebecca navigated away from her proposal to the Brigham Young University (BYU) Corpus of Contemporary American English (COCA)[2], which is (at the time of this writing) a free, searchable 560 million-plus word collection of American English taken from newspapers, magazines, academic texts, and more. When writing, Rebecca would navigate to the COCA website in order to search for specific English collocations:

Although I have been here for over two years. . .I'm still not sure like which collocation should I use like for certain words. (*stimulated recall*)

Therefore, when unsure of specific collocations, she utilized BYU's COCA. For example, in the screen recording, Rebecca wrote:

> For teaching, a lot of universities provide ITA screening procedures and training. . .

However, she paused momentarily in writing this sentence, stating she was unsure of the usage of the verb "provide" and whether it collocated with "training." To examine this, she looked up the verb "training" in COCA. Her search yielded 452 examples of "provide" with "training," of which she examined several closely. After consulting the examples, Rebecca determined her usage was acceptable and continued writing. This process occurred later, too, when she searched for "be qualified" and whether "to teaching" or "for teaching" was the appropriate collocation. Interestingly, Rebecca felt COCA was more effective than consulting her peers:

> Sometimes I feel they cannot really answer my questions really well because they cannot think like I do, right? So I feel now with COCA. . .it's a better way. (*stimulated recall*)

**Google searches.** Finally, Rebecca utilized basic Google searches in her writing. However, they were not used for finding content, but instead, for language learning purposes. In particular, at one point, she searched for the phrase "on a regular. . ." which Google suggested/auto-completed to "on a regular *basis*." I asked her why she did this:

> For Google, the nice thing is. . .it's always trying to predict what you're gonna type. I know that [orally, the phrase is] 'on a regular basis', but I was not sure of like the word. Which word. . .[*basis* or *bases*]? COCA does not give. . .the prediction. (*stimulated recall*)

Thus, in this instance, Google was preferred over COCA as a language-learning tool because of its anticipatory power.

**Rebecca's activity system.** Rebecca's activity system is shown in Fig. 3, including the aforementioned contradiction/tension that occurred, which is illustrated by a jagged line.

*Nat*

**Object.** For her first assignment, Nat wrote a five-page reflection/response paper with an additional sixth page containing three references. The paper discussed the assimilation of immigrants in the 19th and 20th centuries, particularly:

> . . .how schooling contributed to monolingualism of America; and how this monolingual/monocultural rhetoric shaped education for immigrants. (*final paper*)

**Goals.** Prior to writing, Nat indicated her main goal for the assignment was:

[2] 2 For more information regarding COCA, visit: https://corpus.byu.edu/coca

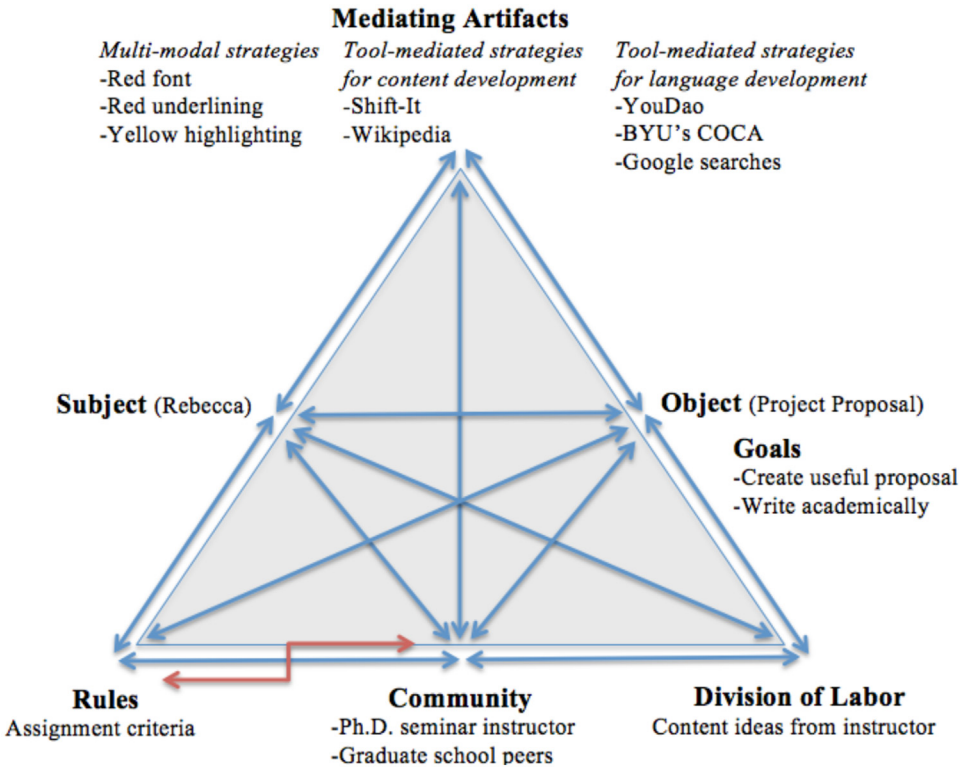


Fig. 3. Rebecca's activity system.

. . .to find out what the professors studying language education will comment about my ideas. (*process log*)

She had a strong desire to receive feedback from scholars in her field. Yet, Nat had another goal as well, which was to continue working on her academic language/writing, stating:

> It is difficult for me to make my ideas sounds like my ideas for my readers, due to my language choice or language limit. (*process log*)

When I asked her to elaborate on this, she stated:

> Because [*English*] it's not my language. Sometimes. . .I meant to mean something—but it doesn't sound like that to a native speaker. . .I find you can make your ideas really clear by using really simple languages that's not academic, but if you want to sound academic, then you have to arrange your languages differently. (*interview #2*)

**Community.** Nat was nervous about completing her first writing assignment, but upon speaking to her peers, she felt comforted. She stated her peers were incredibly supportive:

> It's pretty relaxed. There is no competition among peers. [They're like] "just do your best. You'll be fine! You'll graduate!" (*interview #2*)

Therefore, speaking to her peers alleviated her anxiety and increased her confidence.

**Rules.** For the assignment criteria, Nat felt her instructor was not asking for much: She doesn't even want us to go do extra reading or research. We just need to have some critical thinking about the readings. . .and it's a very short [5-page] paper. (*interview #2*)

Despite the instructor's limited criteria and request not to cite outside sources apart from those assigned, Nat thought the nature of the assigned readings—which were intended to be overviews—actually complicated things:

> [That] makes things a little bit hard because the readings are only talking about certain topics. . .You still have to cite some of the outside sources. (*interview #2*)

For instance, Nat stated her topic on immigrant education was mentioned but not widely discussed in the assigned readings. Therefore, though she was not supposed to, Nat felt compelled to cite additional sources in order to adequately complete the assignment.

**Division of labor.** In preparing for and drafting her paper, Nat consulted four different people, including a: (1) mentor, (2) course instructor, (3) writing counselor, and (4) classmate.

***Mentor.*** The first person Nat consulted before writing was her mentor, a fourth-year doctoral student, who was assigned to her by the department. Nat said she felt stuck, not knowing which topic to choose, but her mentor assisted her:

> I cannot decide what topic to write about, and then she suggested maybe I could relate it to my scholarly interest. . .She's very helpful. (*interview #2*)

Nat heeded her mentor's advice, choosing the topic of immigrant education, which coincided with her interests.

***Course instructor.*** After speaking to her mentor, Nat began drafting her paper. During the drafting process, she approached the course instructor for confirmation on her topic and for some initial feedback. In addition to confirming the topic was appropriate, her instructor assisted her by examining her paper:

> She [*the course instructor*] said: "think of your audience as me". (*interview #2*)

Because the instructor was the audience, she directed Nat to delete some of her written explanations about field-specific concepts, stating she already knew that information. This also helped Nat reduce the length of her paper.

***Writing counselor.*** After making edits and finishing "70% of the writing" (*interview #2*), Nat sent her paper to a writing counselor, a Ph.D. student employed by the department, but the counselor noted a potential issue:

> She's supposed to read our paper and give some revision suggestions. . .[but then] she realized I was citing a lot of outside sources, and then she said that might not be okay . . .but she did not give me any ideas [how to fix it]. (*interview #2*)

This feedback worried Nat, causing a tension and contradiction to occur between the *rules* of the assignment and the *division of labor*, in which the writing tutor interpreted Nat's inclusion of outside sources as problematic. Complicating things was the fact the writing counselor gave her this feedback only one day before the submission deadline.

***Classmate.*** This tension prompted Nat to share her paper with another L1 English classmate for guidance, but the classmate told her not to worry about the counselor's comments. Instead, he suggested Nat focus on other potential issues in her paper:

> He said. . .I should have sentences in between different ideas to connect them. . .he said my opening—my thesis—was too redundant. I should make it more clear. (*stimulated recall*)

Nat decided to disregard the writing counselor's comments, and instead, implemented her classmate's suggestions prior to submitting the paper.

**Mediating artifacts.** Apart from these factors, while composing her paper, I observed Nat's usage of artifacts to mediate her computer-based writing in Google Docs. She discussed each artifact's use further during the stimulated recall. These *artifact-mediated* strategies are again organized into three separate categories, including: (1) multi-modal strategies; (2) tool-mediated strategies for content development; and (3) tool-mediated strategies for language development.

***Multimodal strategies.*** While writing and integrating sources/readings, Nat utilized multiple modes of color to signal different meanings.

**Pink font.** There were instances in which Nat suddenly stopped writing to change her font color from black-to-pink. Then, she would begin writing again in the standard, blank font. I asked her what this pink text signified:

> That means that sentence must be fixed. . .Something's wrong there, but I just have to put it down first. [It's] not the grammar [that needs fixed], just the wording. You know, sometimes the word you want just don't come up, so you will come back. (*stimulated recall*)

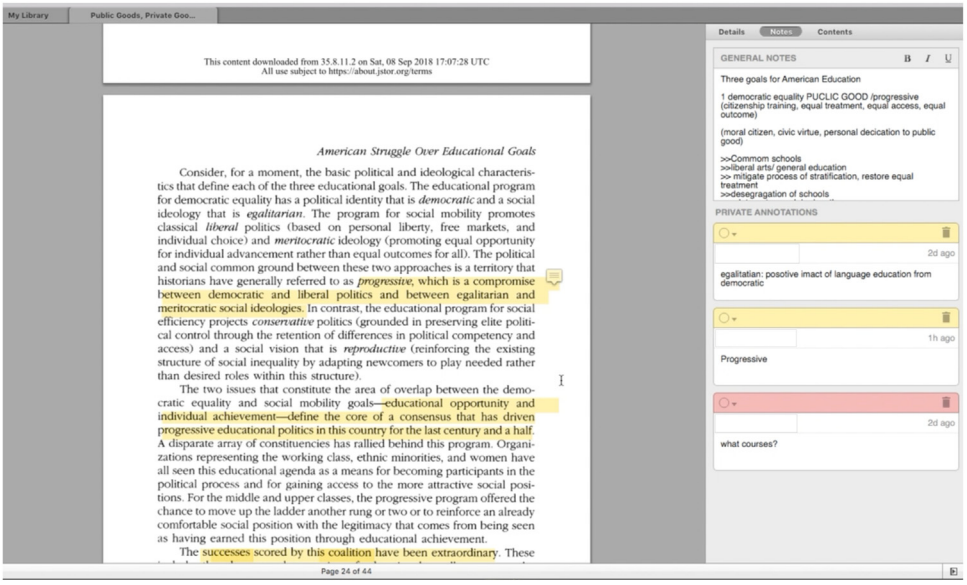


Fig. 4. Image showing Nat's use of highlighting and digital notes in Mendeley.

Nat used this color-mode change so that she would not be stopped from getting her ideas onto the page. It also served as a reminder to revisit language later for rephrasing.

**Blue, green, purple, yellow, and red highlighting.** Within the PDF articles Nat had read/planned to incorporate into her writing, she used five different highlighting colors to indicate different meanings, explaining:

> For this article, there are three topics. . .so I was using three colors for each [*blue, green, and purple*]. And then the yellow one is for general information. . .Red means really important. (*stimulated recall*)

These multimodal highlighting practices assisted Nat in locating information quickly, which could be incorporated into her paper.

***Tool-mediated strategies for content development.*** Nat utilized two *tool-mediated strategies* for facilitating content development, including: (1) Mendeley, and (2) digital notes.

**Mendeley.** Prior to the doctoral program, Nat stated she learned to use Mendeley, a digital document and citation management program with features for note-taking and organizing references. While writing, Nat used Mendeley to access her saved readings, which she drew from to compose her assignment.

**Digital notes.** With her papers embedded/loaded into Mendeley, Nat often utilized a digital note-taking feature. She inserted notes in PDFs prior and during the process of writing:

> I do notes like after [reading] several paragraphs. I will write down. . .what this couple three or four paragraphs talked about. . .I did it here because I want to come back. (*stimulated recall*)

This digital note feature made it easy to access her thoughts on article content, which she then incorporated into her paper. (See Fig. 4 for a screen shot of Nat's Mendeley usage, the digital note feature, and an instance of multimodal highlighting).

***Tool-mediated strategies for language development.*** When writing, Nat employed one *tool-mediated strategy*, YouDao, for facilitating her language learning/development. However, her YouDao usage did not occur in the actual screen recording. Instead, during the stimulated recall, Nat indicated she used the YouDao cellphone application off-screen to look up words. She noted she was always very careful when using YouDao:

> If you want to translate Chinese words into English [or vice versa], it may not always give you the right word for the context you need, so I always make sure I see the word used in an example. (*stimulated recall*)

Apart from Nat's usage of YouDao to occasionally learn English words, no other tools were observed or utilized for facilitating language learning during the process of completing her writing assignment.

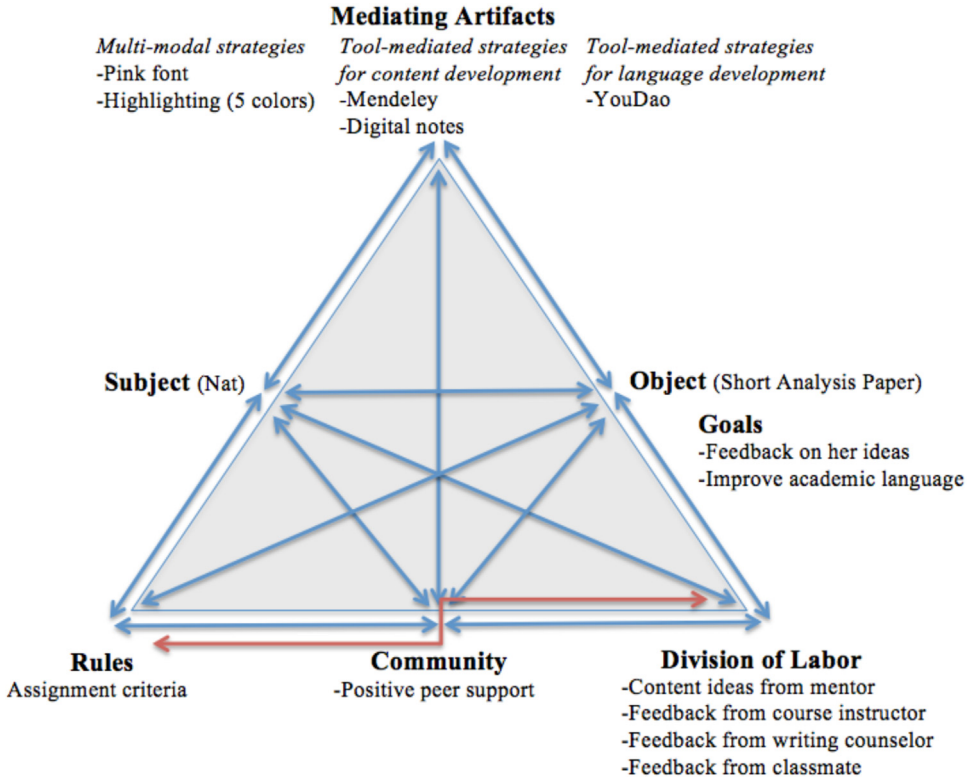


Fig. 5. Nat's activity system.

**Nat's activity system.** Fig. 5 shows Nat's activity system, including the contradiction that occurred, which is illustrated by a jagged line.

## Discussion

In response to recent calls for more qualitative approaches to investigate learner-initiated technology use (e.g., Levy & Moore, 2018; Ma, 2017) and for additional research to examine the graduate/doctoral student population (e.g., Kirkpatrick, 2019), this study adopted an Activity Theory (AT) (Engeström, 1987, 1999) framework to explore the writing strategies and processes of two, L2 English doctoral students. Although various facets surrounding the learners' writing processes were explored in relation to AT, specifically highlighted were the pre-existing *artifact/tool-mediated* strategies that these learners brought with them into their academic studies, as scholars such as Khadka (2018) and others have called for educators to have a greater understanding of students' existing practices and capabilities involving technology. This focus on technological tool-use makes the current study particularly unique in the sense that previous writing strategy studies involving AT have predominantly focused on other issues such as source use/integration (e.g., Li, 2013), coping strategies and learner motivations (e.g., Park & De Costa, 2015), or more exploratory studies surrounding AT and writing strategies in general (e.g., Lei, 2008).

Despite the different foci, this is not to say that some of this study's findings are inconsistent with those studies involving AT, or, research examining different facets of students' digital composing processes more generally. For instance, some of Rebecca and Nat's activities were *rule-mediated*, which Leiös (2008) two writers also exhibited, in that they were driven by the teacher's grading criteria. This was especially evident in Rebecca's actions, as the first moments of her screen recording captured her opening the assignment guidelines to carefully reexamine the instructor's requirements. Additionally, in Park and De Costaös (2015) study, the researchers found their participant's actions to be influenced by her academic *community*, positively spurring her goals/desires to succeed in the program. Likewise, in this study, both Rebecca and Nat's actions were influenced by their graduate-peer communities, but in differing ways: Nat's experience more closely resembled that of Park and De Costa's participant in that Nat's pursuit of her

goals was positively mediated by a supportive, low-pressure graduate community. Conversely, Rebecca's goals were negatively influenced by the pressures she felt externally from observing her high-performing peers, which led to anxiety surrounding the scope and writing of her first assignment.

Previous writing strategy research with AT and digital composition studies more generally have detailed students' uses of *artifact/tool-mediated* strategies, some of which were utilized by Rebecca and Nat. For example, Li (2013) observed his participants' use of Wikipedia to facilitate content development, which was something Rebecca engaged in as well. Advanced doctoral students' use of Wikipedia may be surprising to some instructors, since many teachers often try to dissuade their students from using Wikipedia when conducting research. However, other scholars, meanwhile, have been advocates of Wikipedia's use for various purposes and writing assignments (e.g., Vetter et al., 2019). Returning to Li's (2013) study, the author also described his participants' use of YouDao for language learning purposes—a tool that both Rebecca and Nat employed during the writing process. Multiple studies have also described participants' use of basic Google queries for researching and integrating content (Lei, 2008; Li, 2013; Park & De Costa, 2015). However, in this study, Rebecca used Google searches not for content, but for language learning purposes, particularly for its predictive power in completing phrases (e.g., "on a regular *basis*").

Unlike earlier studies, the coordinated use of screen recordings and stimulated recalls in this research shed light on new and additional *artifact/tool-mediated* writing strategies in the categories of *multimodal strategies* along with *tool-mediated strategies for language development*. For *multimodal strategies,* Rebecca and Nat engaged in changing the mode of color to signify different meanings: some of these colors were utilized to facilitate faster writing (e.g., pink font with Nat, and red font with Rebecca), while other colors were employed to facilitate easier source identification and efficiency in integrating important concepts into their writing (e.g., red underlining and yellow highlighting by Rebecca, and five different colors by Nat). The participants' *tool-mediated strategies for language development*—particularly from Rebecca—also moved beyond what other writing strategy studies have documented. In addition to the aforementioned usage of Google, Rebecca utilized BYU's COCA throughout her writing and effectively found solutions to her language-related questions regarding collocations. In an interesting off-hand remark as well, Rebecca commented that having become so efficient in using this corpus tool for L2 English-learning purposes, she now actually preferred using COCA over asking her peers and other L1 speakers.

While this study attempted to improve on earlier methods aimed at examining students' real-time writing processes, one limitation is that the screen-recordings themselves did not capture participants' composing processes from beginning-to-end, but rather, only approximately half of the time they took to complete their assignments. Likewise, I was unable to capture participants' off-screen actions, such as Nat's stated cellphone use for searching words with YouDao. Despite these limitations, still, there are some potentially important pedagogical implications surrounding this study's findings, particularly in regards to students' existing uses of digital technologies for engaging in and enhancing their L2 composition.

As Zheng and Warschauer (2017) have previously noted, the rapid expansion of technology has fundamentally altered and shaped how students write, both in and out of the classroom, in their L2s. While most previous studies involving students' digital composition processes have tended to be researcher-led intervention studies (e.g., Bikowski & Vithanage, 2016; Dzekoe, 2017; Yang, 2012), the current study has highlighted the vast repository of tools and skills that students may have at their disposal, and, bring with them into their classrooms. As research has suggested (e.g., Mina, 2019), statistically speaking, teachers are unlikely to be aware of the breadth and number of tools that are being used by their students and the ways in which their students are utilizing those tools to their benefit. For instance, in this study, while Rebecca and Nat were only first-year students beginning their first-semesters of their doctoral programs, they brought with them a large set of digital tools and a complex, effective set of skills for using those tools to navigate language issues and for organizing/integrating content into their writing.

Pedagogically speaking, Khadka (2018) has suggested that educators should be actively engaged in constructing and modifying writing curricula that reflect students' current abilities and strategies. If this is to occur, as recommended, the findings of this study showcase the importance of teachers needing to take time out of their schedules and/or classes to survey their students so that they can gain a better understanding of students' practices and the tools they use to assist in their writing. After teachers have surveyed their students and compiled a list of the tools their students use and for what purpose(s), it may be beneficial for teachers to have students share or model such tool-use strategies in a workshop-style format. This type of activity may enable students (and importantly, the teacher) to engage in reciprocal learning.

Finally, another key pedagogical implication was highlighted by Rebecca's usage of Google. The data from the current study revealed that Rebecca utilized Google for language learning purposes, which is important in that it showcases the dual utility and versatile nature of a common technology/tool that might ordinarily be thought of as having only a singular or primary function. BYU's COCA, too—as Rebecca showed—has enormous potential for language learning. Thus, Google, COCA, (and other open, free corpora as well) are resources that teachers in advanced language courses might consider exploring further to see whether they can be integrated into the curricula. These tools not only can assist students in their language learning, but importantly as well, if students can learn to become capable users of these tools, then this can help to facilitate an L2 writer's independence and enable less reliance on the writing instructor.

## Conclusion

In this study, the writing strategies and processes of two, advanced, L2 English writers were examined using an AT framework. Like those studies before it, this research highlighted the multifaceted, interconnected, social dimensions that affect learners as they attempt to pursue their goals and compose individual writing assignments. The writers' actions were influenced by a host of factors, including *division(s) of labor*, and those that were *rule-, community-,* and *artifact/tool-mediated*. Importantly, as educators continue to attempt to grasp how the rapid expansion of social tools and technologies has affected L2 learners' writing processes, this study highlighted that when entering their academic programs, some students may already possess an advanced understanding and knowledgebase of digital tools, which they use and see as an essential part of their own writing processes. If educators are truly to craft curricula that reflect students' practices and capabilities, the current study's findings highlight the importance of teachers taking time to understand the complexities of pre-existing learner writing strategies. For educators—as suggested—grasping these tools may not only be beneficial for the purposes of course planning, but importantly as well, these *artifact/tool-mediated* strategies may be beneficial to introduce to students because of their potential for facilitating language learning, content development, and independence as an L2 writer.

## Acknowledgements

A special thank you to the two focal participants for this study, Nat and Rebecca, for volunteering their time for the project. Additional thanks to Drs. Peter De Costa and Charlene Polio for their feedback on a draft of this manuscript, and finally, to the anonymous reviewers for their helpful comments.

## Appendix A

Process Log Example (Adapted from Lei, 2008)

Directions: Please complete this *Process Log*prior to beginning your XXXX assignment for Insert Class Name. Use complete sentences to answer the following questions. *(This should take approximately* 15 minutes *in total to fill out).*

1 What is the writing assignment topic? What are you required to do?
2 Do you like this assignment? Why or why not?
3 Do you know much about the assignment topic? Briefly explain what you know about it.
4 How did you get ideas for this assignment? (e.g., Did you talk to friends, teachers, search the web, etc.?)
5 Do you have a target audience or readers for the assignment? If yes. . .
   a Who are they? And
   b Why did you choose them?
6 Do you have specific personal goals in writing this assignment? If so, please explain what they are.
7 Did you talk about the topic with anyone before beginning to write? If so, with whom did you speak?
8 Did you prepare for this assignment in a language other than English? If so. . .
   a Which language? And
   b What did you prepare in that language?

9 *Thinking about writing this assignment in the near future:* Is there a specific aspect of this writing assignment that you think will be particularly difficult? If so, what is it and why?
10 *Thinking about writing this assignment in the near future:* Is there a specific aspect of this writing assignment that you think will be particularly easy? If so, what is it and why?

**Matt Kessler** is a Ph.D. Candidate in the Second Language Studies program at Michigan State University, where he also serves as the editorial assistant to the co-editors of *TESOL Quarterly*. His research interests center around exploring the intersections of second language writing, computer-assisted language learning, and research-pedagogy links.

## References

Barab, Sasha, Schatz, Steve, & Scheckler, Rebecca. (2004). Using activity theory to conceptualize online community and using online community to conceptualize activity theory. *Mind, Culture, and Activity*, *11*(1), 25–47. http://dx.doi.org/10.1207/s15327884mca1101-3

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

Ching, Kory Lawson. (2018). Tools matter: Mediated writing activity in alternative digital environments. *Written Communication*, *35*(3), 344–375. http://dx.doi.org/10.1177/0741088318773741

Cotterall, Sara. (2010). Doctoral students' writing: Where's the pedagogy? *Teaching in Higher Education*, *16*(4), 413–425. http://dx.doi.org/10.1080/13562517.2011.560381

Cunningham, Kelly J. (2019). Student perceptions and use of technology-mediated text and screencast feedback in ESL writing. *Computers and Composition*, *52*, 222–241. http://dx.doi.org/10.1016/j.compcom.2019.02.003

De Costa, Peter Ian. (2015). Ethics in applied linguistics research. In B. Paltridge, & A. Phakiti (Eds.), *Research methods in applied linguistics: A practical resource* (pp. 245–257). London, England: Bloomsbury.

Dzekoe, Richmond. (2017). Computer-based multimodal composing activities, self-revision, and L2 acquisition through writing. *Language Learning & Technology*, *21*(2), 73–95.

Elola, Idoia, & Oskoz, Ana. (2017). Writing with 21st century social tools in the L2 classroom: New literacies, genres, and writing practices. *Journal of Second Language Writing*, *36*, 52–60. http://dx.doi.org/10.1016/j.jslw.2017.04.002

Engeström, Yrjö. (1987). *Learning by expanding: An Activity Theoretical approach to develop- mental research*. Helsinki, Finland: Orienta-Konsultit Oy.

Engeström, Yrjö. (1999). Activity theory and individual and social transformation. In Y. Engeström, R. Miettinen, & R.-L. Punamäki (Eds.), *Perspective on Activity Theory: Learning in doing: Social, cognitive and computational perspectives* (pp. 19–38). New York, NY: Cambridge University Press.

Feryok, Anne. (2012). Activity theory and language teacher agency. *The Modern Language Journal*, *96*(1), 95–107. http://dx.doi.org/10.1111/j.1540-4781.2012.01279.x

Fujioka, M. (2014). L2 student–U.S. professor interactions through disciplinary writing assignments: An activity theory perspective. *Journal of Second Language Writing*, *25*, 40–58. http://dx.doi.org/10.1016/j.jslw.2014.05.004

Hafner, Christoph A. (2013). Digital composition in a second or foreign language. *TESOL Quarterly*, *47*(4), 830–834. http://dx.doi.org/10.1002/tesq.135

Hirvela, Alan, & Du, Qian. (2013). "Why am I paraphrasing?": Undergraduate ESL writers' engagement with source-based academic writing and reading. *Journal of English for Academic Purposes*, *12*(2), 87–98. http://dx.doi.org/10.1016/j.jeap.2012.11.005

Hyland, Fiona. (2003). Focusing on form: Student engagement with teacher feedback. *System*, *31*(2), 217–230. http://dx.doi.org/10.1016/S0346-251X(03)00021-6

Isbell, Daniel R. (2018). Online informal language learning: Insights from a Korean learning community. *Language Learning & Technology*, *22*(3), 82–102.

Juffs, Alan, & Friedline, Benjamin E. (2014). Sociocultural influences on the use of a web-based tool for learning English vocabulary. *System*, *42*, 48–59. http://dx.doi.org/10.1016/j.system.2013.10.015

Keengwe, Jared, & Kang, Jung-Jin. (2013). A review of empirical research on blended learning in teacher education programs. *Education and Information Technologies*, *18*, 479–493. http://dx.doi.org/10.1007/s10639-011-9182-8

Khadka, Santosh. (2018). A broad-based multiliteracies theory and praxis for a diverse writing classroom. *Computers and Composition*, *47*, 93–110. http://dx.doi.org/10.1016/j.compcom.2017.12.002

Kirkpatrick, Katherine J. (2019). Online doctoral students writing for scholarly publication. *Computers and Composition*, *52*, 19–36. http://dx.doi.org/10.1016/j.compcom.2019.01.012

Kitade, Keiko. (2014). Second language teachers' identity development through online collaboration with L2 learners. *CALICO Journal*, *31*(1), 57–77.

Lantolf, James P. (2004). An overview of sociocultural theory. In K. van Esch, & O. St. John (Eds.), *New Insights into Foreign Language Learning and Teaching* (pp. 13–34). Frankfurt, Germany: Peter Lang.

Lei, Xiao. (2008). Exploring a sociocultural approach to writing strategy research: Mediated actions in writing activities. *Journal of Second Language Writing*, *17*, 217–236. http://dx.doi.org/10.1016/j.jslw.2008.04.001

Li, Yongyan. (2013). Three ESL students writing a policy paper assignment: An activity-analytic perspective. *Journal of English for Academic Purposes*, *12*, 73–86. http://dx.doi.org/10.1016/j.jeap.2012.11.006

Leont'ev, Aleksei. (1981). *Problems of the development of mind*. Moscow: Progress.

Levy, Mike, & Moore, Paul J. (2018). Qualitative research in CALL. *Language Learning & Technology*, *22*(2), 1–7.

Ma, Qing. (2017). A multi-case study of university students' language-learning experience mediated by mobile technologies: A socio-cultural perspective. *Computer Assisted Language Learning*, *30*(3–4), 183–203. http://dx.doi.org/10.1080/09588221.2017.1301957

Manchón, Rosa M., & Roca de Larios, Julio. (2007). On the temporal nature of planning in L1 and L2 composing. *Language Learning*, *57*(4), 549–593. http://dx.doi.org/10.1111/j.1467-9922.2007.00428.x

Miles, Matthew B., Huberman, A. Michael, & Saldaña, Johnny. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). Thousand Oaks, CA: Sage.

Mina, Lilian W. (2019). Analyzing and theorizing writer teachers' approaches to using new media technologies. *Computers and Composition*, *52*, 1–16. http://dx.doi.org/10.1016/j.compcom.2019.01.002

Ong, Justina. (2014). How do cognitive planning time and task conditions affect metacognitive processes of L2 writers? *Journal of Second Language Writing*, *23*, 17–30. http://dx.doi.org/10.1016/j.jslw.2013.10.002

Park, Ji-Hyun, & De Costa, Peter I. (2015). Reframing graduate student writing strategies from an Activity Theory perspective. *Language and Sociocultural Theory*, *2*(1), 25–50.

Petrić, Bojana. (2012). Legitimate textual borrowing: Direct quotation in L2 student writing. *Journal of Second Language Writing*, *21*(2), 102–117. http://dx.doi.org/10.1016/j.jslw.2012.03.005

Russell, David R. (1997). Rethinking genre in school and society: An activity theory analysis. *Written Communication*, *14*(4), 504–554. http://dx.doi.org/10.1177/0741088397014004004

Sarandi, Srikant, & Candlin, Christopher N. (2003). Trading between reflexivity and relevance: New challenges for applied linguistics. *Applied Linguistics*, *24*(3), 271–285. https://doi-org.proxy2.cl.msu.edu/10.1093/applin/24.3.271

Seloni, Lisya. (2012). Academic literacy socialization of first year doctoral students in US: A micro-ethnographic perspective. *English for Specific Purposes*, *31*(1), 47–59. http://dx.doi.org/10.1016/j.esp.2011.05.004

Vetter, Matthew A., McDowell, Zachary J., & Stewart, Mahala. (2019). From opportunities to outcomes: The Wikipedia-based writing assignment. *Computers and Composition*, *52*, 53–64. http://dx.doi.org/10.1016/j.compcom.2019.01.008

Vygotsky, Lev S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Yang, Yu-Feng. (2012). Multimodal composing in digital storytelling. *Computers and Composition*, *29*, 221–238. http://dx.doi.org/10.1016/j.compcom.2012.07.001

Zheng, Binbin, & Warschauer, Mark. (2017). Epilogue: Second language writing in the age of computer-mediated communication. *Journal of Second Language Writing*, *36*, 61–67. http://dx.doi.org/10.1016/j.jslw.2017.05.014