Peer-Reviewed Article

Supporting Postsecondary English Language Learners' Writing Proficiency Using Technological Tools

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ABSTRACT

Postsecondary international students who are also English language learners face a number of challenges when studying abroad and often are provided with services to support their learning. Though some research examines how institutions can support this population of students, few studies explore how technology is used to support language development and writing proficiency. This article reports on an exploratory study that examined the resources English language learners use to support their writing and the impact of the use of writing productivity software's on writing proficiency. Data were collected using a survey, writing samples, and a focus group. Findings indicate students frequently use technological tools to enhance learning and that technology-based supports such as writing productivity software can complement face-to-face supports.

Keywords: English language learners, language proficiency, postsecondary education, international students

The number of international students studying in Canada has increased 84% between 2003 and 2013 (Canadian Bureau of International Education [CBIE], 2014). Canada's International Education Strategy set a goal of nearly doubling (to 450,000) the number of international students studying in the country by 2022 (Government of Canada, 2014). There is a host of

benefits for countries seeking to increase their international student population; for instance, international students can address skilled labour shortages, relieve demographic pressures of an aging population, and provide an economic boost. In 2012, Canadian international students spent $8.4 billion in their host communities, which helped to sustain 86,570 jobs (Government of Canada, 2014). International students also can diversify the student population across postsecondary campuses and bring different perspectives and experiences to such academic settings.

While the population of international students continues to increase, so too does the subpopulation of international students who are non-native English speakers (NNES). The CBIE's (2009) *2009 Survey of International Students* revealed that English was an additional language for 75% of 178,000 international students studying in Canada. The competition to attract international students is high and much of the discourse surrounding international students relates to their recruitment and enrollment; however, it is becoming increasingly important that these students receive support upon being enrolled. With the projected growing number of NNES students, postsecondary institutions similarly must be cognizant of how they can support NNES language development. As a result, institutions have begun to make student services a priority to ensure that international students' needs and expectations are met. While a large body of research has investigated NNES language proficiency development through the use of face-to- face support systems, few studies have addressed how technology can be used to support English-language learning. Accordingly, the purposes of this study were to investigate how technological tools are used by university-level NNES international students and to explore the effects of writing productivity software on academic writing proficiency.

EXPERIENCING CHALLENGES

International students often face challenges with adapting to the culture of the location that they are studying in. International students may experience culture shock, loneliness, and homesickness when studying abroad (Dongfeng, 2012; Mahmood, 2014; Rajapaksa & Dundes, 2002). These challenges may be exacerbated by such students' perception of having fewer social supports than those available to domestic students (Hechanova-Alampay, Beehr, Christiansen, & Van Horn, 2002). In addition to challenges related to adapting to new cultural and social environments, international students must also adjust to academic environments— including expectations and skills—that may differ greatly from their previous educational experiences (Schutz & Richards, 2004). Additionally, there may be challenges adapting to student-centered teaching styles when NNES international students may be accustomed to teacher-centered

pedagogical approaches (Duanmu, Li, & Chen 2009).

NNES students may face additional challenges when studying in locations where English is the sole or primary language of communication. In these cases, NNES students may face academic adjustment challenges that correspond specifically to language issues such as listening ability, lecture and reading comprehension, note taking, and oral communication. There is some evidence that suggests NNES international students perceive writing tasks as the most difficult language skill in comparison to speaking, listening, and reading (Berman & Cheng, 2001; Cheng, Myles, & Curtis, 2004). Challenges might exist regarding the rigor of academic writing and student expectations and perceptions of what exactly constitutes academic writing (Andrade, 2006; Bronson, 2004; Brown, 2008). Angelova and Riazantswea (1999) and Brown (2008) list additional writing challenges that NNES students might experience, such as topic choice, differences in writing style, organization, expressing personal opinions, and vocabulary. Findings from Singh's (2015) study in which NNES students were asked to rank academic writing practices according to difficulty indicated that writing methodologies, findings/analyses, and literature reviews, using appropriate academic style, writing coherent paragraphs, and expressing ideas in correct (i.e., standard) English were the most challenging aspects of scholarly writing. Because academic writing is critical not only to the students' ability to adjust to their new environment but also to their academic success, institutions are increasingly paying attention to how they can support and help develop their NNES students' writing abilities.

SEEKING LANGUAGE SUPPORT

It is becoming commonplace for institutions to focus on supporting NNES students through various student programs and initiatives. Cownie and Addison's (1996) study exploring the language support provided by 99 British institutions found that 95% of the latter offered some form of language support. Institutions typically have a range of language support programs and services in place to support the needs of all students, and NNES students specifically. Such support programs might include extracurricular language programs that are centralized at the institution (Benzie, 2010; Phillips, 2008); embedded faculty-based programs (Benzie, 2010; Hirsh, 2007; Peelo & Luxon, 2007); and for-credit language courses (Benzie, 2010; Hirsh, 2007). Depending on the type of support, the student may meet one-on-one with a staff member or work in small groups. Benzie (2010) notes that the most common approach to language support is a generic study skills mode, but these types of programs typically have low attendance. Students may also turn to peers to proofread work (Cheng & Fox, 2008; Cheng, et al., 2004; Singh, 2015), as well as to professors and teaching assistants for guidance in academic writing (Cheng & Fox, 2008).

Regardless of the availability of various types of students services, students sometimes do not access them. Singh (2015), for example, found that only 22% of participants indicated they use third-party editors as a solution to improve their language difficulties with academic writing. Although some evidence suggests that participation in different types of language support programs have a positive effect on academic results (Benzie, 2010), students may be reluctant to make use of such resources due to various reasons, such as shyness, a lack of confidence, or at times a sense of cultural inappropriateness (Cheng & Fox, 2008). Such students may also perceive that writing support programs do not help; Cheng and Fox (2008), for example, found that 29% of participants in their study held such a pessimistic view. A disconnect between students' perception of the anticipated outcomes and the goals/priorities of the language support services may also influence students' decision on whether to seek language support.

While much of the discussion in this area has focused on how institutions can provide programs and services to meet the needs of their respective students, several studies have underscored the role of self-improvement and responsibility on the part of learners regarding improving language proficiency. Brown (2008) comments: "To address stress caused or exacerbated by language difficulties, the responsibility to improve language level resides with the student" (p. 19). Robertson, Line, Jones, and Thomas (2000) similarly found that participants recognized their role in their learning: "While there were plenty of calls for more assistance and recognition of their problems, there was also a strong component of self-help strategies in the responses, and a willingness to try new ways once the issues were fully understood" (p. 100).

The question, therefore, of how to efficiently support NNES language and writing needs while also fostering student independence warrants further attention. One approach to addressing such a question might be the integration of technology into NNES students' language development programs.

SUPPORTING NNES LEARNING USING TECHNOLOGY

Some studies have considered how various forms of technology have been implemented or are used by NNES students to support their learning, particularly with regards to language proficiency. Hirsh (2007) notes the potential for the development of online support programs for students, which would be accessible from any location and at any time in order to meet students' particular geographical/temporal needs. Moreover, Li (2006) found that participants revised their writing significantly more using electronic (i.e., word-processing) programs than they did when relying on hand-written samples.

Technology can be used by students in a variety of ways to support English language learning. Clerehan, Kett, and Gedge (2003), for example, examined NNES students' use of online dictionaries and a concordancer that had been integrated into coursework with the purpose of developing study skills. Clerehan, Turnbull, Moore, and Tuovinen (2003) also designed an Online Student Resource Centre website that offered tutorials and downloadable resources whose ultimate purpose was to support students' self-directed means of developing English language and academic skills. Other studies have looked at the potential for electronic feedback from tutors (Zareekbatini, 2015) and the use of Google Translator (Singh, 2015). Conroy's (2010) study investigating students' use of Google assisted language learning (GALL) found that 47% of the sample (*n* = 110) used Google for language learning and that participants were enthusiastic about using GALL for second language learning and improving their academic writing.

Writing productivity software is another example of technology-assisted learning that can support English language development and writing proficiency of NNES postsecondary students. Writing productivity software is an assistive technology through which users input text into a computer or a mobile device which in turn offer various features to support the process of writing, such as word prediction whereby the program provides auto-generated word suggestions as the user types. Such programs may also include thesauruses, dictionaries, speech-to-text ability, and other customizable features. Some research has suggested that word prediction software may have a positive effect on users' typing speed, accuracy, and productivity, while also reducing the number of grammatical and spelling errors and the amount of cognitive load taken to produce written text (Anson et al., 2001; Arcon, 2015; Evmenova, Graff, Jerome, & Behrmann, 2010; Nantais, Shein, & Johansson, 2001). Much of the literature in this area, however, looks at the use of writing productivity software for elementary school students (e.g., Barbetta & Silio, 2009; Schock, 2011) and students with disabilities (e.g. MacArthur, 1996; Tam, Reid, Naumann, & O'Keefe, 2002). Scant research examines the use of writing productivity software for NNES postsecondary students, even though knowledge of how this type of software could be used to support the development of writing proficiency would be quite helpful. Conroy (2010) highlights this gap in the literature:

> It is worth noting that university language support staff and management appear to be, at least on the surface, largely ignorant of, or at least ambivalent towards, the potential of these tools and techniques. Yet the findings here suggest that a significant number of EAL university students in Australia might either already use the tools and techniques, or be eager to start using them. If this is indeed

the case, could those students who already engage with the tools, as well as the wider population of EAL university students, benefit from appropriate instruction, support and guidance in using these tools and techniques to improve their English language and academic writing? (p. 878)

This study, therefore, seeks to contribute to this area of research by exploring the tools students currently use to support their writing development as well as the effects of a writing productivity software on writing proficiency. The research questions were:

1. What resources, digital and print, do NNES international students use to support their writing proficiency?
2. What effect does the use of writing productivity software have on NNES international students' writing productivity?

RESEARCH METHOD

To fulfill the objective of the study, a multi-method design was used to conduct the study in the fall semester of 2015 at a mid-size university in southern Ontario, Canada. Research Ethics Board approval was granted from the participating institution. Students enrolled in the preparation certificate program were eligible to participate. All participants had completed an undergraduate degree in their home country (which in most cases was China) and obtained a Test of English as a Foreign Language (TOEFL) score of 61 or an International English Language Testing System (IELTS) score of 5.0 to be admitted to the preparation certificate.

The main features of the writing productivity software used in this study are word prediction and speech-to-text capabilities. For word prediction, the software helps students review words to use as they are writing and helps them select what they perceive is the appropriate terminology. As students use the software more frequently, the program learns about the user and the terminology they typically use so that the suggestions it makes are more accurate. The speech-to-text feature allows users to listen to what they have written so that they can hear errors in their writing. Spelling and grammatical errors, run-on sentences, and missing words, are examples of errors that can be found when using the speech-to-text feature.

Figure 1 shows the data collection methods. Phase one involved having participants complete a short (paper) survey that inquired about resources participants currently used to support their academic English writing and how often they used each of these resources, and also asked participants to indicate their level of ability in various English communication skills. After the survey, participants were given 30 minutes

to complete an online writing sample based on a TOEFL-like writing prompt. After completing the first writing sample, participants were provided with a 40-minute workshop that highlighted the writing productivity software that was the focus of this study. Following completion of the tutorial, participants were asked to complete a second writing sample, this time using the writing productivity software while they completed the sample. In this case, participants were given another 20 minutes to write about whether they agreed or disagreed with a different TOEFL-like prompt. Phase two of the study took place at the end of the fall semester after students had time to use the software on a trial basis.

Participants were invited to participate in a 30-minute focus group to discuss their perceptions of the challenges and benefits of the use of writing productivity software, as well as overall insight regarding the nature of in-person and electronic writing tutorial and editorial support they receive in their programs.

Figure 1. Research design
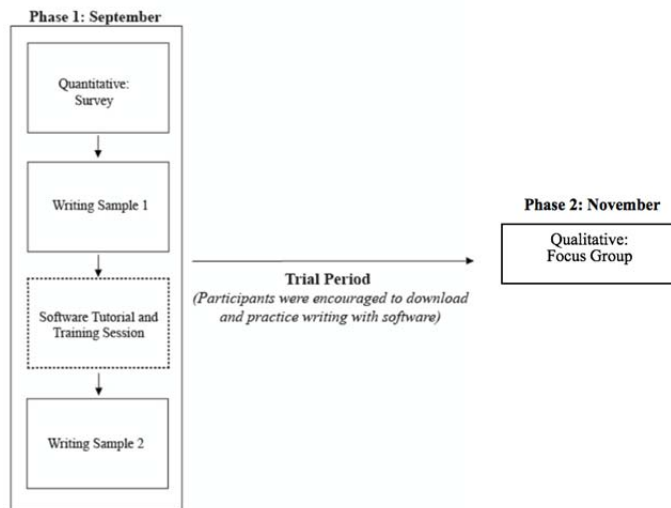
In all, 27 students completed the initial survey, the workshop, and two writing samples. Four students returned to participate in the focus group at the end of the semester. The survey data were compiled and descriptive statistics were generated. Each of the writing samples was evaluated using two electronic writing assessment websites that employ writing assessment software based on the assessment algorithm used by the online TOEFL test. The first writing assessment website provided the total frequency of errors in the samples and frequencies for the types of errors that were found. It evaluated samples for a variety of errors, grouped into grammar, mechanics, style, usage, and spelling. Grammar errors included errors with verbs,

pronouns, subject–verb agreement, possessive pronouns, fragments, and run-on sentences. Mechanics included compound sentences, sentence capitalization, missing commas, hyphenation errors, missing final punctuation, missing apostrophes, and proper nouns. Style errors addressed tone and length. Lastly, the usage category included article errors, preposition, and faulty comparison. The second writing assessment website provided an overall score as a percentage for the writing samples. The focus group data were transcribed by one of the researchers and the research team then analyzed the transcript for themes.

FINDINGS

The results of the survey highlight NNES in the preparatory certificate programs used a number of resources on a regular basis. Specifically, most students reported regular use of a digital Chinese/English dictionary and electronic spell checkers. Twenty-seven of the 28 student respondents claimed they used a digital Chinese/English dictionary daily or multiple times per day. Conversely, 20 participants responded that they used a print Chinese/English dictionary either "occasionally" or "never." Such findings not only indicate that students preferred the digital option but also show that students use this type of tool very often.

      We also inquired about use of spell check software, grammar check software, word prediction software, and text-to-speech software. Figure 2 illustrates responses for each of the latter categories. Almost half of the respondents indicated they used spell check software and word prediction software daily or multiple times per day. Eleven participants responded that they never use grammar check software, while 10 never use word prediction software. A noticeable finding was the infrequent use of text-to-speech
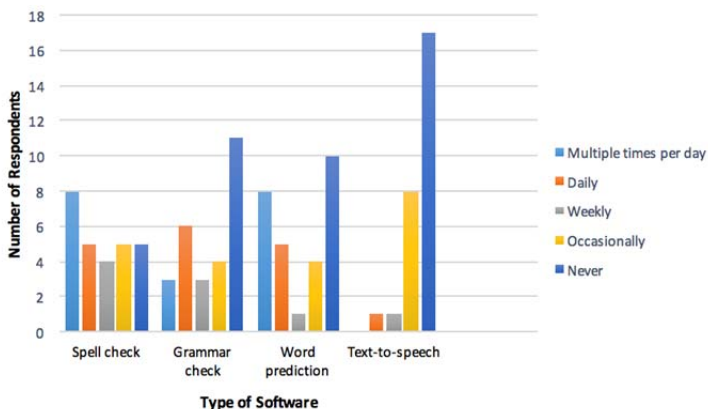

Figure 2. Responses based on use of different types of software.

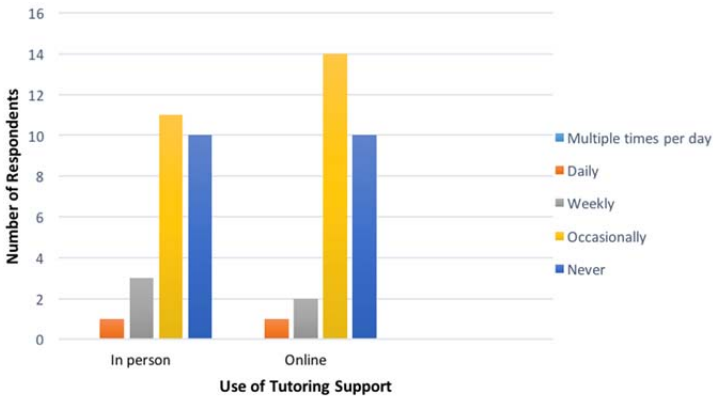software—17 participants reported they never used text-to-speech programs.

Figure 3. Responses to us of tutoring/editing support

The survey also inquired about students' use of in-person and online writing tutors/editors. Most students reported they either never used their in-person or online writing tutor/editor or they did so on an occasional basis. For in-person support, 11 students said they occasionally used a writing tutor, while 10 students claimed they never did so. Only one student said they accessed a writing tutor on a daily basis, and three indicated they did so on a weekly basis. Results corresponding to the online writing tutor are comparable; 14 students responded that they occasionally use an online tutor, and 10 claimed they never did so. Overall, both in-person and online tutor/editor support were not used very often. Web-based electronic writing assessment software was used to evaluate each sample and provided an overall score. Twenty-seven participants completed Sample 1, which was the initial pre-workshop writing sample, and also completed Sample 2, the post-workshop writing sample.

The first electronic writing assessment tool evaluated total frequency of errors in the samples and frequencies for the types of errors that were found. This assessment tool determined that the average number of errors in Sample 1 was 5.19, while the average number in Sample 2 was 4.04. This indicates that there was a decrease in the number of errors when the participants used the writing productivity software.

An analysis of the errors made revealed that few students made errors related to style or with spelling. Most errors were made in the other categories such as grammar, mechanics, and usage. For grammar, most errors involved challenges with verbs, subject–verb agreement, and fragments. For mechanics, the most commonly made error included missing commas, followed by sentence capitalization. Errors in the usage category mainly involved article errors and prepositions.

The second writing assessment tool provided an overall score as a percentage for each of the writing samples. For Sample 1, 25 of 27 respondents were given a score while only 20 received a grade for Sample 2. The mean score for the 25 respondents who received a grade on Sample 1 was 78%, while the mean for Sample 2 was 75.65%. Overall, the post-workshop writing samples were scored slightly lower grades than the initial pre-workshop samples.

The feedback collected during the concluding focus group comprising four participants affords a qualitative understanding of the effect of technology used to support the latter participants' writing productivity. Consistent with the survey results, one theme from the focus group was a reliance on some form of technology to help students with their writing. Students consistently noted how they used one or more technological tools such as digital dictionaries on a regular basis in addition to spell check and grammar check software.

Although the students noted the benefit of having personalized support from a face-to-face meeting with a tutor/editor and identified the motivation behind their decision to seek language support: "Where there is another person he can help me check and find the mistakes I cannot find by myself. If it is just me I can't find anything. I think I am right." They also revealed their concerns associated with in-person support.

Consistent with the survey results, several participants noted that the process of submitting assignments to a tutor/editor and then waiting to receive feedback often took up valuable time. One participant commented:

> With the language support we have to submit the paper 3 days ago. We have to give time. So if we have to submit our paper we need to give it to them so we have shorter time to write the paper.

This participant is referring to a common academic policy that requires students to submit assignments to tutor/editors several days ahead of the ultimate submission deadline so that the person reviewing the paper can have time to provide necessary feedback. Participants also discussed other factors that affected their decision to seek support, including the belief that such editorial services did not meet their needs, and they expressed some skepticism regarding the feedback they received. As one participant noted, "They don't really help us with the writing. They just check to see if we make some mistakes in the APA." Another participant expressed uncertainty regarding the service and was unsure whether the tutor's edits and suggestions were accurate.

When asked about the benefits of using the word prediction software to support their writing, the participants noted its convenience and appreciated that they could customize the software to meet their needs and

that it helped them to save time during the writing process. As one participant expressed, "Online is more convenient; if we go to tutor we have to book them or it's not very convenient to person. But online we can do it whenever we want." Participants also commented on the benefit of the speech-to-text feature, which allowed them to hear where a mistake was located. While further research is needed to pinpoint reasons for the decrease in writing assessment score, the research team has hypothesized that the decrease may result from increased reflection and metacognitive processing during the writing process. Participants in the focus group noted that they enhanced their usual writing process when using the software and paid greater attention on proofreading what they had written and reflecting on appropriate word choice. One participant stated that he/she made greater use of technology for proofreading because the feedback was immediate. The other participants agreed that spelling out a word during the drafting of a text was one of the writing productivity software's most valuable features. One participant spoke of the benefit of this specific feature: "Sometimes I forgot the word and I can see the word in the prediction box—it saves a lot of time." With only 30 minutes to complete the writing sample, more time may have been used for reflection and proofreading, thus negatively impacting the overall quantity and possibly quality of the second writing sample.

Finally, there were multiple instances during the focus group discussion when participants admitted that their lack of knowledge of how to use the software might have affected their writing. This recurring theme underscores that training may be a necessary prerequisite for working with new software and that the learning experience can be thoroughly enhanced when a tool is implemented properly. When asked for suggestions regarding the software, one participant recommended that a formal course should be offered that included tutorials on word-prediction software as opposed to mere one-on-one support. Interestingly, when discussing language support and tutors, another participant commented:

> We cannot ask them for too much. This is our study. We should do it—the job—by ourselves.

DISCUSSION

The data from this study serve to inform stakeholders working in student service areas aimed at supporting NNES student success. Specifically, the finding that participants did not necessarily avail themselves of existing language support programs was surprising because of the researchers' knowledge that this support is available to NNES students. However, this trend is consistent with the literature that notes students may not access

language support even when it is available. Combined with the findings that students frequently use technological tools to enhance their learning and perceive that there are a number of benefits of using these tools, this finding is noteworthy because it highlights an area of research that requires further attention.

The findings from this study are significant for two reasons. First, we believe the findings highlight that the software could be used most effectively as a writing and revision tool prior to students' accessing in-person services. However, such technological tools should not be implemented as a replacement for face-to-face support but rather to complement existing course-based support and in-person editorial and tutorial services. Brown (2008) notes that self-improvement strategies must be used in tandem with additional support(s) in order for language proficiency to improve. But as noted earlier, while a large body of work has considered the use of various types of language support programs, there is a dearth of studies investigating students' study skills and self-improvement.

Secondly, we posit that the findings draw attention to the importance of implementation when introducing new technology to students. The finding that the use of the writing productivity software did not have a positive effect on student writing productivity following the workshop suggests that the use of technology to support writing proficiency must be connected to coursework, so that students are given multiple opportunities to use and understand the relevant tool(s) at their disposition. In reference to the use of digital tools and their potential, Conroy (2010) asks:

> Could those students who already engage with the tools, as well as the wider population of [English as an Additional Language] university students, benefit from appropriate instruction, support and guidance in using these tools and techniques to improve their English language and academic writing? (p. 878).

Further research is therefore needed in order to understand how best to embed the use of specific technology tools into coursework so that it may have a positive impact on English language learners' writing proficiency.

LIMITATIONS

Due to the exploratory nature of the study there are a number of limitations. As a result of the sample size in the initial phase of the study, it is not possible to complete inferential statistics to explore if there were statistically significant differences between the writing samples. Additionally, the

researchers were not able to track how often the participants used the software throughout the term. It is therefore not possible to make inferences regarding how frequency of use might have impacted writing proficiency. With a small sample of 4 participants returning for the focus group, there is the possibility of self-selection bias in that these may be the students who benefitted from the software while those who did not return may not have benefitted. Consequently, the study is therefore limited in generalizability.

CONCLUSION

This study explored NNES students' use of various tools to support their learning and also the effect of a writing productivity software on students' writing proficiency. Overall, the survey indicated that technological tools are being used by NNES postsecondary students more frequently than face-to-face support services. The participant's affinity for using technological resources and the inconsistent use of in-person support reveals that combining the use of writing productivity software with access to human support may be a more effective way to support improvement in academic writing in comparison to using solely one or the other. This also supports the notion that embedded learning opportunities are needed to support the development of self-improvement strategies.

Consequently, a reconsideration of the singular dependence on providing in-person support services—particularly around language learning—is needed, especially within the context of increased financial constraints. While there is a tendency to pressure institutions to provide additional services to students, the cost of providing in-person services is high. Some have discussed the conflict between the resources institutions are allocating for language support and the ability of those working in these areas to meet the increased need for support (Brown, 2008; Cownie & Addison, 1996). With this in mind, institutions should seek to balance centralized in-person support services with embedded language support in cost-efficient ways that provide NNES with the timely, tech-enabled and personalized support they desire.

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