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LESLLA aims to support adults who are learning to read and write for the first time in their lives in a new language. We promote, on a worldwide, multidisciplinary basis, the sharing of research findings, effective pedagogical practices, and information on policy.

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Teaching LESLLA Learners How to Use Chromebooks: Challenges and Possibilities

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Abstract

This paper is an exploration of how Low-Educated Second Language and Literacy Acquisition (LESLLA) learners can make the best use of Chromebooks in an English as a Second Language (ESL) classroom and move from emergent to building users of technology. First, I argue that many of the challenges that prevent instructors from using this technology happen at the commencement of the program, and, with proper preparation, these issues can be avoided. Next, I demonstrate how on-going instruction can be scaffolded for LESLLA learners. Finally, I maintain that motivation and empowerment are experienced by the learners which makes this instruction timely and personally-relevant. To conduct this 20-week project, I used Action Research and used a variety of data: work samples, lesson plans, researcher notes, and class discussions and evaluations. This paper outlines key considerations for classroom instructors or program leaders who plan on implementing technology programs for English as a Second Language (ESL) learners with low print literacy in any language.

Key words: Low-Educated Second Language and Literacy Acquisition (LESLLA) learners, Limited or Interrupted Formal Education (LIFE) learners, Canadian Language Benchmarks-Adult Literacy Learners (CLB-ALL), Chromebooks, technology

Introduction

In the Canadian context, permanent residents and refugees are eligible to take federally-funded English as a Second Language (ESL) courses. For LESLLA learners, special classes are designed to meet their particular needs, and a curriculum document called *CLB for Adult Literacy Learners (ALL)* was created for Canadian instructors to "describe the needs and abilities of adult ESL Literacy learners, and support instructors in meeting their learning needs" (Centre for Canadian Language Benchmarks). Students interested in taking ESL classes begin by having their learning needs assessed at a testing centre and then choose among programs that best suit their particular needs. Many LESLLA students choose classes at my institution since a) there is a LESLLA stream, b) classes are part-time, and c) childcare options are available.

This project is the result of a series of fortunate events. In what I believe is an atypical fashion to most program coordinators, ours believed that new technology should go to the classes with the lowest English proficiency instead of those with the highest. And with an unexpected surplus in our program's technology budget, our coordinator purchased Chromebooks for morning, afternoon, and evening classes. Once purchased, I immediately began a search of relevant literature related to LESLLA learners and Chromebooks and found a paucity of published research. As a then doctoral candidate who was teaching part-time, I took advantage of this opportunity and conducted an action research study on how my CLB 1 class, the majority of whom were LESLLA learners, adapted to daily use of Chromebooks.

Literature Review of LESLLA learners

LESLLA learners. LESLLA learners are traditionally an understudied population (Bigelow & Vinogradov, 2011; Young-Scholten, 2013). Challenges to conducting research with this population include ethical considerations such as informed consent (Aberdeen 2015; Bigelow & Tarone, 2005; Tarone, Bigelow, & Hansen, 2009; Vinogradov, Pettitt, & Bigelow, 2013), participant mobility (Bigelow & Tarone, 2004; Juffs & Rodriguez, 2008), differences and variability among learners (Bigelow & Tarone, 2004), and achievements which are difficult to measure with normed, standardized assessments (Allemano, 2013; Juffs, 2006).

LESLLA learners and literacy

Adult language learners vary in the ESL world in many different ways (aptitude, self-regulation, strategy use, and motivation) and these variances can impact the speed and success of the language learner (Dornyei & Skehan, 2003). More recently, literacy and previous schooling are also considered important variables in the rate in which adults learn a second language. A subpopulation of ESL learners has no or limited literacy in *any* language (Bigelow & Vinogradov, 2011). An international research body (www.leslla.org) is devoted to understanding how learners with no or little formal education approach learning a second language. These learners are known by a range of different terms; however, these are the most common: literacy learners (Bell & Burnaby, 1984), emergent readers (Bigelow & Vinogradov, 2011), and Low-educated Second Language and Literacy Acquisition (LESLLA) learners (van de Craats, Kurvers, Young, Scholten, 2005).

Bigelow and Vinogradov describe the required learning conditions for emergent ESL readers, "Instruction for emergent adult/adolescent readers must fulfill two needs: Adults need contextualized, meaningful instruction that is age and level appropriate, and this instruction needs to be explicit and systematic, focusing in phonemic awareness, phonics, and word recognition" (p. 123). In other words, approaches which favor direct instruction in the mechanics of language, and not global, top-down approaches, are best suited to these learners. Furthermore, these learners require materials specifically designed for their needs, and not those designed for native-speaking children. Kurvers and Ketelaars (2010) found that LESLLA learners progressed through similar, but not exactly the same, steps as children learning to write in their first language. In particular, they noted how LESLLA learners develop a relationship between speech and writing over time, how learners develop in their ability to understand shapes and differentiate letters, how they orient their letters, and how they develop in spelling. Unlike learners with first language literacy, adult emergent readers must learn fine motor skills, visual memory skills, letter recognition, and the alphabetic principle. They must also learn that the words they say can be transcribed into a written form that has meaning for another, and reciprocally what others say can be put into written form and that the message can be deduced by them.

LESLLA learners and technology

Being able to use computers or Chromebooks requires that learners have fine motor skills, visual memory skills, and letter recognition, skills which emergent readers have not yet fully developed. Reder, Vanek, and Wrigley (2013) explain that providing digital literacy instruction for LESLLA learners at the earliest stages of literacy acquisition is challenging. They state, "Lack of literacy remains a barrier for LESLLA learners at the lowest levels and puts real limits to the possibilities for learning and interacting through technology. But for those learners who possess some print literacy, tutor facilitated models with bilingual options can open the door to a new world of digital literacy" (63-64). Studies about LESLLA learners and technology use have tended to be about the creation of specific software applications designed to meet beginner LESLLA learners' needs (Cucchiarini et al., 2015; Olshtain et al., 2015; Sokolowsky, 2015; van de Craats & Scholten, 2013) which has mostly been developed to teach literacy or spelling. Other programs have specifically examined how LESLLA learners go about using the internet or about how websites can be designed with LESLLA learners' abilities in mind (Kennedy, 2015; Reder, Vanek, & Wrigley, 2013; Vaske, 2015). While these studies which address literacy instruction through technology, software development and digital literacy are important for practical and theory-development purposes, they do not address how LESLLA learners can learn the basics of technology in tandem with emergent literacy skills so that they can move towards using the software. To my knowledge, research has not yet made it explicit to instructors how learners are supposed to be able to move forward with limited literacy and limited technology skills to LESLLA learners who can use technology independently to meet their own learning or personal needs. Yet, the ability to use technology would allow LESLLA learners to study outside of class, to find essential information regarding their daily lives (the weather, bus schedules, their children's report cards), and to communicate with family in other parts of the world.

In the document which guides instruction for LESLLA learners, *CLB for Adult Literacy Learners (ALL),* the authors list six guiding strategies for technology use with LESLLA learners. These are 1. Build on learners' strengths, 2. Model use of digital technologies, 3. Recycle and practice extensively, 4. Increase technology skills through thematic instruction, 5. Encourage experimentation and celebrate success, and 6. Expect learners' technology use to vary within literacy levels (Kayed, Dionne, Johansson, 2015, p. 25). The authors are stating

that technology instruction, much like literacy instruction for LESLLA in general, needs to be planned and practiced.

To further describe how LESLLA learners might progress in technology usage, the authors list a continuum of "familiarity with digital technologies" (p. 26-29). At the *emerging* stage of learning technology, LESLLA students are expected to name computer parts, operate a computer with assistance, use a mouse, switch a computer on and off, locate the keys on the keyboard, log into an already created account, and shut down programs. Without going into too much detail, LESLLA learners at the *building* stage learn to use a keyboard correctly, ask for help when needed, and log in and out of programs independently. LESLLA learners at the *expanding* stage are more or less able to use a computer independently, type with multiple fingers, and create personal accounts. While the terms emerging, building, and expanding are helpful in describing learners' abilities with technology, they do not describe how to move from one category to the next.

The *CLB for ALL* is structured to include three developmentally-appropriate sample reading and writing tasks in each of the four CLB Competency Areas (Interacting with others, Comprehending/Reproducing information, Getting things done, Comprehending/sharing information) so that teachers comprehend how lessons might be developed. To better understand how technology use was envisioned in the *CLB for ALL*, I created *Table 1* to highlight the sample tasks which demonstrated technology use. As the reader can see, these tasks were not designed to teach learners technology specifically, but rather were intended to teach through context. I counted 14 sample tasks which used technology from among 96 possibilities (12 reading and 12 writing tasks at levels Foundations through CLB 3L). Tasks which describe technology use or instruction are listed in *Table 1*.

Table 1

Sample tasks from the document Canadian Language Benchmarks: ESL for ALL

CLB Level	Reading	Writing
Foundation	None	None
CLB 1L	-Learners take digital photos on a field trip (p. 44)	None
CLB 2L	-Read and answer questions about an email (p. 50). * As shown in the document, learners do not have to actually use technology to complete this task. -Turn on the computer and enter a password (p. 51). -Roleplay using a self-checkout scanner (p. 51). -Find one's postal code on the Canada Post website (p. 52) -Fill in a job application form on-line (p. 52)	-Send an email message to a company which includes one's address and phone number (p. 85) -Send an email message to an employer about an absence (p.85) -Copy a text message about being absent from a sentence strip and send it (p. 85) -Fill out an employment benefits card on-line (p. 87)
CLB 3L	-Answer questions based on an e-mail (p. 57) -Read a poster about rules of working in the computer lab (p. 58) *As both of these tasks are shown in the document, learners do not have to use actual technology to complete them.	-Create a cover letter for a job (Presumably the cover letter is typed although the task does not specify that it is). (p. 94) -Create a photo story (p. 95).

As shown in *Table* 1, technology tasks are not described for learners with the lowest levels of English or literacy proficiency. Furthermore, these tasks do not demonstrate the *emerging* stage of technology use with the

possible exception of using a digital camera (CLB 1) or logging on to a computer (CLB 2). While the strategies for technology instruction and the familiarity with digital technologies continuum in the document are helpful for instructors to understand *what* processes learners might go through, they offer little guidance in *how* or *when* one should instruct LESLLA learners in using technology or in what challenges teachers and learners can reasonably expect to face. The strategies and continuum are also not specifically linked with expectations to be achieved at any particular level, thus leaving instructors the option of self-selecting which skills they wish to teach. Furthermore, teachers can avoid teaching technology skills, leaving literacy learners further behind their literate classmates.

Methodology

Participants in this study were 11 women and 1 man enrolled in an afternoon ESL CLB1 course. Two of these women had only participated in ESL courses in Canada. Nine had limited formal education, and one had completed high school. One student had cerebral palsy. Data collected throughout this 20-week study included student work and emails, lesson plans, field notes of observations, and class evaluations. These data provided examples of how learners moved from emerging to building users of technology. The convergence of these data sources, coupled with previous literature, lead to what Craig's (2009) definition of triangulation which "occurs when multiple forms of data—when analyzed—show similar results, thereby confirming the researcher's findings" (p. 121). Ethics approval was granted by the school. Students were asked to sign a consent form and then were asked throughout the process for their continuing consent (Aberdeen, 2016).

Getting ready for Chromebooks: Moving from emerging technology users to building technology users

As the *Canadian Language Benchmarks, ESL for Adult Literacy Learners (ALL)* document claims, learners at the emerging technology level need certain skills in order to advance to the next stage of technology skills. In particular, this paper examines four skills: naming the parts of the computer, keyboarding skills and password challenges, logging on and off, and locating programs. In each of these areas, I discuss challenges experienced and I make suggestions for overcoming these challenges. Classroom layout considerations and institutional constraints are also covered.

Naming the parts of the computer

 At no point throughout this project did I provide direct instruction in naming the parts of the computer. All words were used repeatedly in context and the learners were able to follow instruction. As expected, learners improved over time. When a particular learner could not follow, another student usually came to his or her aid. However, Elsie Johnson, (personal communication, October 28, 2014) a colleague who taught Foundations level, created a slide presentation linking concepts previously known to her learners such as pencil and paper, letters and mail, and books and matched them with technology-concepts such as Microsoft Word, Gmail, and the internet. She pointed out similarities such as home address, email address, and telephone numbers as ways for others to make contact. She reported that learners found this presentation useful. She also used screenshots to demonstrate to learners where they needed to look at the screen on their own Chromebooks. It is also important to note that when the task is approached in this manner, parallels can be drawn with the sample task for Reading Foundations Level: Sample Task II-Comprehending Instructions-Study:

> Use a photo representing an instructional verb to carry out a classroom action (e.g., locate an image of scissors on a worksheet to understand that something needs to be cut on the page). (p. 37).

Keyboarding skills and password challenges

A noticeable difference between a Chromebook and a more traditional QWERTY keyboard is that keys on the Chromebook are lowercase. For many LESLLA learners, keyboarding is a challenge for that very reason, they struggle to match upper- and lower-case letters. To clarify, one types a capital "A" on the keyboard, and a small

letter "a" appears on the screen. Furthermore, to get the computer to produce a capital letter "A" as it appears on the keyboard, the learner has to type two keys simultaneously, a task which requires 1) knowing which two keys to punch, and 2) coordinating them to be punched at the same time. Yet, being able to correctly type a password is a first step to using technology independently.

As described above, letter knowledge is essential in early keyboard use. One major on-going challenge for learners was for learners to be able to distinguish, not only between upper- and lower-case letters, but also from a range of confounding symbols. Easily confused symbols are shown in the *Table 2*. Keyboarding appears to require more visual discrimination, but less fine motor control than pencil and paper tasks. In my class, I had one student with cerebral palsy and with practice, she was able to type faster than she could write by hand although she had frequent errors.

Future research is needed to determine whether upper case (typical QWERTY keyboards) or lower case (Chromebook-style) keyboards are more appropriate for LESLLA learners, especially at the earliest stages of literacy acquisition. While I believe that the lower-case keyboard is ultimately better for LESLLA learners, further empirical research will test this assumption and illuminate this issue.

Table 2
Frequently confused letters and symbols on a Chromebook keyboard

i	!	1	L	I	|	J	j	/
o	O	0	D	P	Q			
g	9	Q	p	a	8	y	s	
f	t	L	1	J				
r	n	H	v	y	u			
,	.	"	'	:	:			

Learners at the earliest stages of literacy need to learn how to recognize the letters of the alphabet, match upper and lower case, discriminate shapes, and distinguish between what is the same and what is different (Kayed, Dionne, & Johansson, 2015, p. 34). Keyboarding, as shown with Table 2, seems to require these same skills that emergent readers are in the process of acquiring. In terms of writing skills; however, LESLLA learners at the earliest stages of writing development learn how to form letters, place them on the lines, and develop spelling skills (Kurvers & Ketelaars, 2010). By using a keyboard in place of pencil, two of these writing challenges are eliminated. While literacy learners do not have to form letters or put them on a line, they still must select the appropriate letter. Further research is needed to see if typing, which seems to require more visual discrimination skills, or handwriting, which seems to require more fine-motor control, ultimately leads to better reading and writing outcomes.

Creating accounts, logging on and logging off

At the start of this project, it was the intention that each student would create a personal email account. In order to make this happen, I had a one-to-four teacher-student ratio. Each student created an account according to the following formula school'snameyearstudent'sname@gmail.com. As a password, I required that students use their country of origin and the year of immigration. With assistance in the computer lab, we were able to create the accounts. Two students went ahead and typed in passwords independently. The students and I only learned that the country names were misspelled when we returned to class and attempted to reenter the passwords into their Chromebook. Every variation of misspelling was attempted; none was successful. In the end, both students had to create new accounts which ruined the formulaic pattern.

Google required a telephone or email for authentication. When the other instructors and I came across these prompts, we began using our personal cell phone numbers. It was through experience that we learned that one can only enter a cell phone number a limited amount of times before Google rejects it. We later began to enter other students' numbers. In our scurry to create accounts, we never thought to document which cell numbers we connected with which accounts. This became especially problematic when learners entered passwords incorrectly too many times and needed to enter a phone number to receive a verification code. Because of these errors, we also had to create new accounts for several learners.

Chromebooks are ideal for school usage since they can be prepared for multiple users. Each student was assigned a specific, numbered Chromebook. Since the Chromebooks were shared, each class also chose a symbol to represent it. My class selected the "coffee cup" icon. This meant that if the learner had the correctly numbered Chromebook and selected the coffee cup icon, then he/she could enter the correct password, and log on. Although this happened less with experience, learners would select the wrong Chromebook and attempt to enter their password only to find they would not work. As a result of this very real-world task, some learners became aware of the importance of selecting an identical object according to a number, returning an object in the correct place according to the same number, and verifying someone else had not made a mistake. This error happened less frequently when learners removed the coffee cup symbol and added personal photos. Still, we had one learner refuse to take a photo, stating that her husband did not approve. In fact, I learned how to add learner photos to the Gmail accounts on the Chromebooks from a fellow Foundations instructor, Santosh Kushal, who did this with her students after she learned an unfortunate lesson: just because a learner cannot enter his or her password independently does not mean that he or she cannot manage to delete someone else's account.

In addition to verification codes, logging onto accounts provided learners with two major obstacles. First, learners needed to enter passwords which involved multiple steps including memorizing their passwords (in this case their country's name + year of arrival); and being able to type it into the Chromebook without looking. Even though the learners had some technology experience using a computer lab, none of them had experience logging onto a computer before. Challenges arose when entering passwords since letters typed are replaced by dots. As a result, learners could not match a password written on a slip of paper with what appeared on screen. The only solution I found to this was asking students to type their password repeatedly in a word document until they could do so without looking. Over time, all learners improved with the exception of my student with cerebral palsy. Her coping strategy was to ask a friend to enter her password for her and she completed the rest of the tasks on her own.

The second major obstacle encountered with logging onto accounts stemmed from CAPTCHAs (Completely Automated Public Turing test to tell Computers and Humans Apart). CAPTCHAs are words or numbers that are obscured by the computer which the user must reenter correctly. By their very nature, CAPTCHAs are designed to be confusing. For LESLLA learners who struggle to differentiate between letters, numbers, and symbols on the keyboard, reading CAPTCHAs is an impossibility. These seemed to occur indiscriminately. I never asked learners to try to guess what they were. As learners got more proficient with using the Chromebooks, I had more time to type these in for students.

Creating an account with step-by-step assistance is considered a building technology skill. I attempted to do this with my class at the beginning of the project when learners were still at the emerging technology stage. While I was ultimately successful, I would not recommend creating personal accounts for each student without a great deal of support, and most likely would not recommend at all. To accomplish this, I first used a computer lab and projector, and had a one-to-four teacher-student ratio. Even with this ratio, creating accounts for an entire class was complex. Much later the school adopted the Google Apps for Education system in which the teacher could control accounts and passwords. Under the new Google Apps system, literacy learners still benefitted from an email account that used their names, and they created a meaningful password. If the students forgot their password or made too many mistakes, the instructor had the power to reset it. Other challenges such as entering phone numbers and recreating accounts when passwords were forgotten were avoided under the Google Apps for Education system.

Locating programs

A beneficial tool in teaching emergent readers to use Chromebooks was the use of a digital projector. Our program had one attached to a notebook computer. Since their screens did not match mine, learners had difficulty following. Eventually, our program coordinator was able to locate an adapter so that we could connect the Chromebook to the projector. Once they could match, they learned to follow instructions very quickly. Learners quickly had to learn the symbols for the programs since Gmail, Google docs, Google Slides, and other programs were often located in slightly different positions depending on who used the Chromebook last. These tasks of locating programs are similar to the following task presented for Reading-Pre-benchmark B- II. Comprehending instructions:

Use a photo representing an instructional verb to carry out a classroom action (e.g. locates an image of scissors on a worksheet to understand that something needs to be cut on that page). (p. 37)

Classroom layout and institutional constraints

The Chromebooks were stored in a large locked cabinet designed for charging the machines. To keep the machines safe, we placed the cabinet along the wall farthest from the heaters. Unfortunately, the outlet was located quite a distance from the actual cabinet. This was not an issue until one day the Chromebooks were all uncharged. Someone had unplugged the cabinet to charge their cell phone. Needless to say, that particular day's lesson plans needed to be rapidly changed. A similar event occurred when a student unplugged the school's router to charge his cell phone and disrupted the internet for the entire building. After this incident the router was relocated.

While it is possible that any language learner at any level could have unplugged the power source, taken someone else's computer by mistake, deleted someone else's account or forgot his/her cell phone number, these types of mistakes seem more frequent in the LESLLA class.

Another issue that was frequently experienced was directly related to the building's bandwidth. Since our building is older, we were limited in what internet services we could receive. With two class sets of Chromebooks, a school lab, and multiple employees, bandwidth was often stretched beyond capacity, resulting in a quick change of lesson plans. These issues highlight that 1. LESLLA technology instructors need to be armed with a back-up plan for a worst-case scenario when it comes to technology instruction, and 2. technological considerations should be made before embarking on a project.

Over time students began to find and sign on to their own Chromebook without assistance. Their typing improved when they began to associate the red squiggly lines with errors. They learned that the exact symbol would prevent the line from occurring. Rather than first coming to me to help them locate errors, the learners began to first ask each other.

Observing learner motivation and empowerment: Noticing daily usage of technology in LESLLA learners' lives

One day in class, as a result of a brief discussion about the word "step-sister," we began to discuss the story of Cinderella. Since the class had already taken a diversion from my scheduled lesson plan, I decided to take advantage of the opportunity and have the students copy/type the story of Cinderella. As I kept writing, the students kept copying. Finally, I insisted that they take a break and I left the room. When I returned 15 minutes later, I was surprised to find that my students had opened their web browser, found YouTube, and were watching the cartoon. These were the very same students who, only two months ago, struggled to type in their computer passwords.

Over the course of the instruction in Chromebooks, I became aware of both the technology that learners used in their daily lives as well as the technology that they wished to be able to use. Students in my class mentioned that they communicated with their families through technology, often citing Viber and WhatsApp. One student informed me that she chose her particular brand of telephone because it would support a Tigrinya-English dictionary while another phone would not. She was disappointed to learn that the school would not permit her to use the school's wi-fi due to limited bandwidth. Upon sharing my phone number, students began

to text me when they were going to be late or absent. In fact, my very first text from a student read only the word "EMERGENCY" all in capital letters. The next day in class I learned that she had taken her daughter to the doctor and copied the word from a sign above the door at the Medicenter (a form of drop-in clinic). Another student who was a vegetarian texted me a picture of a "sacrificial" sheep made out of cauliflower for Eid. Many expressed a desire to use Facebook.

Conclusions

This study chronicles my experiences which have shaped my view of technology instruction. First, adjustments and simplifications can be made at the emerging stages of language instruction which normally prevent instructors from embracing technology in their classrooms later on. Some of these issues were related to literacy learners such as remembering passwords and phone numbers, reading CAPTCHAs, and deciphering a new keyboard. However, these issues could have been avoided or minimized with proper planning and preparation. Outlets that are used for powering technology could be marked, Google Apps for Education could be used, and PowerPoint presentations could be prepared to highlight where to find programs and keys on a keyboard.

Second, teachers can scaffold instruction so that learners are still meeting the requirements of the Canadian Language Benchmarks. With practice, the learners were able to type all of their classwork and store it online. For many, typing became less taxing than printing which requires finer hand-eye coordination.

And third, learners report that they find this instruction motivating, empowering, and tied to their personal needs. The learners knew what they wanted to achieve with technology beyond social media. They informed me that their children's teachers sent them emails and that they needed technology to access report cards which now only appeared on-line. They wanted to apply for jobs, many of which required on-line applications. They said they needed to create résumés and cover letters. They needed to be able to access telephone numbers and addresses.

My findings were similar to Vaske (2015) who found, "Lower educated adults are often already active on mobile platforms and social media. They use Facebook, Skype, WhatsApp; they text, and they play games" (p. 350). I would argue that these examples demonstrate Reder's (2015) conceptualization of adult literacy practices as "busy intersections," and they are as great of an indicator of program success as any test score. To paraphrase Reder, these examples show how literacy has been brought to the people, how what has been learned in class has served as a resource, and how learners increased in literacy engagement as a result of the program.

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