Towards a Writing Analytics Framework for Adult English Language Learners

Amna Liaqat[1]
aliaqat@cs.toronto.edu

Cosmin Munteanu[1,2]
cosmin.munteanu@utoronto.ca

[1]University of Toronto, TAGlab [2]University of Toronto Mississauga, ICCIT
Toronto, ON, Canada

ABSTRACT

Improving the written literacy of newcomers to English-speaking countries can lead to better education, employment, or social integration opportunities. However, this remains a challenge in traditional classrooms where providing frequent, timely, and personalized feedback is not always possible. Analytics can scaffold the writing development of English Language Learners (ELLs) by providing such feedback. To design these analytics, we conducted a field study analyzing essay samples from immigrant adult ELLs (a group often overlooked in writing analytics research) and identifying their epistemic beliefs and learning motivations. We identified common themes across individual learner differences and patterns of errors in the writing samples. The study revealed strong associations between epistemic writing beliefs and learning strategies. The results are used to develop guidelines for designing writing analytics for adult ELLs, and to propose ideas for analytics that scaffold writing development for this group.

CCS CONCEPTS

• Applied computing →Education →Computer-assisted instruction

KEYWORDS

Learning Analytics, Writing, Adult Learners, Immigrant

ACM Reference Format:

A. Liaqat and C. Munteanu. 2018. Towards a Writing Analytics Framework for Adult English Language Learners.. In *LAK'18: International Conference on Learning Analytics and Knowledge, March 7–9, 2018, Sydney, NSW, Australia. ACM, New York, NY, USA,* 5 pages. https://doi.org/10.1145/3170358.3170422

1 INTRODUCTION

Of the approximately 272,000 immigrants to Canada in 2015, 62% had intentions to find work. For 91% of all immigrants, English was not their native language, with 23% reporting no English language ability. In total, over 20% of the current population was born outside of Canada [1]. Recognizing the importance of language in adapting to a new country, the government of Canada offers free English Language classes, called LINC, to new immigrants [2]. These classes may last several weeks to a few months, and are offered full or part time.

Effective written communication is an essential, but often underdeveloped, skill for success in school and in the workplace. Resource constraints in traditional classrooms, such as LINC, limit the amount of one-on-one, individualized attention teachers can provide to students. However, improving written literacy, especially for adult non-native immigrants can lead to better employment, education, or social opportunities [5]. While this has been thoroughly investigated for countries such as Canada which see a very large annual influx of immigrants, it is reasonable that improving written literacy for adult English Language Learners (ELLs) is beneficial in other socio-economic settings as well.

Improving written literacy, or Learning to Write (LTW), is one aspect of writing analytics, a subfield of learning analytics that aims to facilitate the writing process. A key objective of writing analytics is to provide formative feedback that scaffolds learners towards meaningful revisions to their writing. Previous work has analyzed writing rhetoric, errors, and feedback to design analytics to scaffold learners towards meaningful revisions [7, 13, 15].

Generally, LTW analytics studies have focused on post-secondary learners writing within an academic context. Both ELLs and older adults outside of the university setting have received comparatively little attention. Relative to young, native English speakers, much less is understood about what motivates mature ELLs to improve their written literacy, the challenges they face in learning to write, and how the design of writing analytic tools can reflect their unique needs.

This paper takes the initial steps towards identifying the motivations, beliefs, and challenges of mature ELLs who are improving their written English. First, the related work surveys writing analytics studies and discusses theoretical perspectives of learning to write for ELLs. These two bodies of research are synthesized to identify gaps that must be bridged to effectively design writing analytics for mature ELLs.

Secondly, we present our ongoing work to address this gap. Motivation and learning beliefs are measured from a field study with 15 adult ELLs to identify the goals these learners set and the processes they use to achieve them. Next, writing samples are analyzed to identify common errors and challenges. From this

LAK'18, March 7-9, 2018, Sydney, NSW, Australia

ACM ISBN 978-1-4503-6400-3/18/03 $15.00
https://doi.org/10.1145/3170358.3170422

analysis, we draw two characteristics that occur across learner profiles and discuss their implications for writing analytic design: (1) low confidence may inhibit learning strategies, and (2) learners may experience external pressure to learn quickly. Next, we establish three overarching themes as the initial step for developing a writing analytics framework to scaffold adult ELLs towards identifying their errors and improving writing literacy: (1) conceptualize, (2) structure, and (3) details.

2 RELATED WORK

In recent years, there has been increasing interest in writing analytics that can provide real-time, formative feedback to learners. [7, 13] developed a framework for mapping rhetorical moves in reflective writing, and built a system that can provide feedback on rhetorical quality to students as they write. [6] built a similar platform for argumentative writing, first developing a conceptual framework for identifying types of moves in argumentative writing before implementing the system. [12] also developed a writing feedback system, but their system was designed for high school students. Design requirement for their system were gathered through interviews with both teachers and students.

Assessing writing is a broad and complex activity, and the criteria for quality writing are highly context and genre dependent. Most of the writing analytic systems thus far have been designed to assess writing in academic contexts with native speakers. Comparatively little attention has been given to ELLs, especially adult ELLs who are no longer in school. Adults ELLs face different challenges than the study populations of previous writing analytics research. [14] reports that the strategies, rhetoric and linguistics of ELL writing differs from native speakers. For instance, ELLs tend to plan less before they write and produce structurally simpler writing [4]. ELLs also make use of different rhetorical devices. A common rhetorical error made by ELLs is when they attempt to translate a phrase from their native language into English [3]. These exclusive features of ELL writing are not well represented in current writing analytic frameworks.

Writing analytics frameworks that have been developed may not be extendable to ELL writing, and so intelligent tutoring systems based on these frameworks may not adequately support ELL writing development. Additionally, the motivations of adult ELLs for improving their written literacy likely differs from younger students, which should be reflected in the design of writing analytics. This study moves towards the development of a framework that encompasses the unique challenges faced by adult ELLs learning to write. The first step in informing design for this framework is to understand the beliefs, motivations and learning strategies of adult ELLs [14], as these constructs can shape an individual's learning style.

An integrated model between epistemic beliefs, goal orientations and learning strategies was proposed by [9]. Epistemic beliefs are beliefs an individual holds about the nature of knowing. Recent research supports the idea that epistemic beliefs are domain-specific [9]. This study builds on previous theoretical work by examining the domain-specific, epistemic writing beliefs of adult ELLs, as well as their motivations and learning strategies to gain a more cohesive understanding of ELL demographics. This link between epistemic beliefs and other constructs has not yet been well-explored for ELLs. The resulting analysis, as well as an exploration of writing samples, are used to initiate the development of a framework for informing writing analytic design for adults ELLs.

3 METHOD

To better understand the epistemic beliefs and learning motivations of ELLs, as well as to collect data informing the development of analytic tools, we have designed and conducted a field study with 15 mature ELLs who are recent immigrants to Canada. The field study consisted of an essay writing session complemented by questionnaires and interview. We discuss here the participant selection, the design of the study, the instruments used, and the data collection procedure.

3.1 Participants

Participants in this study were recruited from the Language Instruction for Newcomers to Canada (LINC) program. LINC is a government funded program offering free English Language classes to recent immigrants [2].

All students must be assessed by the LINC program before being placed in a class. Assessment is done on a standardized scale, divided into three stages. At the time of the study, all participants were enrolled in a stage two LINC class. According to the benchmarks manual, learners at this intermediate stage can create "moderately complex written communication in moderately demanding contexts of language use" [2]. A researcher visited LINC classes to invite students to participate in the study. Steps were taken to ensure that participants did not feel compelled to join the study. The researcher was not affiliated with LINC. Cash compensation of $50 CAD and travel expenses were offered to participants. Both the researcher and the program coordinators facilitating recruitment made it clear that participation was completely voluntary and not a component of their LINC class.

15 ELLs (11 female) participated in the study. Participant ages ranged from 31-59 (mean = 40.1, *SD* = 9.2). Two of the participants immigrated under protected status (e.g. refugees), while the rest were either sponsored or skilled immigrants, which is the predominant class of immigrants to Canada. Other Demographic information for participants is summarized in Figure 1.

3.2 Instruments

Data was collected through questionnaires assessing the participants' learning motivations and their epistemic beliefs, as well as in the form of feedback and objective essay scores based on the IELTS testing rubric.

3.2.1 MSLQ. The Motivated Strategies for Learning Questionnaire (MSLQ) is an instrument for gauging learners' motivational orientations and learning strategies [10]. Learners

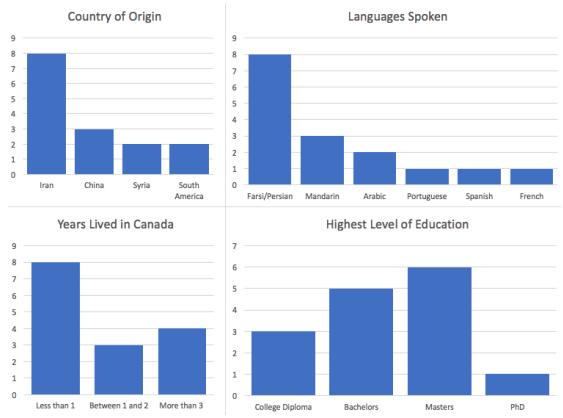

Figure 1: Participant Demographics

self-report on a Likert scale from 1 ("not at all true of me") to 7 ("very true of me"). There are two major scales: motivation scales and learning strategies scales, each with multiple sub-components. The motivation scale contains three components: value beliefs (achievement goals and task value), expectancy (self-efficacy and control of learning beliefs), and affect (test anxiety). The learning strategies scale measures three strategies: cognitive, meta-cognitive and resource management. The test anxiety subscale was adapted as participants were not tested in their ELL classes. The modified scale switched references to tests with writing assignments, and is referred to as the writing anxiety subscale in this paper.

3.2.2 Epistemic Writing Beliefs Questionnaire. To examine the epistemic beliefs participants held about learning to write, the epistemic writing beliefs questionnaire (EWBQ), was administered [8]. This instrument was selected as it focuses heavily on higher-order writing features such as organization and thesis development and less on sentence-level skills such as grammar. There are 26 items, each scored on a Likert scale from 1 ("no confidence") to 7 ("completely confident"). The questionnaire comprises three scales: writing behavior, writing tasks, and writing skills. The writing behavior scale measures a learner's approach to writing, such as "I give up on written assignments before completing them." The writing tasks scale measures the confidence a learner has in their ability to communicate via writing. Items consists of tasks such as "Write a summary of a long essay that effectively captures the essence of it." The third scale, writing skills, includes items measuring confidence in the technical aspects of writing, such as "Write with concise, clear sentences that ''flow'' together." [8].

3.2.3 ILETS Grading Rubric. The IELTS rubric was selected based on recommendations from ESL instructors as being one of the most fine-grained, standardized rubric for assessing ESL writing. This rubric was selected over ones used purely in academic settings as it better assesses a wider range of both academic and non-academic quality indicators. Essays were graded on a scale from 0-9 along four dimensions: task achievement, coherence and cohesion, lexical resource, and grammar. Essay grading and feedback was performed by a hired ELL instructor with expertise in teaching and grading essays written by adult immigrant ELLs.

3.3 Data

In a two-hour session, each participant completed a demographic questionnaire that asked questions about participant background, motivation for taking English language classes, employment status and career goals. Participants also completed the 84-item MSLQ and the Epistemic writing beliefs questionnaire.

Participants wrote two essays each based on argumentative prompts. The prompts can be seen in Table 1. Blank paper and pens were also provided for note-taking. Only two participants used the paper provided. In both cases, participants wrote down a few words in their native language with the English translation next to it, which they had looked up on their phones.

Table 1: Essay prompts

Prompt
Some people spend their entire lives in one place. Others move a number of times throughout their lives, looking for a better job, house, community or even climate. Which do you prefer? Staying in one place or moving in search of another place?
We are becoming increasingly dependent on computers. They are used in businesses, hospitals, crime detection and even to fly planes. Is this dependence on computers a good thing or should we be more suspicious of their benefits?

4 RESULTS

4.1 Demographic

All participants were either unemployed or employed part-time and for almost all (93%), getting a job or returning to school was the main motivator for taking LINC classes. All participants had completed at least some post-secondary before moving to Canada. Five had either a master's degree or a PhD. This sample is a reflection of the Canadian skilled immigration program, which favours highly-educated immigrants.

4.2 Scales

Participant responses to the epistemic writing behaviors (α = .88), skills (α = .96) and tasks (α = .99) scales were highly reliable. The average scores per scale item are shown in Table 2.

Table 2: EWBQ scale averages

Scale	Mean	SD
Writing behaviors	5.0	1.7
Writing skills	4.5	1.6
Writing tasks	4.9	1.3

Participant responses to the MSLQ were highly reliable (α = .88). The average scores per scale item are shown in Table 3.

Table 3: MSLQ scale averages

Scale	Subscale	Mean	SD
Motivation scales	Intrinsic goal orientation	6.0	0.6
	Extrinsic goal orientation	5.4	1.7
	Task value	6.0	0.8
	Control of learning beliefs	5.5	1.2
	Self-efficacy for learning and performance	5.8	0.7
	Writing anxiety	4.8	1.5
Learning Strategy Scales	Rehearsal	5.1	1.2
	Elaboration	5.5	0.9
	Organization	5.5	1.0
	Critical thinking	5.5	1.0
	Metacognitive self-regulation	5.3	1.2
	Time and study environment management	5.4	1.1
	Effort regulation	5.6	1.3
	Help seeking	5.1	1.4
	Peer learning	5.5	0.9

4.3 Correlations

Pearson's correlation was calculated between the EWBQ scales and the MSLQ major scales. Results are shown in Table 4.

Table 4: Correlation between EWBQ and MSLQ scales

		MSLQ Scales		
		Motivation	Learning Strategies	Total
EWBQ Scales	Behaviors	.28	.68**	.58*
	Skills	.42	.61*	.58*
	Tasks	.42	.55*	.54*
	Total	.42	.70**	.65*

* denotes significance at the .05 level (2-tailed)

** denotes significance at the .01 level (2-tailed)

Additionally, Pearson's correlation was run between the MSLQ subscales and EWBQ scales. Significance ($p < .01$) was found between the EWBQ behaviors scale and the MSLQ writing anxiety subscale ($r = -.8$). Within the MSLQ subscales, significant correlations ($p < .01$) existed between writing anxiety and time and study environment management ($r = .73$). Also, there was moderate negative correlation ($p < .05$) between extrinsic goal orientation and epistemic writing tasks (-.53) and skills (-.58).

4.4 Essay grading and feedback

The breakdown of essays scores across the four grading criteria is summarized in Table 5. An overview of the most common mistakes made across each dimension of the IELTS rubric is provided below:

Task response: All but one essay received some variant of the comment "Addresses the task only partially". Participants struggled with conceptualizing the task requirements, and so most essays did not adequately meet all aspects of the prompt.

Cohesion and coherence: Most of the essays had structural problems. One common feedback was the "lack of progression". Ideas were underdeveloped and lacked supporting details. Many essays also incorrectly used cohesive devices. For instance: "But in compare between good things and bad things from computer, I have to say that it is good device and I love it."

Lexical resource: Generally, essays contained inaccuracies in collocations and expressions that impede meaning. The errors suggest that learners are attempting to convey complex ideas, but are unable to construct the appropriate sentence structure. For instance: "We can sleep less hours that our grandparents slept, we spend hours and hours in front of the scream…"

Grammar: Common grammatical errors included run-on sentences, limited range of structures, and complex, unclear sentences. At least one of these issues occurred in almost every essay.

Table 5. Essay average scores

Topic	Mean	SD
Task Response	5.0	1.1
Cohesion	5.1	0.9
Vocabulary	5.4	1.2
Grammar	5.0	1.1
Total	5.1	1.0

5 ANALYSIS AND DISCUSSION

5.1 Scales

On average, participants report high MSLQ and EWBQ scores. The two highest items are the intrinsic goal orientation and task value MSLQ subscales, suggesting participants have strong interest in mastering course material, even if they find it challenging, and that they believe the material is important for them to learn.

Scores on all three epistemic writing beliefs were strongly correlated with the MSLQ learning strategies, suggesting that learners confident in their ability to write essays are likelier to seek ways to improve their writing, such as through help seeking. Conversely, low epistemic beliefs may inhibit learning strategies, and so, writing development. Helping learners revise their epistemic beliefs may improve learning. This is supported by the strong association between writing anxiety and the EWBQ behavior scales. Participants who experience lower anxiety when writing felt more confident in their ability to persevere with challenging writing tasks. There was also strong association between the writing anxiety and the time and study environment management subscales, implying that more confident learners are those with regular study schedules.

Extrinsic goal orientation was negatively associated with the writing tasks and skills scales. One explanation is that learners who experience greater self-doubt when writing tend to be less concerned about the grade they will receive. This may be because many of the participants are under the pressure of needing to learn these skills to improve their employability, which would also help explain the high average task value score. So, unlike in

an academic context, numerical grades that do not offer suggestions for improvement may not be as meaningful to adult ELLs. Formative feedback that helps quicken writing development may be more valuable to adult ELLs than numerical scores.

From this analysis, we present two ideas to consider in the design of feedback systems: (1) adult immigrant ELLs have high intrinsic motivation, which may be prompted by a need to quickly acquire and apply the skills, and (2) learners' epistemic writing beliefs may shape the cognitive, metacognitive and rehearsal strategies used when learning to write, such as help-seeking behaviour, which may ultimately impact writing development and performance. The strong association between the two survey instruments suggests that understanding learners' epistemic beliefs could help design analytics that scaffold them towards their writing goals. Analytics frameworks can incorporate these findings to better design writing support tools for these learners. For instance, learners with low epistemic beliefs may require greater prompting to seek feedback on their writing.

5.2 Essays

The feedback provided by the instructor revealed patterns of errors learners made in each of the four rubric dimensions. Based on the feedback, we propose three types of support that can scaffold ELLs through a writing task.

Support one: Conceptualize. The first challenge participants faced was interpreting task requirements. One strategy for addressing this issue is pre-writing, an essential first step in the writing process for idea development [11]. It seems that participants were not familiar with pre-writing, as the majority did not use the provided paper for note-taking. Writing a multiple paragraph essay without an outline can lead to incomplete, off-topic responses and exacerbate structural issues. So, a support tool should ensure that learners understand the task requirements. This can be done by asking leading questions that prompt learners to explicitly define the task as a pre-writing activity.

Support two: Structure. Many essays struggled with framing coherent arguments. The lack of high-level structure, such as paragraphs, suggests that not all learners are familiar with the essay format. Support tools can help by providing templates that learners can select and build from. On a more localized level, structural issues with sentences was also common, and similar templates could be provided as well.

Support three: Details. Many essays did not provide an adequate level of detail. Feedback mechanisms could prompt learners to develop their points as they write by suggesting sentence starters for different types of details, such as example, elaboration, or counterargument.

6 CONCLUSIONS

This paper presented ongoing work to develop a writing analytics framework for adult ELLs. Individual differences were measured through the MSLQ and EWBQ, which suggested unique ELL characteristics, such as low value placed on summative assessment. More research is needed to examine this.

Adult ELLs face unique challenges that native speakers do not. For instance, writing support tools where the design has been informed only by native speakers may assume certain prior knowledge. However, this field study revealed that even though writing by ELLs may be strong in certain aspects, it could be lacking in core essentials, such as structure. To address this variability of skill level, three overarching themes that encompass distinct skill categories were developed. These are a first step towards more fine-grained analysis of ELL writing challenges, which will lead to the development of a framework for scaffolding the writing development of adult ELLs.

ACKNOWLEDGEMENTS

This work was supported by AGE-WELL NCE Inc., a member of the Government of Canada's Networks of Centres of Excellence program.

REFERENCES

[1] Annual Report to Parliament on Immigration,2015: 2016. https://www.canada.ca/en/immigration-refugees-citizenship/corporate/publications-manuals/annual-report-parliament-immigration-2015.html#fn. Accessed: 2018-01-13.

[2] ARCHIVED – Backgrounder — Language Instruction for Newcomers to Canada (LINC) Program: 2013. https://www.canada.ca/en/immigration-refugees-citizenship/news/archives/backgrounders-2013/language-instruction-newcomers-canada-linc-program.html. Accessed: 2018-01-13.

[3] U. Connor. 1996. Contrastive Rhetoric: Cross-Cultural Aspects of Second-Language Writing. Cambridge University Press, New York, NY.

[4] S.A. Crossley and D.S. McNamara. 2009. Computational Assessment of Lexical Differences in L1 and L2 Writing. Journal of Second Language Writing. 18, 2 (Jun. 2009), 119–135. DOI:https://doi.org/10.1016/j.jslw.2009.02.002.

[5] T.M. Derwing, E. Waugh. 2012. Language skills and the social integration of Canada's adult immigrants. Institute for Research on Public Policy.

[6] N. Elouazizi, G. Birol, E. Jandciu, G. Öberg, A. Welsh, A. Han, and A. Campbell. 2017. Automated Analysis of Aspects of Written Argumentation. Proceedings of the Seventh International Learning Analytics & Knowledge Conference (New York, NY, USA, 2017), 606–607.

[7] A. Gibson, A. Aitken, A. Sándor, S.B. Shum, C. Tsingos-Lucas, and S. Knight. 2017. Reflective Writing Analytics for Actionable Feedback. Proceedings of the Seventh International Learning Analytics & Knowledge Conference (New York, NY, USA, 2017), 153–162.

[8] E. Jones. 2008. Predicting performance in first-semester college basic writers: Revisiting the role of self-beliefs. Contemporary Educational Psychology. 33, 2 (Apr. 2008), 209–238. DOI:https://doi.org/10.1016/j.cedpsych.2006.11.001.

[9] K.R. Muis, L.D. Bendixen, and F.C. Haerle. 2006. Domain-Generality and Domain-Specificity in Personal Epistemology Research: Philosophical and Empirical Reflections in the Development of a Theoretical Framework. Educational Psychology Review. 18, 1 (Mar. 2006), 3–54.

[10] P.R. Pintrich, et al. 1991. A Manual for the Use of the Motivated Strategies for Learning Questionnaire (MSLQ).

[11] D.G. Rohman. 1965. Pre-Writing the Stage of Discovery in the Writing Process. College Composition and Communication. 16, 2 (1965), 106–112.

[12] R.D. Roscoe and D.S. McNamara. 2013. Writing pal: Feasibility of an intelligent writing strategy tutor in the high school classroom. Journal of Educational Psychology. 105, 4 (2013), 1010–1025.

[13] S.B. Shum, A. Sándor, R. Goldsmith, X. Wang, R. Bass, and M. McWilliams. 2016. Reflecting on Reflective Writing Analytics: Assessment Challenges and Iterative Evaluation of a Prototype Tool. Proceedings of the Sixth International Conference on Learning Analytics & Knowledge (New York, NY, USA, 2016), 213–222.

[14] T. Silva. 1993. Toward an Understanding of the Distinct Nature of L2 Writing: The ESL Research and Its Implications. TESOL Quarterly. 27, 4 (Dec. 1993), 657–677.

[15] T.D. Ullmann. 2017. Reflective Writing Analytics - Empirically Determined Keywords of Written Reflection. LAK '17 Proceedings of the Seventh International Learning Analytics & Knowledge Conference (New York, USA, Mar. 2017), 163–167.