Recommendations for the inclusion of mathematics education in language instruction for newcomers to Canada (LINC)

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Abstract

This paper draws on literature that examines the underpinnings of language and math education in Canada as well as on the author's own professional observations and reflections as an adult English-as-a-Second-Language (ESL) educator in Toronto, Ontario in order to advocate for the inclusion of mathematics education in the LINC program. It evaluates the program's conceptualizations of citizenship and existing mathematical subject matter, stressing their shortcomings, in order to make content and pedagogical recommendations for a more holistic learning experience. The original submission was in part of the author's final project for CTL5062: Mathematics Education for Citizenship submitted to Professor Alexandre Cavalcante, Department of Curriculum, Teaching and Learning at OISE.

Introduction

Moving to a new country comes with many challenges. Fitting in with the norms of a different culture, securing gainful employment, and finding a place to live are just some of the tasks that newcomers may face after arrival. Yet, the ability to check off these obligatory boxes on the long list of To-Dos is compounded when these individuals must first master the language of the country they settle in. To help mitigate this major obstacle, the federal government of Canada offers LINC (Language Instruction for Newcomers to Canada) classes in the English-speaking provinces for permanent residents or Convention Refugees, individuals who cannot return to their home country due to the fear of persecution as a result of their "race, religion, nationality, membership in a particular social group or political opinion" (Ontario Council

of Agencies Serving Immigrants, 2022). However, LINC is much more than just about learning a language. Rather, it aims to mold a certain type of newcomer into an employable and financially self-sufficient citizen (Haque, 2017). Given this, not only does the subject matter of the LINC program need to be expanded, but its teachers should also be more adequately prepared to ensure that students are successful in achieving the goals outlined by this hidden curriculum. I argue that this can be done through the inclusion of mathematics education in the LINC program.

Contextualizing adult ESL education in Canada

In order to understand the need for math education in LINC, we must first be aware of the historical underpinnings of language training in Canada, in which policy goals bounced between societal integration and employability. Prior to LINC, there were several programs that were established respectively alongside Canada's immigration policies. At their onset, in concurrence with the Citizenship Act of 1947, the goal of teaching language to newcomers was to replace their first language with one of Canada's official languages: English or French using a curriculum entitled Citizenship Instruction and Language Textbooks (Ciccarelli, 1997; James & Burnaby, 2003; in Guo, 2015). These early programs emphasized that newcomers can only become citizens successfully if they abandon their mother tongues.

Nevertheless, as the needs of Canada's workforce shifted, so did the focus of language courses. As Canada asserted its identity as a multicultural nation, the Immigration Act of 1976 welcomed newcomers on a points-based system consisting of three categories: (1) family reunification, (2) humanitarian concerns, and (3) those who could promote "Canada's economic, social, demographic and cultural goals" (Haque, 2017, p. 99). To account for these changes, the Canadian Job Strategies (CJS) program was developed in 1978 to help new immigrants with limited linguistic proficiency find employment (Guo, 2015). However, it was short-lived because newcomers with lower education levels and women were underrepresented (Haque & Cray, 2007). The CJS' exclusion of certain demographics suggested that only some types of employment were worthy of language instruction, namely highly-skilled jobs done by men. Accordingly, it was replaced by the Settlement Language Training Program (SLTP) in 1986, expanding its eligibility to also include women by offering transportation and daycare services (Guo, 2015).

Ultimately, the Language Instruction for Newcomers to Canada (LINC) replaced all of these programs in 1992. In line with the 1991–1995 Immigration Plan, the chief goal of LINC was integration, which was defined as basic language competency and the learning of Canadian values through real-life English (Haque, 2017). In order to ensure these aims, the LINC program follows The Canadian Language Benchmarks (CLB), a standardized set of competencies measured on a 12-point scale, for each linguistic skill (listening, reading, speaking, writing) (Haque, 2017). In 2001, the policy definition of integration was expanded to include

the achievement of financial self-sufficiency "as soon as possible" (Haque 2017, p. 103). By attributing an economic goal to language learning, the LINC program implicitly defines who is worthy of language instruction or not. It values newcomers who are able to learn enough English to support themselves and their families, believing that they will become successful citizens.

However, it is also worth noting that until 2007, the LINC program was only funded up to CLB 4 in most of the country, with the exception of Ontario at CLB 5 (Haque, 2017). Coincidingly, a level 4 is the minimum required English proficiency level that a permanent resident must achieve before being eligible to apply for citizenship (Immigration, Refugees and Citizenship Canada, 2021). As citizens are not eligible for funded language training, it is assumed that acquiring this level of English is adequate enough to meet the aspect of economic self-sufficiency.

Contextualizing math education

Just as the language programs in Canada have changed to reflect the needs of society, so has math education. From the early 1800s to the 1970s, mathematics in Canada shifted from being acquired rotely in preparation for university to preparing students for the workforce (Kilpatrick, 2014). However, it was still used as a gatekeeping tool in that mathematics education still prioritized "aspects of British-Canadian citizenship" such as arithmetic that valued business in order to counteract "too many immigrants" from "undesirable places" (Kilpatrick, 2014, p. 330).

Nowadays, learning math is largely viewed as being both a necessity for 21st century life and as a tool for employability. Indeed, countries around the world have spotlighted "'higher-order thinking skills' as the most important common goal" in math education, but this priority is largely upheld in order "to increase economic and political competitiveness" (Wong, 2004, in Cai & Howson, 2014). In this way, math has become a subject to navigate successfully through a globalized world. Content including "relevant, real-life examples that help connect math to everyday life, such as developing infographics, creating a budget, e-transfers and learning to code", and tools for "students [to] develop confidence, cope with challenges and think critically" have appeared in the 2020 Ontario elementary math Curriculum along with elements of financial literacy component, which has shifted from a "basic understanding of money and coins" to "understanding the value and use of money over time, how to manage financial well-being and the value of budgeting" (King's Printer for Ontario, 2021). Through this curricular change, the Ministry of Education stresses that there is a need for more financial literate citizens, who can not only understand what money is worth at the present time, but who can also communicate how fluctuations in value at a societal and personal level affect their lives.

Scope of problem

As both the policy documents outlining the LINC and Ontario mathematics curricula stress similar underlying goals of integration and employability, there is no doubt that math should also be included in adult language education programs. Given that the students of both courses of study are being prepared for the workforce, adult immigrants should be given more than just language training in order to be fully equipped for life as a Canadian citizen.

Unquestionably, omitting mathematics for adult newcomers is problematic. As mathematical literacy lies on a continuum of proficiency, grown-ups may have difficulties with some features of math (Kerka, 1995 in Ciancone, 1996). To exemplify, an immigrant from Vietnam may excel in mental arithmetic from running a street stall in their hometown, but they may be unfamiliar with the algebraic or trigonometric calculations that a professional civil engineer from Syria has been doing professionally for years. What's more, this discrepancy in skills can be further confounded when the mathematics that they learned is expressed differently in Canada. For example, individuals hailing from non-English speaking countries may express numerals with a decimal comma (i.e., 1000,75) instead of a decimal point (i.e., 1,000.75), a phenomenon I have seen both in my ESL classroom and growing up at home with immigrant parents and grandparents. Likewise, there are Canadian nuances such as weighing ourselves in kilograms using the Metric system, but weighing our produce in pounds via the Imperial system. These elements of math are taken-for-granted everyday phenomena by those who grow up in Canada but for a newcomer, they can cause grave mistakes when paying for goods/services, writing cheques for rent, or completing other banking transactions.

Notwithstanding these issues, the one mathematical concept explicitly mentioned in the LINC program is Financial Literacy. In 2013, the Toronto Catholic District School Board (TCDSB) published a three-volume set of classroom resources for teaching English for Financial Literacy in LINC. In these documents, goals are outlined under the headings: Earning, Spending, Borrowing, Saving, Consumer Literacy; and are thematically categorized into the following: Banking & Personal Finance, Consumer Matters, Education, Employment, Housing (TCDSB, 2013). In this way, a model language learner and future citizen is one who already understands these concepts in their first language, and just needs to learn how to apply them in English in a Canadian context. On the flipside, it excludes newcomers from cultural backgrounds who have different conceptualizations of these themes. For example, students who practice the Islamic faith may not have the schemata necessary to understand compound interest, as it is forbidden in their religion. Likewise, immigrants from China may not see the value of some of the many credit card reward systems that exist in Canada because their society favours mobile payments or cash over being indebted.

Furthermore, as many of the Financial Literacy elements in LINC ignore "structural issues related to inequality, power and social justice", their inclusion can be viewed as largely neoliberal and individualistic (Cavalcante, 2021, p. 379). Although incorporating Financial Literacy ultimately aims to contribute to newcomers' financial self-sufficiency by explicitly including concepts such as budgeting, saving for their children's post-secondary education, starting a business, or buying a home (TCDSB, 2013), it makes harmful assumptions. For starters, it does not take into account the amount of money needed to accomplish these goals. Saving for children's education is not always feasible when one lives paycheque to paycheque. Moreover, becoming an entrepreneur is a risky endeavour that comes with many start-up costs. What is more, the ability to own a home, particularly in Toronto, a city in which many newcomers settle in in order to be close to a cultural community, is a pipe dream with the average cost of a house costing over a million dollars (The Canadian Magazine of Immigration, 2022).

Additionally, these shortcomings can also be seen in the Consumer Literacy section, which covers how to prevent becoming a victim of fraud and recognizing false advertising (TCDSB, 2013). While students are shown how to recognize phishing scams, the material does not acknowledge that those with low-literacy skills or the elderly are disproportionately affected. Upon teaching this lesson in my own LINC class, I had several students reveal that they had fallen for these scams, losing upwards of five thousand Canadian dollars. For a senior citizen, who already struggles to make ends meet on a small government pension, this has harmful consequences. Likewise, although the lesson about false advertising tries to quantify the cost of everyday goods in Canadian society, it does not acknowledge that some newcomers to Canada arrive with a security net of savings whereas others arrive with only the clothes on their backs as refugees.

Beyond the Financial Literacy documents, mathematical goals are also outlined alongside literacy ones in the CLB Handbook for Teachers. Understanding texts about numeracy or financial services as well as tables about payments (i.e., bills, child support, tax) appear in order to guide decision-making about investments or to follow instructions on how to solve a mathematical problem (CIC & CCLB, 2012). However, all of these aims appear in the stated outcomes for CLB 5 and up, with the majority of them falling into above CLB 8. Given current funding packages, as well as time constraints on newcomers becoming financially independent as fast as possible, the majority of students in the LINC program would not even reach these levels, and thus not be privy to this learning. Just as certain mathematical concepts were reserved for those entering higher education in the past, by only including explicit references to math as a discussion tool for higher-level learners, mathematics is still being gatekept from the masses.

Finally, it is largely up to the teacher to determine what is taught in their LINC classroom. So long as the instructor is following the guidelines set out by the CLB and the models of Portfolio-Based Assessment, it is

their choice as to which competency and theme will underscore their financial literacy and language learning outcomes (TCDSB, 2013). As many language instructors are not comfortable enough with the mathematical concepts to teach them (Ciancone, 1996), they may gloss over or ignore them entirely.

Content recommendations

First and foremost, the mathematical concepts in LINC should be expanded beyond the realms of a neoliberalist agenda. For example, including Mathematical Media Literacy would benefit newcomers' everyday life beyond just aiding them become financially self-sufficient. For instance, in the context of the COVID-19 pandemic, Heyd-Metzuyanim et al. (2021) define this concept of math as "differentiating between linear, polynomial, and exponential growth; understanding the meaning of exponents; reading bar graphs; interpreting the 'flatten the curve' graphs; and interpreting the relation of an exponent to the rate of change" (pg. 208). Newcomers who could not fully comprehend the data being presented on the news were at a triple disadvantage. Not only did they experience the collective uncertainty as the global situation unfolded day-by-day, but by also not being able to fully understand the mathematical representations or language, they experienced heightened fear and anxiety. What is more, many of my students at the onset of the pandemic had a deep mistrust for the media's presentation of COVID-related news, as they hailed from countries in which data is frequently manipulated before it is reported. By teaching students Mathematical Media Literacy in tandem with language, they would feel empowered and be more informed global citizens.

Secondly, the LINC program would also better serve students by including health numeracy in its curriculum. As health-related communication often contains numbers and/or percentages, newcomers could face certain challenges in understanding vital information (Gatobu et al., 2014). Moreover, "low numeracy and health numeracy skills are both associated with poor management of disease and difficulties accessing health care services especially in vulnerable populations" (Gatobu et al., 2014, p. 1). By making sure this demographic maintains their health, it ensures that they are able to work to meet the goal of financial independence. Moreover, it also avoids putting additional or unnecessary strain on the healthcare system.

That said, math cannot be taught as the only way for a newcomer to understand a given concept. Rather, it should be one of the many tools at their disposal. While math can certainly aid in decision-making, "the reasons behind their choice will be informed by multiple epistemologies that might or not include mathematics" (Cavalcante, 2021, p. 384). In the case of health numeracy, while understanding certain values deepens a new immigrant's understanding of a medical concern, "familiarity with the health context, judgment about risks, and other non-numeracy factors" also contribute to their overall sense of health numeracy (Gatobu et al., 2014, p. 7). For example, when presented with numerical information on hypothyroidism, such as their TSH levels or the dosage and frequency of a recommended medication, a newcomer from China may opt to

treat this condition using traditional Chinese medicine instead.

Pedagogical recommendations

In order to stimulate the best math learning possible for adult ESL students, education needs to become more holistic. Many newcomers arrive in Canada with huge aspirations for a better life, but feel "easily devalued to the demands for a low skilled labour market whose requirements are simplified to transactional skills" (Atkinson, 2014). For instance, if learners are only taught the values of coins and bills in the Financial Literacy chapter of their CLB 2 class, they may feel that their skillset lies only in their ability to be a grocery store cashier. However, math can also serve as a vehicle for communication and relational skills. It can be a tool to speak about a variety of topics, such as the price of lettuce in the supermarket or make connections to their home countries. As mathematics teaching and learning is "language and culture specific," teachers can ask students to develop mathematical ideas that reflect their upbringing (Dong, 2016, p. 537). To exemplify this, newcomers can express ratios using currency conversion by comparing their grocery bill in their home country to its Canadian counterpart. This exercise not only practices their language and math skills, but it also allows them the meaningful opportunity to share a piece of their life or culture with their teacher and peers.

In order to successfully implement any sort of content or pedagogical reform, teacher training, namely for ESL instructors, must be revamped. Cavalcante (2021) calls on changes in teacher professional development so that educators are ready to "tackle sociopolitical matters in mathematics" (p. 386). However, in order to do so, an educator must be ready to address their vulnerabilities in teaching math. In my professional experience, I have struggled to implement math in my classroom for several reasons including the diverse cultural composition of my students, the fear of instilling my own opinions coming from a place of privilege (i.e., being a White, female, Canadian citizen), but most prominently, not being a Subject-Expert beyond the English aspect of the lesson. I have felt intimidated by some of Internationally Educated Professionals, especially those who were doctors, engineers, accountants or had studied math more extensively than I had. In this way, LINC educators should have access to continuous professional development that provides them with mathematical foundations and critical reflection techniques to reduce math anxiety. As a result, better learning opportunities could be created for students.

Conclusion

Having examined the foundations of language and math education in Canada, the shortcomings of the mathematical content in LINC juxtaposed with the Ontario elementary math curriculum updates, and my own professional observations, I have highlighted that LINC's current policy goal of financial independence cannot be fully met without incorporating more math education. By adopting my content and pedagogical recommendations, a more holistic learning experience for newcomers can successfully guide their journeys towards Canadian citizenship.

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