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Enhancing pronunciation instruction for non-francophone immigrants in Quebec: a technology-assisted proposal

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Abstract

This paper has two objectives. In Part 1, we report the findings of a mixed-method study that examines the pronunciation needs of non-francophone immigrants in Quebec after they complete the Program for the Linguistic Integration of Immigrants (known as "francization"), a language learning initiative to equip non-French-speaking immigrants with essential French skills. The findings indicate a noticeable disparity between the instruction provided to learners in the program and their practical requirements in real-life situations, and a strong need by the participants to improve their pronunciation autonomously post francization. Part 2 of the study addresses the pedagogical implications of these findings, in which we address our participants' needs with a set of technology-enhanced pedagogical recommendations for blended and autonomous learning.

Keywords: *L2 French, automatic speech recognition, text-to-speech synthesis, intelligent personal assistants, L2 pronunciation.*

1. Introduction

Acquiring intelligible pronunciation in a second language (L2) can be a daunting task for many adult learners (DeKeyser, 2012). For immigrants, this challenge extends beyond the language classroom and can have a significant impact on their social, economic, and cultural integration (Simpson & Whiteside, 2015), given that intelligible pronunciation is a vital component of effective oral communication (Levis, 2020). In Quebec, the Program for the Linguistic Integration of Immigrants (PILI, also known as *francization*) strives to provide non-French-speaking immigrants with the means to acquire the language skills necessary to obtain employment or pursue education in the province (Ministère de l'Immigration, de la Francisation et de l'Intégration, 2022). Despite these efforts, the majority of French learners do not reach level 8, which is considered the threshold for linguistic autonomy (Vérificateur général du Québec, 2017).

To address the issue at hand, this project has two objectives. In Part 1, we report the findings of a mixed-method study that examines the pronunciation needs of non-francophone immigrants in Quebec. Considering the time constraints in traditional classroom settings, which often limit the attention given to pronunciation, and the necessity of continuing to learn it in real life, we aimed to identify the types of pronunciation instruction that the

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participants received during their francization and to determine their current (post-francization) pronunciation needs. We asked the following research questions:

(1) What pronunciation instructions have the adult immigrants received during the program?
(2) Are these instructions sufficient for real-life needs?
(3) Do they enable them to continue to improve the intelligibility of their pronunciation autonomously?

Based on the insights gained from our research, including the fact that the majority of Quebec immigrants rely on smartphones as their only technological device, Part 2 addresses the pedagogical needs of these students with a set of technology-enhanced pedagogical recommendations for blended and autonomous learning using smartphones. To facilitate interaction (Chapelle, 2001) and motivate learners to practice their aural and oral skills (e.g. Cardoso, 2022), these activities follow cognitive interactionist approaches to CALL (Chapelle, 2001). They harness technologies that offer learners human-machine interactions, such as text-to-speech synthesizers (following Liakin et al., 2015), automatic speech recognition (Liakin et al., 2017), and intelligent personal assistants like Amazon Alexa (Moussalli & Cardoso, 2020).

2. Method

Part 1 collected data from 68 participants (adult immigrants, French L2 learners) using a mixed-method approach that included both qualitative and quantitative data collection and analysis techniques. A customized survey was used (following insights from Celce-Murcia et al., 2010 and Pawlak, 2010). Among its 50 five-item Likert-scale questions, 26 items assessed the frequency with which Pronunciation Instruction (PI) was received during the program (from "never" to "very often"). To capture the different types of instruction, this section was divided into three subgroups: the first covers the elements of Phonetics Commonly Taught (PCT). These are classroom instructions that encompass both segmental and suprasegmental features, taking into account three general stages of phonological development by Celce-Murcia et al. (2010): (1) sound awareness (e.g. drawing attention to a particular sound); (2) perception (e.g. through listening to minimal pairs); and (3) controlled or spontaneous oral production (e.g. reading aloud). The second subgroup pertains to Corrective Feedback (CF) given by the teacher, while the third comprises a set of Techniques, Tools, and Strategies promoting Autonomy (TTSA), based on the four categories defined by Pawlak (2010): cognitive, metacognitive, social, and affective.

Regarding the participants' real-life pronunciation needs (NEEDS) and their ability to meet them on their own (AUTONOMY) after the program, ten items measured their attitudes (from "strongly disagree" to "strongly agree") in addition to four open-ended questions. Finally, semi-structured interviews were conducted with 13 randomly selected participants to gain a deeper insight into their pronunciation needs.

The internal validity of the survey was tested in an upstream pilot, after which the internal consistency of the survey items was also assessed for each construct, showing a Cronbach's alpha greater than 0.7. The Likert scale nominal values for frequency and attitude were analyzed using descriptive statistics including Means (M) and Standard Deviations (SD). Correlations between the three different types of pronunciation instruction (PCT, CF, TTSA) and the two constructs, NEEDS and AUTONOMY, were calculated to determine the extent to which the instructions meet real-life needs and support the autonomous pursuit of learning. Finally, the interview data were analyzed qualitatively following Saldaña's (2021) cyclic methods, based on the themes described above.

3. Results

To answer the first research question, survey results indicate that participants receive a variety of pronunciation instructions in the *francization.* Overall, most PI elements were used often (16/26). However, when looking at specific subgroups, as illustrated in Table 1, PCT and CF were used often (above 3/5), while TTSA was used infrequently (2.88/5). The interview data confirmed that lessons are confined to popular features of French phonology (e.g. *liaison*, *enchaînements*), with little or no reference to how learners can continue to improve their pronunciation on their own, such as through the use of technology.

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Table 1. Pronunciation instructions received during PILI by subgroups

Pronunciation Instructions (PI)	M /5	SD
Elements of Phonetics Commonly Taught (PCT)	3.29	1.03
Corrective Feedback (CF)	3.34	0.95
Techniques, Tools and Strategies for Autonomy (TTSA)	2.88	1.13

To answer our second research question, which asked whether the instructions received during *francization* were sufficient for real-life needs, survey results showed high scores for students' needs being met (NEEDS: M=3.62, SD=1.04). A positive correlation was observed between the three types of instruction and NEEDS satisfaction (Table 2). However, most students still expressed wanting to improve pronunciation (3.54, SD=1.07), regardless of the amount of instruction received.

To answer the third research question (whether instruction promotes autonomous learning), correlation analyses show that all three types of pronunciation instruction are positively correlated with AUTONOMY (Table 2). The results indicate that TTSA is the most positively correlated of the three types of instruction with NEED satisfaction and AUTONOMY.

Table 2. Correlations between pronunciation instruction (PCT, CF, TTSA) and NEEDS and AUTONOMY

	NEEDS	AUTONOMY
Elements of Phonetics Commonly Taught **(**PCT)	,452** $p < ,001$	,395** $p < ,001$
Corrective Feedback (CF)	,363** $p = ,005$	,360** $p = ,003$
Techniques, Tools and Strategies for Autonomy (TTSA)	,566** $p < ,001$	,559** $p < ,001$

**. Correlation is significant at the 0.01 level (two-tailed).

Finally, the interviews revealed a missing ingredient in the participants' learning experience. Despite survey responses suggesting they knew 'what' to do for autonomous pronunciation learning (M=4.29, SD=0.95), many did not know 'how' to do it. Survey results showing low scores for TTSA (M=2.88; Table 1) supports this evidence of a lack of strategy for autonomous pronunciation learning in the *francization*.

4. Discussion and pedagogical recommendations

Part 1 aimed to determine whether there is an alignment between the pronunciation instruction offered in the *francization* for adult immigrants and their real-life needs, including the need to continue developing their pronunciation skills independently. Despite the wide variety of instruction received, learners wish to continue their learning and improve their pronunciation outside the classroom, but they do not know how to do it. This desire echoes many studies (Derwing & Rossiter, 2002), which point to the limited opportunities for classroom interaction and personalized feedback, as well as the disparities between classroom instruction and real-life contexts (Beaulieu et al., 2021). Since learner autonomy is important for acquiring L2 pronunciation (Pawlak, 2010), TTSA should be given greater prominence, especially as it shows the strongest correlation with the constructs of NEEDS and AUTONOMY concerning the ability to continue pronunciation learning.

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In response to the needs identified (i.e. that students need strategies to pursue autonomous pronunciation learning), Part 2 presents technology-assisted pedagogical recommendations likely to provide concrete ways to achieve these needs. These recommendations leverage smartphones, a widely used device that naturally lends itself to autonomous pronunciation practice.

Pronunciation instruction, as recommended by Celce-Murcia et al. (2010) and Chapelle (2001), should promote access to input (e.g. listening), opportunities for output practice (e.g. speaking, pronouncing), and input/output interaction. To meet these objectives, we propose the use of three technologies accessible via smartphones: Text-To-Speech synthesis (TTS), Automatic Speech Recognition (ASR), and Intelligent Personal Assistants (IPA).

TTS is a technology that converts written text into spoken speech. This allows learners to develop sound awareness and perception by listening to individual words or full texts read aloud. TTS facilitates access to pronunciation models and can improve listening skills (Liakin et al., 2017). ASR, on the other hand, enables learners to practice their pronunciation and speaking skills. It provides real-time written feedback on their speech, helping them identify and improve specific pronunciation difficulties. Finally, IPAs facilitate communicative practice. Through interacting with IPAs, learners can ask questions and receive spoken responses, promoting low-stress and dynamic input/output interactions.

Teachers play a key role in implementing these recommendations in all stages of pronunciation learning (Celce-Murcia et al., 2010), from developing sound awareness (using TTS) to oral production (ASR) and communicative practice (IPA). By associating these stages with TTS and ASR (e.g. as found in Google Translate) and with the participants' smartphones' IPA, teachers can equip their students for effective autonomous learning. As illustrated in Figure 1, using these speech technologies in a sequenced manner can give learners concrete strategies to improve aspects of their pronunciation autonomously. For instance, they can listen to models (TTS), pronounce, repeat, and adjust speech (ASR), and then practice conversations (IPA). This builds proficiency in the pronunciation features from class while providing strategies for continued autonomous learning.

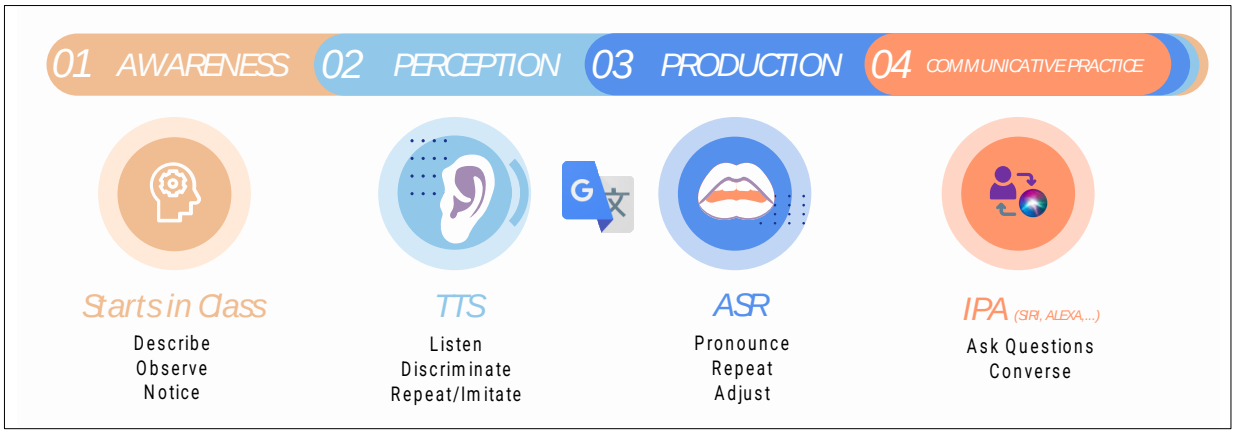

Figure 1. Pronunciation stages, smartphone affordances, and possible actions.

For example, after learning about French nasal vowels in class, students could practice aural perception through a "same or different" minimal pair activity using TTS audio. The teacher could provide minimal pair words containing nasal vowels for students to distinguish, allowing them to develop perceptual skills for the pronunciation feature covered in class, as illustrated in Figure 2.

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	Minimal pairs: nasal vowels		Same (S) or Different (D)
1.	Temps.	Thym.	
2.	Tas.	Temps.	
3.	Tant.	Temps.	
4.	Ton.	Taon.	
5.	Temps.	Taon.	
6.	Vent.	Vend.	
7.	Vin.	Vent.	
8.	Vas.	Vent.	
9.	Vont.	Vent.	
10.	Brin.	Brun.	
11.	Plan.	Plein.	
12.	Pont.	Paon.	
13.	Banc.	Ban.	
14.	Pain.	Peint.	
15.	Daim.	Dont.	

Figure 2. Same or different? Developing perception of nasal vowels with TTS.

Students could then practice producing nasal vowels by speaking to ASR and checking its output (orthography) for accuracy (e.g. if they say "vin" but the transcription reads "vent", that will serve as an indication that their pronunciation is inaccurate). Finally, they can use a set of words containing nasal vowels and engage in conversation with an IPA to practice them (e.g. words such as *temps*, *temperature*, or *boire du vin* could be elicited when discussing one's summer). This allows communicative practice in producing the target feature/s in a low-stress conversation.

Familiarizing students with these three speech technologies during *francization* holds the potential for them to develop strategies that extend beyond the classroom, empowering them to meet their real-life pronunciation needs on their own.

5. Conclusions

This study had two objectives, conceptualized as Parts 1 and 2. Part 1 reported the findings of a mixed-method study that explored the pronunciation needs of non-francophone immigrants in Quebec after *francization*. The results highlighted the need for the teaching of strategies to sustain pronunciation learning autonomously. Part 2, on the other hand, addressed the pedagogical needs of these students by proposing technology-enhanced recommendations for blended (during *francization*) and autonomous learning (after *francization*). These recommendations leverage the capabilities of three smartphone-available technologies: TTS, ASR, and IPA. However, as is the case with any research, there are some limitations to acknowledge for future research. These include a small sample size, the shortcomings of these technologies (e.g. recognition errors), and no empirical data to support the effectiveness of the proposed recommendations.

Given the widespread smartphone ownership in Canada (95% under age 50; Pew Research Center, 2022), pronunciation strategies using built-in tools hold potential, as they can increase learning efficiency and autonomy. These tools should be taught early in *francization* programs to empower learners and address critical communication needs outside class and in their future language learning endeavours.

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