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Globalization and Japanese Phonetic Education

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Pronunciation is one of the most important skills for effective oral communication and also one of the most difficult skills to master for Japanese learners. Technology these days provides rapidly expanding audio and video resources, pronunciation software and internet capabilities and can facilitate pronunciation training. This article introduces some current approaches to computer assisted pronunciation training (CAPT) used as a tool in Japanese language education as well as reviewing the ways in which CAPT for improving Japanese pronunciation can be enhanced. Some limitations of different tools have also been pointed out, offering some directions for future research.

Keywords: Educational technology; Japanese pronunciation teaching; Phonetic education; Computer-assisted pronunciation training

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1. Introduction

The onset of globalization prompted an influx of immigrants, creating demands for teaching Japanese as a second language in schools in Japan for newcomer children, who tend to be assimilated into mainstream Japanese society (Kubota, 2017). Globalization has also triggered greater diversity in language learning aims and styles, and also in language learners. According to a report by the Japan Foundation published in 2018[2], Japanese has been taught in over 142 countries to nearly four million learners and these numbers are growing rapidly every year. The learners' aims in learning Japanese are various, such as "future career" or "cultural interest". However, a lack of appropriate teaching materials and insufficient number of teachers well-qualified in both Japanese proficiency and IT literacy still make it problematic for Japanese language teaching to reach towards its goal of instituting international educational standards. According to Terao (2001), teaching Japanese as a second language in the age of globalization needs to take into consideration these three topics:

1) To produce instructors, learners and language modes while keeping in mind a global perspective.

2) To consider introducing advanced communications technology to language learning

3) That language education should be developed while keeping in mind the perspectives of cross-cultural communication. Hence, it is necessary to build new and diverse approaches for Japanese language education as a result of internationalization. The development of E-learning tools as well as the propagation of Japanese language learning tools can both play a part in promoting Japanese language education internationally.

It is also well-acknowledged that in order to communicate in any foreign language we need to develop not only the necessary level of linguistic competence but also the appropriate level of communicative competence as well (Chaika, 2008). If pronunciation is not intelligible, communication is impossible (Hinofotis & Bailey, 1980). However, pronunciation is one of the most important skills for effective oral communication and one of the most difficult skills to master for foreign language learners (Fouz-González, 2015). Lenneberg's Critical Period Hypothesis (1967) claims that learners must be exposed to L2 input before a critical age, which ends at about the age of puberty, to attain native-like language proficiency. According to this hypothesis, due to age-related decline in neural plasticity, any L2 acquisition which takes place after puberty is fundamentally different in some respects and native-like

[2] Based on the report by Japan Foundation in 2020. See more in: https://www.jetro.go.jp/ext_images/_Events/liveseminar/20200302/bdd-20200302/8.pdf.

attainment is impossible, resulting in foreign-accented speech. However, recently, according to Thomson (2011, p. 355), if adult L2 learners are able to obtain large quantities of high quality L2 input, significant gains in pronunciation may be achieved over a shorter period of time. Research has also explored the ways in which technology can enhance pronunciation training (Fouz-González, 2015). The advantages of modern technological capabilities, such as individualized practice in a private environment and immediate feedback provision and instruction, uniquely afford the possibility for learners to access the type of training that can lead to significant improvements in L2 pronunciation (Thomson, 2011; Neri, Cucchiarini, Strik, & Boves, 2002). Moreover, with the limited time available in teaching pronunciation in a classroom, computer-mediated instruction might be an ideal tool to use to expose learners to L2 sounds and thereby help them to develop their perception and production of target sounds, since it allows learners to practice comfortably and at their own pace wherever they feel at ease. Especially for learners who do not have many opportunities for L2 exposure in their own countries, it is necessary to find alternative ways of implementing pronunciation instruction to in a classroom. For English pronunciation, several CAPT systems have been developed and used successfully for teaching English pronunciation to different age groups in different countries. Many approaches have been used, such as visual simulation-based systems[4], game-based systems[5], comparative phonetics-based systems and artificial neural network-based systems[6]. Sophisticated software tools are available to teach and test English pronunciation, such as the "English Accent Coach" developed by Thomson (2012). Some tools can detect and diagnose mispronunciations in the speech of learners and then help learners to correct them, such as the ISLE project (Interactive Spoken Language Education; Menzel et al., 2000). However, such tools are available only for English learners. In contrast, while recent studies have indicated that Japanese pronunciation instruction is necessary, unfortunately,

[3] According to Agarwal & Chakraborty (2019), a visual simulation based CAPT system records the speech of a learner, analyzes it and provides feedback through explanatory images, animated pictorial characters and comparative videos.

[4] A game-based system can simulate real world conversations and teach learners to speak according to the context (Agarwal & Chakraborty, 2019).

[5] In comparative phonetics-based systems. The phonemes in the native language of a learners are compared to those in English using a stochastic analysis. The CAPT system then records the speech of the learners, detects mispronunciations and suggests ways for improvement considering their native languages (Agarwal & Chakraborty, 2019).

[6] Artificial neural networks can be used to detect and diagnose mispronunciation in a speech (Agarwal & Chakraborty, 2019).

very few studies have implemented tools to improve learners' perception and production ability with Japanese pronunciation. There is also still a lack of pronunciation teaching materials and tools that can aid effective instruction in a classroom (Toda, 2009). It is hoped that this paper will represent one small step towards developing online learning tools for Japanese learners to improve the learning of Japanese sounds. As a first step in developing Japanese language education into a globalized world, this article aims to provide a brief overview of the computer assisted pronunciation tools for teaching Japanese pronunciation which have been developed so far. This will take the form of a case analysis of Japanese phonetic education in Thailand. Some limitations of those technologies will also be discussed. Secondly, suggestions for the direction that Japanese phonetic education in Thailand can take in order to become more effective will also be addressed.

2. Trends in Computer-Assisted Pronunciation Training for Japanese

This section describes and reviews two major tools used to enhance pronunciation, and some common trends in CAPT used to teach Japanese pronunciation. The Online Japanese Accent Dictionary and the Japanese Pronunciation for Communication tool are introduced here since they were the first educational systems actively used by teachers and learners internationally in the Japanese language education community. Some limitations of the tools and suggestions for future directions will also be mentioned.

2.1 Online Japanese Accent Dictionary (OJAD)

OJAD is an online Japanese accent and intonation database for learners and teachers of Japanese; a project led by Minematsu (University of Tokyo). The goal of this tool is to enhance the awareness and understanding of the Japanese pitch accent with a suite of four features (word search, verb suffix search, text search and prosody search). The tool offers three functions; written, auditory and comprehensive diagrams of patterns of accent change. The words in the dictionary encompass over 9,000 nouns and 3,500 declinable words including verbs, i-adjectives, and na-adjectives, making it possible to search approximately 42,300 conjugations of words. Each word available as an auditory recording spoken by both a male and female Japanese speaker. OJAD has been available to use for free from 2012 and has been accessed more than 380,000 times with language support available in 16 different languages. The database includes words from textbooks, such as Minna No Nihongo and Marugoto, which are some of the main textbooks used to teach Japanese for beginners. There are functions making the site easier to use, namely; a "Filter" button and a "Search by type or word" function. Leaners can copy a paragraph from

a textbook and paste it into the tool using “韻律読み上げチュータースズキくん (Inritsuyo-miagechuutaasuzuki “Suzukikun, a tutor which teaches Japanese prosody”)”

Figure 1: The options of the “Search” feature (a screenshot from http://www.gavo.t.u-tokyo.ac.jp/ojad/, 2020)

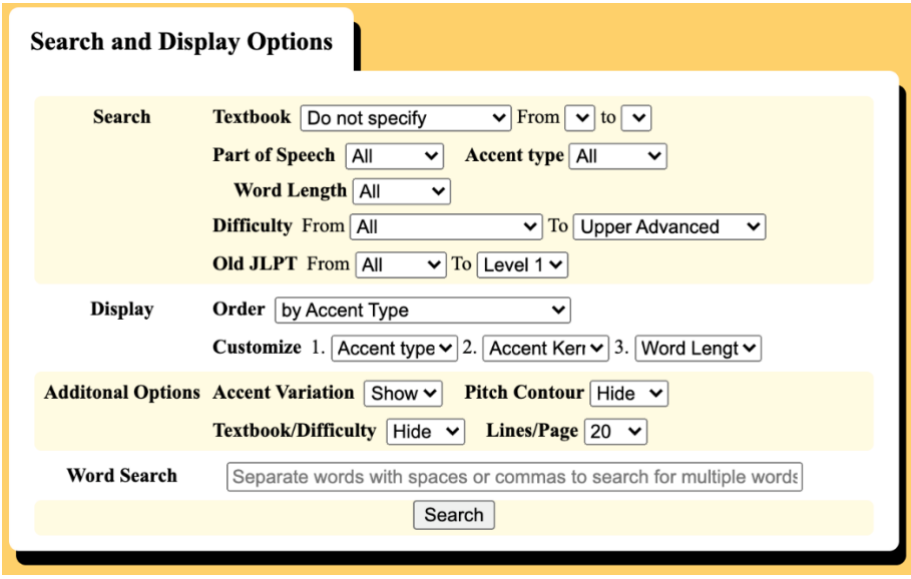
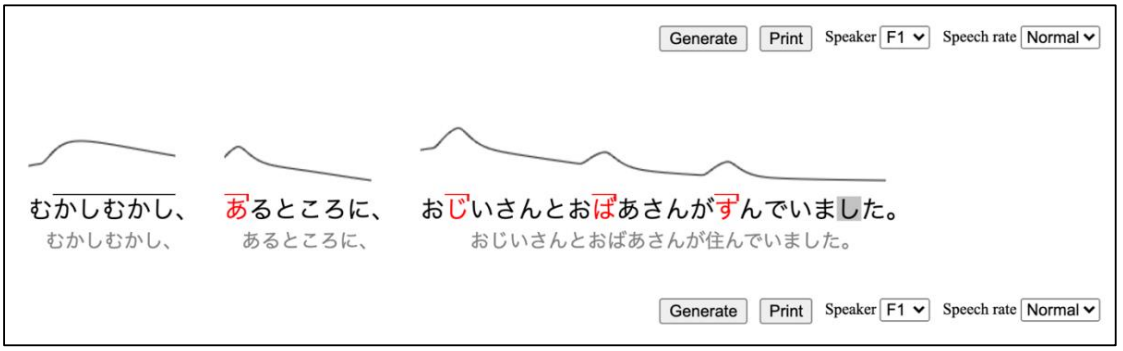


Figure 2: Accent patterns as shown in the search function (a screenshot from http://www.gavo.t.u-tokyo.ac.jp/ojad/, 2020)



Figure 3: Intonation patterns as shown in the Prosody tutor: Suzuki-kun function (a screenshot from http://www.gavo.t.u-tokyo.ac.jp/ojad/, 2020)



Unlike other tools, OJAD focuses on prosodic features. OJAD is an accessible and systematic tool which supports both visual and audio elements.

2.2 Japanese Pronunciation for Communication (JPC)

JPC[7] is MOOCs Japanese online course on edX[8]. It has been open for learners to use for free since 2016. To date, 60,803 students from 170 countries have registered for the JPC course.[9] JPC was designed by the WasedaXteam of Waseda University in Japan. The length of this online course is five weeks with three to four hours practice every week. Regarding the contents of the lecture, JPC uses everyday situations such as a "graduation ceremony", "going to a restaurant", and "getting on the train" to learn Japanese pronunciation as well as teaching users about Japanese culture. The concept of Japanese phonetic education around the world presented by JPC focuses on describing the pronunciation difficulties and learning approaches faced by specialists from various countries, such as Vietnam, Thailand, China, Korea and Japan.

[7] www.edx.org/course/japanese-pronunciation-for-communication

[8] edX is an American massive open online course provider created by Harvard and MIT. It hosts online university-level courses in a wide range of disciplines to a worldwide student body, including some courses at no charge. It also conducts research into learning based on how people use its platform.

[9] Data last updated on 3/04/2020.

Figure 4: Contents and learning procedures of JPC (Referred and translated from Toda (2017))

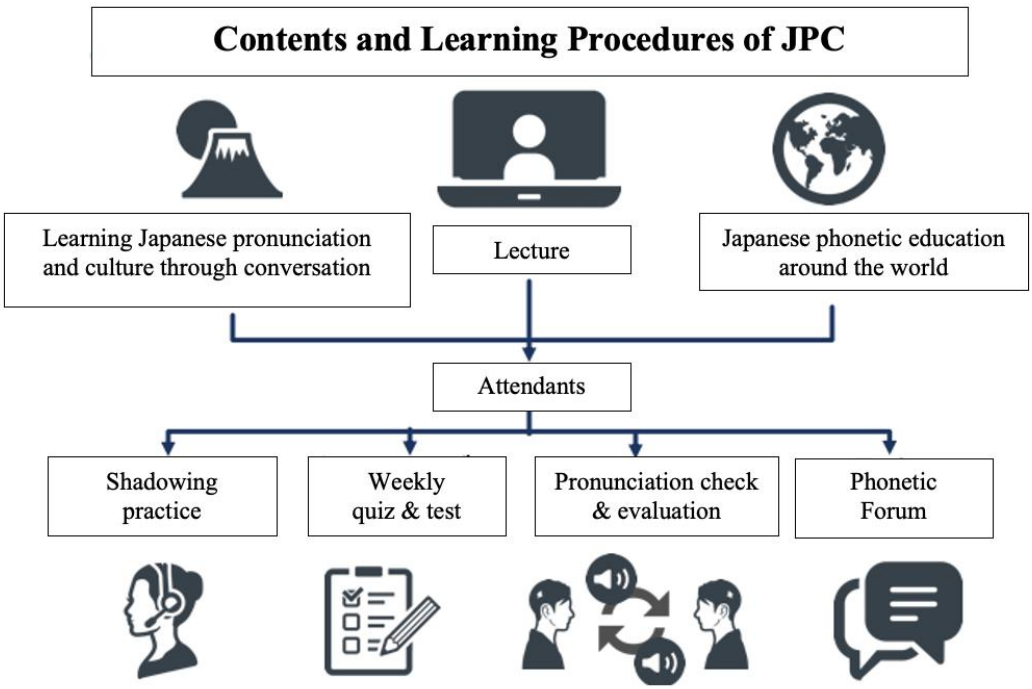
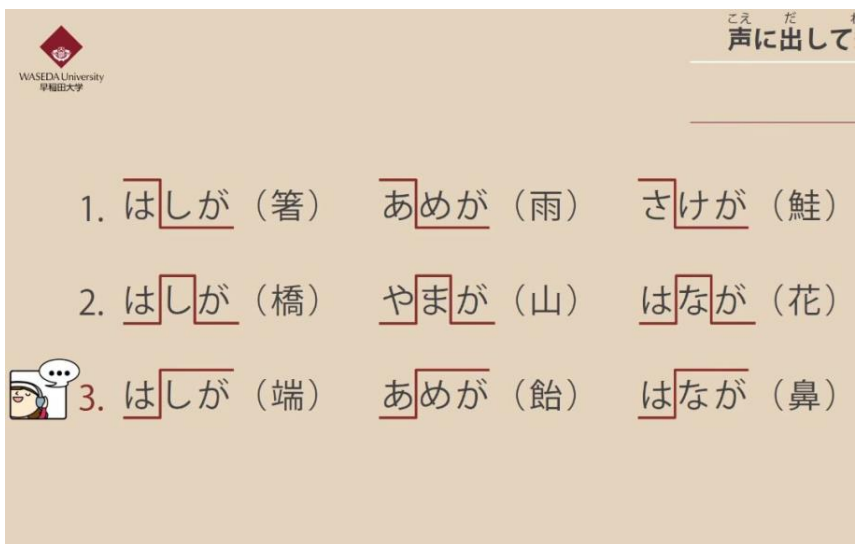


Figure 5: An illustration from pronunciation lecture on JPC.



JPC mainly uses a shadowing technique aimed at improving Japanese learners' listening comprehension skills. The software introduces the shadowing techniques and explains how to train using a silent shadowing technique[10] from both teachers' and learners' points of view. For pronunciation checks & evaluations, attendants can record their voice through the software and then submit it through Course N@vi[11]. Then, the instructor can give comments and feedback individually as well as giving grades in compliance with rubrics. Lastly, on the Phonetic Forum, attendants can share ideas and discussions on a topic given by the instructor such as "accent" and "spoken language". JPC has had positive reviews from its course attendants. The functions available through the tool allow active learning with various styles of exercises and feedback. JPC has made a good first step in emphasizing the importance of pronunciation's role in Japanese Language education, a role which has been claimed to have been neglected up until now.

It has been observed that a number of tools to teach Japanese pronunciation have been developed over the last 10 years. However, they are somewhat old-fashioned. Some use visual feedback illustrating pronunciation errors and video clips showing how to pronounce sounds correctly (Trakantalerngsak, 2019). However, no complicated functions, such as self-recording, or new learning styles, such as learning via apps such as Twitter or podcasts (Fouz-Gonzılez, 2015; 2017) have been used as tools to teach Japanese pronunciation. Apart from JPC, currently not many available tools provide detailed analysis and feedback. For English pronunciation teaching, different techniques have been used such as artificial neural network-based (Qian et al. 2012) or game-based CAPT systems. Several CAPT systems used to improve English pronunciation can compare the utterances of learners with entries in a pronunciation dictionary to detect mispronunciation (Wang et al. 2008; Qian et al. 2010). After undertaking an examination of the relevant CAPT tools dealing with Japanese pronunciation instruction, it is clear that there is still a lot that needs to be developed, since the tools mentioned above appear not to have sufficiently responded to learners' needs and do not appear to motivate learners.

[10] Wiltshier (2006) categorizes various types of shadowing as: full shadowing, slash shadowing, silent shadowing, part shadowing and part shadowing + comment. Silent shadowing is a technique that can be used to shadow people without the speaker knowing. Students can use this outside of class wherever they hear the L2.

[11] A plateform to play the videos and learn by watching and listening to lectures on their own on edX.

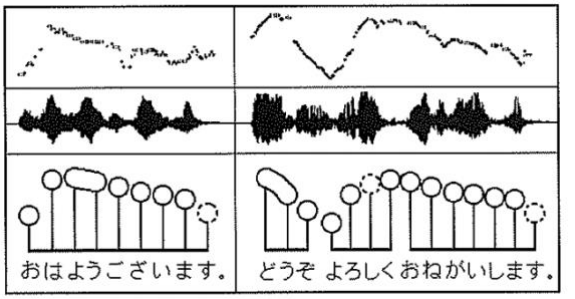
3. Japanese phonetics education in Thailand

According to the report by the Japan Foundation published in 2019, Japanese language education in Thailand still focuses mainly on accuracy not on fluency since most Japanese teachers are non-native speakers. Research into Thai learners' pronunciation of Japanese, such as contrastive analysis comparing the Japanese and Thai sound system and acoustical analysis, has not yet been extensively conducted to see what causes foreign accents among Thai learners. According to Toda (2009), the reasons why Japanese phonetic education is neglected might be because of teachers' belief in 'even though the pronunciation is inaccurate, if it does not impede communication then there is no problem' and 'within a limited amount of class time, there is not enough time to spare for pronunciation practice'. However, as the number of learners is growing each day, in order to yield a more effective oral communication communicative approach it is important to provide adequate and sufficient learning tools. This section introduces the current approaches conducted in Japanese language education in Thailand.

3.1 Practice pronunciation for 10 minutes a day (Kawano, 2009)

This article published by Kawano (2009), suggests a method for improving the pronunciation of Japanese prosody for Thai learners. It follows the approach of "Practice pronunciation for 10 minutes a day (Japanese name: 1日10分の発音練習) (Kawano et al. 2004)". The form of the practice is to show a prosody graph imitating F0 pitch indicator contours with the aim to help learners understand and correctly perceive the positions of high and low pitches in a word or sentence. The topics of the target items given in this method are divided into 6 groups; (1) a greeting; 2) an interrogative at the beginning of a sentence; 3) an interrogative in the middle of a sentence; (4) a verb sentence; (5) a specific modifier; (6) a long sentence. Moreover, Kawano suggested using a prosody graph as well as hand gestures to be used in the Japanese pronunciation classroom, since he asserted that these had proved to be effective in his own class. This article also gives some tips of how teachers and learners can make their own prosody graphs when teaching and learning Japanese intonation patterns. However, this method seems to be outdated since it focuses on an instructor, both of which are difficult to control, and thus difficult to reproduce reliably. A downside of this technique reported in this article was that teachers who tried using this technique were not confident whether they had drawn an accurate prosody graph in their teaching or not. However, the author suggested that this practice comprises another step in enhancing motivation among learners to learn Japanese pronunciation in a different way.

Figure 6: Prosody graph used in Kawano (2009) to show pitch accents for the phrases "ohayoo gozaimasu" (good morning) and "doozo yoroshiku onegaishimasu" (a phrase used to show goodwill when meeting someone).



3.2 Nihongo Speech Trainer (NST) (Trakantalerngsak, 2019)

Trakantalerngsak (2019) developed a website called "Nihongo Speech Trainer (NST)" for teaching Japanese sounds. NST is a specially designed computer website used to train Thai undergraduate students on campus. The tool focuses on consonants such as [shi], [chi], [tsu] since they are some of the main problems in pronunciation faced by Thai learners (Kawano, 2014; Sugegawa, 1993; Yamakawa, 2005). Moreover, the traditional method of "High Variability Phonetic Training (HVPT technique)", which consists of exposing learners to highly variable stimuli of a problematic sound contrast, was also used in Trakantalerngsak's NST in order to train learners to perceive the differences between the selected contrasts. This HVPT technique has been tested numerous times with positive results (e.g., Iverson, Hazan, & Banister, 2005; Thomson, 2011). For the Nihongo Speech Trainer, students were randomly presented with recordings of the target contrasts that they had chosen to practice. They were then given the opportunity for minimal pair practice and descriptions of articulatory gestures. Immediate corrective feedback was then provided through the website. A video tutorial was made available for each target contrast. These videos compared Thai and Japanese phonemes on the basis of phonological rules defined by expert linguists. It was reported that the tool caused improvements in the listening skills at the phoneme level with positive feedback from participants. Even though the system was still in its initial stages when this research was published in 2019, it highlighted some significant pedagogical implications for CAPT in Japanese phonetic education in Thailand.

Figure 7: The training sound items which were specially selected for Thai learners for the NST



Figure 8: An NST video tutorial explaining the differences between [su] and [tsu] contrasts which have been indicated as being problematic among Thai learners.



Unlike other training tools which typically utilize a single speaker to provide input for a given word or sentence, NST used the HVPT technique by using numerous speakers to train problematic sounds. This can give learners more variety in allowing learners to get used to natural speech from different speakers. Moreover, Fouz-González (2015) states that pronunciation training must be tailored to the learners' needs, addressing those aspects that are problematic for their L1 and using the technology that best satisfies their needs in order to complement classroom instruction. NST has thus taken that initial step in designing a tool to fit with Thai learners when training to perceive Japanese sounds.

3.3 Japanese Pronunciation for Communication, Thai version (Chusri, 2018)

As explained in 2.2, JPC is MOOCs Japanese online course on edX. However, this second version of JPC content was especially designed for Thai learners. This Thai version has been available to be used since 2017, with around 500 registered users (as reported in the Chusri article). Tutorial videos focus on segment and word level problems faced by Thai learners. The place of articulation for consonant sounds such as [shi], [chi], [tsu] are explained in terms of how to pronounce them accurately. On the word level, the「平板型」(heiban-gata) "Unaccented pattern" was suggested to be the most difficult for Thai learners because of the tone system in Thai. To teach Thais to learn how to pronounce and listen to Japanese accents accurately, Chusri suggested using Thai learners' knowledge of Thai tones in order to perceive the differences between high and low pitches. For example, for「くだもの」(kudamono), which has a mid-high accented pattern, the author suggested learning its accent pattern by transcribing it into the Thai script and inserting tones on the accented locations so that it would be written as "ขุด๊ะโมโหนะ" . While it maybe has its merits, it should be noted that there are no functions to provide feedback or practice for learners in this version of JPC.

4. Directions for Japanese Phonetic Education.

Table 1: A summary of the pronunciation tools for Japanese

Tools	Technique Used	Country/target learners	Key contribution
OJAD	-Visual illustrations -intonation pitch	Japanese learners around the world	- Provide a big database of words showing accents and audio based on major Japanese textbooks - Improve Japanese accent and intonation by illustrating visuals of prosodic features
JPC	-Shadowing -Lifestyle scene communication	Japanese learners around the world	- Focusing on training natural speech - Give feedback and comments by checking pronunciation online. -Apply "shadowing technique" in improving pronunciation skills.
Nihongo Speech Trainer	-HVPT method perceptual training	Thailand/Undergraduate students	- Specially designed Perceptual training for Thai learners to train problematic sounds. - Perception-based training with high-variety of stimuli and speakers.

The previous sections review the tools used in Japanese phonetic education to enhance pronunciation skills. A summary of major online tools used to improve pronunciation are summarized in Table 1. Some tools reviewed above are believed to have high potential for teaching pronunciation, but they are not yet entirely used in normal Japanese classrooms or known among teachers. It is necessary to properly introduce these tools in order to then apply these tools in teaching Japanese sounds. As suggested by Minematsu (2014), "the limited time dedicated to pronunciation and prosody in the classroom", "a frequent lack of teacher training", and "a lack of good textbooks to teach Japanese accents" are the main difficulties in teaching Japanese pronunciation. Within a limited environment to teach Japanese outside Japan, it is necessary to have a standardized tool to introduce Japanese pronunciation and to introduce more tools to learn Japanese individually. Tools should be disseminated through online platforms, especially via mobile device-based systems so that they can reach a wider audience and thereby allow students to practice autonomously on different mobile devices and receive immediate feedback. However, progress needs to be made in ways that allow CAPT to complement classroom instruction rather than replacing it.

It might be a good idea to discuss among instructors how instructional technology can be incorporated effectively into the teaching of pronunciation. Besides, collaboration between language teachers and software developers to develop CAPT tools, their wide dissemination and integration with the curriculum at school and university levels, and further investigation on mobile and collaborative CAPT systems (Agarwal & Chakraborty, 2019). As stated by Celce-Murcia et al. (2010), teachers can make use of pronunciation instruction by using things such as gadgets, props, cartoons, games, jokes, poetry and songs, since they appeal to a variety of senses and they address individual differences in learning styles. It would also be worthwhile if some applications in the future provide visual feedback concerning the phonetic properties of the learner's recorded speech and allow comparison to the phonetic properties of a native speaker model. This is especially true when teaching intonation and stress, since visual displays such as pitch contours and the relative durations and amplitude of segments tend to be most effective for teaching suprasegmentals (Anderson-Hsieh, 1994; Hardison, 2005). Future research should also aim to design more tools to use for a variety of L1 learners. Moreover, earlier research on the acquisition of Japanese by Thai learners tended to focus on the acquisition of individual vowel or consonant phonemes, and not enough research has dealt with learners' acquisition of intonation, rhythm and accents.

Summary

This article has shown that several tools employing different techniques have been developed and used successfully to teach Japanese pronunciation. The potential of different techniques has been discussed. It has also been reported that the tools reviewed in this article can enhance a learners' perception and production ability in Japanese sounds. However, some limitations of different tools have also been pointed out, offering some directions for future research. First, the tools mentioned in this paper should be introduced for classroom instruction more proactively and also for autonomous use outside the classroom. Moreover, more effort by language teachers and computer engineers is needed for the development of sophisticated, interactive and personalised systems that can address individual differences in learning styles. After a review of the potential different tools, it is hoped that the different techniques which have been used successfully in English phonetic teaching, such as visual simulation-based systems[12], game-based systems, and comparative phonetics-based systems can be applied in teaching Japanese pronunciation as well.

[12] According to Agarwal & Chakraborty (2019), a visual simulation based CAPT system records the speech of a learner, analyzes it and provides feedback through explanatory images, animated pictorial characters and comparative videos.

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