14 **Kocsis Z., & Pusztai G. A double road to success? Impact of dual education on effectiveness.** *Research in Post-Compulsory Education,* 2021, vol. 26 (2), pp. 164-188. https://doi.org/10.1080/13596748.2021.1909923.

15 **Seytalieva A., Shyndaliev N. Implementation of elements of the dual education system based on the interaction of the university and the school.** *Rroblems of Engineering and Professional Education*, 2023, vol. 68(1), pp. 36-50. https://doi.org/10.32523/2220-685X-2023-68-1-36-50.

16 **Cricelli L., Grimaldi M., & Vermicelli S. Crowdsourcing and open innovation: a systematic literature review, an integrated framework and a research agenda**. *Rev Manag Sci,* 2022, vol.16, pp. 1269-1310. https://doi.org/10.1007/s11846-021-00482-9.

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THE USE OF COMPUTER-ASSISTED PRONUNCIATION TRAINING (CAPT) TOOLS IN TEACHING CHINESE PHONETICS

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This study examines the effectiveness of Computer-Assisted Pronunciation Training (CAPT) tools in learning Chinese phonetics. The relevance of this research is due to the challenges students face when studying Chinese phonetics. Several methodologies were used to gather data, including theoretical analyses of relevant literature, empirical data collected from 33 instructors from universities and institutes in Kazakhstan, and an analysis of CAPT tools. According to the study, even though multimedia resources and technology are widely used in teaching Chinese, CAPT tools remain underutilized. Most teachers reported that tones are the most difficult aspect of Chinese phonetics for students. Nevertheless, teachers who used CAPT tools reported a positive impact on their students' pronunciation, motivation, and overall performance. A key focus of the study is increasing access to effective CAPT tools and their integration into the classroom, as well as providing targeted professional development opportunities for teachers. As a result of this study, valuable insights into how CAPT tools are used in Chinese language teaching are gained.

Key words: *second language teaching, Chinese pronunciation, phonetics, smart teaching technologies, computer-assisted pronunciation teaching.*

ҚЫТАЙ ТІЛІ ФОНЕТИКАСЫН ОҚЫТУДА КОМПЬЮТЕРЛІК ҚҰРАЛДАРДЫ (CAPT tools) ҚОЛДАНУ

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Бұл зерттеу Қытай тілі фонетикасын оқытуда компьютерлік оқыту құралдарының (CAPT tools) тиімділігін зерттейді. Бұл жұмыс студенттердің Қытай тілі фонетикасын оқу процесінде көптеген қиыншылықтар кездестіруіне байланысты өзекті болып табылады. Зерттеу әдісінде аралас тәсіл қолданылды, нақтырақ: Қазақстанның университеттері мен институттарының 33 Қытай тілі оқытушыларынан алынған сауалнамалар барысында жиналған деректерді талдау, тиісті әдебиеттерге шолу жасау және қол жетімді CAPT құралдарын талдауды қамтыды. Зерттеу нәтижелері мультимедиялық ресурстар мен технологиялар Қытай тілін оқытуда кеңінен қолданылғанымен, Capt құралдарының интеграциясы шектеулі болып қала беретінін көрсетеді. Оқытушылардың көпшілігінің айтуынша тондар оқушылар үшін Қытай тілі фонетикасының ең күрделі спект болып табылады. Дегенмен, CAPT құралдарын пайдаланған оқытушылар бұл құрылғылардың білім алушылардың айтылымдарын жақсартуға, Қытай тілін үйренуге деген мотивациясын арттыруға және жалпы оқу нәтижелеріне оң әсерін атап өтті. Зерттеу тиімді CAPT құралдарына қол жетімділікті кеңейту, сондай-ақ оқытушыларға олардың педагогикалық дағдыларын арттыру үшін мақсатты біліктілікті арттыру қажеттілігін көрсетеді. Бұл зерттеу Қытай тілін оқытуда CAPT құралдарын қолданудың қазіргі жағдайы туралы құнды ақпарат беру арқылы осы салаға өз ықпалын тигізеді.

Түйінді сөздер: *екінші шет тілін оқыту, Қытай тілінің айтылуы, фонетика, интеллектуалды оқыту технологиясы, компьютерлік айтылымды оқыту бағдарламалары.*

ИСПОЛЬЗОВАНИЕ КОМПЬЮТЕРНЫХ СРЕДСТВ (CAPT tools) В ОБУЧЕНИИ ФОНЕТИКЕ КИТАЙСКОГО ЯЗЫКА

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В данном исследовании изучается эффективность средств компьютерного обучения произношению (CAPT) в изучении фонетики китайского. Актуальность этого исследования обусловлена наличием проблем студентов при изучении фонетики китайского языка. В методологии используется смешанный подход, сочетающий теоретический анализ соответствующей литературы и эмпирических данных, собранных в ходе опросов 33 инструкторов из университетов и институтов Казахстана, а также анализ доступных инструментов CAPT. Результаты исследования показывают, что, хотя мультимедийные ресурсы и технологии широко используются при обучении китайскому языку, интеграция инструментов CAPT остается ограниченной. Большинство преподавателей сообщили, что тоны являются наиболее сложным аспектом фонетики китайского языка для учащихся. Однако те преподаватели, которые использовали инструменты CAPT, отметили положительное влияние на произношение учащихся, мотивацию и общие результаты обучения. В исследовании подчеркивается необходимость расширения доступа к эффективным инструментам CAPT и их интеграции, а также предоставления преподавателям целенаправленных возможностей для повышения квалификации, чтобы максимизировать их педагогические навыки. Это исследование вносит свой вклад в эту область, предоставляя ценную информацию о текущем состоянии использования инструментов CAPT при обучении китайскому языку.

Ключевые слова: *преподавание второго иностранного языка, китайский язык, фонетика, интеллектуальные технологии обучения, компьютерное обучение произношению.*

Introduction. Approximately 25 million people worldwide are learning Chinese as part of their education systems, according to the Chinese Ministry of Education on December 22, 2020. During the 13th Five-Year Plan (2016-2020), 40 million people took Chinese proficiency tests like HSK and YCT, demonstrating its international recognition [1].

The number of international students studying in China in 2017 topped 489,000, with an increase in Master's and PhD candidates supported by government scholarships. China is the most popular study destination in Asia, drawing students mainly from South Korea, Thailand, Kazakhstan and other countries [2]. Confucius Institutes and Classrooms have also been established in 150 countries, fostering widespread interest in Chinese culture and language [3].

The growing demand for the Chinese language reflects the importance of China in the modern world and the need to train professionals with communication skills in this language. There is a growing need for Chinese language professionals in various fields such as business, international relations, technology, and research.

"Learning a second language starts with pronunciation training, which is the first step in learning a second language. By mastering the phonetic system of a second language effectively, students will be able to engage themselves in subsequent lessons and lay the foundation for developing language and social skills. Incorrect pronunciation reveals a foreign accent and affects speech clarity [4]. Therefore, instructors and students should pay close attention to the Chinese language's phonetics when teaching Chinese to non-native speakers."

The most challenging aspect of Chinese language instruction is teaching pronunciation. It is common for students whose native language is not Chinese to mispronounce the Chinese initials, finals, tones, and other phonetic elements. Almost all students encounter this pronunciation error, regardless of their country [5].

The purpose of this research is to examine how Computer-Assisted Pronunciation Training (CAPT) tools can be used to enhance phonetics instruction in Chinese as a Second Language (CSL).

Objectives:

1. To examine the CAPT tools currently available

2. To explore Chinese language instructors' understanding, use, and perceived utility of CAPT tools in their teaching practices via a questionnaire.

3.To assess the impact of CAPT tools on students' motivation and pronunciation skills in CSL classrooms.

Materials and research methods. Several Russian and Chinese authors, including A.N. Aleksakhin, T.P. Zadoenko, I.V. Kochergin, M.K. Rumyantsev, N.A. Speshnev, M.V. Sofronov, Huang Shuin, etc., contributed greatly to the methods of teaching Chinese pronunciation. According to Han Danxing, in his textbook "Practical Phonetics of the Modern Chinese Language", "the phonetic base, which is laid at the very beginning, determines the results of language learning in many ways."[6, pp.3].

According to N.A. Speshnev, it is necessary to be able to pronounce and understand the pronunciation of everyone in order to master the skill of speaking. It is therefore important to continue practicing phonetics even after achieving certain levels of pronunciation skills. In particular, Chinese phonetic skills must be continually practiced throughout the entire study period and beyond [7, pp.4-5].

Our analysis of the most popular phonetics textbooks of the present, which aim to introduce students to the Chinese phonetic system (Speshnev, 1980; Ma & Voropaev, 2013; Aleksahin, 2015; Han', 2016), revealed that not all textbooks that include pronunciation exercises are suitable for students of the initial level. Consequently, the "Phonetic Chinese Language Course" provides exercises and texts that are sufficiently complex for students at a certain level [8, pp.22-23].

Several textbooks are devoted to the detailed study of phonetics (Wu, 2011; Li, 1995). Such textbooks, however, are too complex for students who are learning Chinese as a second language and do not fully meet their needs. Chinese, as well as a second foreign language, is taught comprehensively, not in terms of vocabulary, grammar, and phonetics. This means that the number of hours does not imply a detailed analysis of each aspect. To help improve a student's assimilation of the material, its additional processing, and even better use of auditory skills, we decided to study the methodology of teaching phonetics with computer-assisted pronunciation training tools.

Most of us use digital technologies in our everyday lives, such as smartphones, computers, televisions, and tablets. They are also frequently used in language classrooms or for self-study by many students and teachers. CALL (computer-assisted language learning) has developed extensively in recent decades. Generally, Computer-Assisted Language Learning (CALL) refers to the use of computer-based tools in language teaching and learning in EFL/L2 contexts [9, pp.7-8]. In addition to CALL, Mobile-Assisted Language Learning (MALL) has also been proven to be effective for acquiring language, writing, listening, reading, speaking and learning vocabulary through sources such as smartphones, instant messaging services and social networks [10, pp. 16]. Furthermore, Computer-Assisted Pronunciation Training (CAPT) is increasingly used to teach phonetic skills. Websites and tutorials for learning phonetics and phonology are among them, along with special programs that allow phonetic transcription, speech recognition, text-to-speech and speech-to-text systems, MALLs and mobile learning (m-learning) applications (apps) that can be used as CAPT tools in phonetic instruction [11].

Through CAPT resources, learners gain access to a wide range of multimodal materials and receive immediate, personalized feedback, creating a personalized, stress-free, self-paced learning environment.

It is one of the main advantages of digital technologies, in general, that they motivate and engage learners, particularly youngsters and those with a good level of digital literacy.

For pronunciation learning, multimodal input has consistently been proven to be beneficial, particularly in visual displays, such as spectrograms and computer animations of the lips and oral cavity in two dimensions (2D) and three dimensions (3D) [12, pp.5]. The use of visual displays has been shown to be effective not only for input but also for monitoring pronunciation output and enhancing feedback to students. According to Olson (2014), spectrograms of stop consonants help L2 Spanish learners distinguish their own production from target forms when they are displaying their own phonemes [13]. Various studies have demonstrated that visual representations can assist learners with the perception and production of intonation at the suprasegmental level [14]. Also, it has been shown that hearing and seeing speech articulations simultaneously improves both perception and production of sounds, suggesting the use of technologies that can visualize mouth and facial movements could be beneficial. These displays may be most helpful when demonstrating external articulations, such as the movements of the lips, rather than internal movements, such as those of the tongue. Using visual displays, Badin et al. (2010) demonstrated the benefits of training vowels and consonants but found a frontal view of the face was more effective than a cutaway view [15].

This research employed a mixed-methods approach. Theoretical analysis involved a review of pedagogical and methodological literature. Empirical analysis included examining existing educational materials and commercially available CAPT (Computer-Assisted Pronunciation Training) tools for Chinese pronunciation instruction. Quantitative data on instructors' opinions regarding CAPT-based phonetic instruction were gathered via a survey questionnaire. In this study various analytical methods were employed:

Analysis of scientific literature – Theoretical analysis involved a review of pedagogical and methodological literature. A review of scientific literature was conducted to explore the theoretical principles of interactive learning, the integration of digital technologies in education, and contemporary approaches to teaching Chinese phonetics.

Questionnaire and survey method – the questionnaire and survey method was used to gather empirical data from Chinese language instructors, evaluating the efficacy of CAPT tools in teaching Chinese phonetics.

Pedagogical experiment – the study employed a pedagogical experiment in which CAPT tools were used in Chinese phonetics teaching. Subsequent analysis measured their influence on students' phonetic skills.

Observation methods – observational techniques were employed to analyze instructional trends, student involvement, and phonetic learning outcomes resulting from the implementation of CAPT tools in Chinese phonetics education.

These methodological approaches enabled a comprehensive investigation into how CAPT tools influence Chinese phonetics instruction, while empirically validating their efficacy within contemporary educational frameworks.

Results and discussion. Analysis of CAPT tools for teaching Chinese pronunciation

Over the last few years, computer-assisted pronunciation training (CAPT) tools has gained increased attention. As a first step, the CAPT system can provide students with rich multimedia resources, such as audio recordings of standard language pronunciation, videos explaining pronunciation techniques, and other information that can enhance the effectiveness of their input. In addition, the intelligent CAPT system can assess a student's pronunciation as well, allowing the student to independently engage in a large number of pronunciation exercises.

As an example, we can look at the 'Great Wall Chinese' system, which uses network multimedia technologies, as well as Microsoft's Chinese AI assistant 'Learn Chinese,' for learning the language.

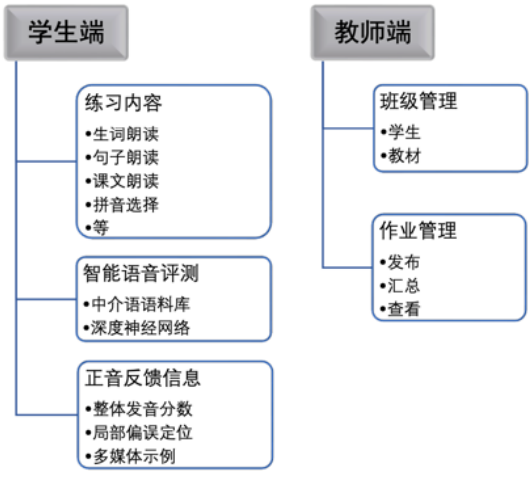
"According to the survey results, over 90% of foreign students with a bachelor's degree or higher, as well as students from Confucius Institutes, have downloaded auxiliary language learning apps to study Chinese [16, pp.11-12]. Chinese pronunciation is a challenge for most students, and most students believe that auxiliary learning software may help them with their pronunciation issues."

As we mentioned before, the phonetics of the Chinese language is one of the most difficult aspects to master, therefore it requires a lot of effort and time, besides, due to the monotony of phonetic exercises in textbooks (reading, listening, repeating sounds), it often does not arouse the interest of students and reduces their motivation. In this regard, finding ways to introduce the use of CAPT tools into the process of formation and improvement of phonetic skills remains as an urgent issue. So, our first step was to analyze the CAPT tools currently available on the market.

Here's the first CAPT tool that we want to introduce: The Erya Chinese app is designed for learning Chinese, with a focus on pronunciation.

The Erya Chinese application for intelligent learning of Chinese pronunciation was developed by the Speech Acquisition and Intelligent Technologies (SAIT) Lab at Beijing Language and Culture University. This app uses a large corpus of Chinese interlanguage speech and a Deep Neural Network (DNN) model to detect specific pronunciation errors more accurately [17]. The program can pronounce entire sentences and evaluate individual words. Additionally, it can detect errors in initial consonants, final consonants, and intonation and provide feedback on pronunciation learning by using a variety of methods, including color hints, sound comparisons, animations, text descriptions, etc.

Erya Chinese APP has two modules: Student Terminal and the Teacher Terminal. Figure 1 illustrates the main functions of each module.



Picture 1. – The Student Terminal and the Teacher Terminal

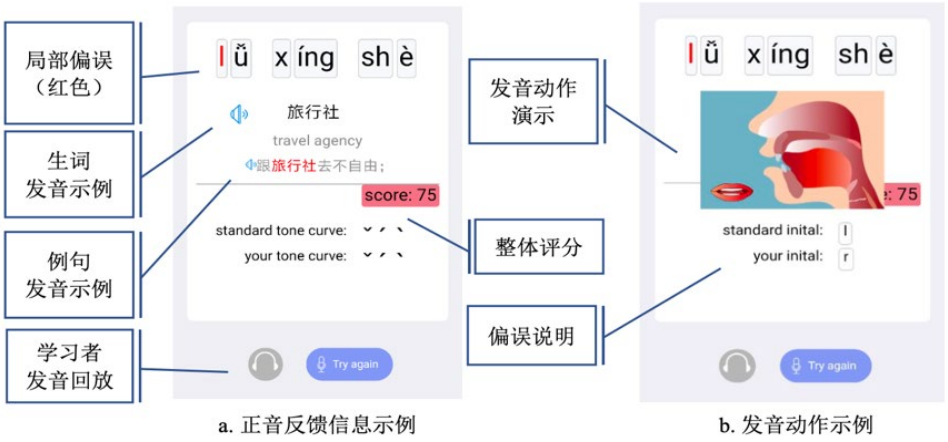
To begin with, the Student Terminal includes practical materials from the textbook Erya Chinese, which includes exercises such as reading new words, reading sentences, reading texts, and selecting pinyin (see Figures 2(a), 2(b), and 2(c). The first page of the pronunciation practice module contains the practice content and an audio sample. As students practice their pronunciation, they can refer to the text prompts and audio examples, record their practice, and then receive feedback after the app evaluates their pronunciation.

a. 生词朗读 b. 课文朗读 c. 拼音选择 d. 发布作业

Picture 2. – Exercizes

To assess students' pronunciation overall and identify local errors, the speech assessment module uses a corpus of Chinese interlanguage speech and deep neural network-based speech evaluation technology. Student pronunciation is assessed based on its acoustic similarity to the standard phonetic model. A low degree of similarity indicates an error. It identifies the sound, rhyme, and tone of each syllable in the audio content so students can practice their pronunciation and evaluate the similarity between each sound, rhyme, and tone, thereby determining whether each sound, rhyme, or tone is correct.As a result, a score will be provided for overall pronunciation.

In addition, the application provides students with feedback in the form of an "overall score + local errors" in order to help them correct their pronunciation. In Figure 3(a), the app highlights in red the pronunciation error in the initial consonant "l" of the first syllable in the word "tourist agency," which was pronounced by the student. If the student clicks on the incorrect initial consonant, he or she will receive feedback shown in Figure 3(b), explaining that "l" is mispronounced as "r."



a. 正音反馈信息示例 b. 发音动作示例

Picture 3. – Feedback

As well as providing a score for each pronunciation, the application will also provide a score for overall pronunciation. By receiving feedback on incorrect pronunciation, students can focus their practice on correcting wrong sounds, rhymes, and intonations. Figs. 3(a) and 3(b) show that the application offers multimedia instructional materials, including standard audio pronunciations, videos demonstrating pronunciation actions, and more. Listening to the words repeatedly, visually comparing them, and imitating their pronunciation can help students identify correct and incorrect words. Students can improve their pronunciation quality and master correct pronunciation by practicing self-directed and repeated exercises.

A dedicated Teacher Terminal is also included in the application for managing classroom instruction as class groups. Teachers can select instructional materials after they create a new class. At the moment, the application includes Volume 1 and Volume 2 of Erya Chinese: Comprehensive Course for Elementary Chinese, but the resources for teaching materials will be expanded as needed. Once students join the class, they will have access to the instructional materials that will allow them to practice their pronunciation. As shown in Figure 2(d), teachers can assign homework to their students via the app. When students submit

their homework, teachers can review how well they completed their assignments and listen to the audio recordings of them practicing their pronunciation.

The second tool, AllSet Learning's Chinese Pronunciation Wiki provides a practical, free, and comprehensive online resource for mastering Mandarin pronunciation, tones, and pinyin. Employing a three-level, two-track approach (pinyin and tones), it effectively guides learners through the complexities of Mandarin sounds.

The framework aligns with the European Common Framework of Reference for Languages (CEFR), starting with A1 (Beginner), roughly equivalent to HSK Level 1. This introductory level focuses on foundational elements:

A1 (Beginner/HSK 1): This level introduces pinyin, beginning with easily distinguishable sounds ("p," "m," "f," etc.) and progressing through vowels and more complex consonant combinations. A concise pinyin chart and a "quick start" guide provide a structured learning path. Tone instruction covers the four main tones and the neutral tone, accompanied by diagrams and explanations of the learning process. Additional resources for further study are provided.

A2 (Elementary/HSK 2): Building upon the A1 foundation, this level tackles more challenging sounds and introduces tone change rules (tone sandhi). The focus is on mastering difficult consonant combinations (e.g., "c-s-z," "sh-ch-zh"), specific vowel combinations, and the application of pinyin spelling rules. Each sound is thoroughly explained with pronunciation tips, audio, and video examples. The section also includes an introduction to erhua (the addition of the "er" sound to syllables), covering its rules, examples, and common usage.

B1 (Intermediate/HSK 3): This level emphasizes refining pronunciation and mastering tone pairs. Learners work on advanced consonant and vowel combinations, including those introduced in A2 but now within longer phrases to practice fluency and tone transitions. The instruction on tone pairs highlights the significance of accurate tone production in connected speech; audio and video examples accompany each tone pair. An introduction to Chinese dialects adds further depth to the learners' understanding of pronunciation variations.

	+ 1st Tone	+ 2nd Tone	+ 3rd Tone	+ 4th Tone	+ Neutral Tone
1st Tone	1-1	1-2	1-3	1-4	1-0
2nd Tone	2-1	2-2	2-3	2-4	2-0
3rd Tone	3-1	3-2	3-3*	3-4	3-0
4th Tone	4-1	4-2	4-3	4-4	4-0

Picture 4. – Tone pairs

B2 (Upper-Intermediate/HSK 4): This level, while under development at the time of writing, is designed to address nuances in pronunciation, such as discrepancies between standard dictionary pronunciations and actual native speaker usage. This includes variations in tone and other phonetic differences.

The Short Pronunciation Variant List

This list contains the most frequent examples. The ones you are most likely to have encountered already.

Word	Dictionary Says	People Pronounce It
办公室	bàngōngshì	bàngōngshǐ
出血	chūxiě, chūxuè	chūxuě
复杂	fùzá	fǔzá
角色	juésè	jiǎosè
下载	xiàzài	xiàzǎi
因为	yīnwèi	yīnwéi
照片	zhàopiàn	zhàopiān
主意	zhǔyi	zhúyi

Picture 5. – The short pronunciation variant list

The AllSet Learning Chinese Pronunciation Wiki offers a structured, progressive approach to pronunciation learning, using a combination of textual explanations, audio, and video to cater to various learning

styles. Its clear organization and comprehensive coverage make it a valuable resource for learners of all levels.

For the experimental study, a group of students learning Chinese at beginner and intermediate levels was selected. The experiment aimed to evaluate the effectiveness of using these digital tools for Chinese pronunciation training, namely the Erya Chinese app and the Chinese Pronunciation Wiki resource.

At the first stage, participants were divided into two groups:

- The control group studied using traditional methods, including textbooks, audio recordings, and classic phonetic exercises.
- The experimental group used interactive CAPT tools (such as Erya Chinese and Chinese Pronunciation Wiki) for independent and supervised pronunciation practice.

Conduct of the experiment:

1. **Diagnostic Testing:** Before the experiment began, all students took an initial pronunciation test, which involved reading individual syllables, words, and phrases in Chinese. Their performances were assessed by experts and automated speech analysis tools.
2. **Training Stage:**

- The control group continued traditional instruction twice a week for 8 weeks.
- The experimental group additionally used the Erya Chinese app for homework and self-practice. The app analyzed students' pronunciation, identified errors, and offered real-time corrections. Teachers monitored students' progress through the "Teacher Terminal" and analyzed error patterns.

3. **Midterm Assessment:** After 4 weeks, a midterm test was conducted to evaluate the progress in phonetic skills in both groups, with special attention to tone accuracy and articulation of difficult sounds.
4. **Final Testing:** At the end of the course, students underwent final testing. Their pronunciation was evaluated both by teachers and by the automated feedback tools of the apps.

Analysis of Results:

- The experimental group showed significant improvement in pronunciation quality, particularly in tone distinction and articulation of complex sounds.
- Students using interactive applications demonstrated a higher level of autonomy in correcting their mistakes thanks to immediate feedback.
- The control group showed less noticeable progress, especially among students who struggled with motivation during repetitive exercises.

Conclusion:

The use of CAPT tools such as Erya Chinese in teaching Chinese phonetics enhances pronunciation quality and increases student motivation through interactive practice and personalized feedback.

Analysis of the Chinese language instructors` questionnaire

In this study, we analyze the use of Computer-Assisted Pronunciation Training (CAPT) tools in teaching Chinese phonetics. There were 33 instructors of Chinese language from universities and institutes who participated in the experiment. Surveys were conducted in Kazakh and Russian languages, containing 23 questions. This study aims to determine how effective CAPT tools are in the educational process, how they affect the quality of the students' education, how they affect their interest in learning, and how well Chinese language instructors understand, use, and utilize the CAPT Tools. The key findings are summarized below:

1. Your workplace? A total of 33 respondents participated in the survey (Chinese language teachers), primarily from educational institutions and over 55% of respondents are from L.N.Gumilyov ENU.

2. How long have you been teaching Chinese? One-third of respondents (30%) have taught Chinese for 1-3 years, while another third (33%) have taught Chinese for more than 10 years.

3. What is your experience teaching Chinese phonetics and pronunciation? There are 27,2% of teachers who have 1-3 years of experience teaching phonetics specifically. Over six years' experience teaching phonetics is also present in the same portion of the group.

4. What role, in your opinion, does phonetics play in learning Chinese?69.6% of respondents find phonetics extremely important for learning Chinese, emphasizing its role in pronunciation and comprehension. The importance of focusing on pronunciation in Chinese language education has been validated by this study.

5-6. What methods and approaches do you use to teach phonetics? What teaching materials do you use for phonetics instruction? Teaching Methods and Materials: Multimedia resources and technology are most commonly used by respondents, with 63,6% using them. The traditional methods (repetition, etc.) are also used to some extent, but to a lesser extent by 41,9 % of the respondents. And only 27,2 % of respondents use CAPT tools in teaching phonetics. From this survey, we can see that textbooks, audio, and video materials are common practices.

7. Which aspects of phonetics, in your opinion, are most difficult for your students? – It is overwhelmingly identified that tones are the most challenging aspect (75.6% of respondents). Sounds (especially consonants) and intonation/rhythm of speech are also considered difficult. Tones consistently

emerged as the most significant challenge. This highlights the need for targeted instruction and practice in this area.

8. What help or resources do you consider necessary to improve phonetics teaching? – Increased access to online platforms and professional development opportunities for instructors (courses, workshops) are highly desired.

9. Do you use technology in the learning process? If yes, which ones? Over 76% of respondents actively use technology in their teaching, primarily utilizing online resources and multimedia materials. A significant portion uses technology, demonstrating a willingness to integrate technology into the classroom

10. Are you familiar with CAPT (computer-assisted pronunciation training tools) for teaching Chinese? – 51% of respondents are familiar with CAPT tools, but only a smaller percentage actively use them.

11. What CAPT tools have you used in your practice? Among the CAPT tools respondents use are Quizlet, trainchinese, Duolingo, and youtube channels (didn't specify).

12. What role do CAPT tools play in your teaching of Chinese?

Over 45% of respondents answered that it is important because it improves students' pronunciation in combination with traditional teaching methods.

13-15. Questions 13-15 was related to the effectiveness of CAPT tools for improving students' motivation to learn Chinese, pronunciation, and in which aspects were changes in pronunciation after using it.

According to over 70% of respondents, CAPT tools improve students' pronunciation or very positively. Improvements are primarily noted in tones and sounds. Motivation for learning phonetics is reported to increase after using CAPT tools. There was a positive impact of CAPT tools on both student motivation and pronunciation, particularly in tones and sounds, according to these questions.

16. Are there any specific aspects of pronunciation that have improved thanks to CAPT tools? – Improvements are primarily noted in tones and sounds.

17. Which functions and capabilities of CAPT tools do you consider most useful for your students? It appears that interactive feedback and practice exercises are the most useful features.

18. How would you rate the accessibility and user interface of modern CAPT tools? – Over 35% of respondents answered accessibility is good, the interface is user-friendly enough.

19. **What difficulties do you encounter when implementing CAPT tools in the learning process?** The major challenges reported are technical problems and time constraints. Student resistance and a lack of readily available suitable tools were also mentioned.

20.**Do you have any suggestions for improving existing CAPT tools?** -A greater percentage of respondents chose Adaptation to different levels: creating specialized programs for different levels of education.

21. **How important is it for you to combine CAPT tools with traditional teaching?** The responses largely favor a combined approach, suggesting both are valuable methods.

22. Do you have any examples of successful experience using CAPT tools in teaching? Yes, I have seen positive results, but the examples are not that specific or significant.

23. What recommendations could you give to your colleagues regarding the use of CAPT tools in teaching Chinese? This points to the need for teachers to adopt a multi-faceted approach and to share their experiences.

The analysis of this survey conducted among 33 Chinese language instructors provides valuable insights into the current use and perception of Computer-Assisted Pronunciation Training (CAPT) tools in the teaching of Chinese phonetics. Despite a general recognition of the importance of phonetics in Chinese language acquisition–emphasized by nearly 70% of respondents–there remains a relatively low rate of systematic use of CAPT tools in practice, with only 27.2% of instructors actively employing them.

The findings indicate that while over half of the instructors are familiar with CAPT technologies, actual integration into teaching remains limited, primarily due to technical difficulties, time constraints, and the lack of specialized resources. Nevertheless, more than 70% of the instructors who have used CAPT tools reported improvements in students' pronunciation, particularly in mastering tones and sounds, as well as an increase in students' motivation to learn.

Respondents highlighted the value of interactive feedback and practice exercises provided by CAPT tools, viewing these as key features for effective phonetic training. Furthermore, the majority of instructors advocated for a blended approach, combining CAPT tools with traditional methods to achieve optimal learning outcomes.

The role of the survey in the overall study was to assess the readiness and willingness of instructors to adopt digital technologies in phonetic teaching, to identify existing challenges, and to gather practical recommendations for the improvement and broader implementation of CAPT tools. The survey results underscore the necessity of developing more user-friendly, adaptable, and technically reliable CAPT solutions tailored to different proficiency levels. They also point to the importance of enhancing professional

development opportunities for teachers to foster more effective integration of technology into Chinese language education.

In conclusion, the survey confirmed that CAPT tools have strong potential to improve the quality of Chinese pronunciation teaching. However, further efforts are required to increase awareness, accessibility, and support for instructors in order to fully realize the benefits of digital technologies in language education.

Conclusion. Phonetics plays a crucial role in successful Chinese language acquisition, and this study sheds light on the challenges students face when learning tones. Despite the availability of multimedia resources and technology in Chinese language instruction, Computer-Assisted Pronunciation Training (CAPT) remains relatively limited. The findings, based on a survey of 33 Chinese language instructors in Kazakhstan, indicate that among those who did use CAPT tools, there were observed positive impacts on student pronunciation and motivation, particularly in improving tone accuracy. Nevertheless, broader adoption faces several challenges, including limited availability of appropriate tools, technical difficulties, and a lack of appropriate teacher training.

The study specifically examined the use of two main CAPT tools:

1. Erya Chinese App: This intelligent learning application, developed by the Speech Acquisition and Intelligent Technologies (SAIT) Lab at Beijing Language and Culture University, uses a large corpus of Chinese interlanguage speech and a deep neural assessment of student work.

2. AllSet Learning's Chinese Pronunciation Wiki: This online network model to detect pronunciation errors, providing feedback through various means such as color-coding, sound comparisons, and animations. It includes modules for both student practice and teacher resource offers a structured, progressive approach to pronunciation learning, aligning with the European Common Framework of Reference for Languages (CEFR). It uses a combination of textual explanations, audio, and video to cater to various learning styles and covers pinyin, tones, and various phonetic complexities of Mandarin.

Future research with a larger, more diverse sample is needed to confirm these findings and to fully explore how specific features and pedagogical approaches within these and other CAPT tools maximize their effectiveness in various learning contexts. Chinese language learning can be enhanced through the development and widespread use of user-friendly, effective CAPT tools, coupled with focused professional development for instructors.

REFERENCES:

1 **Ministry of Education: 70 countries incorporate Chinese into the national education system.** *Source: Ministry of Education of the People's Republic of China,* available at: https://www.chinanews.com.cn/gn/2020/12-22/9368158.shtml. (accessed 10 January 2025). (In Chinese)

2 **Growing number of foreign students choosing to study in China for a degree across multiple disciplines.** *Source: Ministry of Education of the People's Republic of China, a*vailable at: http://en.moe.gov.cn/News/Top_News/201804/t20180403_332258.html. (accessed 12 February 2025).

3 **China's education: 40 years of epic achievements.** *Source: Ministry of Education of the People's Republic of China,* available at: http://en.moe.gov.cn/news/press_releases/201812/t20181224_364525.html. (accessed 14 February 2025).

4 **Zhang L. The contributions of segmental and prosodic information to the perception of foreign accent and speech intelligibility.** *Chinese Teaching in the World*, 2015, no.2, pp. 242-249. (张林军). 音段和韵律信息对汉语外语口音感知及言语可懂度的影响. 世界汉语教学, 2015, 2, 242-249.

5 **Wang Y., Shangguan X. How Japanese learners of Chinese process the aspirated and unaspirated consonants in standard Chinese.** *Chinese Teaching in the World*, 2004, no. 3, pp. 54-66. (王韫佳, 上官雪娜. 日本学习者对汉语普通话不送气/送气辅音的加工. 世界汉语教学, 3, 54-66.).

6 **Han D. Prakticheskaya fonetika sovremennogo kitajskogo yazyka** [Practical phonetics of modern Chinese]. Saint Petersburg, Karo, 2016, 208 p. (In Russian)

7 **Speshnev N. Fonetika kitajskogo yazyka** [Phonetics of the Chinese language]. Leningrad, Izd-vo Leningradskogo universiteta, 2016, 256 p. (In Russian)

8 **He P. Chinese pronunciation course.** Beijing: Peking University press, 2008, 210 p.

9 **Hardisty D., Windeatt S. Computer-assisted language learning.** Oxford, UK, Oxford University-Press,1989, 178 p.

10 **Hou Z., Aryadoust V. A review of the methodological quality of quantitative mobile-assisted language learning research.** *System,* 2021, vol. 100, 37 p. https://doi.org/10.1016/j.system.2021.102568

11 **Gomez-Gonzalez M.A., Lago Ferreiro A. Computer-assisted pronunciation training (CAPT): an empirical evaluation of EPSS multimedia lab.** *Lang Learn Technol,* 2024, vol. 28, no.1, pp. 1-44.

12 **Grant K., Greenberg S. Speech intelligibility derived from asynchronous processing of auditory visual information.** *Paper presented at the Audio-visual Speech Processing Workshop,* 2001, 5 p.

13 **Olson D. Benefits of visual feedback on segmental production in the L2 classroom.** *Language Learning and Technology,* 2014, vol. 18, no. 3, pp. 173-192.

14 **Levis J., Pickering L. (2004) Teaching intonation in discourse using speech visualization technology.** *System*, 2004, vol. 32, iss. 4, pp. 505-524. http://dx.doi.org/10.1016/j.system.2004.09.009.

15 **Badin P., Tarabalka Y., Elisei F. et al. Can you 'read tongue movements'? Evaluation of the contribution of tongue display to speech understanding**. *Speech Communication*, 2010, vol. 52, iss. 6, pp. 493-503. https://doi.org/10.1016/j.specom.2010.03.002.

16 **Liu Y. A study of application of APP Chinese teaching software in extracurricular autonomous learning (Unpublished master's thesis)**. *Liaoning Normal University*, Dalian, China, 2018, pp.11-12. 刘洋. APP 汉语辅助教学软件在课外自主学习中的应用研究(硕士学位论文). 辽宁师范大学, 大连, 中国, 2018, 11-12.

17 **Cao W., Zhang J. The construction of a CAPL Chinese interlanguage corpus and its annotation**. *Applied Linguistics,* 2009, no. 4, pp. 122-131. 曹文, &张劲松. 面向计算机辅助正音的汉语中介语语音语料库的创制与标注. 语言文字应用, 2009, 4, 122-131.

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