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TECHNOLOGY-MEDIATED APPROACHES TO IMPROVING SEGMENTAL AND SUPRASEGMENTAL FEATURES IN L2 PRONUNCIATION

ABSTRACT

Pronunciation is a key component of language learning system. Learning a distinct sound or phoneme perfectly can provide learners with accomplished and coherent speech. This study aims to improve the pronunciation skills of EFL students through technology-based learning and various teaching method which is used over the world. This study is case study research. The quantitative and qualitative research methods have been used in this case study. The subjects were 17 students of first year group of Uzbekistan state world languages university. The techniques for collecting data were observation, rating scale, questionnaire, reporting and task. The instrument of the data collection was speaking and vocabulary performance, digital tools.

The result of this study showed that the process approach with technology-based teaching method could improve students' pronunciation learning skills of EFL students. The difficulties of EFL students in learning pronunciation have been clarified (1); the solution of the research work to solve the problem have been proved (2). In this research work, theoretical and practical data used in the implementation parts were clearly shown to inform teachers and learners how to make efficient use of diverse lexical-phonetic tools and apps available online. As the theoretical and practical data, several foreign and native research works have been selected by analyzing each research. Finally, how to provide systematic strategy training, especially the knowledge and skills needed for self-regulated learning in order to make technology-mediated pronunciation

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IKKINCHI TIL TALAFFUZIDA SEGMENTAL VA SUPRASEGMENTAL JIHATLARNI RIVOJLANTIRISHGA QARATILGAN TEXNOLOGIYAGA ASOSLANGAN YONDASHUVLAR

ANNOTATSIYA

Talaffuz til o‘rganish tizimining muhim tarkibiy qismi hisoblanadi. Alohida tovush yoki fonemani mukammal o‘zlashtirish o‘rganuvchilarga ravon va izchil nutqni shakllantirish imkonini beradi. Ushbu tadqiqotning maqsadi dunyo bo‘ylab qo‘llanilayotgan turli o‘qitish usullari va texnologiyaga asoslangan ta’lim orqali ingliz tilini xorijiy til sifatida (EFL) o‘rganayotgan talabalarning talaffuz ko‘nikmalarini rivojlantirishdan iborat. Mazkur tadqiqot keys-stadi (holat tahlili) usulida olib borildi. Tadqiqotda miqdoriy va sifat jihatidagi tadqiqot metodlaridan foydalanildi. Tadqiqot ishtirokchilari O‘zbekiston davlat jahon tillari universitetining birinchi bosqichida tahsil olayotgan 17 nafar talabadan iborat bo‘ldi. Ma’lumotlarni yig‘ish usullari sifatida kuzatish, reyting shkalasi, so‘rovnoma, hisobot va topshiriqlar qo‘llanildi. Ma’lumotlarni yig‘ish vositalari sifatida og‘zaki nutq va lug‘at boyligini baholash hamda raqamli vositalardan foydalanildi.

Tadqiqot natijalari shuni ko‘rsatdiki, jarayonga yo‘naltirilgan yondashuv texnologiyaga asoslangan o‘qitish metodlari bilan uyg‘unlashganda EFL talabalarning talaffuzni o‘rganish ko‘nikmalarini sezilarli darajada yaxshilaydi. Tadqiqot davomida EFL talabalarning talaffuzni o‘rganishdagi qiyinchiliklari aniqlandi (1) hamda ushbu muammolarni hal etish bo‘yicha taklif etilgan yechimlarning samaradorligi isbotlandi (2). Tadqiqotning amalga oshirish bosqichlarida foydalanilgan nazariy va amaliy ma’lumotlar o‘qituvchilar va o‘rganuvchilarni

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learning more effective and efficient, is discussed.

To conclude, learning every new foreign language demand learners to begin with phonetic and phonemic comprehension at first. On this case, digital technologies come to the stage to ease learning and teaching phonemic process. The appropriate technology used in the lesson made the results more achievable and effective.

Key words: technology-based, method, case study, theoretical and practical data, technology-mediated pronunciation, lexical-phonetic tools, rating scale, reporting instrument, observation method, questionnaire.

onlayn mavjud bo‘lgan turli leksik-fonetik vositalar va ilovalardan samarali foydalanish usullari bilan tanishtirish maqsadida aniq va tizimli tarzda yoritildi. Nazariy va amaliy asos sifatida bir qator xorijiy va mahalliy ilmiy tadqiqotlar tanlanib, har biri tahlil qilindi. Yakuniy qismda, ayniqsa, texnologiya vositasida talaffuzni o‘rganishni yanada samarali va natijador qilish uchun zarur bo‘lgan o‘zini o‘zi boshqarib o‘rganish (self-regulated learning) bo‘yicha bilim va ko‘nikmalarni rivojlantirishga qaratilgan tizimli strategiyalar muhokama qilinadi.

Xulosa qilib aytganda, har bir yangi xorijiy tilni o‘rganish jarayoni avvalo fonetik va fonemik idrokni shakllantirishdan boshlanishi lozim. Ushbu jarayonda raqamli texnologiyalar fonemik o‘rganish va o‘qitish jarayonlarini yengillashtirishda muhim rol o‘ynaydi. Dars jarayonida mos texnologiyalardan foydalanish ta’lim natijalarini yanada samarali va erishiladigan darajaga olib chiqdi.

Kalit so‘zlar: texnologiyaga asoslangan, metod, keys-stadi, nazariy va amaliy ma’lumotlar, texnologiya vositasida talaffuzni o‘rganish, leksik-fonetik vositalar, reyting shkalasi, hisobot vositasi, kuzatuv usuli, so‘rovnoma.

INTRODUCTION

There are several views on the importance of pronunciation competence in the language learning process. In this state, there would be two questions in one’s mind: Should we learn this subject? Why do we need to learn every sound to speak? Let us give more data to clarify these questions. According to T. Derwing and M. Munro, pronunciation is considered a fundamental component of communicative competence and a crucial determinant of whether second language (L2) speakers are understood by their listeners [Derwing & Munro, 2015; 14]. Every language has its own specific sound system and the way of pronunciation to shape a word that has a specific meaning. As an example, the English language involves 44 distinct sounds (phonemes) which are represented by only 26 letters. J. Levis wrote in his works that even learners with advanced grammatical and lexical skills may fail to communicate effectively if their pronunciation lacks intelligibility [Levis, 2018; 125]. It can be seen that a mistake in a phoneme or in stress can change the whole meaning of a word or an opinion. To justify this phrase, “full(/ʊ/) – fool(/uː/), cot(/ɒ/) – caught(/ɔː/)” word examples could be mentioned. Researches, specifically in L. Nguyen and J. Newton’s investigation, demonstrate that poor pronunciation can impede oral communication, lower speaker confidence, and limit academic and professional opportunities [Nguyen & Newton, 2020; 13]. In this case, different methods of teaching to overcome difficulties in learning a foreign language are being developed day by day in this field of teaching

methodology to ease both the learning and teaching processes. What cannot be ignored is that explicit and systematic instruction from a teacher works as a compass in pronunciation lessons. For English as a foreign language (EFL) learners, particularly in contexts such as Uzbekistan, where authentic exposure to native or near-native English speech is limited, explicit and systematic pronunciation instruction becomes essential.

In this modern world, technologies have appeared to assess teaching process. Technology provides instant access to data, which is vital in the classroom. Mobile phones, computers, projectors, and tablets are already a common element of everyday life for students and teachers alike. It is only natural that the use of technological devices in the classroom is explored to create meaningful and effective learning experiences for learners. Using different types of technology in the classroom, including a virtual classroom, creates learners who are actively engaged with learning objectives. The implementation of technology also creates pathways for differentiated instruction to meet the unique needs of students as individual learners within a broader classroom climate. Additionally, technological devices and programs can offer multiple means to present, engage, express, and assess student understanding and acquisition of language and literacy skills. Recent technological developments have introduced new pedagogical possibilities for improving L2 pronunciation. Computer-assisted pronunciation training (CAPT), automatic speech recognition (ASR), and mobile learning applications now offer learners frequent, individualized, and immediate feedback that is difficult to replicate in conventional classroom settings [Amrate & Tsai, 2024; 24] [Sun, 2023; 2]. Such tools can target both segmental (individual consonants and vowels) and suprasegmental (stress, rhythm, intonation) features, providing structured opportunities for deliberate practice and self-monitoring. Importantly, these tools enable flexible learning beyond classroom hours, making them particularly valuable in EFL environments with limited instructional contact time [Lee et al., 2023; 3].

This study investigates effective ways of improving the pronunciation skills of EFL students. Based on the research, several effective methods can improve EFL students' pronunciation using digital technologies. The study involves various continental research works regarding the investigations of H.Khoshsima, A.Saed, J.M. Schirmer, G.B. Pardabayeva, U.Evelyn, A.Zuraina, J.Mukundan, A.Fauzi, B.Roselan, J.Fouz-Gonzalez, P.M. Rewell-Rogerson, G.H. Bakiyeva, A. E.Rustamova and L.T. Axmedova. This investigation shows that there are still undeniable pronunciation problems that both teachers and students face in their daily speech. It is well-known fact that every language learner, even those who have reached the advanced level of a foreign language, needs to enhance their language competence, especially pronunciation skills, year by year with unstoppable training. However, no one is undeniable to make mistakes on their speech. It is fact that every person uses their native language a lot rather than a second language, and they do not shape second language habits from early school years. Because of these reasons, teaching never stops developing new approaches, methods and techniques. Nowadays, digital technologies

play a dominant role in accelerating the learning process. All the researchers that have mentioned above also use technologies in pronunciation classes to solve problems of their students found in their teaching process.

Of the various strategies, group activities by using online teaching tools were found to be the most preferable for the sample course [Boud & Cohen, 2011]. The reason for working with boring and old teaching methods in this fast-developing era may demotivate learners' eagerness to learn something new, especially vocabulary with correct pronunciation. Teachers are responsible for students inside of the classroom rather than outside of the class. For this reason, the facilitator should not only give new words to learn at home as homework, but they should also try to teach new words partially during the lesson. As mentioned above, the researcher used different online teaching tools, such as the ELSA pronunciation app, Learna AI, and audio-video lessons, etc., to reach the goal. Under these intentions the following research was conducted to further analyze the use of technology as a tool to develop vocabulary and pronunciation knowledge of language learners.

This research represents an extension of the reflection and critical self-reflection that educators may face in their daily lessons. The researcher used both quantitative and qualitative data collection tools in this research paper. Primary and secondary sources were utilized to gain enough information to make an effective plan. This research work could be used by educational practitioners and professionals to examine or to improve their pedagogy and practice.

Literature review

Technology has always been an important part of the teaching and learning environment. It is an essential part of the teachers' profession through which they can use it to facilitate learners' learning. The integration of technology into pronunciation teaching aligns with the communicative approach's focus on intelligibility rather than native-like accent [Derwing & Munro, 2015; 167] [Thomson & Derwing, 2015; 20]. Empirical evidence suggests that technology-enhanced pronunciation instruction can improve not only phonetic accuracy but also global speaking measures such as fluency and comprehensibility [Sun, 2023; 3]. This is particularly relevant in the Uzbek context, where English instruction traditionally emphasizes grammar and vocabulary, and where pronunciation often receives comparatively little curricular attention. By leveraging digital tools that offer rich auditory models and real-time feedback, educators can effectively bridge this gap. A wide range of software tools are available for teaching pronunciation, addressing various components of pronunciation competence. As a key element of computer-assisted language learning (CALL), computer-assisted pronunciation training (CAPT) has developed more extensively than other language skills, leading to numerous programs designed to facilitate pronunciation instruction. These tools provide learners with innovative learning environments that offer multiple practice opportunities within a limited space, independent of time constraints and direct teacher involvement.

M.Eady and L.Lockyer supported the view that technology has always been an important part of the teaching and learning environment [Eady & Lockyer, 2013;

71]. It is an essential part of the teachers' profession through which they can use it to facilitate learners' learning. When we talk about technology in teaching and learning, the word 'integration' is used. With technology being part of our everyday lives, it is time to rethink the idea of integrating technology into the curriculum and aim to embed technology into teaching to support the learning process. That is to say, technology becomes an integral part of the learning experience and a significant issue for teachers, from the beginning of preparing learning experiences through to the teaching and learning process.

In recent years, numerous researchers have examined the effectiveness of computer-based pronunciation programs in language instruction. For instance, H.Chen did research on the impact of MyET software on the pronunciation development of Taiwanese university students. Because MyET is an online platform, learners were able to use it both inside and outside the classroom [Chen, 2014]. The findings indicated measurable improvement in students' pronunciation skills; although some learners continued to prefer traditional face-to-face instruction, the majority showed an increased inclination toward the integration of software-based tools in classroom learning. Similarly, B.Gorjian, A.Hayati, and P.Pourkhoni explored the use of Praat software to help Iranian university students develop prosodic features of English, including stress and intonation [Gorjian et al., 2013; 34]. Their results demonstrated that learners who practiced through a CALL-based approach outperformed those taught using conventional methods. Furthermore, F. AbuSeileek reported that advanced EFL learners who used the *Mouton Interactive Introduction to Phonetics and Phonology* software showed significant improvement in both the perception and production of correct stress patterns at the word, phrase, and sentence levels [AbuSeileek, 2007; 10].

According to B.Dalton and D.Grisham's view, the reference proposes a number of ways in which vocabulary can be integrated into vocabulary teaching and learning [Dalton & Grisham, 2011; 306]. Those include learning from visual displays of word relationships within text, connecting fun and learning with online vocabulary games, having students use media to express vocabulary knowledge, supporting with reading and word learning with just-in-time vocabulary reference support, using language translators to provide just-in-time help for English language learners, increasing reading volume by reading digital text, and improving reading volume by listening to digital text with a text-to-speech tool and audio books.

A.Pourhosein and N.Sabouri emphasized that through using technology, learners can control their own learning process and have access to much information over which their teachers cannot control [Pourhosein & Sabouri, 2017; 79]. Technology plays an important role in promoting learning activities and significantly affects teachers' teaching methods. If teachers do not use technology in their lessons, they will never be able to keep up with these technologies. Thus, it is very important for teachers to have a full knowledge of these technologies in teaching language skills.

According to the words of Y.Liu, pronunciation should not be neglected as an essential part of language learning in classes, if a person wants to have a promoted social status, because of its essential roles in oral communication, speaker's

identity, and listener's perception [Lui, 2008; 9]. Strong pronunciation skills might show the power of words, our rhetoric, and social status by hiding our disbelief and weaknesses. Individuals who have a special role in society used to create their personality with a strong sense of identity in the community of the target society via good and excellent pronunciation skills. As an addition, H. Khoshima, A. Saed and S. Moradi wrote about the intelligibility principle of pronunciation with differences from nativeness in the speech of other languages. They concluded that acquiring intelligibility of pronunciation, namely having comprehensible and understandable speech for listeners, is more important than the nativeness of speakers [Khoshima et al., 2017; 4]. That's why, the linguists investigated the importance of suprasegmental features of pronunciation, including stress, intonation, and rhythm in the speech of the community by using the Clear Pronunciation tool 2 in EFL classes, knowing the global effect of computer technology and CALL in education nowadays, and got the expected effective results that were required. The instructional computer software has been used to accurately produce word stress, sentence stress, consonant clusters, and intonation, connected speech of Iranian intermediate EFL students who have prosodic difficulties in speaking the English language.

The methodology of L.Axmedova and V.Normurotova also recommends to give special attention to teach pronunciation features to enunciate the sounds perfectly, to stress words or sentences correctly and intonate the speech in order not to change the meaning of the speech by providing language teachers with practical methodological guides, drills, tong twisters, exercises and useful ideas for improving learner's pronunciation [Axmedova & Normurotova, 2011].

Moreover, the investigations of G.Bakiyeva and Rustamova show that both educators and learners should modify the way of pronunciation teaching and learning environment by including actual social, psychological, and cultural elements of target classes [Bakiyeva G. & Rustamova A., 2020; 1208]. The research work focuses on Uzbek EFL students who have intercultural problems in pronouncing English words despite the excellent and hard efforts of both sides. The case study mainly compared foreign and local teacher's methodology in pronunciation classes with their real attitudes towards English pronunciation by taking interviews and questionnaires from both teachers and learners. Interestingly, the results show that Uzbek pronunciation learners preferred more local English educators instead of foreign native speakers with distinctive percentages, in spite of the poor English proficiency, lack of confidence, and teaching behavior of locals compared to foreign teachers who have difficulties understanding learners' culture and mother tongue and effective pedagogy for this culture.

According to M.Revell-Rogerson's article, future directions for pedagogy should be at the forefront of developments with computer-assisted pronunciation training (CAPT) by covering ubiquitous learning regarding intelligent tutoring, authentic interactions, goal-oriented and task-based learning [Revell-Rogerson, 2021; 3]. As he mentioned, today's pedagogical system can not be parted from technological assistants by creating individualized, stress-free, self-paced, limitless, accessible,

multimodal material classes with immediate and customized feedback. Accelerating pronunciation learning with mobile apps (Duolingo, Mondly, AI Speaker), websites (BBC English, British Council Learn English), social media platforms (Facebook, Instagram, Twitter) and platforms (ELSA Speak, Clear Pronunciation tool 2) gave learners more opportunity to realize how important pronouncing every features and motivated to hold self-studies on their accent errors despite having little attention in school's curriculum which was arranged by educational authorities. Although J.Fouz-Gonzalez also mentioned the importance of technological devices and tools in pronunciation training in his research, he regarded that using collaboration in education with general terms like "CAPT" or "technology" might be misleading for educators through using limited resources in the teaching process [Fouz-Gonzalez, 2025; 4]. Therefore, the linguist offers establishing realistic expectations regarding what technology can actually do and cannot do for lessons before, then the educator should consider what learners need at different stages of the teaching-learning process. As it is known that not every teacher uses the same tool or textbook that was chosen at the beginning of the course, throughout the whole year of the education term. He exemplified perception training, including High Variability Phonetic Training (HVPT) technique, for educators to use, which provides students with multiple instances of target phonetic features pronounced by multiple speakers in different contexts.

What's more, J.Johnston and L.Barker stated that using technology, for example, may give students the chance to be in touch with the real world and it can be motivating for them [Johnston & Barker, 2002; 139]. In addition, using technology as an aid helps students be active, eager, and involved in class due to the interest it generates. There is no doubt that using computers and the different kinds of technological tools affects students' behavior in a positive way.

Furthermore, B.Tomlison and B.Gençlter state that computer-based activities provide learners with rapid information and appropriate materials [Tomlison, 2009; 189] [Gençlter, 2015; 313]. They continue that internet materials motivate learners to learn more. In addition, D. Larsen-Freeman and M. Anderson supported the view that technology provides teaching resources and brings learning experience to the learners' world [Larsen-Freeman & Anderson, 2011; 42]. Through using technology, many authentic materials can be provided to learners, and they can be motivated in learning a language.

Another technological development that has an impact on language learning, especially in pronunciation teaching, is Virtual Reality (VR) and Robot-assisted language learning (RALL). M.Peterson described a VR system that enables target learners to immerse themselves in numerous simulated and actual social contexts and game-based activities by assuming the avatar or a person anonymously in order to reduce the pressure and stress of learners [Peterson, 2012; 25; Qing, 2017]. What should be mentioned despite its less impact on pronunciation learning is that both T.Lin and K.Yan, Sh.Wang and C.Vasquez implemented Second Life and Active Worlds in their case studies, respectively, to teach a foreign language [Lin & Yan, 2015; 490; Wang & Vasquez 2012; 420]. J. Han informed educators with RALL

technologies for its automated L1 English-speaking teaching assistants to improve learners' pronunciation skills, which are mainly used in pre-school and after-school programs of Japan, Korea, and Taiwan [Han, 2012; 4]. He added that extending the concept of embodied agents has resulted in the application of robots in educational contexts, including language learning. What it means that personal robots are expected to represent a major development in everyday life, with significant implications for human communication in the foreseeable future.

Research questions:

The critical questions of this research are the following:

1. What kind of difficulties do the students face when it comes to pronunciation?
2. How effectively can the usage of a technology-based strategy enhance learners' pronunciation in class?
3. To what extent do teaching online tools during the lesson improve students' vocabulary and pronunciation knowledge?

METHODS

This study is case study research using four steps: observation, reflection, planning, and implementation using selective data.

The research was conducted in the first semester of the academic year 2025/2026, from October to January, among 1st-year students at the Uzbekistan State University of World Languages. The subjects were the first-year groups, who were 17 students in total. The English teaching and learning processes in this class were held twice a week, with an 80-minute lesson for each meeting.

A qualitative research type was used in this work. All the required and useful data had been collected through observation and performance techniques. The data collection methods in this research consists of several methods, each of which does not stand alone but supports and complements the outcome of the findings of the other methods. The data collection methods in this study are: a method of inquiry or questionnaire, used to obtain information from respondents about the teaching and learning methods and the learning atmosphere, and the observation method, used to supplement the research results. The observation technique involves observing participants' ongoing behavior and responses to a particular task, while the performance technique focuses on learners' participation and active physical responses.

Technology-based language learning strategies were utilized. Technology-based learning means learning via digital technology, including the Internet, intranets, satellite broadcasts, audio and video conferencing, bulletin boards, chat rooms, webcasts, and so on. It uses a series of delivery methods and hardware or software tools to manage and deliver learning content and manage and track learner progress, as well as learner-to-learner and learner-to-instructor communication.

RESULTS AND DISCUSSION

The major findings from the research are to observe effective types of pronunciation teaching methods and the results of these methodologies to help both teacher and student to achieve their academic goals. At the beginning of this study, the

researcher did some observations and took various data to clarify the exact problems and its resolutions in learning processes. First, the researcher observed the potential English class research works and selected them according to the effectiveness of the results. Secondly, the researcher checked all the results in the pre-process period and aimed to notify other teachers and researchers with accessible data to provide them with effective teaching material. Then, the researcher discussed current problems with the collaborators. The researcher utilized observation and interview methods to identify the problems. The first observation was done on Monday, October 14, 2025. The observation was conducted in a class consisting of 17 students. The pretest consists of 15 questions which cover general phonetic features in the forms of unique and multiple-choice question types. Different kinds of new research works, articles, and action research, that have been mentioned above, have been analyzed, and useful data have been collected. The discussion with the English teachers related to the problems and data collection methods of teaching and learning processes was also held. To clarify the actual results of the case study, a hypothesis should be created. A hypothesis is a type of prediction found in many experimental studies; namely, it is a statement about what we expect to happen in a study. In research reports, there are generally two types of hypotheses: research hypotheses and null hypotheses. The null hypothesis (often written as H0) is a neutral statement used as a basis for testing. The null hypothesis states that there is no relationship between the items under investigation. The statistical task is to reject the null hypothesis and demonstrate a relationship between x and y. Given our hypothesis above that French-speaking learners of English would perform better following form-focused instruction than Japanese-speaking learners of English, the null hypothesis would be:

There will be no difference in performance between the French and the Japanese groups on a post-test [Mackey & Gass, 2016; 150].

From the definition above, we can say that our null hypothesis can be:

There will be no difference between the results of the pre-test and the test that was taken after the implementation of the pronunciation training materials that have been used during the whole research period for EFL learners.

There are two ways of formulating an alternative hypothesis:

1. Non-directional or two-way hypothesis.
2. Directional or one-way hypothesis.

In that case, our non-directional hypothesis will be:

There will be a difference between the results of the pre-test and the post-test after the implementation of pronunciation training materials and digital tools for EFL learners.

As for the directional or one-way hypothesis, we will have enough evidence to predict it more clearly. In that case, our hypothesis can be:

Pupils will show better results in the post-test than in the pre-test after the implementation of pronunciation training materials and digital tools for EFL learners.

The pretest is all about common acquired phonological features. The teacher helped students to pronounce new words or to place correct intonation and stress on

the given words. The result of the pretest showed only 40% of the students. Other students did not understand or mispronounced the words they had learnt.

At first, problems that had been identified were listed. Then, the researcher introduced the list to her collaborators and some more suggestions and recommendations were taken. After analyzing the causes of the problems, the researcher and the collaborators continued the discussion and determined that the problems related to the students' personalities needed to be solved as soon as possible. During the first month of the research, target topics regarding consonant and vowel sound features according to the curriculum of the university were taught in more traditional methods by utilizing tongue-twisters, sound pronunciation training exercises, poems, and audio materials in various contexts. In the second period till December 15, the main focus was given to the intonation and word stress, sentence stress, and rhythm of English phonology with the help of Clear Pronunciation 2, Pronunciation Power (second version) and ELSA Speak app and online flashcard tools with printed pronouncing materials, including exercises on these topics. At the last part of the investigation devoted to word clusters and correct pronounced speeches by showing the English speakers' performance, Ted Talk videos and Real Life app with additional teaching activities which were more game-based to motivate and promote their knowledge on phonetics. At the end of the case study, the researcher took a post-test including 20 open-ended questions and immediate speech from the participants of the class.

After the first period, educators assessed learners' motivation and interest in the target lessons and checked how participants acquired previous knowledge by providing them with mini pronunciation exercises, assessing learners around 1-15 scores. However, the result shows that only 50% of the students (with only 10% improvement) were motivated to learn and completed their work effectively. Unfortunately, the achievements of the learners did not improve enough as expected. In order to clarify the results of the research work after shaping the research hypothesis above, the data was analyzed using the JASP statistical program. Table 1 consists of first period results:

Table 1

Paired Samples T-Test					
Measure 1		**Measure 2**	**t**	**df**	**p**
pre-test	-	1st exercises	-3.293	16	.005

Here, the scores of pre-test and 1st ending period exercises are compared, including t-value (which shows the differences of the results of tests to show effects of variability), differences, and p-value (which indicates the probability of the hypothesis).

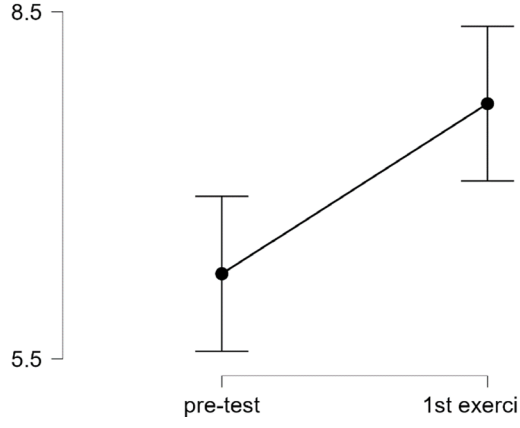
Descriptives					
	N	**Mean**	**SD**	**SE**	**Coefficient of variation**

pre-test	17	6.235	1.821	0.442	0.292
1st exercises	17	7.706	1.312	0.318	0.170

The descriptive table shows the differences in mean (average), SD (Standard Deviation), and SE (Standard Error of the Mean).

Descriptives Plots

It shows the improvement of participants between pre-test - 1st exercises (how the improvement of the research was going):



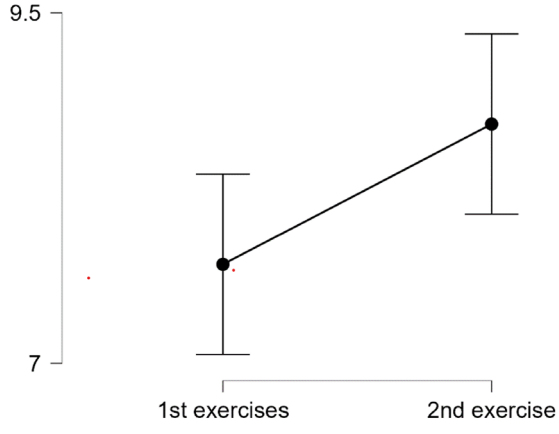
After the second part of the case study was conducted, the researcher took another repetition of self-checking exercises by assessing learners with scores ranging from 1 to 15 in the same way as the first period. The number of the next data with nearly 70% of achievements of students could show the enhancement in the teaching process, and this data was statistically analyzed by comparing with the first mini-checking test:

Table 2

Paired Samples T-Test					
Measure 1	**N**	**Measure 2**	**t**	**df**	**p**
1st exercises	-	2nd exercise	-2.332	16	.033
Note. Student's paired t-test results of 1st and 2nd period implementation.					
Descriptives					
	N	**Mean**	**SD**	**SE**	**Coefficient of variation**
1st exercises	17	7.706	1.312	0.318	0.170
2nd exercise	17	8.706	1.105	0.268	0.127

Descriptives Plots

The differences in the results between 1st exercises - 2nd exercise:



Students were engaged and motivated to acquire all the data given. After finishing the whole procedure, students had achieved and the process improved of 85% of student's achievement:

Table 3

Paired Samples T-Test					
Measure 1		**Measure 2**	**t**	**df**	**p**
pre-test	-	post-test 1	-9.114	16	< .001

Note. Student's paired t-test results of the pre-test and post-test period implementation.

For each test, the **t-value** is a way to quantify the difference between the population means, and the **p-value** is the probability of obtaining a t-value with an absolute value at least as large as the one we actually observed in the sample data if the null hypothesis is actually true. If the p-value is less than a certain value (e.g., 0.05), then we reject the null hypothesis of the test [Ibrohimova Sh., 2023]. Here, in our case, our null hypothesis is rejected, because the p-value is 0.001 and it is less than 0.05.

Test of Normality (Shapiro-Wilk)				
			W	p
pre-test	-	post-test 1	0.900	.069

Note. Significant results suggest a deviation from normality.

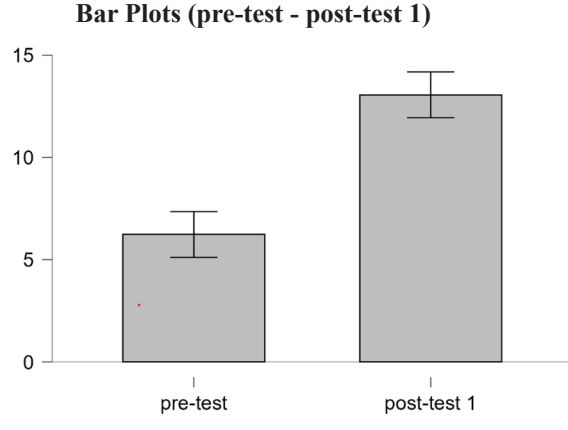
The Shapiro-Wilks test is one of three general normality tests designed to detect all departures from normality. It is comparable in power to the other two tests. The test rejects the hypothesis of normality when the p-value is less than or equal to 0.05. Failing the normality test allows you to state with 95% confidence that the data does not fit the normal distribution. Passing the normality test only allows you to state no

significant departure from normality was found. In this case, our p-value is 0.069, which means our experiment passed the normality test. The Shapiro-Wilk test assesses whether a sample of data comes from a normal distribution. The output displays the statistic, W with its probability value under the assumption that the data are Normal [Ibrohimova Sh., 2023]. So, a low probability indicates that the data are unlikely to be from a normal distribution.

Descriptives

	N	Mean	SD	SE	Coefficient of variation
pre-test	17	6.235	1.821	0.442	0.292
post-test 1	17	13.059	2.164	0.525	0.166

Here the hypothesis is different, which means measurement 1 is less than measurement 2.



The result of the bar plot shows that a distinctive improvement has been achieved by the case study which was conducted with 85 percent.

They learned all the necessary rules and features of pronunciation and tried to use them in their speaking with correct pronunciation. In order to collect reliable data, the researcher tried to ensure the reliability and validity of the information.

CONCLUSION

The technology-based learning method applied in this case study, implemented over three instructional periods, demonstrated a positive impact on first-year students' participation and pronunciation competence at the Uzbekistan State World Languages University. This improvement was evidenced by a steady increase in learners' mean pronunciation scores, rising from 40% in the pre-action stage to 50% in the first cycle, 70% in the second cycle, and ultimately reaching 85% in the final cycle.

The technology-based learning approach incorporated digital tools such as ELSA Speak, *Clear Pronunciation 2*, *Pronunciation Power 2*, instructional videos, TED Talks, and real-life online learning resources to facilitate students' learning processes and enhance their pronunciation skills. The findings confirm that this

method effectively contributed to the development of learners' pronunciation mastery.

The findings of this research suggest important implications for universities and instructors. The implementation of newly developed teaching methods can motivate teachers to enhance the teaching process and significantly reduce facilitators' workload compared to traditional paper-based instructional materials. For teachers, these methods can also increase students' participation and interest in learning new vocabulary and practicing pronunciation during classroom activities.

At the beginning of the case research, many students demonstrated passive behavior and a tendency to procrastinate in their learning. However, after completing three action research cycles, students were successfully engaged in the lessons. Therefore, it is recommended that teachers motivate students by consistently applying this method at each stage of the teaching and learning process in order to help learners achieve the desired level of mastery, ideally approaching full (100%) attainment.

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