# Investigating the Use of E-Dictionaries as Strategy to Improve Speaking Skill through Practical Activities of Precise Phonemes Realization: Case Study of EFL Undergraduate Students of Haripur University, Abatabad University, & Hazara University Mansehra, Pakistan

Abdul Sattar[1], & Sami Saad Alghamdi[2]

[1] Department of English, College of Science and Arts Muhayil Asir, King Khalid University, Saudi Arabia

[2] General Courses Department, Applied College Muhayil Asir, King Khalid University, Saudi Arabia

Correspondence: Abdul Sattar, Department of English, College of Science and Arts Muhayil Asir, King Khalid University, Saudi Arabia. E-mail: amkhan@kku.edu.sa

Received: June 27, 2023 Accepted: August 11, 2023 Online Published: September 7, 2023

doi:10.5430/wjel.v13n8p182 URL: https://doi.org/10.5430/wjel.v13n8p182

**Abstract**

Reassessing the operationalization of e-dictionaries, the last epoch of English teaching-learning has revolutionized direct motivational currents and precise phoneme realization in undergraduates. Instructors have experienced incredible progress in improving speaking accuracy. E-dictionaries predispose undergraduates to imitate and emulate the accurate enunciation of mispronounced lexicons. Reconsidering the rapid evolution and practicing correct patterns of stereotypically distorted pronunciation have been reformed through operating E-dictionaries to rectify poor articulation. Instructors have reflected their insights regarding their prospective objectives of enhancing undergraduates' accurate pronunciation, inflicting prompt spoken consciousness by integrating E-dictionaries into EFL classrooms for practical activities. The tenacity of the contemporary study was to determine the impact, influence, and efficacy of e-dictionary integration as an instructional strategy to measure altercations and accuracies during speech sound production. A randomization strategy and Praat quantitative data analysis were applied to determine the variation in the preference poll percentage of precision during the phonetic analysis of phoneme vocalization. The study has been categorically designed to monitor changes in English learners' speaking, refining inaccurate pronunciation from 3.5% to 6.8% out of 10% through an Integration Model Application. The findings revealed substantial disparities during articulations. The results revealed significant differences in undergraduates' precise realization of phonemes that improve excellence in enunciation, which leads to improvement in speaking faculty. After the integration of e-dictionaries, undergraduates recognized the distinction and amelioration of their conversations. To Investigate the use of e-dictionaries as strategy to improve speaking skill has helped to realize precise phonemes during practical activities.

**Keywords:** motivational currents, prospective objectives, error-free codification, academic excellence, substantial variations, precise phoneme realization

## 1. Introduction

Undergraduates encounter and experience distortion in pronunciation, which affects their speaking faculty in academic presentations and professional performance. Integrating technology, as an assistant, evidently instigates and effectively refines the accurate realization of phonemes through imitation and reiteration of the misprinted lexicon immediately. Phonetic cognizance, as well as precise sentience, requires learners to rehearse autonomously for the elevation and standardization of articulation. The present study has undertaken systematic planning and implementation to investigate the effective integration of e-dictionaries to augment the refinement of articulation and exercise accurate phoneme vocalizations at three different univeristies, namely Haripur University, Abatabad University, & Hazara University Mansehra, Pakistan. technology-integrated methods determine improvements in the articulation of speech sounds. Undergraduates realize the appropriate impact of complementary distribution on preceding and receding phonemes. By applying randomization strategies, phonetic analysis, and qualitative data analysis, it has been observed that coherent integration e-dictionaries reduce imprecise articulations of active and passive lexicons. This integration of e-dictionaries provides maintenance in mispronunciation and technical assistance to undergraduates who desire to streamline and ameliorate their pronunciation understanding and ability. Moreover, the existing teaching-learning process requires the application of modern technological apps and devices to induce students to adopt positive effects. Postitivley, the significant erudition of phonetic inaccuracies has accelerated rectification of pronunciation with timely and meaningful feedback. In this study, the contextualization of literature is pertinent to the advantages of technology integration. A quantitative approach and randomization strategies were used in the research described in the methodology. Finally, the conclusions and findings regarding significant e-dictionary integration are presented.

Over the years, technological devices and their applications have become fixtures in global spheres, generally and particularly in academia.

Technology integration impacts and influences have permeated all facets of teaching and learning English in Pakistan; integration changes classroom dynamics by means of rapid learning of enunciation. The objective of this study is to explore the effectiveness of utilizing E-dictionaries in EFL classrooms at the undergraduate level and statistically analyze how much they assist and facilitate undergraduate learners in *Ameliorating Speaking Accuracy*—rectification in speaking, precise phoneme realization (ASA) and improvements in pronunciation. (Wilson, & Thayalan, 2007). E-dictionaries began in the last half decade when instructors of the English language in EFL classrooms experienced speaking inaccuracies during teaching. Improving pronunciation through e-dictionaries [henceforth EDs] becomes visible in undergraduate programs in which most students are in dire need to enhance speaking and phonetic skills. In the contemporary phase of the English language teaching-learning process, EDs utilization and integration accelerate the ASA by imitating and reiterating the correct articulation of words. (Solanki, & Shyamlee1, 2012). The use of EDs provides opportunities for undergraduate learners to exercise not only correct enunciation, but also recognize the realization of phonetic features during their discussions and debates. (Pourhosein & Sabouri, 2014). EDs have also revolutionized English teaching-and-learning methodologies for enhancing enunciation, thus turning them into more pleasant as well as productive ways to improve the aptitude and attitude of learners. According to Balaaco (1996), digital learning is "just in time and on-demand delivering knowledge" when or where language instructors and learners need assistance. Hence, the emergence of the concept of "anywhere-anytime" could serve learners on a larger scale in ASA.

Globalization influences rapid language learing through utilization of technology in classrooms. Thus, the dire need for e-dictionaries integration in teaching pronunciation has become more lucrative in precise phonemes realization in speaking. The subsequent Integration Model Application (IMA), as shown in figure 1, was applied in this study. Indeed, Articulatory Synthesis indicates a speaker's articulation characteristics and specifications of moving articulators during the production of speech sounds (fricatives and affricates). The researcher applied student-centered multimedia presentations to evaluate undergraduates' pronunciation errors. This highlights "artword" leading to rectification in articulation of phonemes in vocal track. Subsequently, IMA demonstrates six consecutive stages that highlight EDs integration and its effectiveness, which increases the stimulation for imitation and reiteration of mispronounced lexicons. Stage four recapitulates precise phoneme realization, leading to accurate articulation, which lucractivley augments speaking accuracy.

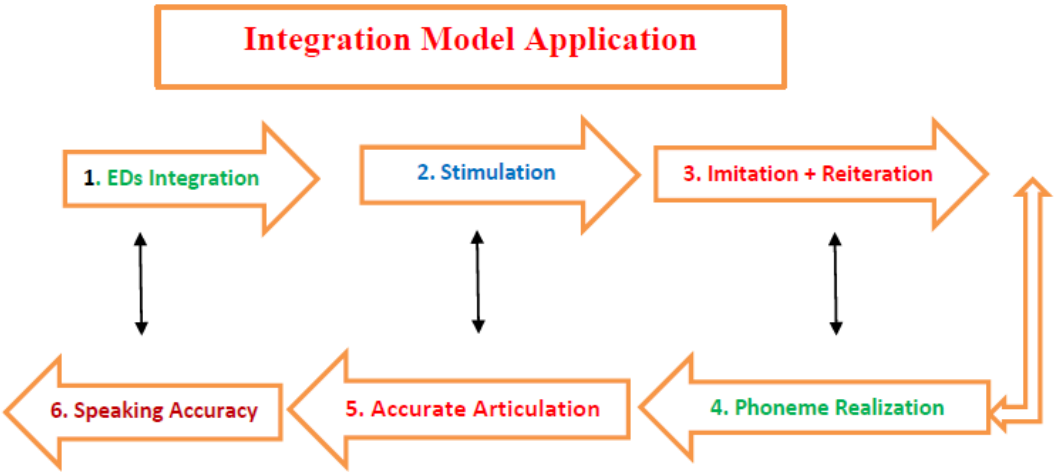


Figure 1. Integration Model Application

The scope of integrating technology (EDs) in instructional sessions is commonly defined as a technical device or tool application that is used to enhance instruction. According to Lever-Duffy, McDonald, and Mizell (2005), educational technology/academic apps might include media, models, projected and non-projected visual, as well as audio, video, and digital media, which augments learning and refining students' academic performance. These authors also claimed that some "educators may take a narrower view" of technology integration. (pp. 4-5). This definition may take into consideration pedagogical convenience and the elevation of learners' academic and professional presentations and principles due to the application of various technologies in educational inquiries. (Miner, 2004). The isolation of technology from pedagogical and self-assistance processes may not increase contemporary styles of teaching and moderate learning tendencies. The integration of EDs is perceived as an innovative teaching and learning strategy. It connects instructional strategy and technological apps with methods of instruction, learning objectives, learning styles (pace of learning), assessment, gradation, and evaluation strategies. Technology integration incorporates technological skills and users' abilities to capitalize on pedagogical knowledge, which promotes their understanding. (Jonassen, Howland, Marra, & Crismond, 2008). Tech-integration is based on readiness and current practices of pronunciation as a personal growth plan to mark differences in pre-test and post-test results.

**2. Literature Contextualization**

Changing pronunciation and articulation have led to perceived changes through the integration of technology-based methods and EDs utilization in classroom activities. It has been contemplated that the integration of technology becomes indispensable to explore within the context of teaching and learning accurate speech sound realization. Redmann and Kotrlik (2004) defined technology integration (TI) as "using international networking (internet), interactive media, personal academic applications, teleconferencing, and other technological

means during instructional sessions to back, improve, stimulate and construct learning. Shelly, Cashman, and Gunter (2008) explained such an integration of technology as a combination of hardware and software with each subject-related domain of the syllabus or curriculum to augment autonomous learning. (Xie, Nelson, Cheng, & Jiang, 2023). Technology–app integration incorporates technology resources to make convenient practices in academic advancement during daily routines, institutes, and professional firms. (Shuldman, 2004). Technology integration training to foster collaboration and support, address daily challenges, and ultimately to have more frequent and effective use of technology in the classroom (Carlson, 2002).

Accordingly, technology integration is meant to view technology as an instructional and learning-independent assistant for delivering subject matter and self-practice. Consoli, Désiron, and Cattaneo (2023) have identified the purpose of TI and perceived as bringing or bridging technology with teaching-learning process and strategy so as to meet the standardization of learning objectives and requirements of the curriculum outcomes. As pronunciation is very important, researchers have used a variety of techniques, including updating speech technologies (Carr et al., 2021). In the current phase, TI simultaneously accelerates undergraduates' performance by stimulating their aptitudes and attitudes. The reason and sophistication behind TI changed the traditional approach of the teaching-learning process into a moderate one to reduce errors in learning and refine learning instantaneously. (Sang, Valcke, Van Braak, & Tondeur, 2010). According to Lever-Duffy, McDonald, and Mizell (2005), "educational technology might include media, models, projected and non-projected visual, as well as audio, video, and digital media." These authors claimed that some "educators may take a narrower view" and are likely to "confine educational technology to software used for teaching and learning" (pp. 4-5).

According to Chun, Kern, and Smith (2016), TI has developed moderate dynamics to literate students and promote their confidence in discussing newly acquired material. Indeed, learners' preparations and literacy skills improve strategies that promote a random learning environment to indirectly reinforce instructions. In the contemporary era, staring learning concepts address multiple modes, deliveries, and demands of various e-systems for learning achievements. (Benson et al., 2001, p.121). Stimulation for Amelioration Speaking Accuracy (ASA), EFL instructors successfully attempt to change and transform undergraduates' speech-sound errors to speed up accurate phoneme realization during discussions and debates. (Lewis, 2015). It has been observed that TI could be effective when utilizing EDs in transformation learning enunciation through a Randomization Strategy to uplift the speaking faculty of undergraduates. (Nimehchisalem, 2014). Learning correct pronunciation brings about changes in precise articulation during phonetic analysis, indicating progress in the realization of exact speech sounds. Moreover, the potential advantages of TI provide convenience in imitation and reiteration of words.

To re-articulate the accurate phoneme and recognize spelling-to-sound rules, strealime pronunciation. TIs are becoming globalized in the English language market to enhance teaching and learning pronunciation skills. Instructors capitalize on the significance and effects of English pronunciation learning. Speaking accuracy is shaped and driven using EDs as personal academic assistants (PAA). (Jarvis, & Achilleos, 2013). EDs applications evolve learners' seeking behavior to adopt new phonetic rules such as assimilation, stress, intonation, phonetic transcription, manner, place, and control of articulation effectively. (Firman, & UlHaq, 2012). EDs implementation in the classroom serves as a fruitful application that engages students in conceivable enunciation and correcting their realization of speech sounds. (Peters, 2009). TI becomes more dependent on observing students' understanding during the practice sessions. By increasing the visible competence of learners speaking faculty projects its effectiveness, TI stimulates sound articulating techniques along with spelling-to sound rules. (McKenney, & Visscher, 2019).

## 3. Justification of the Study

The present study aims to conduct an experimental study on the utilization of e-dicitonaries by English language instructors to stimulate undergraduates for precise phoneme realization, leading to improvement in speaking accuracy. Enhancing the pronunciation skills of English speakers positively affects their presentation as well as performance through integration of technology. In addition, how the undergraduates alter their enunciation substantially by simultaneous imitation and reiteration after using e-dictionaries applications.

## 4. Hypothesis

The accurate pronunciation of English words has become an immense challenge for undergraduates in Pakistani universities, where they have no awareness of precise phoneme realization. It is believed that the integration of e-dictionaries at the undergraduate level augments undergraduates' vocalization and articulation of active and passive vocabs, leading to speaking accuracy. This integration of e-dictionaries will be found more effective in terms of minimizing undergraduates' mispronunciation and inaccurate phoneme articulation, which could be a substantial achievement and improvement in understanding the precise phoneme uses of English speech sounds.

## 5. Theoretical Framework

Randomization concpet has applied and processed by assigning participants to treatment and control groups, assuming that participants have an equal chance of being assigned to any group. Randomization has evolved into a fundamental aspect of reliability and validity or stastistical estaimetes in precise realizatin of phonemes. Randomization strategies have used as theoretical framework for randomized experiements of enunciation of the participanats. Finally, it permits the use of probability theory to express the likelihood of chance as a source for the difference of end outcome. This paper discusses the different methods of randomization and use of online statistical computing programming to mark the difference of variations in pre-test and post-test. Probability theory has applied of mathematimatics and statistics purposes concerning with the analysis of random phenomena (Pre- and Post-tests Randomization Strategy 1-3, Practicing Sesssions).

**6. Objectives of the Study**

The subsequent are the fundamental objectives of this study:

A: To know the impacts of e-dictionaries utilization on undergraduates at university English classes to realize precise phonemes during the speaking.

B: To explore the effectiveness of introduction of e-dictionaries in university students' English class for accelerating their speaking accuracy.

**7. Research Questions**

The research questions of this study have given subsequently:

A: What are the impacts of e-dictionaries utilization in university students of English classes to realize precise phoneme realization during speaking?

B: What is the effectiveness e-dictionaries integration at university level in English classes in acceleration of speaking skill accuracy?

**8. Methodology**

Randomization strategies were implemented at three different Universities in Pakistan, chiefly Haripur University, Abatabad University, and Hazara University Mansehra in the K.P province. Undergraduates were exposed to speech sound articulation using Praat software for phonetic analysis. The pre- and post-tests were taken from undergraduate students for qualitative data analysis. Positive influences and impacts emerged as variations in articulation during both tests. E-dictionaries have been observed during undergraduates' interactions and the enunciation of imprecise and precise articulation of active and passive lexicons in different practice sessions. The researcher observed refinement and reduction in inaccurate phoneme realization in undergraduates' phonetic transcriptions and the production of speech sounds after e-dictionary integration. The researcher has experienced that the Integration Model Application appears to be lucrative and meaningful in learning accurate pronunciation. Three consecutive tables highlighted disparities in articulatory phonetic analysis during the exercise of randomization strategies to measure differences in percentages for both active quotidian and passive vocabs.

A group of 30 undergraduate students from Haripur University, Abatabad University, and Hazara University Mansehra in K.P province studied at undergraduate levels in English departments in 5$^{th}$ semester system for two successive years of English. The participants' age varies from 20-24 years. The participants were both male and female regardless any gender discrimination. Therefore, they were preferred as a sample for this study. They also partook voluntarily in the pre-test and post-test to perceive their amelioration in the articulation of words after utilizing EDs during the EFL classrooms. Total 8 sessions conducted during the study; 4 sessiond has conducted for pre-test with intervals, 4 sessions has further conducted for post-test with intervals. The date collected from 8 sessions have used for Praat analysis to mark variaitons in realzing of precise phonemes during speaking. The nominated group of EFL undergraduates exercised to compare their level of phonetic accuracy. The group was scrutinized through pre- and post-tests on the influence of ED on undergraduates' improvement in speaking. The data were evaluated through the Praat Experiment, which helps in the identification and discrimination of accurate and inaccurate realizations of speech sounds during production. The number of words was 20, half related to active quotidian vocabulary and; half pertinent to passive vocabulary.

*8.1 Population, Sample, and Data Collection*

To investigate the Integration Model Application, Praat analysis for phonetic variations, 30 undergraduates were selected for the present study as volunteer participants. The pre-test and post-test were conducted to evaluate their variations during the articulation of speech sounds. These tests have been applied in experimental designs to accurately realize phonemes through randomization strategies. Active and passive vocabs of 20 lexicons were used as instructional and experimental design tasks, using EDs integration and software for phonetic analysis observed in practicing phonemes. At the end of the enunciation sessions, the evaluation phase of the articulatory phonetics, participants, and researchers observed amelioration in the speaking accuracy of undergraduates through effective integration of EDs.

The following Table-1 data summarizes Active Quotidian vocabs along with their inaccurate articulation preference poll, which demonstrates variations from 62% to 83% in mispronunciation. Besides, Table-2 data recapituates Passive vocabs showing inaccurate articulation preference poll instantaneously. The variations between the highest and lowest were observed from 64% to 91%, which identified undergraduates' imprecise phoneme realization hampering and hindering their speaking accuracy and fluency.

Table 1. Active Quotidian Vocabs Indicating Inaccurate Preferential Poll Percentage

| No | Active Quotidian Vocabs | Pre-test Articulation | Inaccurate Speech Sound Articulation | Post-test Articulation | Preference Poll of Inaccurate Articulation |
|---|---|---|---|---|---|
| | **Ambiguity** | /æm bɪ ˈgjuviti/ | **/juvi/** | /æm bɪ ˈgjuːˌəti/ | **65%** |
| | **Consecutive** | /kən ˈzekjt ɪv/ | **/z/** | /kən ˈsek jʊt ɪv/ | **82%** |
| | **Conservative** | /kan ˈzɜːvɪtɪv/ | **/z/** | /kən ˈsɜːv ət ɪv/ | **78%** |
| | **February** | /feb riˌər i/ | **/ri/** | /feb ruˌəri/ | **69%** |
| | **Homogenous** | /hu ˈmudʒ iːn əs/ | **/hu ˈmu/** | /hə ˈmɒdʒ ən əs/ | **75%** |
| | **Insert** | /ɪn ˈzɜːt/ | **/z/** | /ɪnˈsɜːt/ | **83%** |
| | **Miser** | /mezər/ | **/e/** | /maɪzər/ | **62%** |
| | **Salmon** | /salmən/ | **/al/** | /sæmən/ | **74%** |

| | | | | | |
|---|---|---|---|---|---|
| | **Wednesday** | /wednez deɪ/ | **/dnez/** | /wenz deɪ/ | **68%** |
| | **Tomb** | /tuːmb/ | **/mb/** | /tuːm/ | **83%** |

Table 2. Passive Vocabs Indicating Inaccurate Preferential Poll Percentage

| No | Passive Frequency Vocabs | Pre-test Articulation | Inaccurate Speech Sound Articulation | Post-test Articulation | Preference Poll of Inaccurate Articulation |
|---|---|---|---|---|---|
| | **Camouflage** | /kæm ə flɑːdʒ/ | **/dʒ/** | /kæm ə flɑːʒ/ | **64%** |
| | **Chutzpah** | /tʃʊts pə/ | **/tʃ/** | /hʊts pə | **71%** |
| | **Desiderate** | /dɪˈsɪdɑːeɪt/ | **/sɪ/** | /dɪˈzɪdəreɪt/ | **76%** |
| | **Epitome** | /ɪ ˈpɪt uːm/ | **/uː/** | /ɪ ˈpɪt əm/ | **81%** |
| | **Fa çade** | /fɑːˈkɑːd/ | **/kɑ/** | /fə ˈsɑːd/ | **83%** |
| | **Hyperbole** | /haɪ ˈpɜːb uli/ | **/u/** | /haɪ ˈpɜːbəli/ | **66%** |
| | **Nietzsche** | /ˈniːt ʃeɪ/ | **/ʃeɪ/** | /ˈniːtʃ ə/ | **86%** |
| | **Paparazzo** | /pæp ə ˈræzəʊ/ | **/zəʊ/** | pæp ə ˈræts əʊ/ | **79%** |
| | **Quiescence** | /kwi ˈis əns/ | **/is əns/** | /kwi ˈes ənts/ | **83%** |
| | **Rapport** | /ræ ˈpuː rt/ | **/t/** | /ræ ˈpɔː r/ | **91%** |

## 9. Results

The integration of EDs in EFL classrooms of undergraduates has brought about significant changes in speaking accuracy and correct phonetic realization of speech sounds during articulation. This utilization of EDs has inspired constructive variations in teaching methods at the university level. Undergraduates improved from 3.5% to 6.8% out of 10% in their speaking faculty while using EDs pronunciation features that tracked learners' enunciation progress. The Integration Model Application (IMA) has shown that EDs utilization has stimulating effects leading to pronunciation rectifications. To overcome all refining phonetic challenges, E-dictionary and IMA could help measure the increasing effectiveness of precise phonetic realization of speech sounds of undergraduates. The integration of teaching in teaching-learning pronunciation proposes significant variations in the Preferential Poll Percentage and accurate articulation of active and passive lexicons in the pre-test and post-test. The results showed that the pre-test contained an increased percentage of mispronunciations (7.4% out of 10%, leading to inaccurate phoneme realization and imprecise enunciation. Immediately after the integration and utilization of EDs, the undergraduates of the above-mentioned three universities altered their articulatory manner to reduce error factors. This reduction maximized their precise phoneme realization owing to the technology-based hearing of phonetic transcriptions of the lexicon. EDs integration has explored minimization of challenges in teaching pronunciation to learners, along with seeking handy and dynamic solutions.

Table 3 presents the pre-test and post-test results in condensed forms and their comparison. The first row of the table shows inaccurate phoneme realization, whereas the second row indicates accurate phoneme realization, along with variations in both rows in preference poll percentages.

Table 3. Variation in Preferential Poll Percentage Pre-test and Post-test Randomization Strategies

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **1. Pre-test Preference Poll Percentage (10%)** | **6.5%** | **8.2%** | **7.8%** | **6.9%** | **7.5%** | **8.3%** | **6.3%** | **7.4%** | **6.8%** | **8.3%** |
| **2. Post-test Preference Poll Percentage (10%)** | **6.4%** | **7.1%** | **7.6%** | **8.1%** | **8.3%** | **8.6%** | **8.2%** | **7.9%** | **8.3%** | **9.1%** |

The above table recapitulates the variations in the Preferential Poll Percentage of Pre-test and Post-test Randomization Strategies. The total percentage is 10%; each word has given 0.5% marks. There have been 20 words in both Pre-test and Post-test that make total 10%. Thus, the variations of both tests, as applied randomization strategies 1-3 for Pre-test, and 1-3 for Post-test, has indicated huge variaitons in their results after the integration of EDs at undergraduate level. Undergraduates had inaccurate phoneme realization during the pre-test sessions without EDs integration. The rate of inaccuracy ranged from 6.3% to 8.3% for mispronunciation. Immediately after, the integration of EDs immensely substantial increases in rectification as well as precise phoneme realization have been adopted, which has led to amelioration of speaking and reduction of pronouncing errors. The minimum percentage of accurate phoneme realization was 6.4%, whereas the maximum phoneme realization accuracy was 9.1% out of 10%. Hence, integrating e-dictionaries effectively enhances phonetic accuracy, bringing changes in speaking amelioration and precise articulation of the lexicon in both tests.

### *9.1 Discussion and Findings of the Empirical Data*

Redeeming the integration of EDs for phonetic improvements diverges distracted undergraduates from the traditional approach to e-learning pronunciation. This addition of using a Personal Academic Assistant (PAA) projects learners' inclination to improve their speaking accuracy by refining their articulation. EDs utilization makes learning pronunciation enjoyable through class interactions. Inspiring constructive conversations is possible through correct hearing phonation and phonetic transcription. Accessibility to EDs has become a trending education of articulation that has led to the replacement of the traditional manner of refining speaking accuracy. (Reynolds & Morgan, 2001). Furthermore, benefitting from EDs in articulation correction invigorates learners' curiosity to refine their phonetic features. Undergraduates could speak better and perform well in their academic careers without communicative barriers because of the prioritization of EDs, which augments their phonetic knowledge through imitation of sounds with more precision. (Valdez, 2005).

It has been beneficial to use and integrate EDs to compensate for pronunciation errors. The features of EDs create an atmosphere of accurate interaction in undergraduates' conversations. In addition, reconsidering facets and variations in speech sound production makes EDs collaborations more operationalized. This operationalization of TI reconsiders the understanding of variations that could become

perceivable through "autonomous learning." (Yildiz & Yucedal, 2020). Some undergraduates expressed opinions regarding the realization of correctly enunciating words due to TI. The percentage of these learners has changed from **2.5%** to **7.8%**. At the same time, others firmly stated their inspiration and satisfaction felt because of EDs applications. Speaking corrections were developed by reiterating the pronunciation of the lexicon after being pronounced. EDs engage students to rectify mispronounced words in a group shape, providing effectiveness in connecting IT apps, leading to a focused erudition.

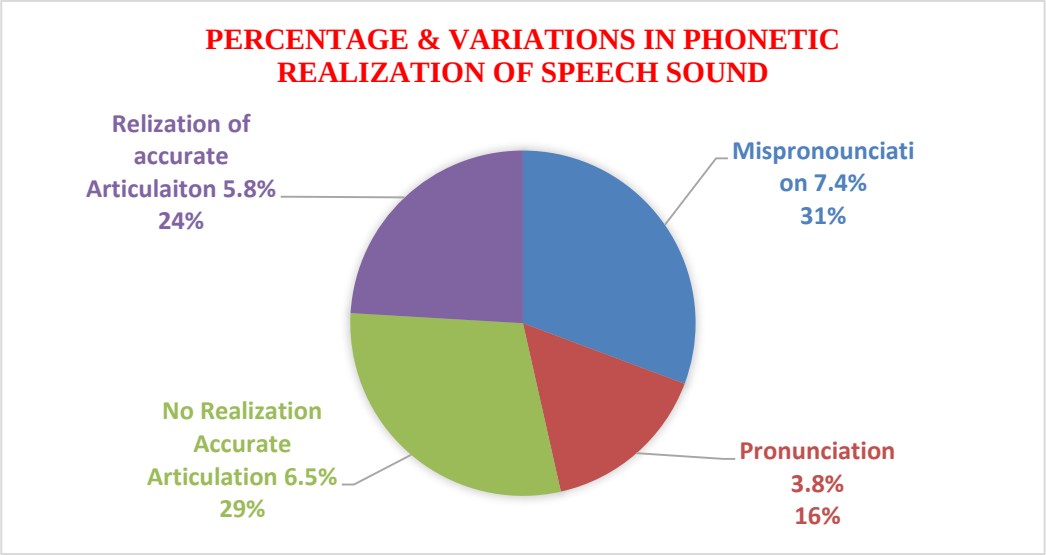


Figure 2. Percentage & variations in phonetic realization of speech sound

figure 2 further discusses the perceptions of speech sound realization and articulation. Before the integration of EDs, the students had poor speaking ability or no consciousness to revisit their phonetic inaccuracies during the instructional sessions. Experiments have shown that 6.5% of learners have no Realization of Accurate Articulation (RAA). This shows that pedagogical assistance and effects can help standardize the pronunciation of mispronounced lexemes. It can be observed that lucrative integration of EDs to facilitate learning enunciation becomes more anticipated as part of the instructional and learning process. In addition, the utilization of EDs provides academic convenience in broadening the phonological and phonetic spheres of understanding spellings to sound rules. The researcher observed that the application of various new formats of EDs should be included as a strategy for promoting the manner, place, and control of articulation. The learners demonstrated increasing skills in evaluating their production and reception of speech sounds. The pie chart shows 7.4% inaccurate realization of phonemes and 5.8% accurate realization of phonemes before integration of EDs.

To customize EFL classrooms by integrating technological apps that facilitate language improvement. This decision to utilize EDs modifies the ASA in which the minimization of phonetic errors has taken place. 5.8% Realization of Accurate Articulation (RAA) was investigated out of 10%. The objective of ameliorating RAA outcomes should involve more dependency on EDs software, which helps in understanding phonetic principles and specificities to converse without errors. Relationship between EDs integration and speaking amelioration codependent variables by reconsidering pronunciation intentions Undergraduates have re-assessed the impact of using apps to recognize disparities in sound utterances. By conducting interconnected activities, the essence of the present article is to explore the optimization and operationalization of EDs that encourages students to imitate and reiterate correct pronunciation. The more students are exposed to practice, the more reflective the practitioners become. (Shyamlee, & Phil, 2012).

Inosculating undergraduates' rectification in pronunciation because of EDs becomes more significant in terms of positive alterations that stress accurate spoken language. Instructors have mastered their correct enunciation over time and what undergraduates can imitate by restating their teachers. This imitation of speaking helps students achieve excellent fluency in academic institutions. EDs application could be a better option to increase speaking faculty and knowledge of enunciation at the present time. With the pre-test and post-test of active and passive vocabs, the researcher analyzed how precisely undergraduates perceived improvement in the assigned tasks. Comparative analysis of pre- and post-tests has emerged as an excellent choice for students to elevate their phonetic accuracy. Randomization Strategies from 1-3 of the pre-test and post-test presented significant variations in terms of rectification in the enunciation of the lexicon. Participants performed expectedly fine during the reproduction of words in the posttest. For instance, students need to demonstrate speaking proficiency and accuracy in a variety of speaking activities. In the amelioration of pronunciation, Pakistani students manifested their aspirations for the integration of EDs to increase their speaking abilities. Teachers consider enhancing the articulation of their achievements and accomplishments, which are measured through phonetic transcriptions and records (tests and assessment) of the learners. Teachers also evaluated the undergraduates' speaking precision and determined further improvements. The participants improved in accordance with the

phonetic rules, sound features, and standards. TI and EDs should be adopted as innovative strategies to increase learning of articulation. (Chun, Kern, & Smith, 2016).

The central objective of this study was to determine undergraduates' pronunciation quality through the capitalization of EDs, leading to effective results. Positive influences, on learners' articulation accuracy, have been highlighted in "Preferential Poll Percentage". Undergraduates have paid great attention to observing and reiterating accurate speech sounds during their exercises. The integration of EDs reinvigorates learners' phonetic performance through the intervention of apps, constructing positive behaviors for them to speak fluently and accurately. Mostly, learners' amelioration in speaking has been measured using different tests and oral presentations, indicating the pronounced accuracy of active quotidian vocabs. This acceleration in perceiving speech sounds precisely projects the positive tendency in rectify phonetic errors.

Adopting more immersive learning options and solutions, undergraduates have developed experimental understanding, leading to an apparent achievement of learners' improvement in speaking faculty. Two internal and external factors systematically influenced the students' speaking rectification. EFL teachers' integration of EDs included motivational factors to promote the aptitude of enunciation intelligence along with enthusiastic concentration on grammaticalities and linguistic categorization of words. Indeed, internalization of phonetic abilities stimulates students' eagerness and satisfaction with English exact pronunciation by using assistant EDs in such acquisition. Hence, undergraduates' assertiveness vis-à-vis benefitting from technology integration develops their anticipation and pleasure in correcting their mispronunciation. It could be perceived that EDs have more interference in the attainment of correct articulation; likewise, EDs facilitate undergraduate students' comprehension of phonetic symbols and transcriptions.

Moreover, the utilization of EDs creates an atmosphere for instructors to sustain the enthusiasm of learners who receive stimuli in classrooms. For example, sound variations could reduce the percentage of producing inaccurate articulatory phonetics leading to minimize students' phonating anxieties which affect their learnings of precise phonemes realization. Subsequent to accurate sound reception, instructors suggest that learners capitalize on contemporary technological achievements in correctly recognizing speech sounds. In engaging learners in different class activities, instructors advocate for students the effectiveness of EDs in motivating their speaking accuracy while expressing ideas and thoughts. Joseph and Uther (2009) argued that mobile phone dictionaries assist language learners in increasing their pronunciation skills; learners refine their concepts concerning phonetic complexities by hearing the pronunciation of the lexicon. Table-1 and Table-2 highlight imprecise phonemes and their phonetic transcripts, indicating improper articulation of active and passive vocabularies.

EDs uses the render affordance of individual connectivity that maintains speaking progress. Undergraduates emphasize that EDs utilization is helpful in creating spontaneity in speaking and developing literacy in pronunciation without being time-consuming. (Reynolds & Morgan, 2001). E-dictionaries have strengthened vocabulary articulation and function, leading to precise interactive learning, including speech and phonetic knowledge. This article explores dichotomies in pre- and post-test preferential poll percentages. The profiting influence of EDs on undergraduates' speaking progress could be the result of integrating applications to inspire pronunciation corrections. Learners imitate the exact articulation of words by means of repetition and constant imitation of pronunciation, which reshapes the control of speech sound production by moving Active Articulators (lips, jaws, and tongue). Imitation and repetition have surfaced mutual correspondence as well as correlations promoting the sustainable attitude of EFL learners towards the standardization of vocalization. (Gunu ç & Babacan, 2018). EFL instructors' realization of IPA standard articulation has a positive influence on undergraduates' learning of precise speech sounds. (Yang, 2023). The relationships and correlations between learners' performance and language aptitudes indicate teachers' sustainable achievements in the context of articulation progress. (Amirian, & Heshmtifar, 2013).

The following tables show active quotidian vocabs and their Randomization Strategies for imitation and repetition of the inaccurate articulation of speech sounds. The pre-test articulation of speech sounds has revealed inaccuracy during the production of the lexicon about which the undergraduates have no accurate realization of speech sounds. The Preference Poll of Inaccurate Articulation has highlighted variations from 62% to 83% during undergraduates' speaking, before integration of EDs, in the pre-test. After experiencing and analyzing a handsome percentage of inaccurate articulation of high-frequency words, the researchers put the due phonetic transcriptions of the pre-test lexicon for the manifestation of comparison. The statistics unfolded the learners' incorrect pronunciation of the given words. They could not differentiate between /s/ and /z/ allophones during articulation in rapid spoken language due to not actual realization of phoneme complimentary distributions. The undergraduates could not recognize the distinctive realization of an allophone. This emergence of mispronunciations at the undergraduate level has created significant room for EDs integration to elevate the standardized enunciation of EFL learners.

The data in Tables 4-6 present Pre-test Randomization Strategies (1-3) with different preference polls, percentages of inaccurate phoneme realizations, and phonetic transcriptions. Each Randomization Strategy has variations to evaluate the mispronunciation of undergratudes and the imprecise articulation of active vocabs.

Table 4. Pre-test Randomization Strategy # 1 of Preferential Poll Percentage

| Items | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Active Vocabs | Ambiguity | Consecutive | Conservative | February | Homogenous | Insert | Miser | Salmon | Wednesday | Tomb |
| Phonetic Transcription | /æm bɪ ˈgjuviti/ | /kən ˈzekjt ɪv/ | /kan ˈzɜːvɪtɪv/ | /feb ri◡ər i/ | /hu ˈmudʒ iːn əs/ | /ɪn ˈzɜːt/ | /mezər/ | /salmən/ | /wednez deɪ/ | /tuːmb/ |
| Inaccurate Phoneme Realization | /juvi/ | /z/ | /z/ | /ri/ | /hu ˈmu/ | /z/ | /e/ | /al/ | /dnez/ | /mb/ |
| Preferential Poll Percentage | 65% | 82% | 78% | 69% | 75% | 83% | 63% | 74% | 68% | 83% |
| 10% | 6.5% | 8.2% | 7.8% | 6.9% | 7.5% | 8.3% | 6.3% | 7.4% | 6.8% | 8.3% |

Table 5. Pre-test Randomization Strategy # 2 of Preferential Poll Percentage

| Items | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Active Vocabs | Ambiguity | Insert | Salmon | February | Tomb | Consecutive | Miser | Conservative | Wednesday | Homogenous |
| Phonetic Transcription | /æm bɪ ˈgjuviti/ | /ɪn ˈzɜːt/ | /salmən/ | /feb ri◡ər i/ | /tuːmb/ | /kən ˈzekjt ɪv/ | /mezər/ | /kan ˈzɜːvɪtɪv/ | /wednez deɪ/ | /hu ˈmudʒ iːn əs/ |
| Inaccurate Phoneme Realization | /juvi/ | /z/ | /al/ | /ri/ | /mb/ | /z/ | /e/ | /z/ | /dnez/ | /hu ˈmu/ |
| Preferential Poll Percentage | 65% | 83% | 74% | 69% | 83% | 82% | 63% | 78% | 68% | 75% |
| 10% | 6.5% | 8.3% | 7.4% | 6.9% | 8.3% | 8.2% | 6.3% | 7.8% | 6.8% | 7.5% |

Table 6. Pre-test Randomization Strategy # 3 of Preferential Poll Percentage

| Items | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Active Vocabs | Ambiguity | Miser | Conservative | Wednesday | Homogenous | Insert | Consecutive | Salmon | February | Tomb |
| Phonetic Transcription | /æm bɪ ˈgjuviti/ | /mezər/ | /kan ˈzɜːvɪtɪv/ | /wednez deɪ/ | /hu ˈmudʒ iːn əs/ | /ɪn ˈzɜːt/ | /kən ˈzekjt ɪv/ | /salmən/ | /feb ri◡ər i/ | /tuːmb/ |
| Inaccurate Phoneme Realization | /juvi/ | /e/ | /z/ | /dnez/ | /hu ˈmu/ | /z/ | /z/ | /al/ | /ri/ | /mb/ |
| Preferential Poll Percentage | 65% | 63% | 78% | 68% | 75% | 83% | 82% | 74% | 69% | 83% |
| 10% | 6.5% | 6.3% | 7.8% | 6.8% | 7.5% | 8.3% | 8.2% | 7.4% | 6.9% | 8.3% |

The following tables also present passive-frequency vocabs and their Randomization Strategies for imitation and repetition of inaccurate articulation of speech sounds. The pre-test articulation of speech sounds has exposed unexpected inaccuracies despite successful instructors' attempts in the classroom. The production of the subsequent lexicon has revealed that undergraduates have no appropriate realization of speech sounds. The Preference Poll of Inaccurate Articulation has shown that learners have a sheer fiasco pronouncing precise words. The variations from 64% to 91% in undergraduates' speaking have been revealed before integrating EDs in the pre-test. After analyzing the huge dichotomy between correct and incorrect enunciation, the researcher put the due phonetic transcriptions of the pre-test lexicon for the purpose of comparison. The statistics also clarify that learners' inappropriate pronunciation of the given words requires rectification and exact speech sound realization for better proficiency and fluency in English. They could not differentiate between /dʒ/ phoneme and /ʒ/, /kɑ/ and /sɑː/, /ʃ/ and /tʃ/ during the articulation. Referring to the emergence of mispronunciations at the undergraduate level, the researcher has created significant room for the dire need for EDs integration to stimulate learners to acquire standardized pronunciation of English.

Tables 7-9 present Post-test Randomization Strategies (1-3) with different preference polls, percentages of accurate phoneme realizations, and phonetic transcriptions. Each Randomization Strategy has variations to evaluate the undergratudes' rectification and accuracy in pronunciation, indicating the precise articulation of passive vocabs.

Table 7. Post-test Randomization Strategy # 1 of Preferential Poll Percentage

| Items | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Passive Vocabs | Camouflage | Chutzpah | Desiderate | Epitome | Fa ɑde | Hyperbole | Nietzsche | Paparazzo | Quiescence | Rapport |
| Phonetic Transcription | /kæm ə flɑːdʒ/ | /tʃʊts pə/ | /dɪˈsɪdɑːeɪt/ | /ɪ ˈpɪt uːm/ | //fɑːˈkɑːd/ | /haɪ ˈpɜːb uli/ | /ˈniːt ʃeɪ/ | /pæp ə ˈræzəʊ/ | /kwi ˈis əns/ | /ræ ˈpuː rt/ |
| Inaccurate Phoneme Realization | /dʒ/ | /tʃ/ | /sɪ/ | /uː/ | /kɑ/ | /u/ | /ʃeɪ/ | /zəʊ/ | /is əns/ | /t/ |
| Preferential Poll Percentage | 64% | 71% | 76% | 81% | 83% | 86% | 82% | 79% | 83% | 91% |
| 10% | 6.4% | 7.1% | 7.6% | 8.1% | 8.3% | 8.6% | 8.2% | 7.9% | 8.3% | 9.1% |

Table 8. Post-test Randomization Strategy # 2 of Preferential Poll Percentage

| Items | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Passive Vocabs | Façade | Nietzsche | Rapport | Epitome | Camouflage | Hyperbole | Chutzpah | Paparazzo | Quiescence | Desiderate |
| Phonetic Transcription | //fɑːˈkɑːd/ | /ˈniːt ʃeɪ/ | /ræ ˈpuːrt/ | /ɪ ˈpɪtuːm/ | /kæm ə flɑːdʒ/ | /haɪ ˈpɜːbuli/ | /tʃʊts pə/ | /pæp ə ˈræzəʊ/ | /kwi ˈis əns/ | /dɪˈsɪdɑːeɪt/ |
| Inaccurate Phoneme Realization | /kɑ/ | /ʃeɪ/ | /t/ | /uː/ | /dʒ/ | /u/ | /tʃ/ | /zəʊ/ | /is əns/ | /sɪ/ |
| Preferential Poll Percentage | 83% | 82% | 91% | 81% | 64% | 86% | 71% | 79% | 83% | 76% |
| 10% | 8.3% | 8.2% | 9.1% | 8.1% | 6.4% | 8.6% | 7.1% | 7.9% | 8.3% | 7.6% |

Table 9. Post-test Randomization Strategy # 3 of Preferential Poll Percentage

| Items | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Passive Vocabs | Nietzsche | Desiderate | Chutzpah | Paparazzo | Rapport | Quiescence | Camouflage | Epitome | Hyperbole | Façade |
| Phonetic Transcription | /ˈniːt ʃeɪ/ | /dɪˈsɪdɑːeɪt/ | /tʃʊts pə/ | /pæp ə ˈræzəʊ/ | /ræ ˈpuːrt/ | /kwi ˈis əns/ | /kæm ə flɑːdʒ/ | /ɪ ˈpɪtuːm/ | /haɪ ˈpɜːbuli/ | //fɑːˈkɑːd/ |
| Inaccurate Phoneme Realization | /ʃeɪ/ | /sɪ/ | /tʃ/ | /zəʊ/ | /t/ | /is əns/ | /dʒ/ | /uː/ | /u/ | /kɑ/ |
| Preferential Poll Percentage | 82% | 76% | 71% | 79% | 91% | 83% | 64% | 81% | 86% | 83% |
| 10% | 8.2% | 7.6% | 7.1% | 7.9% | 9.1% | 8.3% | 6.4% | 8.1% | 8.6% | 8.3% |

It also comes to the surface that EFL instructors' problems include a lack of materials and technical assistance in refining learners' pronunciation skills. The development of phonetic knowledge and modern EDs has become more desirable for the refinement of the speaking faculty. Introducing innovations to reduce mispronunciation by 7.4% requires following up on the correct hearing of phonetic transcription for rectification. To reform undergraduates' accents and awareness of no mutual (one-to-one) correspondence in spoken and written language, the researcher felt that the utilization of EDs for ASA fluency and accuracy was 4.8%. This issue certainly plays a rudimentary role in the precise realization of phonemes for conceptualization and practice. To fulfill this task, it is essential to consistently utilize EDs that are considered handy in use. The students obtain independent accessibility to personal academic assistants, which provide manageable access to use. Continuity in the utilization of EDs generates better omens for reducing mispronunciation factors. Through this utilization, learners can stimulate their phonetic intellectuality and perceive tangible sound hearing for effective vocalization and phonation.

*9.2 Eds As Personal Academic Assistants (Paa)*

The experimental phase of imitation and reiteration during pre- and post-text exhibited better preparation and learners' experience. The students realized the accurate realization of speech sound articulation. The more time allocated to practice with EDs, the greater the increase in the percentage of accuracy that emerges in student performance. The integration of EDs provides immersive speaking development opportunities for EFL learners to access specific sound pronunciations for practical applications. In addition, the assistance and utilization of apps initiate stimulation for understanding precise sound articulation rather than speaking with a poor rate of pronunciation accuracy. (Jarvis, & Achilleos, 2013). The chart depicts the effectiveness of EDs integration, which facilitates learning and the long-term retention of accurate comprehension of phonetic knowledge and phonetics (articulatory and acoustic). PAA stimulates accurate phonetic changes needed to internalize reduction in errors. Second, undergraduates refocus on practice and performance.

English learners currently revolve around modern global communication trends. The development of English enunciation requires a model of student-centered correction using electronic dictionaries and applications of pronunciation. The application of technology helps improve speaking accuracy, which is 63.5% (6.3%). This percentage could promote positive attitudes toward integrating modern technology as an assisting learning strategy in instructional design to understand the difference between the accurate and inaccurate articulation of speech sounds. Stimulation for right articulation and rectification augmented the percentage from 43% to 67%, which indicates students' predisposition towards positive behavior of refining their speaking power. The researcher advocated that collaborative learning augments learners' experiences by means of the practical repetition of accurate phonetic symbols. Indeed, undergraduates have grown speaking proficiency concomitantly with their understanding of differentiating inaccurate and accurate articulations through EDs integration for pronunciation correction. Phonetic instructions meet the needs of students in EDs to refine their communication enunciation, which highlights their stimuli to overcome inaccurate articulation.

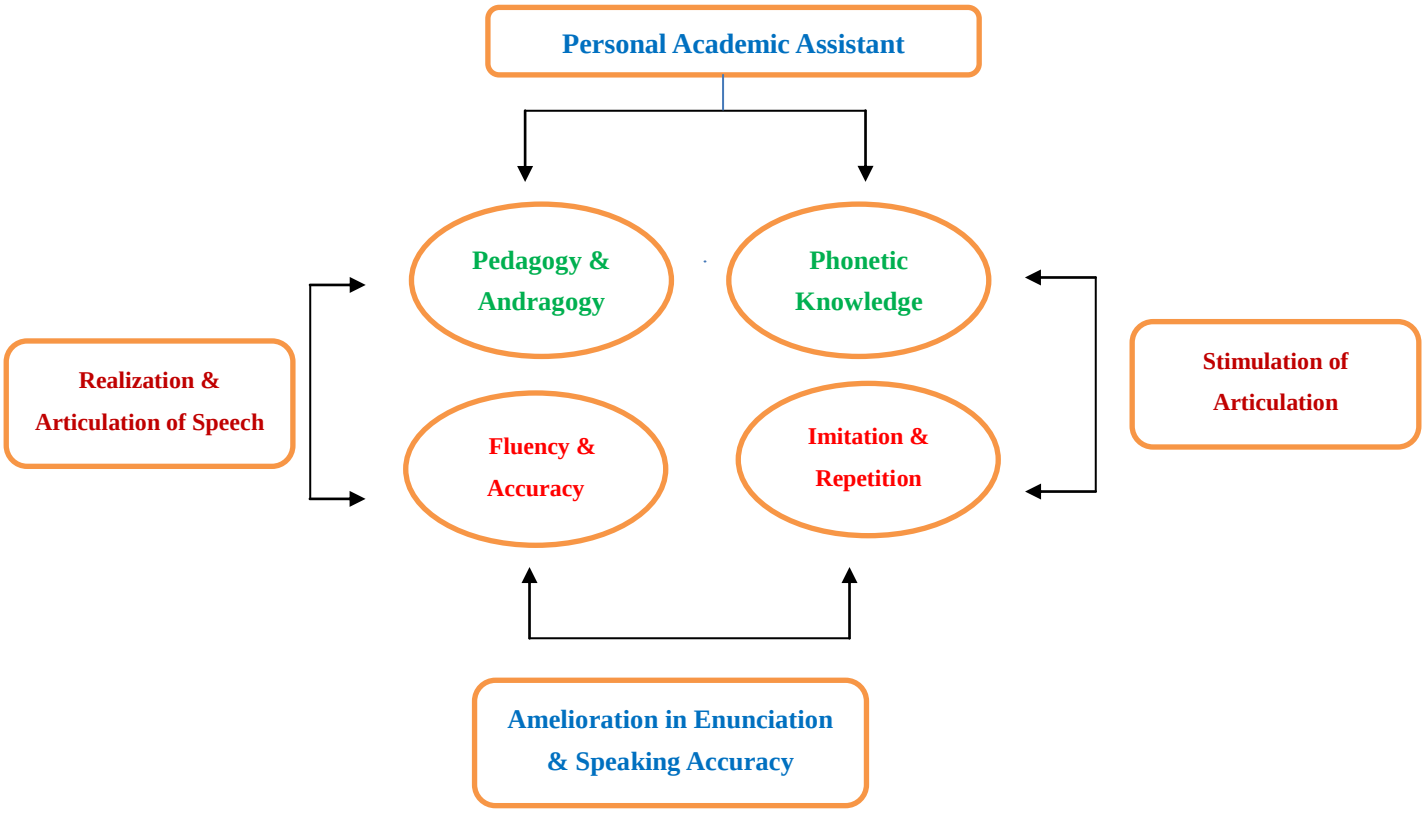


Figure 3. Effectiveness of E-dictionaries Integration

This study surfaced that familiarity with rudimentary fundamentals of speech sounds could increase phonetic knowledge and phonetic accuracy. EDs, as personal academic assistants, help in pedagogy and andragogy to enhance the overcoming of both perceived pronunciation and psychological barriers experienced by learners. The researcher conceived of the level of enthusiasm about using EDs and realized their lucrative impacts on the development of accent and accuracy simultaneously. The realization and articulation of speech sounds (48%-74%) had a lucid influence on students' pronunciation skills. It has been shown that beneficial impacts on undergraduates' phonetic considerations lead to their stimulation of the rectification of phonetic features. Learning pronunciation is intended to be the process of retention of phoneme realization, which creates sufficient competence in digital literacy, exclusively using techo-apps to interact meaningfully. In post-test articulation, students redeemed streamlining their skills for precise phonation of phonemes. The examination and evaluation of both tests explicitly projected the elevation in pronunciation standardization without restrictions. The researcher investigated variations in pre-test and post-test articulation results, showing significant effects of using Praat diagrams to facilitate technical support. Sustainable achievements in refining enunciation and rectifying mispronunciation were up to 62.3% out of 100% (6.23% out of 10%). This indicates that undergraduates should be recommended to integrate EDs to get Amelioration of Speaking Accuracy (ASA). However, technological tools do not meet their neEDs because they are at an advanced level for learners (Sharko et al., 2021).

## 10. Conclusion

To recapitulate this regular article, the integration of e-dictionaries streamlines speaking accuracy at the undergraduate level. This integration has led to the generation of encouraging sparks and exclusive concentration to reduce phonetic errors. After EDs incorporation and utilization, improvements in speaking accuracy have led to seamless and accurate phonetic comprehension of speech sounds. Undergraduates have become familiar with phonetic transcriptions and moving articulators. The percentage of inaccurate enunciation was reduced to a minimum level from 7.4% to 2.8% out of 10%. EDs applications not only engaged students, but also increased their Preferential Poll of accuracy. Undergraduates began to refine their understanding of the manner, place, and control of articulation because they had personal academic assistants (e-dictionaries). The effectiveness of e-dictionaries changes pronunciation through repetition and imitation, which motivated the right dynamics of enunciation. Incorporating EDs has an encouraging effect on students' phonetic considerations. Using Praat for a variety of lexicon randomization strategies created an understanding of mispronouncing phonemes and stimulated undergraduate students to enrich the rectification of articulatory and acoustic phonetics. Accurate articulation has manifested from 6.7% out of 10% as positive impacts and efficacies of EDs. The integration and utilization of EDs have been observed to be directly proportional to augmenting the quality and accuracy of enunciation, which has led to the emergence of fluency and proficiency in speaking power in academic and professional contexts. Finally, it has been observed that EDs applications influence the precise realization of speech sounds, which reduces the mispronunciation of active and passive lexemes.

*10.1 The Study Has the Subsequent Main Findings*

1. E-dictionaries integration effectively improves precise phoneme realization.
2. E-dictionaries integration stimulates undergraduates to refine pronunciation.
3. E-dictionaries integration provides opportunities for undergraduates to reduce their phonetic inaccuracies.
4. E-dictionary integration could be perceived as a Personal Academic Assistant (PAA) refining enunciating aptitude.
5. E-dictionary integration strengthens the imitation and reiteration of active and passive vocabs, leading to the exact vocalization of the lexicon.

*10.2 Conflict of Interest*

The authors declare that this research was conducted in the absence of any commercial benefits or financial relationships, which could be precisely construed as potential conflicts of interest.

**Acknowledgment**

The authors express their gratitude to King Khalid University for providing a healthy research environment.

**References**

Alhaisoni, E. (2016). EFL Teachers' and Students' Perceptions of Dictionary Use and Preferences. *International Journal of Linguistics, 8*(6), 31-52. https://doi.org/10.5296/ijl.v8i6. 10267

Amirian, S. M. R., & Heshmtifar, Z. (2013). The Impact of Using Electronic Dictionary on Vocabulary Learning and Retention of Iranian EFL Learners. *International Journal of Research Studies in Educational Technology, 2*(1), 35-44. https://doi.org/10.5861/ijrset.2013.384

Benson, L. F., Farnsworth, B. J., Bahr, D. L., Lewis, V. K., & Shaha, S. H. (2001). Preparing tomorrow's educators to use technology: Learning and attitudinal impacts on elementary learner. *Journal of Instructional Psychology, 29*(3), 121-138.

Carr, J. A., Petrokofsky, G., Spracklen, D. V., Lewis, S. L., Roe, D., Trull, N., … Sallu, S. M. (2021). Anticipated impacts of achieving SDG targets on forests - a review. *Forest Policy and Economics, 126*, 102423. https://doi.org/10.1016/J.FORPOL.2021.102423

Chun, D., Kern, R., & Smith, B. (2016). Technology in language use, language teaching, and language learning. *The Modern Language Journal, 100*, 64-80. https://doi.org/10.1111/modl.12302

Ciaffaroni, M. T. (2006). How Good Are Esl/Efl Websites? *Teaching English with Technology, 6*(4). Retrieved from http://www.tewtjournal.webs.com/VOL%206/ISSUE%204/06_HOWGOODARE.pdf

Consoli, T., Désiron, J., & Cattaneo, A. (2023). What is "technology integration" and how is it measured in K-12 education? A systematic review of survey instruments from 2010 to 2021. *Computers & Education*, 104742. https://doi.org/10.1016/j.compedu.2023.104742

Dashtestani, R. (2013). EFL Teachers' and Students' Perspectives on the Use of Electronic Dictionaries for Learning English. *Call-Ej, 14*(2), 51-65. https://doi.org/10.1016/0346- 251X(95) 00005-5

Firman, F., & UlHaq, M. (2012). Improving the students' speaking accuracy through "LSE 9.0 Software Version". *Exposure: Jurnal Pendidikan Bahasa Dan SastraI NGGRIS*, *1*(2), 166. https://doi.org/10.26618/ejpbi.v1i2.777

Gunuç S., & Babacan, N. (2018). Technology integration in English language teaching and learning. *Positioning English for Specific Purposes in an English Language Teaching Context*, *1*.

Jarvis, H., & Achilleos, M. (2013). From computer-assisted language learning (CALL) to mobile assisted language use (MALU). *The Electronic Journal for English as a Second Language (TESL-EJ), 16*(4), 1-18. Retrieved from http://usir.salford.ac.uk/29388/

Jonassen, D., Howland, J., Marra, R. M., & Crismond, D. (2008). How does technology facilitate learning? *Meaningful Learning with Technology* (5-10). NJ: Pearson Allyn Bacon Prentice Hall.

Joseph, S., & Uther, M. (2009). Mobile Devices for Language Learning: Multimedia Approach. *Research and Practice in Teaching Enhanced Learning, 4*, 7-32. https://doi.org/10.1142/S179320680900060X.

Lever-Duffy, J., McDonald, J. B., & Mizell Al P. (2005). *Teaching and learning with technology.* San Francisco: Pearson.

Lewis, G. (2015). Reality check: Evaluating the impact of technology in language teaching 10 years afterWeb 2.0. Plenary Session 2 of the 5th Bilgi University ELT Conference, May 9, Turkey.

McKenney, S., & Visscher, A. J. (2019). Technology for teacher learning and performance. *Technology, Pedagogy and Education*, *28*(2), 129-132. https://doi.org/10.1080/1475939X.20 19.1600859

Miner, T. (2004). *Using technology to enhance learning: Instructor-or student-moderated discussion boards: Which are more effective?* Retrieved from http://www.cccone.org/scholars/0405/TomMiner_final_report.pdf

Nimehchisalem, V. (2014). Approaches to the evaluation of computer-assisted language learning software. In R. Al-Mahrooqi & S. Troudi (EDs.), *Usingtechnology inforeignlanguage teaching* (pp. 285-302). Newcastle upon Tyne: Cambridge Scholars Publishing.

O'Dwyer, L., Russel, M., & Bebell, D. (2004). Identifying teacher, school and district characteristics associated with elementary teachers' use of technology: A multilevel perspective. *Education Policy Analysis Archives, 12*(48). https://doi.org/10.14507/epaa.v12n48.2004

Peters, L. (2009). *Global Education: Using technology to bring the world to your students* (1st ed.). International Society for Technology in Education. Washington.

Pourhosein, G. A., & Sabouri, N. B. (2014). Role of Iranian EFL teachers about using Pronunciation Power Software in the instruction of English pronunciation. *English Language Teaching, 7*(1), 139-148. https://doi.org/10.5539/elt.v7n1p139

Redmann, D. H., & Kotrlik, J. W. (2004). Analysis of technology integration in the Teaching-Learning process in selected career and technical education programs. *Journal of Vocational Education Research, 29*(1). [Online] https://doi.org/10.5328/JVER29.1.3

Reynolds, C., & Morgan, B. A. (2001). Teachers' perceptions of technology in-service: A case study. *Society for Information Technology & Teacher Education*, *2001*(1), 982-986.

Sang, G., Valcke, M., Van Braak, J., & Tondeur, J. (2010). Student teachers' thinking processes and ICTintegration: Predictors of prospective teaching behaviors with educational technology. *Computers &Education, 54*(1), 103-112. https://doi.org/10.1016/j.compedu.2009.07.010

Sharko, M., Shpak, N., Gonchar, O., Vorobyova, K., Lepokhina, O., & Burenko, J. (2021). Methodological basis ofcausal forecasting of the economic systems development management processes under the uncertainty. *Advances in Intelligent Systems and Computing*. https://doi.org/10.1007/978-3-030-54215-3_27

Shelly, G. B., Cashman, T. J., Gunter, G. A., & Gunter, R. E. (2008). *Educators discovering computers: Integrating technology and digital media in the classroom* (5th ed.). Boston: Thomson.

Shuldman, M. (2004). Superintendent conceptions of institutional conditions that impact teacher technology integration. *Journal of Research on Technology in Education, 36*(4), 319-343. https://doi.org/10.1080/15391523.2004.10782418

Shyamlee, S., & Phil, M. (2012). Use of technology in English language teaching and learning: An analysis. *A Paper Presented at the 2012 International Conference on Language, Medias and Culture IPEDR Vol.33 (2012) ©(2012) IACSIT Press, Singapore*, *33*(2012), 150-156. Retrieved from http://www.ipedr.com/vol33/030- ICLMC2012-L10042.pdf

Solanki, D., & Shyamlee1, M. P. (2012). *Use of technology in English language teaching and learning: An analysis.* 2012International Conference on Language, Medias and Culture IPEDR vol. 33(2012)©(2012)IACSIT Press, Singapore. 150-156.

Valdez, G. (2005). *Technology: A catalyst for teaching and learning in the classroom.* Retrieved April 1, 2012, from http://www.ncrel.org/sdrs/areas/issues/methods/technlgy/te600.htm

Wilson, D., & Thayalan, V. (2007). *The role and relevance of CALL*. Karen's Linguistics Issues. Retrieved from http://www3.telus.netlinguisticsissuesrolecall.html

Xie, K., Nelson, M. J., Cheng, S. L., & Jiang, Z. (2023). Examining changes in teachers' perceptions of external and internal barriers in their integration of educational digital resources in K-12 classrooms. *Journal of Research on Technology in Education*, *55*(2), 281-306. https://doi.org/10.1080/15391523.2021.1951404

Yang, J. (2023). *Teaching K-5 English Language Learners Through Technology: Developing Effective Lesson Plans* (Doctoral dissertation, Greensboro College).

Yildiz, Y., & Yucedal, H. M. (2020). Learner autonomy: A central theme in language learning. *International Journal of Social Sciences & Educational Studies, 7*(3), 208-212. https://doi.org/10.23918/ijsses.v7i3p208