The Impact of Using Cell Phones on the Pronunciation of English Consonant Clusters among Saudi Female Secondary School Students*

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Abstract—This research attempts to find out the impact of using cellphones on the students' pronunciation with an emphasis on consonant clusters. The sample of the study was 40 female secondary school students divided into two groups control and experimental. The study attempted to answer one question: Will the use of pronunciation videos on cell phones help to improve Saudi female secondary students' pronunciation of English consonant clusters occurring in the onset position? To achieve this, the researcher conducted a pre-test and a post-test to test students' pronunciation of selected vocabulary from the English Inventory of consonant clusters. After the pre-test, the experimental group used video to practice these sounds while the control group practiced that in traditional classes. The findings showed that both groups improved. However, the experimental group, having utilised cell phone videos, made significant improvement by 7.05% in the correct production of consonant clusters.

Keywords—consonant cluster, onset, traditional method, cellphones

1 Introduction

Second language (L2) learning has gone through long stages of development and improvement. It started with a considerable focus on the acquisition of correct grammar and translation. Besides, writing and listening have been given attention by scholars and language instructors. Unfortunately, accurate pronunciation has not been given enough attention and sometimes looked at as insignificant. However, much research has been done on pronunciation teaching and L2 learning in general. For example, Brodkey (1972) [3] and Stuparyk (1996) [14] investigated the importance of teaching pronunciation and its role in speech intelligibility. Therefore, the focus of this study will be on the role of cell phones in enhancing L2 students' pronunciation, particularly consonant clusters occurring in the onset position.

2   Literature review

2.1   Theoretical background

Pronunciation problems can disrupt the flow of communication among non-native speakers, on the one hand, and between native and non-native speakers, on the other hand. In other words, intelligibility between speakers can be absent or weak when pronunciation did not reach the threshold level. This is described by Celce-Murcia, Brinton, and Goodwin (1996) [4] as an essential stage towards being intelligible to other speakers. Intelligibility was defined by Anderson-Hsieh (1989) [1] as the point where a speaker reaches a degree of accuracy sufficient to be understood by other people. This degree of accuracy as described by Anderson-Hsieh (ibid) can be reached by adopting appropriate pronunciation teaching methods which can now be possible from the use of new technology and the advancements in portable mobile devices, which can be utilized to enhance the pronunciation of consonant clusters.

Consonant clusters in English occur in one of these positions: onset, medial, or coda. The words '**str**ong', '**cr**owd', and '**fr**eak' are examples of consonant clusters occurring in the onset position. The words 'e**mpt**y', 'te**mpt**ed', and 'la**ndl**ady' are examples of medial consonant clusters. Finally, the words 'rea**ct'**, 'wo**rds'**, and 'te**xts'** are examples of consonant clusters occurring in the coda position. However, it should be noted that digraphs, such as /**ʧ**/ and /**dʒ**/, are not considered consonant clusters because each digraph represents a sound made of two symbols, as in the words '**ch**eck' /t**ʃ**ek/ and '**j**udge' /**dʒ**ʌ**dʒ**/ respectively (Black, 1981) [2].

2.2   Previous studies on pronunciation

In relation to pronunciation errors in consonant clusters, Na'ama (2011) [10] conducted a study on Yemeni students at Hudeidah University to discover what pronunciation errors in consonant clusters might occur. He reported interesting findings regarding these errors and gave some pedagogical propositions. Accordingly, the subjects came from levels 1, 2, and 3. The selection of the subjects was random, 15 from each level. The findings of Na'ama's study indicated that the subjects had noticeable errors with consonant clusters represented by what he called 'epenthesis' or 'vowel insertion'. Although the researcher did not give a statistical analysis of the results, he emphasized the presence of such errors and attributed this problem to the students' first language (Arabic) which does not allow the use of consonant clusters.

A number of experimental studies investigated the practicality of new technology in the teaching and enhancement of students' pronunciation (Johnson, Dunkel, Rekart, & Rekart, 1991) [9]; (Schwartz, J. Markoff, & Jain, 1991) [12]. The studies focused on intelligibility and comprehensibility in terms of the impact of technology-based pronunciation instruction on the acquisition of correct pronunciation. Therefore, the researchers inferred that pronunciation affects intelligibility. Derwing and Munro (2013) [5] defied intelligibility as "the extent to which a listener actually understands an utterance" (p. 385). Johnson, Dunkel, and Rekart (1991) [9] and Schwartz, Markoff, and Jain (1991) [12] also gave a definition of comprehensibility as "a listener's perception of how difficult it is to understand an utterance". Intelligibility is usually assessed using transcription or listening comprehension drills completed by a listener (ibid, p. 385).

The use of new technology in the enhancement of pronunciation has the potential of being effective in developing L2 learners' pronunciation. Nadeem, Mohsin, Mohsin, and Hussain (2012) [11] conducted a study on 50 MA students of English who had been taught using traditional methods. After taking a pronunciation pre-test, it was found that the subjects had many pronunciation mistakes in some individual words and had improper intonation as well. The researchers used some computer programs with pronunciation drills in which the students were trained and received feedback afterwards. The researchers noticed that students were better able to pronounce and differentiate between long and short vowel sounds. They were able to pronounce diphthongs and produce word stress and intonation in connected speech with better performance. Nadeem et al. (2012) [11] did not give a statistical discussion of the findings, but they emphasized the effectiveness of technology-based pronunciation learning and suggested that the use of new technology should be encouraged in L2 teaching and learning.

Similarly, Stenson, Downing, Smith, and Smith (1992) [13] carried out an experiment using the Speech Viewer to teach pronunciation, a digital display of sound waves. They wanted to find out whether computer-based displays of speech were effective in the teaching of pronunciation in L2. The results showed that in the pre-test, the difference between the experimental and the control groups was close, with an average of 1.10 points higher in favour of the experimental group. However, in the post-test, the difference between the experimental and control groups was higher, with an average of 3.01 points higher in favour of the experimental group. Nonetheless, both groups showed development in their pronunciation. The experimental group scored 7.33 points, and the control group scored 5.42 points. The researchers thought that the close results of both groups are because the subjects did not have enough training on the Speech Viewer. Otherwise, the statistics could have shown more significant results.

As stated earlier, much research has been conducted on the use of new technology in language teaching. For example, Harper (2004) [8] conducted a study to investigate the effectiveness of Computer-Assisted Language Learning (CALL) based pronunciation exercises for beginning ESL learners. But to the extent of the researcher's knowledge, no one has researched the impact of cell phones on the enhancement of pronunciation of consonant clusters occurring on the onset position. Therefore, we find this topic as important and genuine.

3   The study

3.1   Statement of the problem

Learners of English as a second language (ESL) or as a foreign language (EFL) often encounter some difficulties in word pronunciation. Saudi students are EFL learners who have their own problems in pronunciation, which might be attributed to first language interference. One of these problems is the mispronunciation of consonant clusters occurring in the onset position, a problem which can interfere and impede communication successfully. Hence, the researcher will investigate the impact of cell phones on pronouncing consonant clusters occurring on the onset position. The study will discuss the impact of cell phone pronunciation videos on a problematic issue for Arabic speaking learners of English called 'epenthesis', which is the insertion of a vowel

or consonant segment within an existing string by non-native speakers. For example, the word '*next'* would be pronounced /nekəst/ instead of /nekst/ (Yip, 1987) [16].

3.2 Question of the study

The study attempts to answer the following question:

— Will the use of pronunciation videos on cell phones help to improve Saudi female secondary students' pronunciation of English consonant clusters occurring in the onset position?

3.3 Hypothesis of the study

The researcher hypothesizes that in terms of consonant clusters occurring in the onset position, there will be an observable difference in pronunciation between students using cell phones and those who are taught using the traditional method.

3.4 Significance of the study

The study aims to provide teachers of English as a foreign language and EFL learners with a self-learning method through which good pronunciation can be enhanced in the students' own pace. The availability and utilization of cell phones in language classrooms can make language learning take place anywhere and anytime.

3.5 Participants

The targeted sample in this study included two randomly selected 2nd grade classes in female secondary school. During that time, the participants have studied English for five years in Saudi Arabia and were of almost the same age. They were studying the same courses and were being taught by the same teacher. Each class consisted of 20 students, so the total was 40 participants. These 40 students were chosen randomly with no criteria set before. The participants' levels were expected to be varied. One of the classes was a control group (class B) and the other, which is the focus of this study, was an experimental group (class A). The experimental group was given different audio and video recordings to be used on the subjects' mobile phones anywhere and at any time.

3.6 Instrument

To answer the research question, the researcher needed to have a suitable instrument. Therefore, a pre-test and a post-test were used to collect data and to confirm or reject the research hypothesis (see appendix A). The test has adopted from a previous form of Inventory of English Consonant Clusters. Both of them, the pre-test and the post-test, consist of three columns. The first one had a list of 20 words consisting of consonant clusters on the onset position (**Bl**ue, **Br**ight, **Cl**own, **Cr**owd, **Dr**ink, **Fr**own, **Gl**ass, **Gr**ass, **Pl**ug, **Pr**oud, **Shr**ank, **Sk**ull, **Scr**eam, **Squ**are, **Spl**een, **Spr**ing, **Tr**ig, **Str**ing,

Trip, **Str**ip). The second and third columns were used to show whether each participant pronounced the word correctly or not. The items of the tests were derived from the Inventory of English Consonant Clusters with some modifications to serve the purpose of the study. Those modifications included replacement of some items to make the words list compatible with the words in the audios and videos given to the students. Also, the other columns for insertion, deletion, and substitution of consonant clusters in the original form of the Inventory of English Consonant Clusters were not used since the purpose of this study is to examine the effect of cell phones as a means on the pronunciation of onset cluster rather than to investigate the types of errors made by Saudi secondary students. Nonetheless, the researcher made efforts to guarantee the validity of the test. The test was designed to measure onset consonant clusters and nothing else. Furthermore, reliability was also taken care of, and the test would hopefully give the same or similar results if conducted again in the same or similar circumstances.

3.7   Definition of terms

− *Consonant:* One of the speech sounds that is not a vowel and is produced by stopping the air from flowing easily through the mouth (Roach, 2009) [17].
− *Consonant Cluster:* two or more consonants placed adjacent to each other at the beginning, middle or end of a word (Roach, 2009) [17].
− *Onset:* the segment of a syllable preceding the nucleus as the [gr] in the word *great* (Roach, 2009) [17].
− *Traditional Method:* it gives the important role of the teacher as being the controller of the classroom learning context. In short, the language teacher is the one who makes learning take place (Novak, 1998) [18].

3.8   Procedures of data collecting and data analysing

Data collection. The procedures used for collecting the data for the study involved per- test and post-test. On November 24th, the pre-test was conducted on both groups in the lab where each student sat in an individual booth supplied with a headset and a monitor. After introducing herself to the participants and explaining the aim of this study, the researcher gave brief instructions to the subjects on what to do. Then, the words were displayed on the monitor one by one, and each student started reading the words as the researcher listened and checked the subjects' pronunciation simultaneously on a checklist (see Appendix A). After that, each student in the experimental group was given five different audios and videos that provided examples of words with onset consonant clusters pronounced by native speakers. These recordings included words such as *blend, brown, broccoli, black, blue, cry, crap, clap, clown, grapes, green, glasses, gloves, frog, French, fly, drink, dressed, trained, tree, plant, playground, scooter, scarf, skirt, sky, sleep, slow, smile, smock, snow, snails, squares, squid, spoon, spin, stars, stop, sweater, swimsuit, sing, stunk, stinky*. These recordings have been reformatted to work on different types of cell phones. The subjects received these videos on their cell phones to use anytime and anywhere. Furthermore, the students had the chance to listen to the correct pronunciation and even record themselves using similar items to those

in the list. On the other hand, the control group underwent the usual traditional teaching method of learning the pronunciation of onset consonant clusters in the classroom and on the board without using any of these cell phone videos. On December 1st, the post-test was conducted on both groups after one week to see if there is a significant difference in the subjects' pronunciation. The data was gathered from both tests and was entered into excel and analysed. Then, the findings were reported, and suggestions and recommendations were given as well.

Data analysis. The pre-test and post-test have led to some significant findings. There were some noticeable errors with the production of consonant clusters that the researcher revealed. The subjects were inclined to insert a vowel into the cluster, and this what Na'ama (2011) [10] referred to as 'epenthesis'. For example, the words 'scream', 'square', 'spleen', 'spring', 'string', and 'strip' were pronounced as /səkrɪm/, /səkweər/, /səplɪn/, /səprɪŋ/, /sətrɪŋ/, and /sətrɪp/ respectively. The differences between the control and experimental groups can be visually perceived from Figures 1 and 2. It is worth mentioning that the subjects who had scored 100% in the pre-test had been excluded from the analysis because there was no point in measuring their performance after the experiment. These differences will be discussed in detail below.
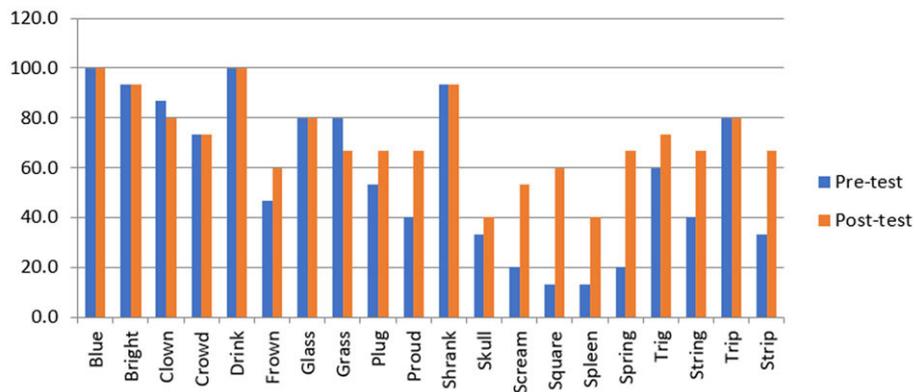

Fig. 1. Control group

Figure 1 shows that there was no significant change in the results and performance of the control group in both tests as illustrated by the blue and red columns. The performance was almost stable with some insignificant improvement in pronunciation of some words, which could be attributed to ordinary teaching following a traditional method.

In the control group, the number of students who did not score 100% was 15. The words 'blue', 'bright', 'crowd', 'drink', 'glass', 'shrank' and 'trip' were pronounced correctly by 15, 14, 11, 15, 12, 14, and 12 subjects in both tests. The results of these words in both tests showed no change in performance. However, there was a difference in the results of the post-test in the following words: 'clown'; 'frown'; 'grass'; 'plug'; 'proud'; 'skull'; 'scream'; 'square'; 'spleen'; 'spring'; 'trig'; 'string'; and 'strip'. The cluster 'cl' in the word 'clown' was pronounced correctly by 13 subjects in the pre-test, and by 12 in the post-test. The cluster 'fr' in the word 'frown' was pronounced correctly

by seven subjects in the pre-test, and by nine in the post-test. The cluster 'gr' in the word 'grass' was pronounced correctly by seven subjects in the pre-test, and by nine in the post-test with a minor improvement. The cluster 'pl' in the word 'plug' was pronounced correctly by eight subjects in the pre-test, and by ten in the post-test with also a minor improvement. The cluster 'pr' in the word 'proud' was pronounced correctly by six subjects in the pre-test, and by ten in the post-test with relative improvement. The cluster 'sk' in the word 'skull' was pronounced correctly by five subjects in the pre-test, and by six in the post-test with a minor improvement. The cluster 'skr' in the word 'scream' was pronounced correctly by three subjects in the pre-test, and by eight in the post-test with good improvement. The cluster 'squ' in the word 'square' was pronounced correctly by two subjects in the pre-test, and by nine in the post-test with a major improvement. The cluster 'sp' in the word 'spleen' was pronounced correctly by two subjects in the pre-test, and by six in the post-test with a relative improvement. The cluster 'spr' in the word 'spring' was pronounced correctly by three subjects in the pre-test, and by ten in the post-test with a major improvement. The cluster 'tr' in the word 'trig' was pronounced correctly by nine subjects in the pre-test, and by 11 in the post-test with a minor improvement. The cluster 'str' in the word 'string' was pronounced correctly by six subjects in the pre-test, and by ten in the post-test with a relative improvement. The cluster 'str' in the word 'strip' was pronounced correctly by five subjects in the pre-test, and by ten in the post-test with a relative improvement. Therefore, the improvement was generally minor.

Figure 2 shows that there was a relatively significant improvement in pronunciation of the experimental group after the experiment as shown by the results of the post-test. In the experimental group, the number of students who did not score 100% was 12. The word 'drink' was pronounced correctly by all subjects in both tests. The red columns in Figure 2, which depict the post-test results, are higher in all cases except with the word '*drink*' simply because all the students pronounced correctly in both tests and therefore no change would be expected. However, the results were varied noticeably with these words: 'blue'; 'bright'; 'clown'; 'crowd'; 'frown'; 'glass'; 'grass'; 'plug'; 'proud'; 'shrank'; 'skull'; ''scream'; 'square'; 'spleen'; 'spring'; 'trig'; 'string'; 'trip'; and 'strip'.
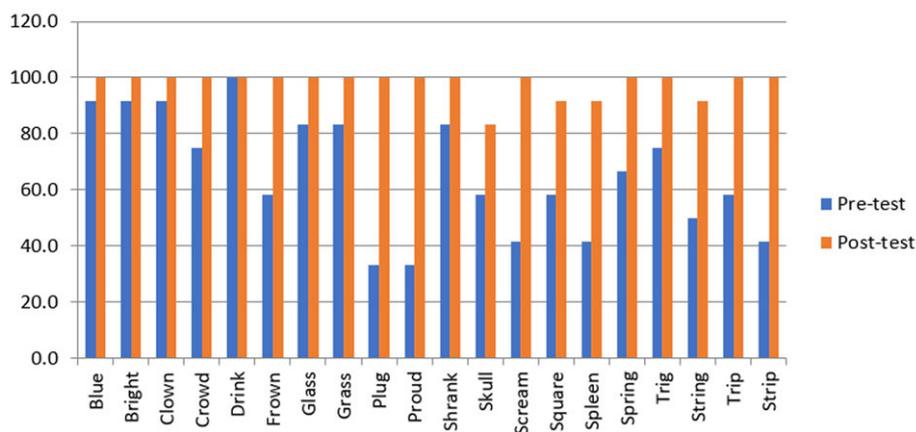

Fig. 2. Experimental group

The clusters 'bl', 'br' and 'cl' in the words 'blue', 'bright' and 'clown' respectively were pronounced correctly by 11 subjects in the pre-test, and by 12 in the post-test. The cluster 'cr' in the word 'crowd' was pronounced correctly by nine subjects in the pre-test, and by all subjects in the post-test. The cluster 'fr' in the word 'frown' was pronounced correctly by seven subjects in the pre-test, and by all subjects in the post-test. The clusters 'gr', 'gl' and 'shr' in the words 'grass', 'glass' and 'shrank' were pronounced correctly by ten subjects in the pre-test, and by all subjects in the post-test. The clusters 'pl' and 'pr' in the word 'plug' and 'proud' pronounced correctly by four subjects in the pre-test, and by all subjects in the post-test with a major improvement. The cluster 'sk' in the word 'skull' was pronounced correctly by seven subjects in the pre-test, and by ten in the post-test with a relative improvement. The cluster 'scr' in the word 'scream' was pronounced correctly by five subjects in the pre-test, and by all subjects in the post-test with a significant improvement. The cluster 'squ' in the word 'square' was pronounced correctly by seven subjects in the pre-test and by 11 in the post-test with a relative improvement. The cluster 'sp' in the word 'spleen' was pronounced correctly by five subjects in the pre-test, and by11 in the post-test with a major improvement. The cluster 'spr' in the word 'spring' was pronounced correctly by eight subjects in the pre-test, and by all subjects in the post-test with a major improvement. The cluster 'tr' in the word 'trig' was pronounced correctly by nine subjects in the pre-test, and by all subjects in the post-test with a major improvement. The cluster 'str' in the word 'string' was pronounced correctly by six subjects in the pre-test, and by 11 in the post-test with a major improvement. The cluster 'tr' in the word 'trip' was pronounced correctly by seven subjects in the pre-test, and by all subjects in the post-test with a major improvement. The cluster 'str' in the word 'strip' was pronounced correctly by five subjects in the pre-test, and by all subjects in the post-test with a significant improvement. Therefore, the improvement was relatively significant.

4 Discussion of the results

4.1 Results of the control group

Figure 3 shows a comparison between the results of the pre-test and post-test of the control group. The striped columns represent the correct pronunciation of consonant clusters, while the dotted columns represent the incorrect pronunciation. It is evident from the chart that the control group have made some minor improvement in pronunciation. Correct forms rose by 2.25%, from 43.24% to 45.50%. On the other hand, incorrect forms of pronunciation decreased by 2.25% from 56.75% to 54.50%. However, this improvement may seem too small to be considered significant, which, as mentioned earlier, can only be attributed to normal language acquisition development through the traditional teaching method.
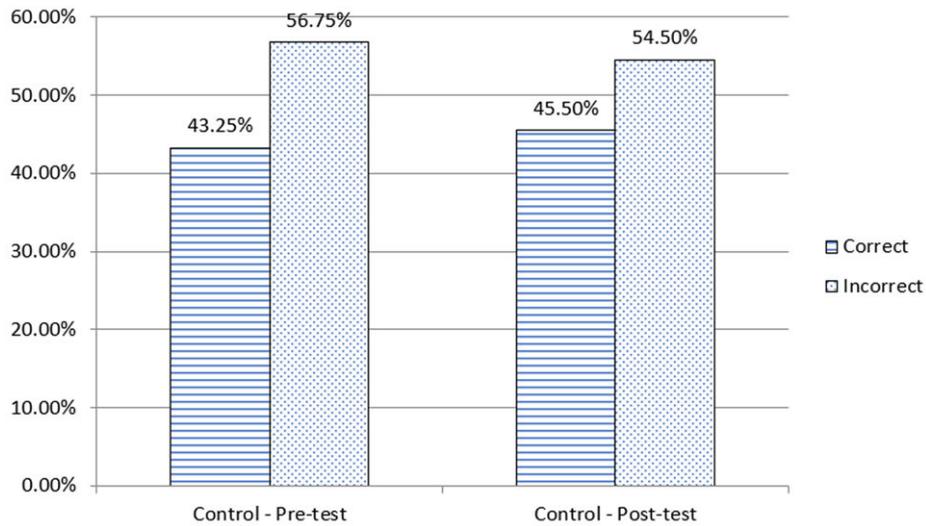
Fig. 3. Control group

4.2 Results of the experimental group

Figure 4 illustrates the results of the experimental group's performance of consonant clusters in the onset position. The striped columns indicate the correct pronunciation in the pre-test and post-test while the dotted columns indicate the incorrect pronunciation in both tests. It is obvious from the chart that there is some significant change in the results. Correct forms of pronunciation by the experimental group increased by 7.05% from 58.75% to 65.80% as opposed to just 2.25% by the control group, where traditional teaching took place. By the same token, incorrect forms of pronunciation decreased by 7.05% dropping from 41.25% to 34.20% after the experiment in which the subjects used videos and audios on their cell phones to learn the pronunciation of onset consonant clusters. Even though the change was not significantly high, it proved that using cell phones could be very effective in the long term.
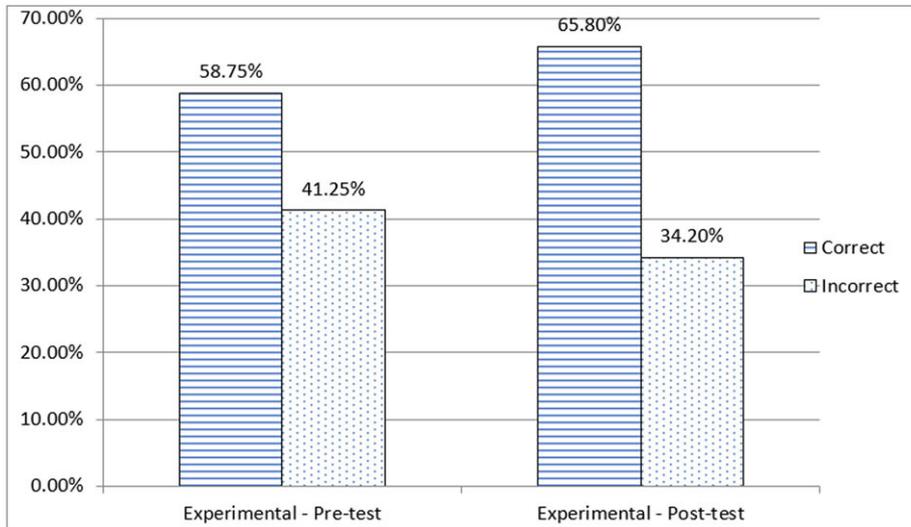
Fig. 4. Experimental group

4.3 Summary of results

Figure 5 shows clearly an upward trend for both groups in terms of correct forms of pronunciation, and logically, they must have a down trend in the incorrect forms. However, the upward trend for the experimental group is relatively more significant than that of the control group. Similarly, the trend for incorrect forms is relatively steep for the experimental group while it shows only a minor decrease for the control group.
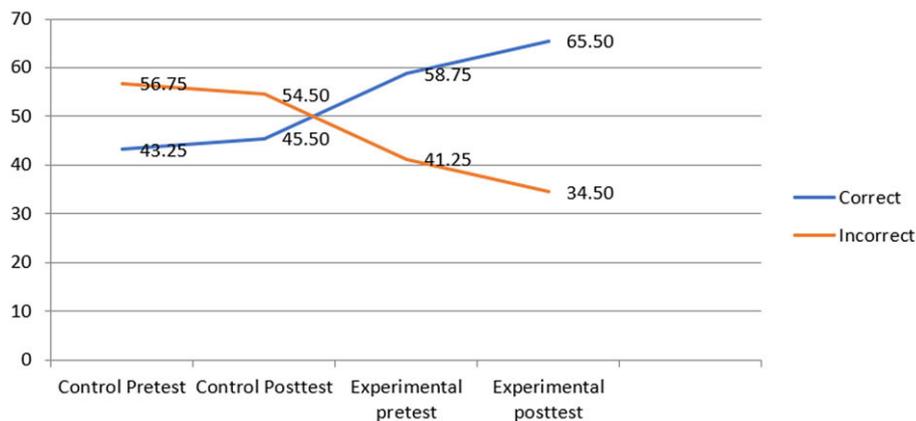

Fig. 5. Results

The results of both groups show that cell phones could be utilized to improve students' pronunciation of consonant clusters in the onset position. The decline in error

frequency for the experimental group in the post-test demonstrates the effect of video and audio recordings using portable devices such as cell-phones. However, it could be argued that the improvement was not substantially significant, and that is absolutely true. The experimental group improved by 7.05% in just a one-week experiment during which students were encouraged to use cell phones to learn and practice pronunciation following native speakers as a model. The relatively small increase in correct pronunciation could only be attributed to the short period allotted for the experiment. Therefore, a longer period should produce more significant improvement not only in the pronunciation of consonant clusters but also in pronunciation in general.

5　Conclusion

The general conclusion would be that the use of new technology, namely cell phones, could supersede the application of traditional teaching method in teaching pronunciation. The results showed that traditional methods would not work with pronunciation as successfully as new methods in which there was an implementation of hi-tech portable devices such as cell-phones. In other words, traditional methods could make positive changes in performance, but those changes would be extremely slow and not very effective. On the other hand, the use of cell phones could produce more effective and positive results in a relatively short time in comparison to traditional methods. Moreover, such modern devices are portable and useable anytime and anywhere, a feature which would make learning easily accessible and more interesting and motivating.

5.1　Delimitations and limitations

Because of the limited time and space, this study was delimited to consonant clusters occurring in the onset position. Furthermore, to the extent of the researcher's knowledge, there were no previous studies that highlighted the effects of cell phone, especially in pronunciation. Moreover, the technology used was only cell phone with some videos downloaded on it. The study was also confined to second-grade students in a secondary school in Riyadh.

Therefore, it is important to consider the limitations of this study. Since data collected in this study was limited to a specific group of people, Saudi female secondary students, the findings cannot be generalized. Also, the researcher focused on one issue of pronunciation, consonant clusters occurring in the onset position and with a limited set of isolated words. However, investigation of pronunciation involves more integrated elements which could contribute to the development of other important aspects in pronunciation as what the researcher recommended later. Furthermore, since age is an important factor in the acquisition of the second or foreign language as evidenced by distinct research in the field of L2 acquisition, the findings of the study cannot be popularized to all ages. For instance, it was proved by Fathman (1975) [7] in an empirical study that the younger the learner was, the better the scores were in term of their pronunciation abilities. She also noted that the older they were when they started language learning, the more errors they had in pronunciation.

5.2   Recommendations and suggestions

In light of the findings and limitations of this short study, the researcher gave recommendations for future studies. It is recommended to examine the effect of cell phone in all consonant clusters initial, middle and final. In addition to this, since this study is confined to consonant clusters, it is also suggested to investigate the impact of cell phone in different issues of pronunciation. As reported in different studies, Derwing, Munro, and Wiebe (1998) [6] and Wennerstrom (1998) [15] suprasegmental features, such as intonation, can play a vital role in word pronunciation and successful communication. Furthermore, Cell phones and other types of hi-tech portable devices could be employed to improve L2 learners' pronunciation of English vowels as well. Teachers of English as a foreign language and EFL learners should be encouraged to benefit from advancements in technology. Some activities should be designed to work on cell phones for developing certain skills in the language.

The current work tackled the potential effect of cell phones on the pronunciation of consonant clusters occurring in the onset position. Therefore, further research may be needed to deal with other portable devices such as iPods, iPads, and PDA's. Further research may be needed to investigate the effect of cell phones on other language skills such as reading, writing, and listening. Even more, research may be needed to investigate the effect of cell phones on grammar and vocabulary. Also, taking Fathman (1975) [7] study into account, the current study would have given more findings if the participants came from different age groups.

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7   Appendix A

Check list of consonant clusters occurring in the onset position

No	Words	Evaluation	
		Correct	*Incorrect*
1	Blue		
2	Bright		
3	Clown		
4	Crowd		
5	Drink		
6	Frown		
7	Glass		
8	Grass		
9	Plug		
10	Proud		
11	Shrank		
12	Skull		
13	Scream		
14	Square		
15	Spleen		
16	Spring		
17	Trig		
18	String		
19	Trip		
20	Strip		
Final Score			

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