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RESEARCH ARTICLE

L2 Acquisition Of Arabic Guttural Consonants By L1 English Speakers: The Impact Of Intervention

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ABSTRACT

The aim of this study is to investigate the role intervention plays in the acquisition of Standard Arabic (SA) guttural consonants by English native speakers. It addresses the issue of how the phoneme inventory of L1 interacts with that of L2 and to what extent the implementation of an intervention may have an impact on L2 learners' phonological acquisition. Acquiring the phonological component of a second language may be very challenging when learners are exposed to an L2 phonological system that has sounds and sound patterns that are not similar to those of their native language. English-speaking learners of Standard Arabic, which is a semitic language that is typologically different from theirs, are expected to find difficulties with consonants that are not part of their phonological representation. These basically include guttural consonants, namely q, x, ɣ, ħ, ʕ, tˤ, dˤ and sˤ, which constitute almost the third of the 28 Arabic consonants. The Arabic emphatic (pharyngealized) consonants tˤ, dˤ, and sˤ, for instance, are very demanding because they are produced by two simultaneous articulations, a primary and a secondary one, and they involve, in addition to this, the pharynx, which is an inactive articulator in the English language. This suggests that acquiring this category of speech sounds is very challenging from an articulatory perspective and will certainly be subject to a great deal of cross-language mapping. The findings have shown that intervention tasks contribute significantly to an improvement in production.

KEYWORDS

Standard Arabic acquisition, guttural consonants, English native speakers, phoneme segmentation, intervention.

ARTICLE INFORMATION

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1. Introduction

The acquisition of the phonological component of a second language may be very challenging when learners are exposed to an L2 phonological system that has sounds and sound patterns that are not similar to those of their native language. They need to produce, perceive, and categorize the phonemes of a second language, often under conditions of cross-linguistic influence, which may lead to phonological transfer, whereby features from one language influence the production or perception of sounds in the other particularly when a phoneme exists in one language, but not in the other. For example, English second language learners may encounter difficulties with Arabic emphatic consonants because English lacks pharyngealized sounds, which makes the acquisition of new phonetic categories demanding and may lead to cross-language mapping. Learners may also experience category overlap in speech perception. When phonemes in the two languages are acoustically similar yet function differently, they may initially assimilate them into a single category. This phenomenon can impede accurate phonological acquisition until learners develop language-specific phonological representations. Conversely, exposure to two languages can enhance phonological awareness, increasing sensitivity to sound contrasts over time. Managing two phonological systems requires greater motor flexibility and may lead to temporary variability in pronunciation. However, with sufficient input and explicit instruction, learners can achieve near native-like phonological competence in both languages. The trajectory of phonological development in learners depends on factors such as age of exposure, language dominance, quality of input, and instructional support. (Flege,1995) (Add another recent reference). The aim of this study is to examine the impact of intervention on English native speakers' acquisition of SA guttural consonants.

2. Background / literature review

SA, a modern variety of Classical Arabic, the language of the Quran and pre-Islamic poetry, is a language that belongs to

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the Semitic branch of the Afro-Asiatic language family. It is not a native language of anyone, and it is used for written and formal communication. In addition, it stands in a diglossic relationship with colloquial Arabic dialects (Ferguson, 1959, 1972), which serve as native languages across the Arab world. In Morocco, for instance, Moroccan Arabic, also called Darija, is the colloquial Arabic variety used for everyday communication, and SA is the language used in formal situations and for written communication. That is, the two types of Arabic are characterized by

function specialization; each variety has its distinct domains of use. As other Semitic languages, SA is characterized by a root-and-pattern, nonconcatenative morphology (Watson, 2002; Ryding, 2005; Haddad, 2023). The majority of its words are formed from consonantal roots combined with different vowel patterns. It also has a complex verbal and nominal inflectional system. Concerning phonology, it has a rich consonantal system characterized by many back consonants in addition to a simple vowel system that consists of three short vowels (u, i, a), which stand in phonemic contrast with three long vowels (u:, i:, a;).

The acquisition of Arabic phonology is particularly salient when the phonological system of learners' first language differs from that of L2. In fact, linguistic typology was found to play a crucial role in L2 phonology acquisition. It significantly predicts the speech sounds that will be challenging for L2 learners. Native speakers of English, a typologically different language that belongs to the Germanic language family, are expected to find difficulties when acquiring the phonology of Standard Arabic because the phoneme inventories of the two languages are quite distant. SA has guttural consonants, namely uvular consonants /q/ (ق), /x/ (خ), /ɣ/ (غ), pharyngeal consonants ħ, ʕ and emphatic (pharyngealized) consonants, /ṣ/, /ḍ/, /ṭ/, which English lacks. Uvular consonants are produced with the back of the tongue raised toward the uvula. The most back consonants for English speakers are velars (k, g, ŋ), produced at the level of the velum (soft palate). This means that for English speakers learning Arabic, uvulars would constitute marked speech sounds and are hence expected to be hard to learn. Pharyngeals are even more back; they are produced at the articulation place called the pharynx (Ladefoged and Maddieson, 1996; Ladefoged and Johnson, 2015). Their production involves the retraction of the tongue root, creating a constriction at the wall of the pharynx. English speakers are expected to experience difficulty with this type of consonants because they are not part of their L1 phonetic categories. Even children whose native language uses the pharynx frequently "take longer time to acquire the production of pharyngeal consonants compared to oral consonants" (Elgendy, p. 65). In addition to uvulars and pharyngeals, another class of consonants that is also demanding for English-speaking learners of SA is that of emphatics (pharyngealized) consonants because they involve both a primary and secondary articulation. For instance, an emphatic consonant such as 'tˤ' has a primary articulation which consists of putting the blade of the tongue against the alveolar ridge in addition to a simultaneous secondary articulation which consists of retracting the tongue towards the pharynx. Shehata (2015, p. 24) stated, referring to emphatic (pharyngealized) consonants that they "are articulatorily difficult because of the backing gesture" and that "They involve complex articulatory coordination". The other reason why the acquisition of these sounds is demanding for English-speaking learners is that contrast is not easily perceived in terms of English phonetic categories, making category formation difficult. Aldamen and Al-Deaibes (2023), in their book *Perception and production of L2 Arabic emphatic consonants*, reported that plain Arabic consonants are assimilated to English categories whereas emphatic consonants are not assimilated at all, causing perceptual difficulty for English L2 learners. The interaction with vowel quality adds further phonetic difficulty. In the study of Arabic emphatic production, researchers found that emphatic contexts significantly lower the second formant (F2) of vowels compared to plain contexts, showing how emphatic consonants change surrounding vowels' acoustic properties.

Given the differences between the phonological system of English and that of SA, L1 English learners of Arabic, especially beginners and intermediate learners, would employ certain strategies when acquiring phonology. For instance, they would substitute a guttural with the closest consonant in English; the voiceless, uvular stop 'q' would be replaced with the voiceless, velar stop 'k'. Thus, if a beginner wants to say قلب/*qalb*/ (a heart), he would say كلب /*kalb*/ (a dog), which totally changes the meaning of the word. Another strategy is to use a plain consonant instead of a consonant that involves two simultaneous articulations. Emphatic consonant such as 'tˤ', 'dˤ' and 'sˤ' are replaced with 't', 'd' and 's' respectively. Another strategy is that of deletion; the learner would drop a consonant that is not present in his phonological representation. The pharyngeal consonant 'ʕ' tends to be deleted when it is present in a word.

Empirical research has shown that explicit pronunciation training may have an impact on English learners' mastery of speech sounds that are not present in their phonological system. Ahmed (2025), in his book *Acquisition and pedagogy of the Arabic emphatic consonants,* finds that various pronunciation training activities improve learners' perception and production of emphatic sounds, suggesting that general exposure alone is not enough and explicit instruction is beneficial to L2 learners. According to Titze (2000), the importance of gutturals as speech sounds comes from matching what the instruments are playing and keeping the intensity going. In previous studies, the results were either shy or not enough to solve the whole issue. Saadah (2011, p. 45) notes that instructional materials often do not include targeted articulatory or perceptual training while Ryding (2014) claimed that pronunciation is often treated implicitly, without intensive articulatory or perceptual instruction. Therefore, despite the recurrence of this acquisition problem, the majority of the books that are designed to teach Arabic as a second language did not deal with it. In fact, they just deal with these challenging consonants like all the other consonants without providing the learners with intensive strategies that would help them overcome these

difficulties in terms of articulation or perception. The aim of this study is to address the issue of how the phoneme inventory of L1 interacts with that of L2 and to what extent the implementation of an intervention may have an impact on L2 learners' phonological acquisition.

3. Material and methods

3.1 Participants and setting

Eleven American participants, four males and seven females whose age ranges between twenty-one and twenty-two years learning SA as a second language at university (in the US in Erie (North Pennsylvania State) took part in this study. The department of languages at this university offers students different foreign languages to learn such as Chinese, French, Japanese, Spanish and Arabic. As a good number of people from the Arabic community have settled and integrated in the US, it has become of paramount importance for non-Arabs to study this language and to include it within the American educational system as a second or foreign language. Most of the students who choose SA study Islamic Studies, Social Ethics, Ethics of Belief or Psychology. SA is offered unless there is a specific purpose to learn an Arabic dialect. The participants learn SA through a syllabus presented in a textbook called "Alif Yaa" by Mahmoud Albatal, an Iraqi author. Classes teach reading, writing, listening and speaking skills. The participants of this study, who were in their fourth year at university (Senior/BA), had already studied Arabic in both the fall semester of their third and fourth year. According to their university education files, the participants had never been introduced to the Arabic language prior to the two previously mentioned university courses they signed in for. It should also be mentioned that they had never studied any language apart from English, which is their L1. They had Arabic classes three times a week for one hour fifteen minutes. The intervention implemented three times a week during the spring term involving participants who were diagnosed as experiencing difficulties with Arabic guttural consonants.

3.2 Data collection

The data consists of a phoneme segmentation test and intervention tasks.

3.2.1 The phoneme segmentation test

The phoneme segmentation test consists of reading a set of twenty words that contain, as shown in example (1), the targeted guttural speech sounds, namely q, x, ɣ, ħ, ʕ, tˤ, dˤ and sˤ and asking the participants to segment them into their consonant phonemes. It was administered in four weeks, in twelve sessions (3 sessions per week). All the words included have diacritics for short and long vowels. The participants were trained by the experimenter on how to segment phonemes and how to make a difference between segmenting consonants and vowels. Time was set for one minute.

Example (1)

S A	Transcription	gloss
صَغِير	/sˤaɣiːr/	small
عِلْم	/ʕilm/	knowledge
طَالِب	/tˤaːlib/	student
ضَرْب	/dˤarb/	hitting
صَوْت	/sˤawt/	voice
ضَوْء	/dˤawʔ/	light
صَبْر	/sˤabr/	patience
مِصْبَاح	/misˤbaːħ/	lamp
حَرْف	/ħarf/	letter
خُبْز	/xubz/	bread
غُرْفَة	/ɣurfa/	room

مَغْرِب	/mayrib/	west
عَطْشَان	/ʕatˤʃaːn/	thirsty
صَحْرَاء	/sˤaħraːʔ/	desert
طِفْل	/tˤifl/	child
ضِفْدَع	/dˤifdˤaʃ/	frog

The experimenter used a progress monitoring sheet; each sheet includes twenty words that contain the eight targeted Arabic speech sounds. The participant would listen to the word that the experimenter uttered twice, segment it into speech sounds and then read it. While listening to the participants' segmentation, the experimenter underlined the wrong sounds. After the administration of the test, the experimenter counted the number of all the consonants segmented by the participant during one minute in order to determine those produced correctly. A different test is used in each session as seen in examples (2) and (3).

Example (2)

SA	Transcription	Gloss
صَدِيق	/sˤadiːq/	friend
طَبِيب	/tˤabiːb/	doctor
صَعْب	/sˤaʃb/	difficult
طَرِيق	/tˤariːq/	road
ضَحِك	/dˤaħika/	he laughed
ضَعِيف	/dˤaʃiːf/	Weak
حَصِير	/ħasˤiːr/	mat
صَحِيح	/sˤaħiːħ/	correct
عَظِيم	/ʕaðˤiːm/	great
مَخْطُوط	/maxˤtˤuːtˤ/	manuscript
عَمل	/ʕamal/	work
صُنْدُوق	/sˤunduːq/	box
غَضَب	/ɣadˤab/	anger
طَغَى	/tˤaɣaː/	he transgressed
خَطَر	/xatˤar/	danger
غَطَاء	/ɣitˤaːʔ/	cover
حِمَار	/ħimaːr/	donkey

Example (3)

SA	Transcription	Gloss
غليظ	/ɣaliːðˤ/	Thick/harsh
طَبق	/tˤabaq/	plate
طُغيان	/tˤuɣjaːn/	tyranny
ضَروري	/dˤaruːriː/	necessary
صِغيرة	/sˤaɣiːrat/	feminime
ظِلْ	/ðˤill/	shade
مِطْرَقَةٌ	/mitˤraːq/	hammer
صُنع	/sˤunʃ/	making
عْظم	/ʕaðˤm/	bone
حِقيبة	/ħaqiːbat/	suitacase
حَضآرة	/ħadˤaːra/	civilization
خَشب	/xaʃab/	wood
غَذاء	/ɣiðaːʔ/	food
ضْرس	/dˤirs/	molar tooth
عُمر	/ʕumur/	age
صُفْحة	/sˤafħat/	page

The aim of this test is to measure the participants' mastery of guttural consonants. The sounds segmented as a whole were counted minus the incorrect sounds to have the number of phonemes segmented correctly per minute. The test was used in the baseline stage, that is, before intervention tasks, to determine the participants' mastery of guttural consonants before each intervention and see whether it had improved after it.

3.2.2 The intervention tasks

In addition to the phoneme segmentation test, the data consists of intervention tasks, which were administered in four weeks, six sessions per week. They consist of two parts. Participants watched some videos that show them how to pronounce these problematic sounds and their place of articulation and were afterwards provided with production exercises which include the targeted consonants in different positions in the word (initially, medially and finally) as in example 4 and exercises in which the targeted consonants are used in minimal pairs as shown in example 5. Each learner had to pronounce these words at least twice. The experimenter collected all the data based using the same kind of sheet mentioned before.

Example 4

Targeted consonant	First position	Middle position	Final position
/ɣ/ غ	غُراب /ɣuraːb/ (crow)	بَلْغَة /balɣatun/ (Moroccan slipper)	صبّاغ /sˤabbˈaːɣ/ (painter)
/q/ ق	قَميص /qamiːs/ (shirt)	مَقـ ص /maqasˤ/ (scissors)	شَفق /ʃafaq/ (twilight)
/x/ خ	خُروف/xaruːf/ (sheep)	مَخْلب /maxlab/ (claw)	كُوخ /kuːx/ (hut)

Targeted consonant	First position	Middle position	Final position
/ħ/ ح	حَرْف /ħarf/ (letter)	مِحْراب /miħraːb/ (prayer niche)	سَمْح /sˤamħ/ (forgiving)
/tˤ/ ط	طائر /ˈtˤaːʔir/ (bird)	مِسْطَرة /mistˤara/ (ruler)	مِمْشط /maʃtˤ/ (comb)
/sˤ/ ص	صِفْر /sˤifr/ (zero)	عَصير /ʕassˤiːr/ (juice)	قَميص /qamiːsˤ/ (shirt)
/dˤ/ ض	ضَبْع /dˤabʕ/ (hyena)	قَضِيّة /qaḍˤiːjja/ (case / issue)	عَضّ/ʕaḍˤ/ (biting)
/ʕ/ ع	عَميل /ʕamiːl/ (~~worker~~ / client)	مَعْمل /maʕmal/ (factory)	صَلع /sˤalaʕ/ (baldness)
هـ /h/	هَدّ /hadd/	he demolished	

ه /h/	هَلْ	/hal/	whether / interrogative particle
ح /ħ/	حَنَّ	/ħann/	long / yearned
ح /ħ/	حَدّ	/ħadd/	limit / boundary
ح /ħ/	حَلّ	/ħall/	To solve / untied
خ /x/	خَدّ	/xadd/	cheek
خ /x/	خَلّ	/xall/	vinegar
غ /ɣ/	غَدٍ	/ɣad/	tomorrow / root form
غ /ɣ/	غَلّ	/ɣall/	malice / hatred

The phoneme segmentation test and the intervention tasks alternate in the following way: 1st Baseline phase:

The first baseline data, which consists of the phoneme segmentation test, was collected during the ~~two~~ first two weeks in six sessions for all the participants. It provides an evaluation of students' mastery of guttural consonants before ~~before~~ the intervention ~~put into practice.~~ was implemented.

1st Intervention phase:

The first intervention phase lasted for two weeks during six sessions. It started in week seven for all the participants. It was implemented in a successive manner only when the participants had shown that they had a stable baseline; in fact, most of the participants had a stable baseline. Thus, they received the intervention at the same time.

2nd baseline phase:

The second baseline phase lasted also for two weeks, including six sessions in all. It includes phoneme segmentation tests whose aim was to describe the current level that the learners were performing at with respect to the production of guttural consonants.

2nd Intervention phase:

The second intervention phase took place after the second baseline phase. It also spanned over a period of two weeks and was implemented in six sessions for all the participants.

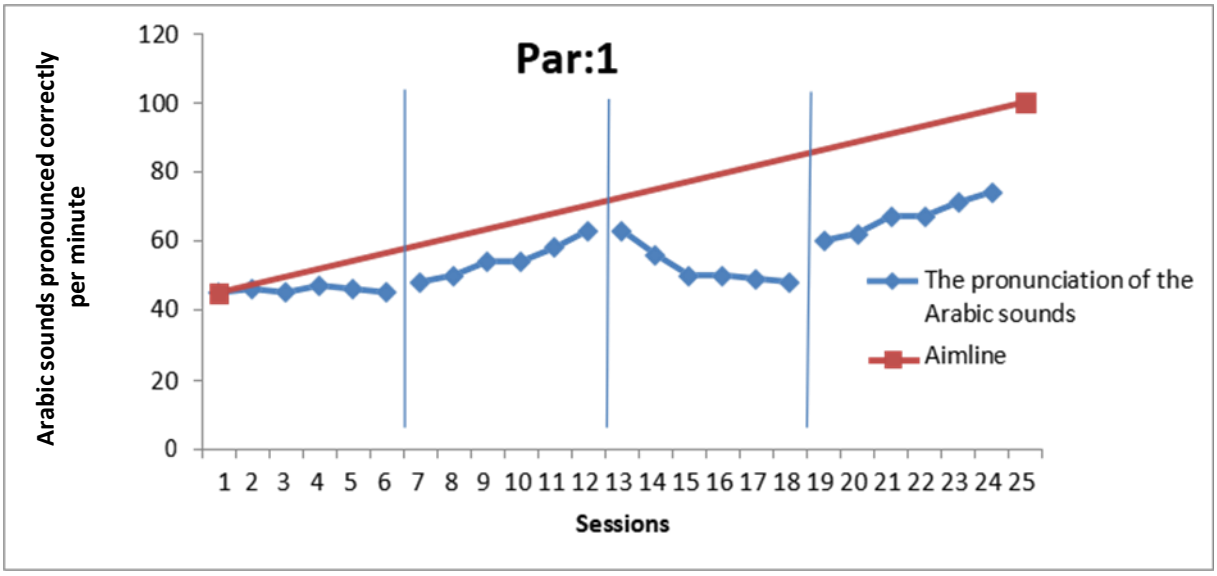
3.2.3 Experimental design

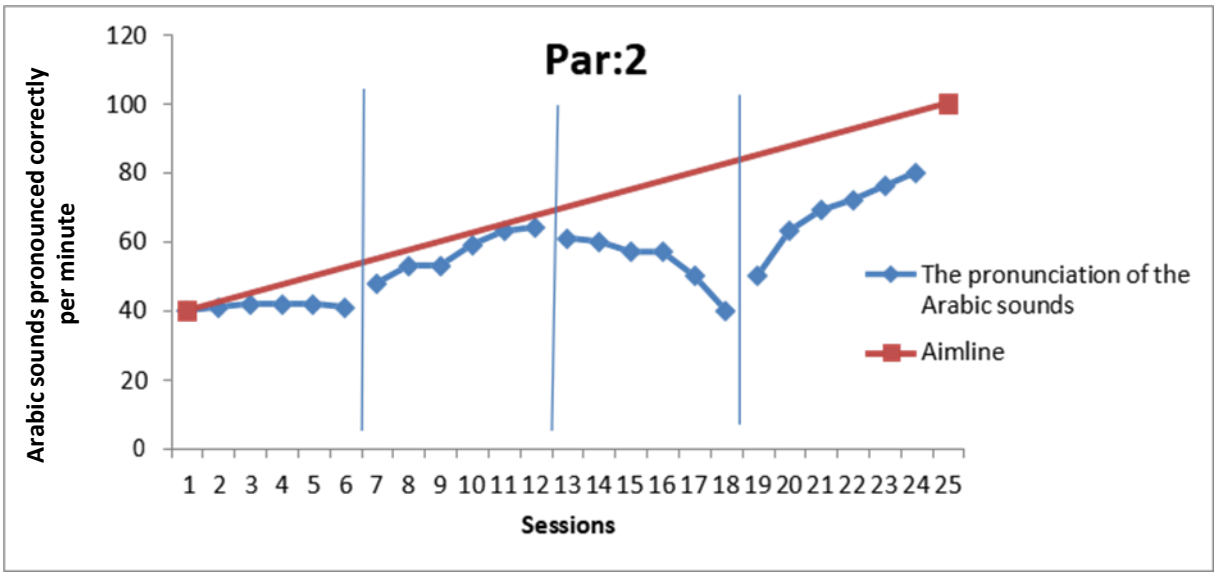
An ABAB design (a reversal design), which is a single-subject experimental design graph, was used across the participants to demonstrate the effectiveness of the intervention. It provides a visual representation of whether the intervention was effective in improving the learners' acquisition of gutturals or not.

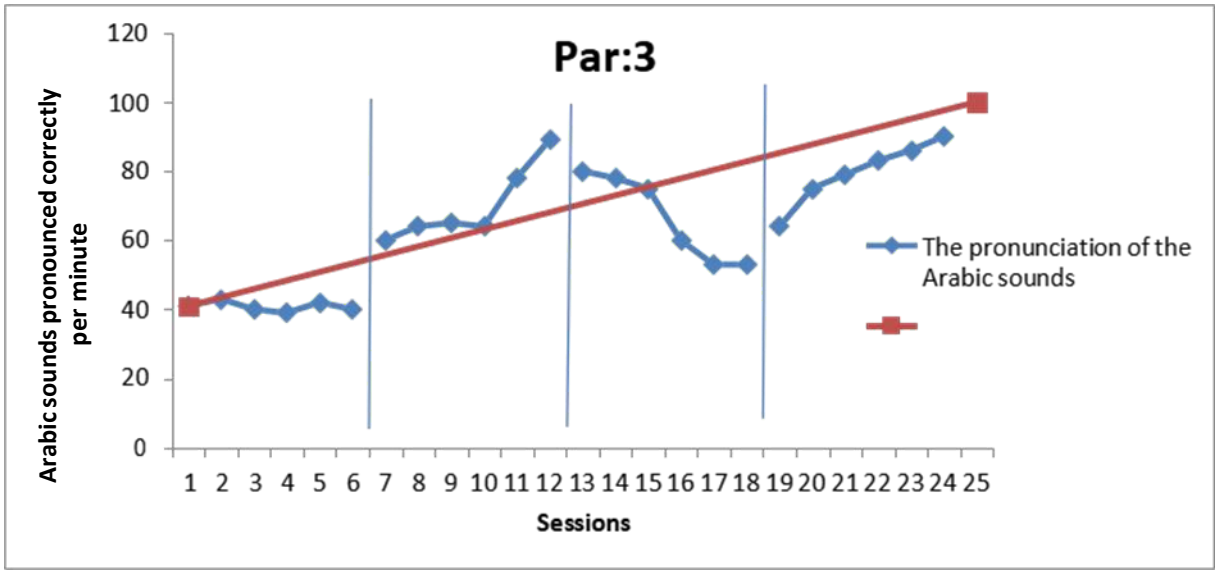
4. Results and discussion

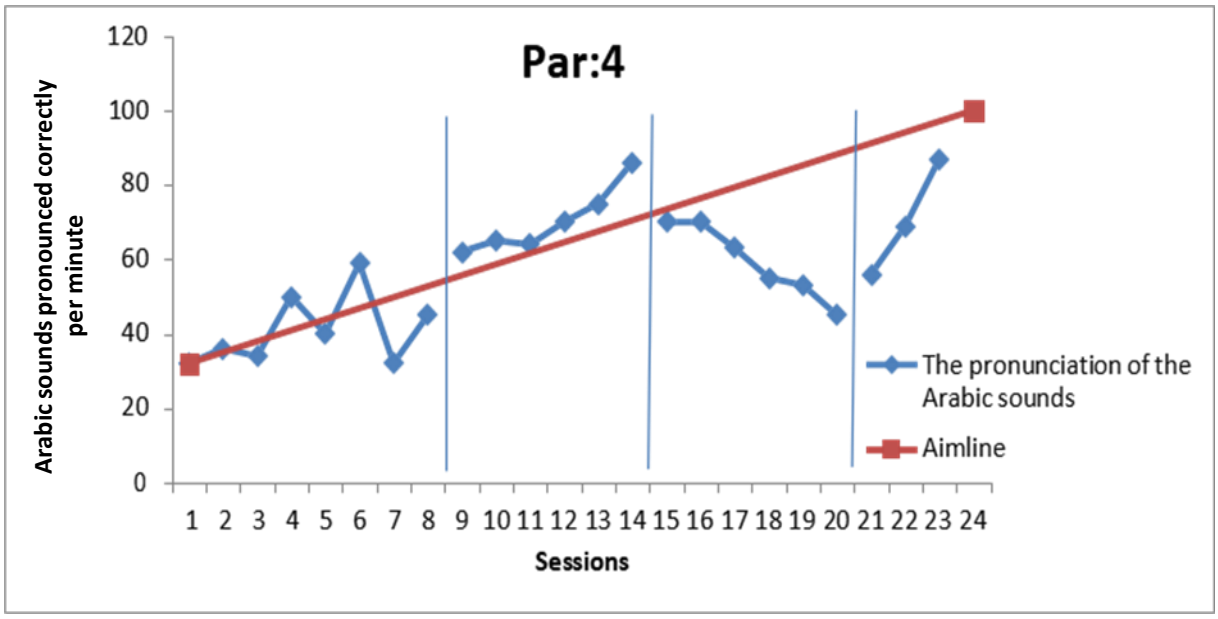
The results have shown an increase of phoneme segmentation accuracy after the videos and the intervention exercises the participants had received. The videos were effective as demonstrated by an improvement in the production of the targeted phonetic categories which the participants had experienced difficulty with before. Likewise, the intervention exercises were also efficient. The minimal pair activity and the different position sound exercises were found to increase learners' segmentation accuracy and a better production of these sound consonants that are very challenging because they are not part of their L1 phonological representation. The results presented in the following ABAB graphs show the impact of the two intervention phases on the eleven participants' production of Arabic guttural consonants.

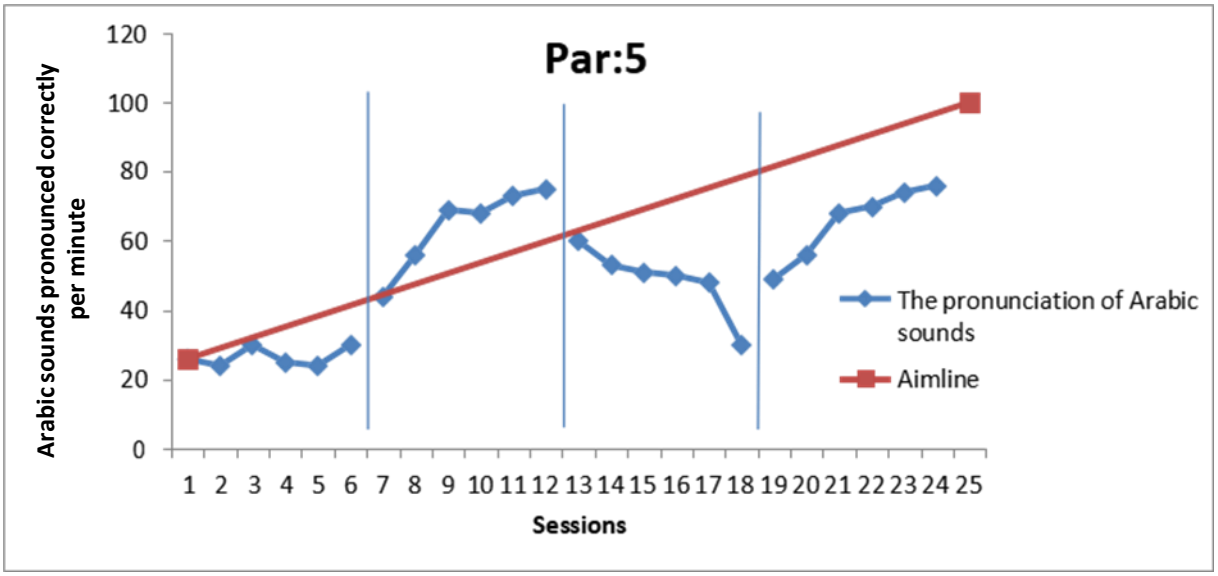
ABAB Graphs: The Impact of Intervention on the Participants' Production of Arabic Guttural Consonants

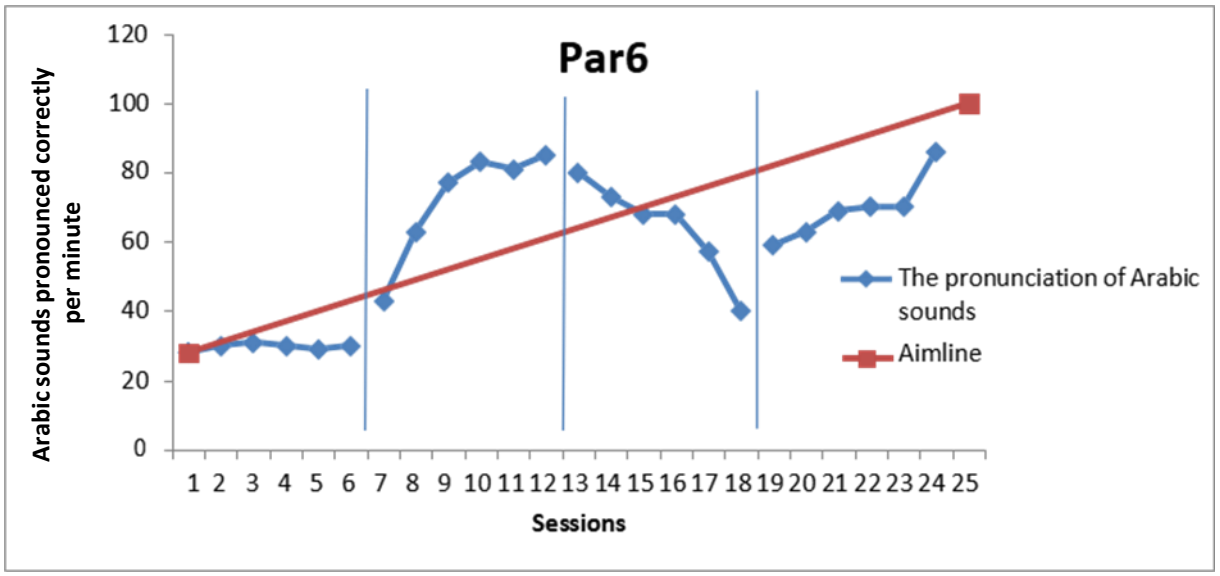


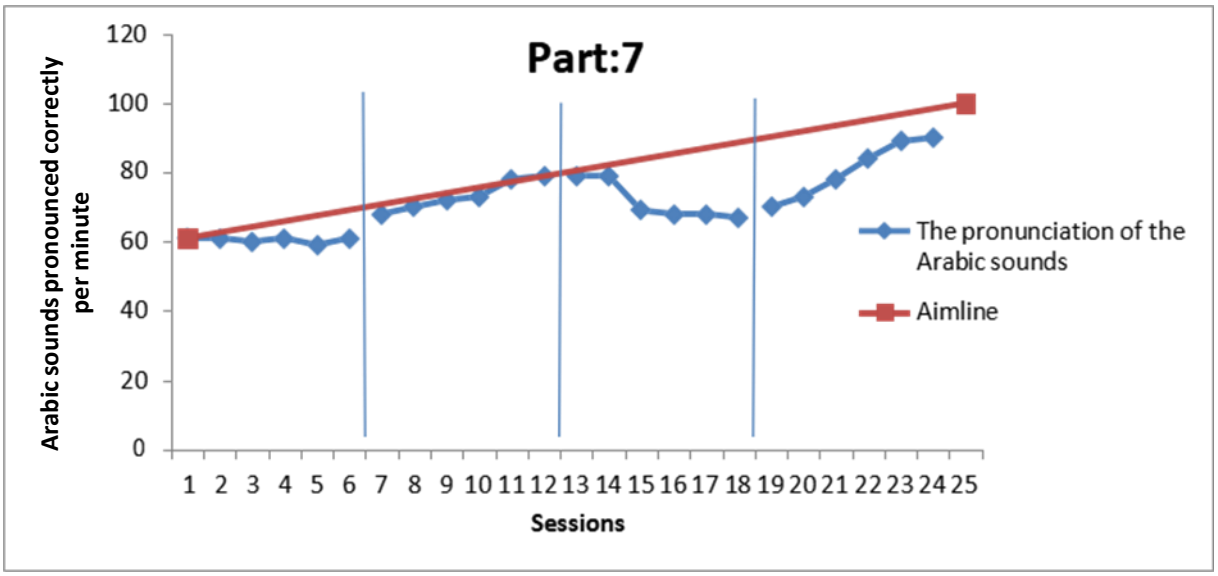


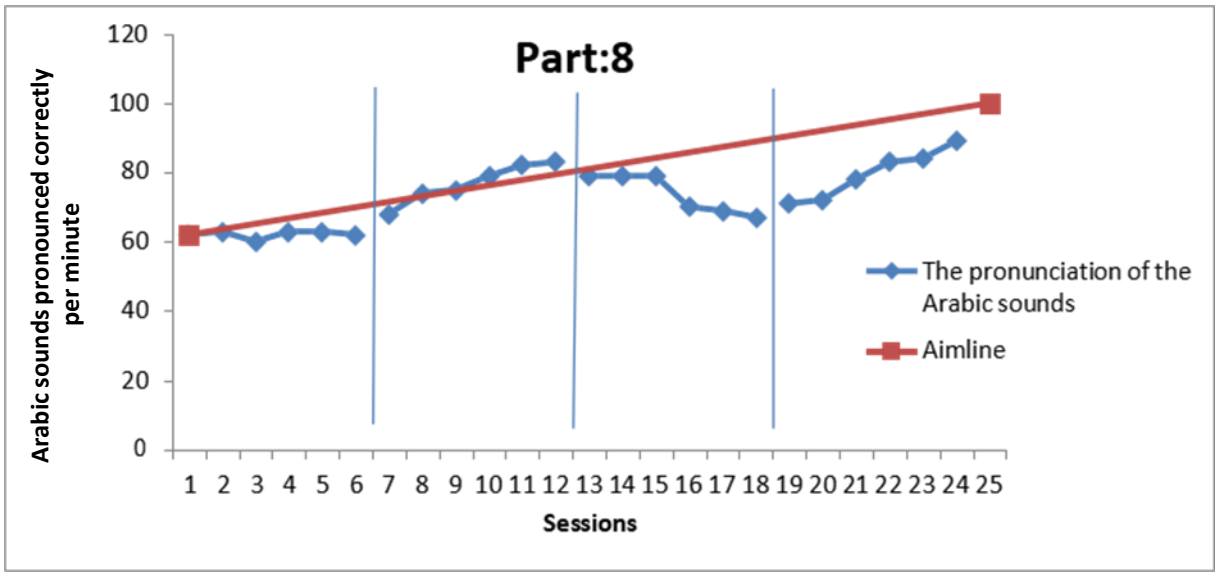


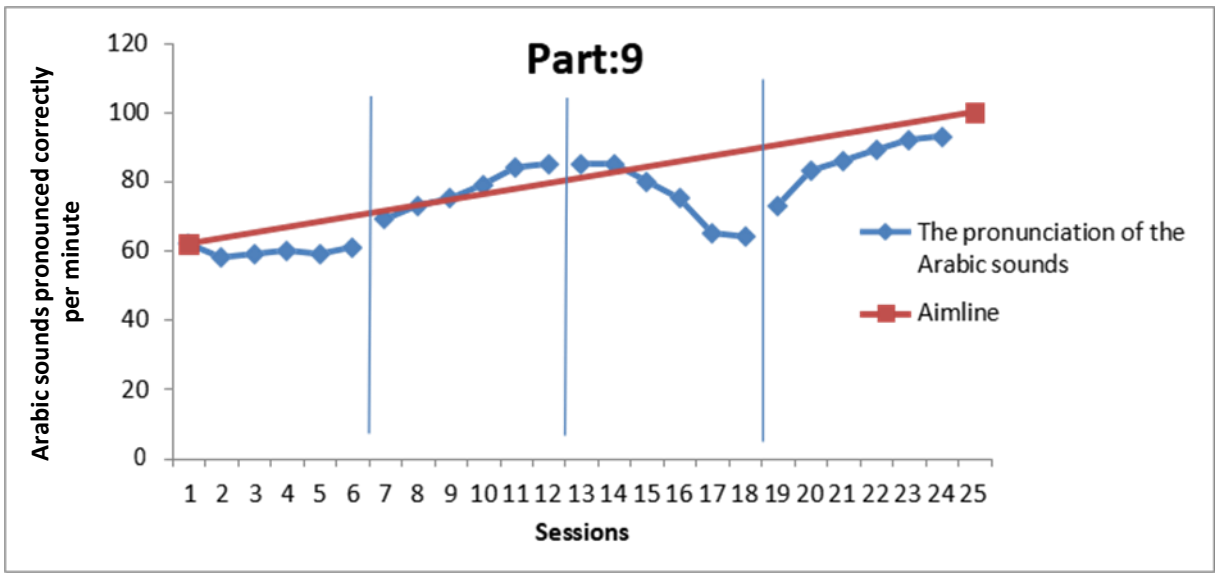

Par:4
Arabic sounds pronounced correctly per minute
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Sessions
The pronunciation of the Arabic sounds
Aimline

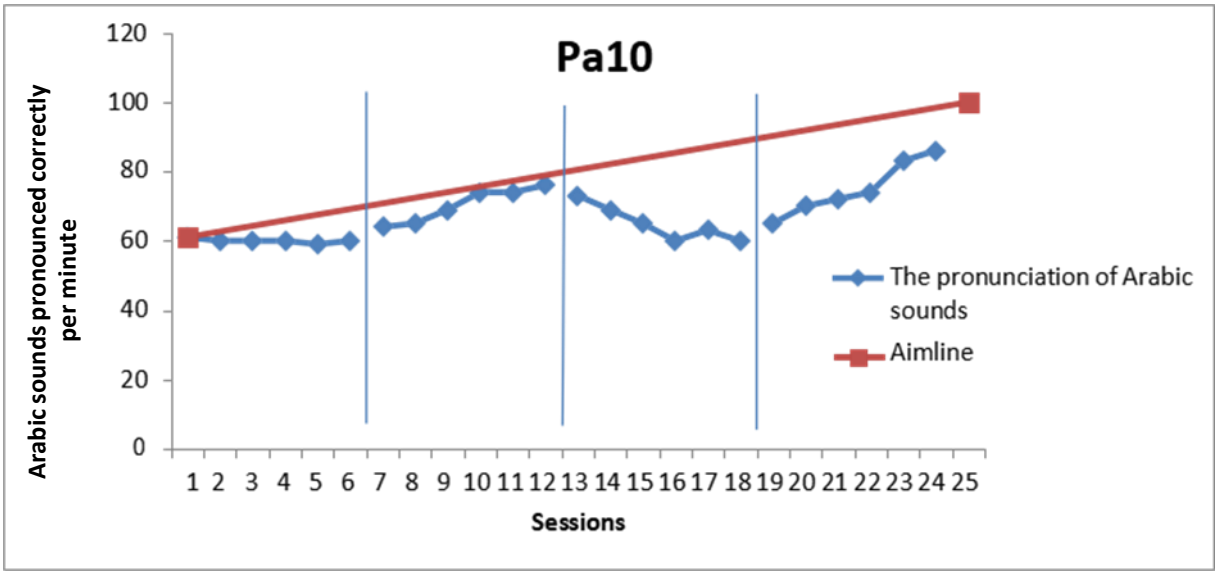

Par:5
Arabic sounds pronounced correctly per minute
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Sessions
The pronunciation of Arabic sounds
Aimline

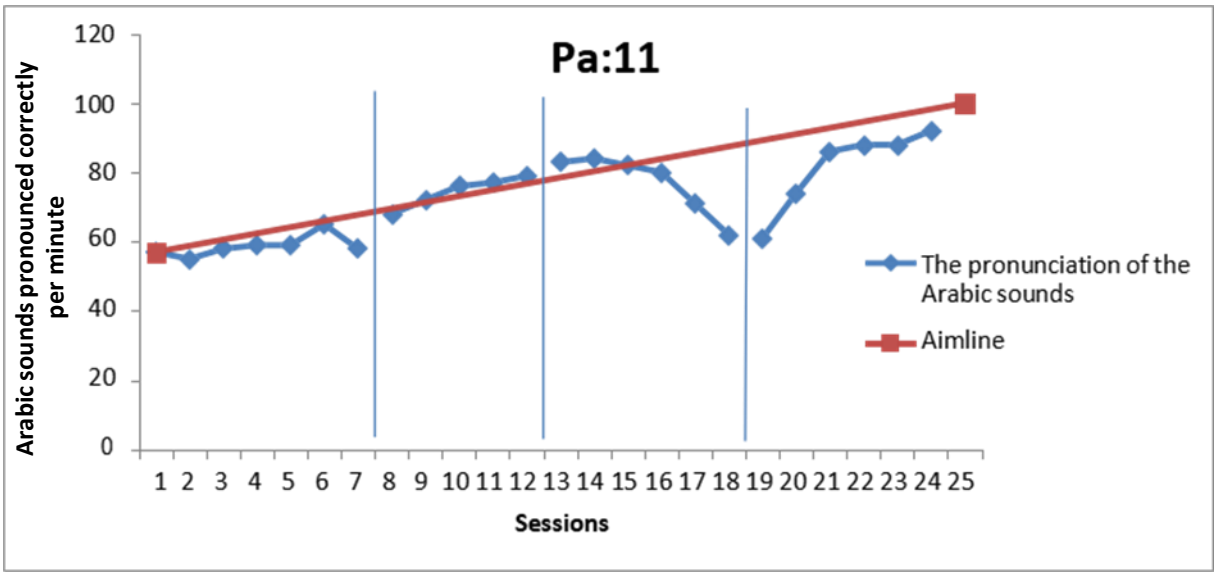

Par6
Arabic sounds pronounced correctly per minute
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Sessions
The pronunciation of Arabic sounds
Aimline


Part:7
Arabic sounds pronounced correctly per minute
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Sessions
The pronunciation of the Arabic sounds
Aimline


Part:8
Arabic sounds pronounced correctly per minute
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Sessions
The pronunciation of the Arabic sounds
Aimline


Part:9
Arabic sounds pronounced correctly per minute
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Sessions
The pronunciation of the Arabic sounds
Aimline





Analyzing the above graphs, the outcomes of the experiment can be seen in the following points. 90**%** of the participants of the study had a stable baseline during the first six sessions. After the first baseline, the examination of the learners' sheets segmenting the Arabic words into their speech sounds showed that all of the them had difficulties with almost the same demanding consonants that were ~~suspected~~ expected to pose production challenges at the beginning, namely q, x, ɣ, ħ, ʕ, tˤ, dˤ and sˤ because they are not part of their L1 phonological system. In the first intervention tasks, the number of the correctly segmented Arabic phonemes was higher for all the the participants. No participant scored one point ~~data~~ under the first baseline. The second intervention tasks showed an increase in the performance again. Seventy percent of the participants scored better than after the first intervention as displayed in Table 4.1:

Table 4.1 Participants' phoneme segmentation accuracy between the baseline and the two phases interventions:

Participants **Sessions**	**Part:1**	**Part:2**	**Part:3**	**Part:4**	**Part:5**	**Part:6**	**Part:7**	**Part:8**	**Part:9**	**Part:10**	**Part:11**
Sess:1	42%	40%	41%	32%	26%	28%	60%	62%	62%	60%	58%

Sess:2	43%	40%	40%	37%	25%	30%	60%	62%	58%	59%	57%
Sess:3	42%	40%	39%	36%	29%	31%	59%	60%	59%	58%	58%
Sess:4	43%	39%	38%	44%	25%	30%	60%	63%	59%	57%	59%
Sess:5	42%	40%	39%	38%	25%	29%	58%	62%	58%	56%	59%
Sess:6	41%	39%	39%	58%	29%	30%	60%	60%	60%	57%	62%
Sess:7	**44%**	**43%**	**58%**	**31%**	**41%**	**41%**	**68%**	**68%**	**64%**	**62%**	**58%**
Sess:8	**46%**	**50%**	**62%**	**40%**	**58%**	**61%**	**66%**	**76%**	**65%**	**64%**	**64%**
Sess:9	**49%**	**50%**	**63%**	**59%**	**68%**	**79%**	**71%**	**77%**	**66%**	**68%**	**70%**
Sess:10	**49%**	**58%**	**62%**	**61%**	**67%**	**81%**	**72%**	**79%**	**72%**	**72%**	**73%**
Sess:11	**56%**	**60%**	**78%**	**63%**	**71%**	**80%**	**77%**	**80%**	**79%**	**73%**	**75%**
Sess:12	**59%**	**60%**	**90%**	**62%**	**73%**	**82%**	**78%**	**76%**	**81%**	**78%**	**74%**
Sess:13	59%	58%	80%	64%	58%	79%	79%	75%	80%	70%	76%
Sess:14	49%	56%	78%	76%	56%	76%	79%	74%	78%	63%	76%
Sess:15	42%	54%	76%	82%	54%	68%	64%	73%	69%	60%	74%
Sess:16	41%	53%	58%	62%	53%	68%	63%	64%	65%	58%	73%
Sess:17	40%	42%	45%	61%	52%	58%	62%	63%	62%	60%	63%
Sess:18	40%	39%	45%	58%	31%	43%	61%	60%	60%	58%	59%
Sess:19	**59%**	**43%**	**60%**	**50%**	**43%**	**60%**	**64%**	**64%**	**69%**	**62%**	**59%**
Sess:20	**60%**	**59%**	**70%**	**44%**	**50%**	**64%**	**66%**	**65%**	**79%**	**67%**	**69%**
Sess:21	**64%**	**62%**	**78%**	**63%**	**64%**	**70%**	**76%**	**77%**	**82%**	**69%**	**83%**
Sess:22	**63%**	**69%**	**80%**	**79%**	**65%**	**73%**	**83%**	**82%**	**88%**	**71%**	**88%**

Sess:23	**74%**	**72%**	**90%**	**98%**	**74%**	**72%**	**96%**	**84%**	**92%**	**85%**	**90%**
Sess:24	**79%**	**79%**	**97%**	**Absent**	**76%**	**86%**	**98%**	**96%**	**98%**	**91%**	**98%**

	Part:1	**Part:2**	**Part:3**	**Part:4**	**Part:5**	**Part:6**	**Part:7**	**Part:8**	**Part:9**	**Part:10**	**Part:11**
Baseline: 1	42.16%	39.66%	39.33%	40.83%	26.5%	29.66%	59.5%	61.5%	59.33%	57.83%	58.83%
Intervention 1	50.5%	53.5%	68.83%	52.66%	63%	70.66%	72%	76%	71.16%	69.5%	69%
Baseline: 2	**45.16%**	**50.33%**	**63.66%**	**67.16%**	**50.66%**	**65.33%**	**68%**	**68.16%**	**69%**	**61.5%**	**70.16%**
Intervention:2	66.5%	64%	79.16%	66.8%	62%	70.83%	80.5%	78%	84.66%	74.16%	81.16%

As shown in the table above, all the participants made an important increase in the correctly produced guttural consonants like participant 5, who moved from correctly segmenting 26% of the targeted phonemes per minute in the first session to 76% correct phonemes in the last one. Participant 6 moved from 28% to 86%, and participant 3 from 41% to 97% correct phonemes. Concerning participant 11 and especially participant 4, the intervention did not have the same outcome because of their non-participation in two intervention sessions, yet their performance was not far from that of their peers. They also showed a real improvement especially at the end of the intervention.

5. Conclusion

The results of this study provide additional empirical evidence that the implementation of explicit, regular intervention activities has an impact on L2 learners' phonological acquisition. The learners' performance in the phoneme segmentation tests has known significant gradual improvement as revealed by the percentage of accurately produced guttural consonants. Repetition intervention exercises are so important. They would not only facilitate the acquisition of these speech sounds and make them less demanding, but also help the learners activate their place of articulation. Minimal pair exercises are also important in developing the production of these sounds because they draw learners' attention to contrastive distinctive phonemes in the target language. Videos that show the manner and place of articulation play a facilitative role in phonology acquisition. Most of the learners would strive to articulate ق /q/ for instance, but they cannot even perceive it many times because they do not know the exact place where it is articulated in the vocal tract.

To maintain the good production of these speech sounds, which are demanding for native speakers of English because they do not exist in their L1 phonological system, the period of the intervention should be shortened from six sessions to five to four till the intervention is not needed anymore. That is, the time of the intervention should be reduced gradually till a good mastery of the targeted phonetic categories is obtained. These speech sounds should also be practiced in syllables, words, sentences and paragraphs as well to maximize their use in speaking.

Second language teachers need to be aware that the phonological component in second language acquisition is very crucial, especially when L1 and L2 have speech sounds and sound patterns that are not similar. They should give importance to ~~on~~ these speech sounds from the beginning of L2 learning. They need to draw their learners' attention to their specific articulatory features in order to make them aware of the extra efforts they need to make when L1 and L2 do not share the same phonetic categories. When students understand the mistakes that they make when replacing a sound by another, mispronouncing it, or dropping it, they would undoubtedly make a double effort to solve that. Therefore, raising explicitly learners' awareness of this issue would facilitate the acquisition of the phonological component of SA.

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References

Aldamen, H., & Al-Deaibes, M. (2023). Perception and production of L2 Arabic emphatic consonants: The role of communicative and traditional form-based approaches. *Ampersand, 10*, Article 100105. https://doi.org/10.1016/j.amper.2022.100105

Alqassas, A. (2025). Acquisition and pedagogy of the Arabic emphatic consonants. *Romano-Arabica, 24*(1). https://doi.org/10.62229/roar_xxiv/2

Alsrhid, A. M. M. (2013). Difficulties face by foreign students in learning Arabic language programs for non-native speakers (Evaluation study). *Journal of Education and Practice, 4*(2).

Crystal, D. (2003). *A dictionary of linguistics and phonetics* (5th ed.). Blackwell Publishing.

Delattre, P. (1971). Pharyngeal features in the consonants of Arabic, German, Spanish, French, and American English. *Phonetica, 23*(3), 129–155. https://doi.org/10.1159/000259336

Dimeo, D. F. (2012). *Arabic for dummies audio set*.

Dmine, A. (2013, November 15). *Pronouncing difficult Arabic sounds*.

Elgendy, A. M., & Pols, L. C. W. (2001). Mechanical versus perceptual constraints as determinants of articulatory strategy. *Proceedings of the Institute of Phonetic Sciences of the University of Amsterdam, 24*, 65–74.

Faisal, F. (2023, November). *Investigating the problems of letter-based pronunciation*.

Khalid, A. (2009a, September 10). *The beginning of a new series of lessons*.

Khalid, A. (2009b, November 14). *The Hamza and Ain pronunciation lesson*.

Laufer, A., & Baer, T. (1988). The emphatic and pharyngeal sounds in Hebrew and in Arabic. *Language and Speech, 31*(2), 181–205. https://doi.org/10.1177/002383098803100205

Odisho, E. Y. (2005). *Techniques of teaching comparative pronunciation in Arabic and English*. Gorgias Press.

Shehata, A. (2015). *The perception and production of Arabic emphatic consonants by second language learners*.

Ziafat, N., Ahmad, H. F., Fatima, I., Zia, M., Alhumam, A., & Rajpoot, K. (2021). Correct pronunciation detection of the Arabic alphabet using deep learning. *Applied Sciences, 11*(6), Article 2508. https://doi.org/10.3390/app11062508