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PRODUCTION OF ARABIC EMPHATIC AND GUTTURAL SOUNDS BY L2 LEARNERS: AN ERROR ANALYSIS STUDY

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Abstract:
This study investigates the pronunciation of Arabic consonants by learners of Arabic as a foreign language, focusing on areas of difficulty and their sources. Sixteen foreign learners of Arabic in Saudi Arabia read 36 target Arabic words, which were audio-recorded, transcribed using the International Phonetic Alphabet (IPA), and analysed qualitatively. The results indicate that the emphatic and the guttural consonants were the most challenging for the learners. The results further show that the complex articulatory mechanisms involved were the primary cause of mispronunciation, while interference from local Arabic varieties also affected the acquisition of standard pronunciation. The study concludes with pedagogical recommendations to support the acquisition of challenging Arabic consonants.

Keywords: error analysis, Arabic as a foreign language, emphatic consonants, guttural consonants, Saudi Arabic dialects

1. Introduction

1.1 Second language acquisition

Children acquire their first language (L1) primarily through exposure, whereas the acquisition of a foreign language (L2) is impacted by various internal and contextual factors. This is also true for Arabic as a foreign language (henceforth AFL), where learners often encounter challenges that may stand as obstacles, impeding or decreasing language acquisition. These challenges have been attributed to factors such as L1 interference, age, personality, and the learning context (Al-Saidat et al., 2023, 2024). Studies have revealed that the learning context plays a significant role in enhancing L2 acquisition (Serrano et al., 2011). For example, the study abroad (SA, henceforth) setting has been reported in various studies to be an ideal learning environment to promote learners' linguistic abilities (e.g., Dewey, 2004; Llanes & Muñoz, 2013). SA benefits are attributed to the

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authentic language that learners are exposed to through interacting with native speakers in real-life situations, which increases their L2 gains (Shehata, 2024). However, it is not only the increased exposure that shapes L2 development but also the type of linguistic input available to learners. For example, learners of Arabic as a foreign language (AFL, henceforth) learn Modern Standard Arabic (MSA) inside the classroom, but are exposed to local dialects of Arabic in Arabic-speaking environments, which may influence their perception and production of target sounds.

As for the role of the learning context in developing learners' L2, the majority of studies have focused on languages like English, French, and Spanish. However, research is scarce on the relationship between the learning context and language perception, especially in less-commonly taught languages; fewer studies explored the acquisition of AFL pronunciation (Moyer, 2016). The present study aims to bridge this gap by examining the difficulties encountered by AFL learners in learning Arabic consonants.

It is essential for learners of a foreign language to acquire a whole new way of speaking in the target language (Malkawi & Al-Saidat, 2025); achieving native-like fluency is usually not attained, especially in the area of pronunciation as it has been viewed as one of the toughest areas in the acquisition of any L2 (Al-Saidat et al., 2024). According to the Revised Speech Learning Model of Flege and Bohn (2021), learners of a foreign language usually rely on phonetic features of their first language to produce those of L2; they map L2 sounds onto phonetic categories of L1 (Shehata, 2018) which may lead to pronunciation errors as much as the two systems differ (Flege & Bohn, 2021). The present study addresses this issue by exploring AFL learners' difficulties in producing Arabic consonants, with particular attention to the role of learning context and exposure to local Arabic dialects.

1.2 Arabic language and dialects

Arabic is a Semitic language; it belongs to the Afro-Asiatic language family (Albirini, 2016). It is spoken in the Arabian Peninsula, major parts of the Middle East and some parts of North Africa (Alkhudidi, 2024). It is one of the five most widely spoken languages worldwide (Al-Huri, 2015). Arabic is commonly classified into three varieties: Classical Arabic, Modern Standard Arabic (MSA), and Colloquial Arabic (CA) (Al-Saidat & Al-Momani, 2010). In this study, the term 'Arabic' covers both Classical Arabic and MSA, while CA will be used as a collective term for regional and local colloquial varieties. MSA is the official language of all Arabic-speaking countries; it is employed in education, religious events, and other formal domains (Al-khudidi, 2024; Bassiouney, 2009). By contrast, CA is used between family members, friends, and in all informal situations; it varies considerably across countries and regions, although mutual intelligibility is generally maintained (Al-Saidat & Al-Momani, 2010). Most differences between MSA and CA are found at the lexical and phonological levels (Al-khudidi, 2024; Abu-Rabia, 2000).

Having two varieties used within the same community for different purposes led Ferguson in his seminal work (1959) to refer to Arabic as a diglossic language. Native

speakers of Arabic have no difficulty in dealing with this diglossic situation, but it may be a different issue for AFL learners. AFL learners taught MSA in formal instruction settings but are exposed to CA in naturalistic contexts. This dual input may result in competing phonological models, especially when colloquial varieties exhibit sound substitutions, mergers, or phonetic realisations that differ from MSA norms. As a result, diglossia may contribute directly to pronunciation errors, especially in the production of marked consonants such as emphatics and gutturals.

The phonemic inventory of Arabic comprises 36 phonemes: 28 consonants, six monophthongs, and two diphthongs. The current study focuses on the acquisition of Arabic consonants, which are presented in Table 1 according to their voicing, places and manners of articulation.

Table 1: Arabic Consonants (Amayreh et al., 1999; Al-Ani, 1970, with modification)

		Manner of articulation											
		Stop		**Affricate**		**Nasal**		**Fricative**		**Trill**		**Approximant**	
		vl	**vd**	**vl**	**vd**	**vl**	**vd**	**vl**	**vd**	**vl**	**vd**	**vl**	**vd**
Place of articulation	Bilabial		b				m						w
	Labiodental							f					
	Interdental							θ	ð ð̪				
	Alveodental	t t̪	d d̪										
	Alveolar						n	s s̪	z		r		l
	Postalveolar				dʒ			ʃ					
	Palatal												j
	Velar	k											
	Uvular	q						χ	ɣ				
	Pharyngeal							ħ	ʕ				
	Glottal	ʔ						h					

Note: vl=voiceless, vd=voiced.

Table 1 presents a schematic overview of Arabic consonants based on standard phonological descriptions. Emphatics are indicated by diacritics (e.g., /t̪, d̪, s̪, ð̪/), reflecting their secondary articulations; they include two stops and two fricatives. Gutturals include uvular, pharyngeal and glottal consonants. This classification is important for understanding the articulatory complexity of these sounds and the possible challenges they pose for AFL learners.

1.2.1 Arabic as a foreign language

Arabic is learnt as a foreign language for various reasons, including academic and religious purposes (Abu-Irmies, 2014). Moreover, there is a growing number of individuals from different countries who seek to learn Arabic to enhance their understanding of Arab culture (Abourehab & Azaz, 2023; Abedalla, 2015). Furthermore, Arabic is attaining international recognition as many countries have realised its importance in international communication (Moghazy, 2021). The interest in learning Arabic has been increasing rapidly as many international organisations have put a lot of

effort into teaching and learning Arabic as a foreign language. These include the British Association of Teachers of Arabic (BATA) and the American Association of Teachers of Arabic (AATA), and the Arabic Teachers Association of Indonesia (ATAI) (Almelhes, 2024; Soliman & Khalil, 2022). Learners of AFL encounter various challenges when attempting to master the language's different skills. One of these difficulties is the production of certain Arabic sounds that appear unfamiliar to learners. For certain sounds, the precise articulation is required to avoid potential communication breakdowns (Heffner & Myers, 2021); Alkhudidi (2024, p. 2) provided some examples of incorrect pronunciation of some Arabic consonants which resulted in a deviation from the target meaning, such as /tˤaːba/ 'healed' when pronounced incorrectly as /taːba/ 'repented'; the meaning is changed and if the listener could not interpret the meaning from any contextual clue, there would be a communication failure. Thus, clarity and comprehension in spoken Arabic are essential. The present study tries to find the difficult areas in producing Arabic consonants, underlying the cause of these difficulties and their possible solutions.

1.3 Significance of the study

The researcher is a native speaker of Arabic and a linguist. He observed that many AFL learners experience difficulties in producing Arabic sounds to the extent that their pronunciation deviates from the intended meaning, although they completed several Arabic language courses in Saudi Arabia. Thus, it is essential to identify the difficult sounds and explore the sources of these difficulties in order to propose pedagogical solutions that may assist both teachers and learners in overcoming such difficulties. Moreover, compared to other languages, research on AFL remains limited (Alhamami & Almosa, 2023; Soliman & Khalil, 2022; Moghazy, 2021). By exploring AFL learners' pronunciation errors, this study extends interlanguage theory by showing how AFL learners develop stable, non-target phonological representations influenced by exposure to local Arabic dialects. Furthermore, the study refines markedness-based accounts by indicating that highly marked consonants – particularly emphatics and gutturals – are not only inherently difficult but are further influenced by diglossic input, thus emphasizing the interaction between phonological markedness and learning context. This study, therefore, attempts to contribute to bridging this gap in AFL research.

1.4 Objectives and research questions

This study aims to explore the challenges encountered by AFL learners when producing Arabic consonants in order to find out the sources of these difficulties and, consequently, suggest pedagogical strategies. To achieve this aim, the study addresses the following research questions:

RQ1: Which Arabic consonants are most difficult for AFL learners?

RQ2: What makes these consonants difficult?

RQ3: How can these difficulties be addressed, based on the study's analysis and pedagogical discussion, rather than through experimental intervention?

2. Literature review

Incorrect pronunciation is one of the reasons behind foreign language learners' failure to communicate (Abu Guba et al., 2021; Huneety et al., 2020). It is generally acknowledged that non-native speakers rarely produce native-like pronunciation (Al-Mahmoud, 2005). As far as the Arabic consonants are concerned, emphatic and guttural consonants pose a challenge for AFL learners (Eads et al., 2018; Mashaqba et al., 2022; Watson, 2002).

Arabic emphatics include two stops (/t̪/, /d̪/), and two fricatives (/s̪/, /ð̪/), whereas the gutturals include two glottals (/ʔ/, /h/), two pharyngeals (/ħ/, /ʕ/), and two velars (/χ/, /ɣ/), and one uvular (/q/) (Eads et al., 2018). The articulation of these sounds involves the backing of the tongue body and/or constriction of the pharynx or the larynx. However, they remain difficult since these movements are imperceptible to the ears and eyes (Abu Guba et al., 2021; Eads et al., 2018).

2.1 Emphatics

The Arabic emphatic consonants, /t̪, d̪, s̪, ð̪/, pose a challenge for AFL learners (Eads et al., 2018). They are often misidentified by L2 learners due to their lack of familiarity (Al Mahmoud, 2013). They have non-emphatic counterparts /t, d, s, ð/. The articulation of the emphatics is complex in that they involve two articulations: the primary and the secondary articulation (Alkhudidi, 2024). The primary articulation is performed by making a constriction in the coronal region, whereas the secondary articulation is difficult to determine (Al-solami, 2017). Some studies maintain that the secondary articulation of the emphatic consonants is located in the pharynx (e.g., Al-Ani, 1970; Israel et al., 2012), while others argue that it is near the epiglottis and the larynx (e.g., Al-Tamimi et al., 2009; Laufer & Baer, 1988). A third claim states that the secondary articulation of the emphatic consonants is near the uvula (e.g., Ghazeli, 1977; Younes, 1993; Zawaydeh & de Jong, 2011). This implies that there is no agreement upon the exact location of the secondary articulation of the emphatic consonants in the literature (Alkhudidi, 2024). Learners of AFL are expected to have difficulties in learning these sounds due to their secondary articulation, especially when these are unfamiliar to them. Moreover, the influence of the local dialects used in the Arabic-speaking countries contributes to these difficulties, as the voiced emphatics /d̪/ and /ð̪/ have variations in some dialects. For example, /d̪/ is produced as /ð̪/ in most of the Gulf, Tunisian (Watson, 2002), and Jordanian dialects.

The literature shows that the acquisition of Arabic consonants by non-native speakers has attracted the attention of researchers. Studies have revealed that certain Arabic consonants pose a challenge for AFL learners (e.g., El Haimeur, 2025; Aldamen & Al-Deaibes, 2023; Binasfour et al., 2017; Lababidi, 2016; Shehata, 2015; Huthaily, 2008).

El Haimeur (2025) explored the acquisition of Arabic emphatic and pharyngeal sounds by AFL learners. The sample consisted of fourteen undergraduate students at an American university; all the participants had a similar linguistic background and joined an elementary-level Arabic course. For data collection, the author collected data through written assignments, recordings and perception tasks. El Haimeur (2025) found that the

participants had difficulties in learning Arabic emphatic and pharyngeal consonants; they replaced them with similar sounds from their L1, English. The results of the study also revealed that integrating VoiceThread and recorded instructional videos was effective in improving the acquisition of the Arabic /d̪/. This was the only consonant that was accurately perceived and produced. Similar results were reported in Huthaily's (2008) study in terms of substituting unfamiliar L2 sounds with similar L1 sounds.

Aldamen and Al-Deaibes (2023) explored the acquisition of Arabic consonants by nineteen AFL learners. The study focused on the perception and production of Arabic emphatic and non-emphatic consonants. The results showed that the non-emphatic consonants were mapped onto similar sounds that existed in the participants' L1, English. The emphatic consonants posed a challenge for the participants as they were not aligned to any L1 category. Moreover, due to the similarities between the Arabic emphatics and their non-emphatic counterparts (Binasfour et al., 2017), AFL learners frequently find it challenging to differentiate between the two sets. For example, in Shehata's (2015) study, the participants were unable to differentiate the Arabic emphatics from non-emphatics as the former set does not exist in English, the participants' L1. Similarly, the participants of Binasfour et al. (2017) were unsuccessful in distinguishing Arabic emphatics from their non-emphatic counterparts due to the similarities between the two.

Lababidi (2016) studied the categorical representations of the Arabic emphatic and their non-emphatic counterparts in the minds of monolingual speakers of American English, aiming to determine precise category mappings between English and Arabic. The results of the study revealed that the Arabic consonants /t, d, ð, s, s̪/ were considered as 'similar' sounds to the English categories, /t̪, ð̪/ were considered 'less similar, whereas Arabic /d̪/ was considered a 'new' sound.

2.2 Gutturals

The Arabic guttural consonants, /ʔ, h, ħ, ʕ, χ, ɣ, q/, do not exist in many AFL learners' L1 (Mashaqba et al., 2022). Learning these sounds is considered challenging and problematic for many AFL learners (Eads et al., 2018; Mashaqba et al., 2022). The large set of Arabic guttural consonants is a unique feature of Arabic phonology (Watson, 2002). Gutturals refer to the sounds produced with a primary articulation in the posterior regions of the vocal tract (McCarthy, 1991). This place feature, guttural, stands for a zone of articulation which includes the larynx, the pharynx and the uvula (Watson, 2002). Pronouncing any of the gutturals incorrectly may lead to a communication breakdown. For example, if /ɣ/ is incorrectly produced as /χ/, as in /raχwa/ 'loose' for /raɣwa/ 'foam', this will hinder communication since the two words have different meanings (Mashaqba et al., 2022, p. 335).

The previous studies have revealed that certain Arabic gutturals, among other consonants, pose a challenge for AFL learners (e.g., Al Mahmoud, 2013; Mashaqba et al., 2022; Eads et al., 2018, among others).

Mashaqba et al. (2022) examined the phonological differences in the production of Arabic gutturals by native and non-native speakers of Arabic. Using free speech and

nonsense word testing, they collected data from 40 participants. The results of the study showed that non-native speakers were unable to make the required amount of coarticulation for Arabic gutturals; they do not make sufficient primary constriction in the posterior regions of the vocal tract. The results also showed that the easiest guttural for non-native speakers was the voiceless glottal fricative /h/, followed by the voiceless glottal stop /ʔ/, whereas the most difficult one was the voiced velar fricative /ɣ/, followed by the voiced pharyngeal fricative /ʕ/. The study concluded that the challenges that non-native speakers faced in the production of Arabic gutturals are due to the coarticulatory attributes of gutturals, the absence of these sounds in learners' L1, and the lack of exposure to an Arabic-speaking environment.

Eads et al. (2018) investigated the articulation of Arabic emphatic and guttural consonants of nine AFL learners at a university in the United States. The results of the study revealed that many participants struggle with Arabic emphatic and guttural consonants. These consonants were challenging as the results showed that participants were unable to fully distinguish between the expected articulations of emphatic/non-emphatic or guttural consonants, except for the glottals, as found by Mashaqba et al. (2022). The study also revealed that the most difficult sounds for AFL learners were the voiced emphatic sounds and the guttural fricatives.

Similarly, Al Mahmoud (2013) explored the ability of twenty-two native speakers of American English to perceive and discriminate Arabic consonant contrasts. Participants were able to discriminate contrastive sounds that have English equivalents, such as /t/-/d/ and /θ/-/ð/, but they found it difficult to identify new contrasts such as /χ/-/ɣ/, /ħ/-/h/, and /χ/-/ħ/. The study reported that English-speaking learners of Arabic found various difficulties in acquiring Arabic consonants; it showed that the voiceless pharyngeal /ħ/ was the most difficult and challenging Arabic sound for them.

2.3 Critical synthesis

The literature on Arabic emphatics and gutturals has shown that these two sets of consonants are challenging for AFL learners (e.g., Eads et al., 2018; Mashaqba et al., 2022; Al Mahmoud, 2013; El Haimeur, 2025). Their results revealed that the sources of difficulty in learning these sounds are attributed to L1 interference, lack of equivalent sounds in learners' L1s, and the complex articulatory aspects of these sounds. Furthermore, the emphatics /d̪, ð̪/ and the gutturals /χ, ɣ, ħ, ʕ/ are identified as the most challenging consonants (Mashaqba et al., 2022; Eads et al., 2018).

Nevertheless, the previous studies have limitations. For example, many focused mainly on perception tasks or isolated pronunciation assessment rather than naturalistic production. Moreover, they examined learners with limited exposure to the natural use of language, not considering the impact of dialectal variation and diglossic switching on learners' interlanguage. Previous studies often did not link pronunciation challenges to pedagogical strategies or propose practical methods for overcoming such difficulties. Finally, few studies systematically examined both emphatics and gutturals in the same sample, limiting comparisons across consonant types.

The current study attempts to bridge these gaps by investigating AFL learners' pronunciation of Arabic consonants in a controlled yet realistic reading task; considering the influence of the Saudi local dialects of Arabic; analysing both emphatics and gutturals within a single framework; and developing pedagogical implications based on the error patterns observed rather than simply identifying difficulties. In doing so, the study hopes to contribute to a comprehensive understanding of the challenges encountered by AFL learners and provide evidence-informed recommendations to enhance consonant acquisition.

3 Methods

3.1 Site and participants

This study was conducted at an institute for teaching Arabic as a Foreign Language in Saudi Arabia. The participants were sixteen male AFL learners. All were male participants due to the gender segregation policy in Saudi Arabia, which limits access to mixed-gender classrooms. They were multinational learners of Arabic with various linguistic backgrounds (Appendix A). It should be noted that the small, all-male, and institution-specific sample restrictions the generalizability of the outcomes to other settings and learner populations.

The researcher introduced the study to the participants, explained its objectives, and informed them that participation was voluntary and that they could withdraw at any time without providing a reason. After all participants had signed consent forms, the data collection process began.

3.2 Data collection and analysis

This study aims to explore the challenges that AFL learners encounter in learning and producing Arabic sounds. More precisely, it aims to identify the most difficult consonants and the sources of these difficulties in an attempt to describe the pronunciation patterns and analyse them through phonological and language acquisition theories. The study adopted a descriptive qualitative approach with quantitative elements; it relied primarily on collecting and analysing spoken data, documenting the learners' production of Arabic consonants and identifying the challenges they encountered. It also utilised analytical elements to infer the causes of the difficulties that the participants faced. To interpret the underlying cause of these difficulties, the study relied on Selinker's (1972) Interlanguage Theory and Eckman's (1977) Markedness Differential Hypothesis (MDH), whereas quantitative counts of mispronunciations were used to determine the frequency of errors for each consonant. The findings are expected to offer some pedagogical insights into improving the teaching and learning of the pronunciation of Arabic consonants in the AFL context.

Being a native speaker of Arabic and a linguist, the researcher designed a list of 36 Arabic words (Appendix B), covering the consonants predicted to be the most difficult based on his observations and professional experience. Each participant was required to

read the list aloud. The researcher audio-recorded the participants' pronunciations and later transcribed them using IPA symbols (see Table 1). The analysis involved identifying challenging sounds according to the frequency of incorrect pronunciation and mapping the difficulties to likely causes, such as the articulatory complexity of certain consonants or the degree of unfamiliarity.

The researcher, who is a native speaker and a linguist, also consulted some experts from the Department of Arabic at Taif University to confirm the correct pronunciation of the recorded material, in addition to a linguist experienced in Arabic phonetics, for the validation of the transcription. Descriptive inter-rater agreement was high, with raters agreeing on over 90% of identified errors. Discrepancies were discussed and resolved through consensus.

4. Findings and discussion

The results of the analysis are discussed under two major categories: the emphatics and the gutturals. This categorization is based on the frequency of errors in these two areas.

4.1 Emphatic consonants

The Arabic emphatic set of consonants includes /t̪, d̪, s̪, ð̪/. They involve primary and secondary articulations, as discussed above. The first two are stops, and the other two are fricatives, see Table 1.

4.1.1 Emphatic stops

The analysis of the recorded data shows that the two emphatic stops (/t̪, d̪/) are replaced by their non-emphatic counterparts (/t, d/), respectively.

The recorded data did not show any appearance of the voiceless alveodental emphatic stop /t̪/ and the voiced alveodental emphatic stop /d̪/; they are replaced by their non-emphatic counterparts /t/ and /d/, respectively. For example, /t̪/ is pronounced non-emphatic /t/ as in /t̪a:ʔırah/ → /ta:ırah/ 'airplane', /batt̪ah/ → /battah/ 'duck', /muħı:t̪/ → /muhı:t/ 'ocean' and /batt̪ı:χ/ → /battı:k/ 'watermelon'. Similarly, /d̪/ is replaced by its non-emphatic counterpart /d/. Examples include /wa:d̪ıħ/ → /wa:dıh/ 'clear', /ʔabyad̪/ → /ʔabyad/ 'white', and /ʔard̪/ → /ʔard/ 'land'. These two emphatic sounds seem to be difficult for AFL learners, as they substitute them with similar sounds that differ only in the emphasis feature. This process of emphatic neutralisation involves abandoning the secondary articulation of the emphatics. The difficulty arises from the process and nature of articulating emphatic sounds that may be unfamiliar to the learners. Especially for /d̪/, the outside-class environment contributes to making this sound difficult to learn due to its absence from the local dialects used. Speakers of many dialects, such as the Gulf and Jordanian dialects, usually replace /d̪/ by /ð̪/ as the pronunciation of /ð̪ama:n/ instead of /d̪ama:n/ 'security'; in the Lebanese and Syrian dialects, it is pronounced /d/ as in /dama:n/ 'for/d̪ama:n/ 'security'.

4.1.2 Emphatic fricatives

This category includes two sounds: the voiced interdental emphatic fricative /ð̲/ and the voiceless alveolar emphatic fricative /s̲/. They are replaced by their non-emphatic counterparts /ð/ and /s/, respectively. Examples from the data include /ħað̲/ → /hað/ 'luck', /ʕað̲m/ → /aðm/ 'bone' /ð̲ulm/ → /ðulm/ 'injustice', /raχɪːs̲/ → /rakɪːs/ 'cheap', /s̲awt/ → /sawt/ 'voice', and /mɪs̲r/ → /mɪsr/ 'Egypt'. The source of difficulty in the production of these two sounds is similar to the process of emphatic neutralisation described in the preceding category. However, in the Saudi dialects to which the participants are exposed in their daily interactions with the local community, these sounds are used and pronounced correctly. The reasons for learners' mispronunciation can be attributed to the emphatic articulation or the absence of these sounds from their L1. In some other Arabic dialects, the voiced fricative /ð̲/ is replaced by /z/ with some emphasis, as in the pronunciation of /ð̲ulm/ as /zulm/ 'injustice' and /ð̲arɪːf/ as /zarɪːf/ 'nice'. However, these substitutions were not common in any of the Saudi dialects.

4.2 Guttural consonants

This set of sounds includes two uvular fricatives /χ, ɣ/, two pharyngeal fricatives /ħ, ʕ/, two glottals /ʔ, h/, and one uvular stop /q/.

4.2.1 The uvulars

This category includes three sounds: /χ/, /ɣ/, and /q/. The first two are voiced and voiceless fricatives, respectively. /χ/ is substituted by the voiceless velar stop /k/, as in /χaːdɪm/ → /kaːdɪm/ 'servant' an /taːrɪːχ/ → /taːrɪːk/ 'history'. /ɣ/ is replaced by the voiced velar stop /g/, as in /ɣarɪːb/ → /garɪːb/ 'strange' and /mablaɣ/ → /mablag/ 'amount'. This substitution is predictable since the processes /χ/ → /k/ and /ɣ/ → /g/ seem to be based on certain similarities between the two sounds, such as sharing the same voicing and adjacent places of articulation.

The third uvular is the voiceless stop /q/. It is regularly replaced by /k/, sharing the same voicing and manner of articulation. Erroneous pronunciations of /q/ include /qarɪːb/ → /karɪːb/ 'near' /ʃarq/ → /ʃark/ 'east' and /suːq/ → /suːk/ 'market'. In most of the Arabic dialects, /q/ is replaced by /g/, /k/, /ʔ/ or /dʒ/. For example, in some dialects, the word /qaːl/ 'he said' may be pronounced as /kaːl/, which would be interpreted as 'he measured' unless determined from the context. Similarly, there will be no difference in the pronunciation between /ʔanaːnɪ/ 'selfish' and /ʔanaːnɪ/ 'bottles'. The learners' mispronunciation of /q/ may be attributed to at least two reasons: first, they do not hear /q/ in the outside-classroom environment because it is pronounced /g/ in the Saudi dialects; second, being a uvular sound, its articulation is difficult, to some degree, since it involves backing the tongue towards the uvular region. This is true for most learners who are unfamiliar with the uvular articulation.

4.2.2 The pharyngeals

In Arabic, there are two pharyngeal consonants: /ħ/, which is a voiceless pharyngeal fricative, and its voiced counterpart /ʕ/. The participants of this study replace /ħ/with the voiceless glottal fricative /h/, retaining the voicing and manner features, but shifting the place of articulation to an adjacent one, the glottis. This is seen clearly in the following examples: /ħarb/ → /harb/ 'war', /murɪːħ/ → /murɪːh/ 'comfortable' and /baħr/ → /bahr/ 'sea'. The second pharyngeal consonant, /ʕ/, is omitted, as in /ʕayn/ → /ayn/ 'eye', /asal/ → /ʕasal/ 'honey', and /saʕɪːd/ → /saɪːd/ 'happy'. The difficulty can be attributed to the mechanisms involved in the articulation of pharyngeal sounds, especially when these do not exist in the learners' L1.

4.2.3 The glottals

The majority of the participants dropped the voiceless glottal stop /ʔ/ as in /qabaːʔɪl/ → /kabaːɪl/ 'tribes' and /hawaːʔ/ → /hawaː/ 'air'. The source of difficulty in the production of this sound can be attributed to two reasons: the influence of learners' L1, especially if this sound does not exist in their phonemic inventory. The second reason is the impact of the Arabic local varieties since native speakers usually omit /ʔ/ and lengthen the preceding vowel to ease the pronunciation as in /fɪʔraːn/ → /fɪːraːn/ 'mice', /θaʔr/ → /θaːr/, 'revenge', /bɪʔr/ → /bɪːr/ 'water well', and /ðɪʔb/ → /ðɪːb/ 'wolf'. In contrast, the available data did not indicate any errors in the production of the second glottal consonant /h/; all the participants produced it correctly.

This research explored the challenges that AFL learners encounter in learning Arabic consonants. The major difficulty was caused by the nature of articulation involved in the production of some consonants, such as the emphatic and guttural sets of sounds. The participants neutralised the emphatics /t̪, d̪, s̪, ð̪/; they were regularly replaced by their non-emphatic counterparts /t, d, s, ð/. This finding is in line with the findings of the previous studies. For example, Arabic emphatics were identified as challenging sounds for the AFL learners in many studies (e.g., El Haimeur, 2025; Aldamen & Al-Deaibes, 2023; Eads et al., 2018; Shehata, 2015; Al Mahmoud, 2013). Similarly, Binasfour et al. (2017) reported that participants were unable to distinguish emphatics from their non-emphatic counterparts. This finding also partially agrees with the results of Lababidi (2016) in that /t̪, d̪, s̪, ð̪/ were difficult to learn for their participants. However, the current study identified /s̪/ as a difficult sound, unlike the participants of Binasfour et al. (2017), who found it easy.

The analysis showed that the Arabic guttural consonants were difficult to learn, except for/h/. They are articulated in the posterior regions of the vocal tract, including the larynx, the pharynx and the uvula. Similar to the findings of the current study, the previous research showed that Arabic gutturals were among the challenging and problematic sounds for AFL learners (e.g., Mashaqba et al., 2022; Eads et al., 2018; Al Mahmoud, 2013). Moreover, the voiceless glottal fricative /h/ was correctly produced by all participants. This was also the result of Mashaqba et al.'s (2022) study. They reported that /h/ was the easiest sound among the gutturals for non-native speakers of Arabic.

Exposure to authentic sources played an important role in the acquisition of Arabic consonants by the participants of this study. The absence of some consonants from the dialects to which participants were exposed affected their pronunciation. For example, /d̪/ and /q/ are pronounced in the Saudi dialects as /ð̪/ and /g/, respectively. This agrees with the observation of Watson (2002) and the results of Mashaqba et al. (2022). As these sounds are constituents of the phonological system of the Saudi dialects, learners encounter various challenges when using what they learnt inside the classroom in the outside environment. This may affect their learning of the correct pronunciation of these sounds.

4.3 Summary of findings

4.3.1 Data-driven findings

1) None of the participants produced the voiceless emphatic stop /t̪/ correctly (100% substitution). It was replaced by its non-emphatic counterpart /t/.
2) Only two participants (12.5%) correctly produced the voiced emphatic stop /d̪/, whereas 14 participants (87.5%) pronounced it as /d/.
3) The voiceless emphatic fricative /s̪/ was incorrectly produced as /s/ by 75% of the participants.
4) The voiced emphatic fricative /ð̪/ was substituted with /ð/ in 81.2% of the instances.
5) The voiceless guttural uvular fricative /χ/ was produced as /k/ in 81.2% of the instances, whereas its voiced counterpart /ɣ/ was replaced by /g/ in 87.5% of productions.
6) The guttural uvular stop /q/ was replaced by /g/ in 75% of the instances, reflecting the impact of the Saudi local dialects.
7) The pharyngeal sounds seem to be the second most challenging after /t̪/. The voiceless pharyngeal /ħ/ was pronounced as /h/ in 93.7% of productions, whereas its voiced counterpart /ʕ/ was omitted in 90.6% of instances.
8) The glottal fricative /h/ was correctly pronounced by all participants (100%), whereas the glottal stop /ʔ/ scored only 43.1% correct pronunciation and was omitted in the rest of the instances (56.9%).

4.3.2 Interpretation

The process of emphatic neutralisation reflects the challenge that AFL learners face, which implies their unfamiliarity with secondary articulation in Arabic and the interference of local dialects, as in the case of /d̪/, which is often replaced by /ð̪/ in Gulf and Jordanian dialects or by /d/ in Lebanese and Syrian dialects. Substitutions for uvulars and pharyngeals are systematic and reflect articulatory difficulty (tongue backing and constriction in the pharyngeal area), which is unfamiliar to most learners. Moreover, the mispronunciations of /q/ and /ʔ/ reflect the impact of dialectal variation.

Participants' challenges in producing articulatory difficult sounds align with articulatory markedness (Eckman, 1977) and interlanguage influence (Selinker, 1972). The impact of the dialectal exposure shaped the pronunciation patterns (e.g., d̪ and q),

emphasising the interplay between learning context and phonological acquisition. These errors are not random mistakes; they reflect systematic patterns, suggesting stable interlanguage representation in AFL learners.

5. Conclusion and pedagogical implications

The aim of the current study was to examine the pronunciation of Arabic consonants by AFL learners in order to identify the most difficult sounds and the sources of these difficulties. The results revealed that the emphatic and guttural consonants were the two most challenging sets for AFL learners. The main sources of difficulty included the articulatory complexity of these sounds, especially the secondary articulations of the emphatics and the tongue backing of the gutturals, in addition to the influence of local Arabic varieties to which learners were exposed outside the classroom. The findings have direct pedagogical implications for teaching Arabic as a foreign language.

Effective instruction can integrate the following:

1) **Articulatory training:** Guide learners to feel tongue, pharynx, and uvula positions for producing emphatics and gutturals.
2) **Visual feedback:** Show the articulatory movements of the challenging sounds using spectrograms, ultrasound imaging, or video recordings.
3) **Minimal-pair drills:** Contrast emphatic with non-emphatic sounds, and guttural with non-guttural sounds to make the differences clear.
4) **Dialectal variation awareness:** Place more emphasis on differences between MSA and local dialects to minimise communication breakdowns.

The present study has successfully identified challenging sounds and the sources of these challenges for AFL learners. Despite this, the findings cannot be generalised since the sample size was small and limited to male learners. However, future research could address these limitations by:

1) Including male and female learners in larger and more diverse samples from different institutions.
2) Incorporating experimental interventions to assess their effectiveness in enhancing pronunciation. These may include articulatory training or visual feedback.
3) Exploring other phonological aspects, such as vowels, consonant clusters, and the impact of the L1 phonological system, to provide a comprehensive understanding of AFL learners' phonological acquisition.

By implementing the above pedagogical strategies and research designs, both AFL teachers and researchers can identify the challenging areas for AFL learners and facilitate the acquisition of Arabic phonology both inside and outside the classroom settings.

Conflict of Interest Statement

The author declares no conflict of interest.

About the Author

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Appendices

Appendix A: Participants' L1s and Arabic Proficiency Levels

Participant	L1	Arabic Proficiency*
P1	Malay	Beginner
P2	Urdu	Beginner
P3	Swahili	Beginner
P4	Filipino	Beginner
P5	Malay	Beginner
P6	Swahili	Beginner
P7	English	Beginner
P8	Russian	Beginner
P9	Urdu	Beginner
P10	Swahili	Beginner
P11	Malay	Beginner
P12	Russian	Beginner
P13	Bengali	Beginner
P14	Swahili	Beginner
P15	Filipino	Beginner
P16	Urdu	Beginner

*Proficiency levels were determined based on the course completion records.

Appendix B: List of Arabic words

1	أبيَض	2	عَسَل
3	أرض	4	عَظم
5	بَحْر	6	عَين
7	بَطّه	8	غائب
9	بَطّيخ	10	غريب
11	تاريخ	12	قبائل
13	حَرب	14	قريب
15	حَظ	16	قطّة
17	خادم	18	لص
19	خرائط	20	الله
21	دَهْر	22	مبلغ
23	سعيد	24	مُحيط
25	سُوق	26	مُريح
27	شَرق	28	مصْر
29	صَوت	30	مَغْص
31	ضَئيل	32	نَظيف
33	طائرة	34	هَواء
35	ظُلم	36	واضِح