

The Use of Arabic in Language-Learning Applications: Duolingo as a Case Study

Dr. Fadila Deguenati ¹

¹Scientific and Technical Research Center for the Development of the Arabic Language,
Research Unit for Linguistic Studies and Issues of the Arabic Language, Algeria, Ouargla

Abstract

Language education has become an important field in the context of digital globalization and cross-cultural communication. Acquiring new languages enables individuals to engage with the wider world and gain access to new knowledge, ideas, and cultures. In this context, numerous applications and online programs have been designed to facilitate self-directed language learning.

This research paper aims to investigate the use of Arabic in electronic language-learning applications by examining how Duolingo approaches the Arabic linguistic system at the phonological, morphological, syntactic, and semantic levels, whether Arabic is used as a target language or as an intermediary language. It also seeks to assess the extent to which the application succeeds in selecting Arabic equivalents that convey the intended meaning while taking learners' cultural backgrounds into consideration.

The study adopts a descriptive approach supported by analytical procedures. It examines and analyzes selected examples extracted from the application. The findings confirm the active presence of Arabic in the digital environment of language-learning applications, while also highlighting an urgent need to improve the computational processing of Arabic content, particularly at the syntactic and grammatical-inflection levels.

Keywords

Arabic language; language learning applications; electronic learning; Duolingo; computational linguistics; language education; digital learning.

1. Introduction

The rapid technological developments witnessed over recent decades have led to the emergence of new forms of learning based on electronic media and smart applications. E-learning represents a significant transformation in the field of applied linguistics. Such applications have contributed to transforming language-learning methods and creating interactive environments that enable learners to acquire new vocabulary as well as reading and listening skills in a self-directed and flexible manner, without being restricted by time or place.

The computerization of language education has received considerable attention in contemporary linguistics, which seeks to adapt computational systems to the processing of human languages and to present linguistic content in an accessible digital format. Duolingo represents a leading model in this field, offering short, interactive lessons based on repetition and educational games designed to motivate learners to continue learning. Duolingo primarily adopts English as its main language. Arabic, meanwhile, is incorporated into the application as a global language that is gaining increasing popularity in the digital sphere. It appears in two contexts: as a **target language**, through teaching Arabic to non-Arabic speakers, and as an **intermediary language**, through teaching other languages to Arabic speakers.

The digital processing of Arabic poses complex linguistic challenges related to the nature and structure of the Arabic language. In order to examine the current state of Arabic usage in digital language-learning applications, this research paper, entitled “**The Use of Arabic in Electronic Language-Learning Applications: An Analytical Study of Duolingo,**” seeks to shed light on this experience and assess its current status.

Research Problem

The central research question can be formulated as follows:

How effective are language-learning applications in their use and treatment of the Arabic language?

This question gives rise to the following sub-questions:

- What is meant by electronic language-learning applications?
- How does Duolingo deal with Arabic at the phonological, morphological, and semantic levels?
- Does Duolingo take into consideration the cultural and social particularities of the Arab learner?

To address these questions, a number of examples extracted from the application were examined, described, and analyzed using a descriptive methodology supported by analytical procedures. This process led to a number of significant findings.

Previous Studies

The topic of electronic language education has received considerable attention in contemporary linguistic and educational research, with numerous studies addressing it from various methodological and applied perspectives.

Among the studies consulted in this context is Al-Yubi's (2017) study entitled **"The Effectiveness of Websites in Teaching Arabic to Non-Native Speakers"** (Al-Yubi, 2017). The study focused on identifying the fundamental principles that should be taken into account when designing educational websites and provided an analytical description of the curricula adopted by such websites. The present study differs from Al-Yubi's approach in that his study examined educational websites in general, whereas the present research focuses specifically on the use of Arabic in Duolingo.

In a related context, Al-Mulhim (2021) investigated **"The Current State of Using Smartphone Applications in Teaching Arabic to Speakers of Other Languages at the Institute for Teaching Arabic to Non-Native Speakers at the Islamic University from Teachers' Perspectives"** (Al-Mulhim, 2021). The study aimed to measure the effectiveness of integrating smartphones into the educational process within a specific institutional setting, without focusing on a particular software application. The present study, by contrast, focuses on a unified educational program intended for a global audience.

The present study also shares its applied analytical dimension with Brahim's (2024) study entitled **"Artificial Intelligence Applications for Teaching Arabic Vocabulary to Non-Native Speakers: LingoDeer as a Model"** (Brahimi, 2024). Brahim examined lexical competence and vocabulary within the application. The present research complements and extends this approach by going beyond the lexical level to include other linguistic levels, in addition to the cultural and contextual dimensions associated with learning through Duolingo.

2. Materials and Methods

(Font: Times New Roman, Size: 14, Bold)

Describe the methodology, experimental setup, tools, and techniques used in the research.

3. Results

Introducing Duolingo



Duolingo is an American mobile application and website dedicated to language learning. Duolingo is based on a **freemium model**, offering some of its application and website services free of charge while also providing premium services for an additional fee. The application also offers an online test designed to assess English-language proficiency.

The application was updated on October 13, 2020, introducing several changes and additions. Following the update, it offered 98 different courses for learning 38 different

languages. The application also had a registered user base of more than 300 million users worldwide.

Teaching Methods Used in the Program

The lessons offered by the program cover the four language skills—listening, speaking, reading, and writing—through a variety of activities. These include finding translations of individual words in the target language and translating short sentences. The application also allows learners to produce spoken language by pronouncing phrases through a microphone, after which the program alerts them to pronunciation errors.

One of its distinctive features is its use of gamification. As Duolingo itself states: “Duolingo is designed to be fun and game-like.”

Arabic in the Application

When entering the application, the learner selects the language through which they will learn—the application language or intermediary language. A list of target languages is then displayed.

When Arabic is selected as the application language, the learner is presented with a list of languages to learn, including English, French, German, Spanish, Korean, Japanese, Italian, Chinese, and Portuguese.

If another language, such as English, is selected, Arabic appears among the available target languages. However, Arabic is not included in all curricula.

Thus, Arabic occurs in the application in two contexts:

- **Arabic as an intermediary language**, used to teach another language to Arabic speakers.
- **Arabic as a target language**, used to teach Arabic to non-Arabic speakers.

Arabic as a Target Language

Duolingo provides a curriculum for teaching Arabic to non-native speakers. However, this curriculum is not available across all language interfaces; Arabic is offered through a limited number of languages.

For the purposes of this study, we examine the English-language curriculum for learning Arabic. The lessons are divided into sections, each containing a number of units. Each unit has a title corresponding to a particular topic and includes a series of lessons.

For example, the first unit of the first section focuses on associating letters with their sounds, while the second unit introduces nouns, followed by lessons concerning places and other topics.

Several observations can be made regarding the application’s treatment of Arabic.

Phonological Level

Language is initially constituted by sounds, and every language possesses a phonological system that distinguishes it from other languages. Languages may share certain sounds while differing in others.

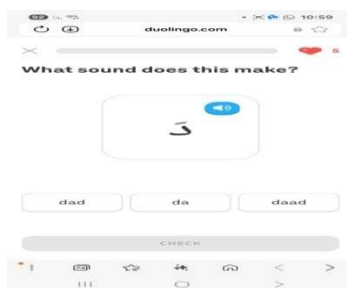
The curriculum begins by teaching letters. In the first unit, it focuses on the following activities:

1. “What sound do you hear?”

The application presents the Arabic letter together with its pronunciation, including vowel markings, and provides its representation in the learner’s language, English.

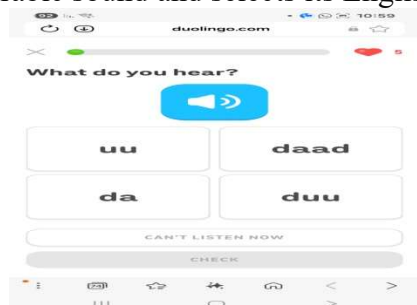
For example:

د — with the pronunciation and a choice among several options:
dad – da – daad



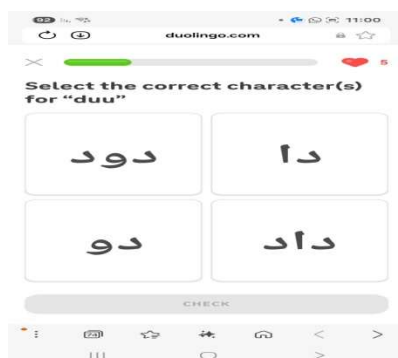
2. “Choose what you hear”

The learner hears only the Arabic sound and selects its English equivalent.



3. “Choose the correct letter”

No audio is provided. The learner attempts to identify the Arabic letter through its English representation.



It is noticeable that the application devotes numerous lessons to sounds in their different forms, including short and long vowels, both individually and in combinations.

One of the challenges encountered by curriculum designers teaching a foreign language is representing the sounds of the target language in writing. Duolingo provides a list of Arabic sounds and their English equivalents.

Arabic Vowels and Their English Representations

Arabic vowel	Written symbol	English equivalent
Fatha	َ	A
Long fatha (alif)	ل / ا	Aa
Kasra	ِ	I
Long kasra (yā')	ي	Ii
Damma	ُ	U
Long damma (wāw)	و	Uu

Just as vowels differ from one language to another, consonants also differ. A sound may exist in the target language without having a direct equivalent in the learner's language. The educational-program designer therefore attempts to establish correspondences between the two languages by providing written representations that approximate the target sound.

Examples found in Duolingo include:

Arabic consonant	English representation	Example
Hamza (أ) (إ)	2 (2a)	أب: 2 ab
Thā (ث) (ث)	th (tha)	ثوب: thawb
Dhāl (ذ) (ذ)	dh (dhu)	ذوب: dhawb
ʿAyn (ع) (ع)	3 (3i)	بَعِي: ba3ii
Ghayn (غ) (غ)	Gh (gha)	تَغْرِي: taghrii
Wāw (و) (و)	w (wa)	راو: raw
Yā (ي) (ي)	y (ya)	راي: ray

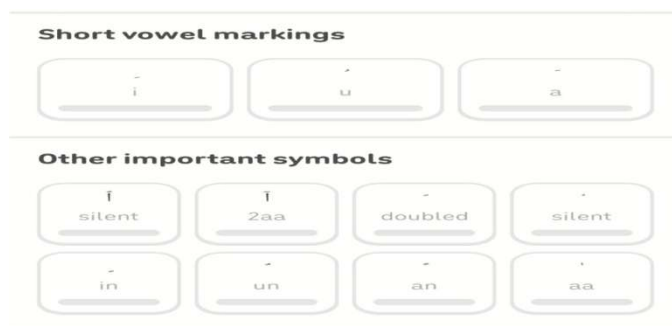
The application also provides a table of Arabic letters and their corresponding representations, with an option to hear their pronunciation by clicking on each letter.

Several observations can be made concerning these representations:

- The application generally relies on phonetic symbols based on the learner's language. The exceptions are the letters **ʿayn** and **hamza**, which are represented by the numerals **3** and **2**, respectively.
- A single symbol in the learner's language (English) may represent more than one sound in Arabic because of their perceived similarity. For example: ض: **D** / د: **d**, س: **s** / ص: **S**, and ط: **T** / ت: **t**. Although these sounds share certain phonetic characteristics, they differ in other articulatory and phonological properties. For example, ṣād and sīn share the same general place of articulation and the feature of sibilance, whereas ṣād is distinguished by emphatic articulation. This is reflected in the use of an uppercase letter for ṣād and a lowercase letter for sīn, while their actual audio realization remains distinct.
- The application distinguishes between **wāw** and **yā** in their long-vowel and consonantal functions, assigning them different representations: و: **uu** / w and ي: **ii** / y. However, the pronunciation exercises focus primarily on their long-vowel realization, e.g. و: **ū** and ي: **ī**.
- The application places **tā' marbūṭa (ة)** in a separate category, represented as **a/at**, apparently based on the assumption that the preceding letter is always marked with fatha and that the /t/ sound is omitted in pausal position.
- The application also introduces the different written forms and positions of hamza under the category **"Placements of Hamza."**



- It provides symbols for short vowels, sukūn, and tanwīn under the category **"Other Important Symbols."**



The phonetic representations adopted by the application enable beginners to learn Arabic sounds through approximations based on the sound system of their native language. This may be useful at the beginner level; however, each language has precise phonological characteristics that differ from those of other languages, and these differences should be taken into account at more advanced levels.

Morphological Level

Learners move from recognizing individual sounds to recognizing morphological forms, in which groups of sounds or letters combine to form words, whether nouns, verbs, or particles.

One observation concerning the application is its presentation of unusual forms that may not actually exist in Arabic, apparently for the purpose of focusing learners' attention on the letters that constitute them. It would have been more appropriate to use familiar and meaningful forms in such activities so that learners could become accustomed to them and consolidate them in memory.

Examples include:

مَام (ma2am) – تَأَج (ta2aj) – جَكَد (jakad)

The application also occasionally uses forms that are closer to colloquial Arabic, such as بنتي ("my daughter") in:

أُحِبُّكَ كَثِيرًا يَا بِنْتِي.

"I love you very much, my daughter."

Syntactic Level

Arabic is an inflectional language whose grammatical structure relies significantly on case marking. The orientalist Johann Fück states that:

"Classical Arabic has preserved, in its system of grammatical inflection, one of the oldest linguistic features that was lost by all Semitic languages except Old Babylonian before the period of its literary development and flourishing" (Fück, 2014).

Accordingly, learners of Arabic are required to take this feature into consideration because grammatical inflection contributes to conveying the overall meaning of the sentence.

Duolingo provides short sentences corresponding to the topic of the unit to which they belong. Lessons vary between translating a sentence, rewriting a sentence after hearing it in the same language, and reading a sentence aloud through the microphone.

Examples include:

Translate this sentence

The sentence may be presented in English and the learner is asked to translate it into Arabic, with several options provided:

a kind grandmother and a kind grandfather

لطيف – لطيفة – وجد – جدة

Alternatively, the sentence may be presented in Arabic and the learner is asked to translate it into English, again with several options:

زَوْجَتُكَ مَلِكَةٌ يَا سَامَ

Options:

Arab – fast – hungry – is – queen – Sam – wife – Your

“Repeat after me”

The learner reads the sentence by pressing the microphone button, and the application evaluates the response and identifies errors. This activity is not compulsory, as it can be skipped by selecting **“I can’t speak now.”**

“Write what you hear”

The learner listens to the sentence by pressing the listening icon, with an option to slow down the audio, and then selects the correctly formed words.

It is noticeable that the application relies on artificial intelligence in sentence generation and processing. This has resulted in shortcomings in the quality of Arabic speech output, including the following:

- **Overreliance on pausing or neutralizing word-final vowels:** For example, in the sentence:

الدكتورة ستعود الشهر المقبل

all words may be pronounced without appropriate final case marking.

Although the omission of inflectional endings does not always affect meaning, the use of incorrect vowel endings can affect both meaning and syntactic structure. Those responsible for the application should therefore take this issue into account in order to achieve the intended educational objectives. Consulting specialists in Arabic language pedagogy and computational Arabic processing could help avoid such difficulties.

- **Failure to represent gemination (shadda) in certain contexts:** For example:

جَدِّي يحبني

In the audio, the word جَدِّي may be pronounced without the expected gemination.

Style and Sentence Formulation

One of the aesthetic features of Arabic lies in its expressive and syntactic formulation. Duolingo tends to rely on short, direct sentences, many of which are structurally influenced by English.

For example:

غسان جوعان جدًا مهندس لبناني

is used as a translation of:

“Ghassan is a very hungry Lebanese engineer.”

Lexical Level

Duolingo seeks to introduce learners to new words at each stage. It repeatedly presents newly introduced vocabulary in different contexts and activities, which helps reinforce and consolidate it.

The application also provides a list of **802 Arabic words**, accompanied by their English equivalents and pronunciation guides.

In its previous version, the application included a dictionary that allowed learners to search for equivalents between their native language and the target language, and vice versa, by entering a word into the designated field. The corresponding word would then

appear along with selected contextual examples. This dictionary feature was removed in the newer update.

Arabic as an Intermediary Language

When Arabic is selected as the intermediary language for learning English, all instructions are displayed in Arabic. The lesson structure does not differ significantly from that described above, except that learners begin directly with words rather than receiving dedicated lessons on letters and sounds.

Duolingo and the Arab Learner's Culture

The designers of the program have attempted to include a broad range of vocabulary within the selected subject areas. Some learners, however, may find that certain expressions do not correspond to their cultural background and may attempt to overlook or ignore them.

Examples include:

I drink beer.

أنا أشرب بيرة.

My daughter is a waitress.

ابنتي نادلة.

If a learner refuses to engage with this type of vocabulary, they may be unable to complete the relevant stage, since all lessons within a stage must be completed.

Although some vocabulary may not correspond to a learner's cultural background, it is generally beneficial for language learners to be exposed to a broad range of vocabulary rather than being subjected to excessive selectivity. Context remains the principal factor in determining meaning and appropriateness.

Nevertheless, it is advisable for language-learning applications to take into consideration the values and cultural norms of the communities targeted by their educational programs, while recognizing that such programs are often designed by organizations that may not explicitly incorporate these considerations into their curricula **Figure 1:** [Insert caption here. Recommended width: 4.5 inches].

4. Conclusion

After examining some aspects of the use of Arabic in Duolingo, the following conclusions can be drawn:

- Arabic is one of the world languages that has entered computer-based language-learning applications and has established a significant presence both as an intermediary language and as a target language.
- The use of Arabic in computer-based programs continues to face several challenges that require further development, particularly with regard to the accurate audio realization of sentences and the appropriate representation of grammatical case endings.
- The incorporation of Arabic into computer-based language-learning environments is a positive and valuable development. However, the creation of applications grounded in the cultural and linguistic specificities of Arabic would provide greater potential and more diverse linguistic levels.

.

References

- Abu Mahfouz, Ibtisam Mahfouz. *Language Skills*. Riyadh: Dar Al-Tadmuriyyah, 1st ed., 2017.
- Hassani, Ahmed. *Studies in Applied Linguistics: The Field of Language Education*. Algiers: Office of University Publications, 2nd ed., 2009.
- Al-Baghdadi, Shireen Abdel-Moati. *Music and Language Skills in Children*. Modern University Office, 1st ed., 2013.
- Al-Aref, Abdulrahman bin Hassan. "Employing Computational Linguistics in the Service of Arabic Linguistic Studies: Efforts and Results." *Journal of the Jordanian Arabic Language Academy*, Jordan, No. 73, 2007.
- Abdulrahim, Abdulrahim Mohammed, and Hassan Mohammed Nour Al-Mubarak. *Arabic Writing*. Suez Canal University, Egypt, n.d., 2006.
- Wafi, Ali Abdel-Wahed. *Philology*. Cairo: Dar Nahdat Misr, 2004.
- Al-Bari, Maher Shaaban Abdel-Bari. *Practical Speaking Skills and Performance*. Dar Al-Masirah, 1st ed., 2011.
- Fück, Johann. *Arabic: Studies in Language, Dialects, and Styles*. Translated by Abdel-Halim Al-Najjar. Cairo: National Translation Center, 2014.
- *Best Free Applications for Learning Languages on Your Smartphone*. Al Jazeera Midan, 18 May 2026.