# PEDAGOGICAL LEXICOGRAPHY APPLIED TO ARABIC DICTIONARIES AND SMARTPHONE APPLICATIONS

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Abstract:     Arabic dictionaries suffer from several drawbacks that render them mostly inadequate for learners. The advent of mobile digital devices, especially the smartphone platform, has made it possible to significantly enhance the language learning experience in hitherto unavailable ways. This paper describes a series of tools designed to aid learners master Arabic in a pedagogically effective manner. The first is an Arabic learner's dictionary fine-tuned to the special needs of learners that presents abundant lexicographic information in a user friendly manner available in two editions: as a printed dictionary (CALD) and an mobile application (iCALD) that takes advantage of the superb features of the smartphone platform. The second is an Arabic verb conjugator application (CAVE) for the smartphone platform that provides instant access to Arabic conjugation paradigms in a user friendly manner. Finally, the paper presents an innovative phonemic transcription system (CARS) designed specifically for learners that is used both in the two dictionaries and the conjugator.

## 1   LEARNER'S DICTIONARY

### 1.1 Background

The lack of effective learner's dictionaries and other pedagogical tools puts learners of Arabic as a second language at a disadvantage compared with those of other major languages.

   Existing dictionaries, often rooted in Classical Arabic, suffer from shortcomings that make them inadequate for learners. These include, among other things, user-unfriendly design, lack of romanization and inaccurate or out-of-date equivalents. Another obstacle for learners is the lack of accurate phonological information, especially word stress. For beginners who have no knowedge of roots and patterns, locating entries in traditional dictionaries is time-consuming and unreliable. Equally inconvenient is the lack of illustrative examples and the absence of part-of-speech labels.

   In light of the acute surge in Arabic langauge studies in recent years, there is a growing need for a dictionary that meets the practical needs of the learner.

### 1.2 Aims and Target

This paper introduces *The CJKI Arabic Learner's Dictionary,* or CALD for short. The primary goal of CALD is to enable learners to gain a firm understanding of the basic meanings and grammatical features of the core vocabulary of Modern Standard Arabic. From the outset, CALD was designed to meet the specific needs of beginners and intermediate learners by addressing the shortcomings of existing dictionaries. CALD is also being made available as an electronic dictionary application (iCALD) for the smartphone platform.

   A number of features distinguish CALD as a new type of pedagogical tool, including a learner-oriented romanization system that indicates word stress, a user-friendly design, accurate up-to-date equivalents, abundant illustrative examples, detailed grammatical information such as part of speech codes, alphabetical ordering, and *full form* search in the smartphone application. Everything from the selection and presentation of headwords and their meanings to the writing of examples and the entry layout was fine-tuned to create an effective learning aid that stimulates a desire to learn.

## 1.3 Compilation Techniques

CALD was compiled with the help of computational lexicography techniques combined with the latest advances in desktop publishing technology. Various tools were used to perform extensive sanity checks to ensure data integrity, accuracy and consistency, and the work was independently reviewed by a team native speaker editors and lexicographers.

CALD is firmly committed to the descriptive approach. Existing dictionaries often include obscure or archaic meanings occurring only in Classical Arabic. The word senses in CALD were newly created specifically for this dictionary on the basis of actual occurrences, not merely on the authority of other dictionaries.

## 1.4 Selection Criteria

The lemmata have been selected on the basis of existing dictionaries and corpora-based frequency statistics. These include (1) *A Frequency Dictionary of Arabic* (Buckwalter and Parkinson, 2011), based on a 30-million-word corpus, (2) the lexical database used for the ElixirFM project (Smrž, 2007), (3) K. Honda's excellent Arabic-Japanese learner's dictionary (Honda, 1997) and (4) the Arabic Treebank (Maamouri et al., 2004). The single senses were selected on the basis of occurrences in various dictionaries and the subjective judgement of the editors.

The selection of entries and word senses for learner's dictionaries is not a mechanical process that can be based on raw frequency alone. The final decision was based on "usefulness to the learner," as judged by the editors. As a result, CALD includes up-to-date lemmata and senses ignored by many dictionaries, such as مُدَوَّنَةٌ *mudawwánatun*, 'blog' and اَلصّرَافُ ٱلآلِيّ *'aṣṣarráf-u_l'ạlíyy-u* 'ATM'. However, since CALD is a learner's dictionary, coverage of technical terms and senses is necessarily limited.

## 1.5 Alphabetical Ordering

A serious obstacle to learners is that locating entries in traditional dictionaries requires a knowledge of roots, making the lookup process time-consuming and unreliable. Though a knowledge of roots is valuable, looking up by roots is inconvenient for beginners since they are unable to identify the root of a verb or to determine the basic form (Form I) from a derived form.

For example, to look up the verb اِنْتَظَرَ *'intáẓara* 'wait for' the user needs to know that it is Form VIII,

derived from the basic form نَظَرَ *náẓara* 'look at', and be able to identify the root as ظ ر *n-ẓ-r.* Under that root, اِنْتَظَرَ is listed along with other verbs like أَنْظَرَ *'ánẓara* 'grant' (Form IV) and تَنَاظَرَ *tanáẓara* 'face each other' (Form VI). Looking for اِنْتَظَرَ under ظ ر is not intuitive and means that beginners, even after repeated time-consuming searches, may fail to find the desired entry.

An important feature of CALD is the ordering of entries in alphabetical order, so that اِنْتَظَرَ is found under its canonical form اِنْتَظَرَ rather than under its root ظ ر. Many leading Arabists such the author of Sharoni's Arabic-Hebrew dictionary (Sharoni, 1987) are in favor of ordering by roots because it enables the general user (not just the learner) to locate entries quickly and easily. In CALD, as in Sharoni's dictionary, it is also possible to search by roots since cross-references point from all verb roots to the verbs derived from that root.

## 1.6 Up-to-date Meanings

Existing dictionaries often list meanings that are out-of-date, mixing historical meanings with modern ones with no indication of their temporal status. On the other hand, recent words and word senses, especially those related to information technology, are often omitted. Another issue is that in some dictionaries historical or arbitrary sense ordering makes it difficult to know which senses are important.

In CALD, the English equivalents are up-to-date, accurate and concise, and are listed in order of importance in contemporary Arabic. When a new concept first enters a language, the meaning of an existing word is often extended to cover that of the new concept, as in سَاحَة *sáḥa*, 'courtyard, field', extended to mean 'forum', while in other cases loanwords like تِلِفُون *tilifún* 'telephone' are adopted. The editors of CALD have made an effort to include such recent senses, which are often not listed in other dictionaries.

For the convenience of the learner, the equivalent indicates the particles that collocate with intransative verbs, such as سَلَّمَ عَلَى *sállama εalạ* 'greet (someone)' and سَافَرَ إِلَى *sáfara 'ílạ* 'travel to', while subentries list useful word combinations such as phrasal verbs like قَامَ بِ *qáma bi,* 'take upon' and وَقَعَ عَلَى *wáqaεa εála* 'come across' and prepositional phrases like مِنَ ٱلْمُمْكِنِ *mina_lmúmkini* 'possible'.

# أَكَلَ ’á•ka•la VT [أ-ك-ل]
eat

لَمْ يَأْكُلْ شَيْئًا مُنْذُ صَبَاح ٱلْيَوْم *lam yá’kul sháy’-an múndhu ṣabáḥ-i_lyáwm-i* He has not eaten anything since this morning.

| Form I - Z1 - 123 | AP آكِلٌ ’ákil-un |
|---|---|
| PR يَأْكُلُ *yá’kulu^u* | PP مَأْكُولٌ *ma’kúl-un* |
| IM كُلْ *kul* | VN أَكْلٌ *’ákl-un* |

# بَيْتٌ báy•t-un NOUN [ب-ي-ت]

① house, home, residence

بَيْتٌ صَغِيرٌ *báyt-un ṣaghír-un* small house

② verse

بَيْتُ ٱلشِّعْرِ *báyt-u_shshíɛr-i* verse of poem

| MS بَيْتٌ *báyt-un* | MP ① بُيُوتٌ *buyút-un* |
|---|---|
| FS — | أَبْيَاتٌ② *’abyát-un* |

# صَرَّافٌ ṣar•rá•f-un NOUN [ص-ر-ف]
money changer, cashier

يَعْمَلُ ٱلصَّرَّافُ فِي ٱلْبَنْك *yáɛmalu_ṣṣarráf-u fi_lbánk-i* The money changer works at the bank.

| MS صَرَّافٌ *ṣarráf-un* | MP صَرَّافُونَ *ṣarrafúna* |
|---|---|
| FS صَرَّافَةٌ *ṣarráfa-tun* | FP صَرَّافَاتٌ *ṣarrafát-un* |

ٱلصَّرَّافُ ٱلْآلِيُّ *’aṣṣarráf-u_l’álíyy-u* ATM (automated teller machine)

# قَرِيبٌ qa•rí•b-un ADJ [ق-ر-ب]
① near, close

قَرِيبٌ مِنْ بَيْتِي *qaríb-un min báyti* near my house

② recent, soon

فِي وَقْتٍ قَرِيبٍ *fi wáqt-in qaríb-in* in a short time

| MS قَرِيبٌ *qaríb-un* | MP قَرِيبُونَ *qaribúna* |
|---|---|
| FS قَرِيبَةٌ *qaríba-tun* | CM أَقْرَبُ *’áqrab-u* |

# وَقَعَ wá•qa•ɛa VI [و-ق-ع]

① fall down, drop, tumble

وَقَعَ مِنَ ٱلسُّلَّمِ *wáqaɛa mína_ssúllam-i* He fell off the ladder.

② take place, happen, occur

وَقَعَ حَادِثٌ فِي ٱلْمَصْنَع *wáqaɛa ḥādíth-un fi_lmáṣnaɛ-i* An accident happened in the factory.

③ be located, be situated, lie

تَقَعُ ٱلْمَكْتَبَةُ وَسْطَ ٱلْجَامِعَةِ *táqaɛu_lmaktába-tu wásṭa_ljāmíɛa-ti* The library is situated at the center of the university.

| Form I - A2 - 150 | AP وَاقِعٌ *wáqiɛ-un* |
|---|---|
| PR يَقَعُ *yáqaɛu^a* | PP مَوْقُوعٌ *mawqúɛ-un* |
| IM قَعْ *qaɛ* | VN وُقُوعٌ *wuqúɛ-un* |

وَقَعَ عَلَى *wáqaɛa ɛála* VI come across, run into

وَقَعَ فِي حُبٍّ *wáqaɛa fi ḥúbb-in* VI fall in love

# ٱلْيَابَانُ ’al•ya•bá•n-u NOUN
Japan

سَافَرَتْ إِلَى ٱلْيَابَانِ *sáfarat ’íla_lyabán-i* She travelled to Japan.

# يَابَانِيٌّ ya•ba•níyy-un NISBA
Japanese ADJ

ٱلْحُكُومَةُ ٱلْيَابَانِيَّةُ *’alḥukúma-tu_lyabaníyya-tu* Japanese government

a Japanese NOUN

سَأَلَنِي يَابَانِيٌّ سُؤَالًا *sa’álani yabaníyy-un su’ál-an* A Japanese asked me a question.

| MS يَابَانِيٌّ *yabaníyy-un* | MP يَابَانِيُّونَ *yabaniyúna* |
|---|---|
| FS يَابَانِيَّةٌ *yabaníyya-tun* | FP يَابَانِيَّاتٌ *yabaniyát-un* |

Figure 1: Page sample of CALD.

## 1.7 Illustrative Examples

According to a CJKI survey, only three out of 30 bilingual Arabic dictionaries give example sentences for all or almost all entries (some of which include snippets from the media too difficult for learners), while a couple of dictionaries give examples only very occasionally (CJKI, 2011). From a pedagogical point of view, quoting examples from corpora or directly from sources like newspapers can be counterproductive since such sentences can be long, complicated, or difficult to understand.

In CALD, each sense is illustrated by easy example sentences *written specifically for this dictionary*. As can be seen from Figure 1, the examples enable the learner to gain a good understanding of how the headword is used in context.

## 1.8 Grammatical Information

CALD provides detailed grammatical information such as the regular and irregular inflected forms for the imperfect, active and passive participles, verbal noun(s), feminine form, sound and broken plurals, the root, and the like.

| Form I - Z1 - 123 | AP آكِلٌ 'ákil-un |
|---|---|
| PR يَأْكُلُ yá'kulu<sup>u</sup> | PP مَأْكُولٌ ma'kúl-un |
| IM كُلْ kul | VN أَكْلٌ 'ákl-un |

Figure 2: Grammar Box for أَكَلَ.

Multiple plurals corresponding to different word senses are also shown, e.g., the plural of بَيْتٌ *báytun* 'house' is بُيُوتٌ *buyūtun* for the sense 'house' but أَبْيَاتٌ *'abyátun* for the sense 'verse'.

| MS بَيْتٌ báyt-un | MP ① بُيُوتٌ buyút-un |
|---|---|
| FS — | ② أَبْيَاتٌ 'abyát-un |

Figure 3: Grammar Box for بَيْتٌ.

The Grammar Box thus provides the learner with detailed information on inflected and derived forms, eliminating the need for laboriously consulting grammar books and conjugation tables.

## 1.9 Part of Speech Codes

The survey by CJKI showed (1) that 22 out of 30 dictionaries do not provide explicit POS codes, including such well-known dictionaries as Hans-Wehr (Cowan, 1979), and (2) that not a single dictionary gives explicit verb transitivity codes for all verb entries (although a couple provide them implicitly). The failure of many dictionaries to provide POS codes is linguistically untenable and most inconvenient to learners.

An important feature of CALD is that explicit and accurate part of speech codes are given for every entry. For example, many *nisba* adjectives have noun counterparts, such as يَابَانِيٌّ *yabanīyyun* 'Japanese' meaning 'a native of Japan' as a noun and 'relating to Japan' as an adjective. These are listed separately, with separate example sentences, to show how each is used in context. A useful feature not found elsewhere is that CALD indicates verb transitivity by explicit part-of-speech codes such as *VT* and *VI*.

## 1.10 User Friendliness

A drawback of many existing dictionaries is poor design and user-unfriendliness. Often the fonts are so small and the design so poor that looking up words becomes a burdensome chore, strongly demotivating learners. Special efforts were made to design CALD for maximum user friendliness, ease of use and portability. Typographical design with the aid of cutting edge DTP technology was used to achieve a harmonious blend of font styles and sizes, resulting in an esthetically pleasing design that strongly stimulates a desire to learn.

## 1.11 Smartphone Application

CALD is also being made available as an electronic dictionary application for the smartphone (iOS and Android platforms), referred to as iCALD, which takes advantage of the superb features of the smartphone. Space does not permit a description of iCALD in detail. Briefly, it offers a user-friendly interface, *full form* search for locating any inflected form (see Section 2.2), multiple search modes, audio for all lemmas and example sentences, and seamless integration with CAVE that enables immediate access to full conjugation paradigms.

# 2 VERB CONJUGATOR

## 2.1 Background

Mastering a verb system as complicated and as irregular as the Arabic one is a daunting challenge that requires years of effort. The number of inflected forms and irregular conjugation paradigms is difficult to master even for native speakers. Traditional tools, like grammar books and printed paradigm tables, make learning a chore so tedious that it often demotivates the learner. Paradigm tables present long and boring lists of verbs, often in barely legible print, making lookup a laborious process. With the worldwide increase in the number of learners of Arabic, there is a compelling need for a new medium to present this complex information in a pedagogically effective manner.

The advent of the smartphone platform provides new tools to enhance the language learning experience. In particular, iOS mobile devices such as the iPhone and iPad have given rise to a sharp surge in dictionaries and applications available to language learners (Asialex, 2011). This platform provides an infrastructure that allows for creative approaches to interface design, enabling users to easily zoom in on the information they are looking for.

## 2.2 Aims and Target

*The CJKI Arabic Verb Conjugator,* or CAVE, is a bilingual Arabic-English verb conjugator application for the smartphone platform (iOS and Android). Its goal is to help learners, and even native speakers, to master the Arabic verb system. CAVE was designed to be a highly effective pedagogical tool that makes the process of looking up verb paradigms easy, fast, and enjoyable.

To this end, CAVE provides exhaustive coverage of 170 conjugation paradigms for over 1600 common verbs. Its many features include an innovative romanization system that indicates word stress, a user friendly interface, clearly pronounced audio for over 400,000 inflected forms, and multiple search modes. The most important feature of CAVE is its ability to perform **full form search**; that is, it allows even beginners to quickly access verbs from any of their inflected forms, or from their English equivalents (see Section 1.7).

## 2.3 Full Form Dictionary

A unique feature of both iCALD and CAVE is that they are driven by a "full form" bilingual dictionary, enabling the user to perform **full form search.** This allows even beginners to quickly access verbs from any of their inflected forms, not just the root or canonical form, or from their English equivalents. For example, typing *ya'tii* or ي أﺗ 'he comes' will directly locate the entry for أَﺗَﻰ *'áta* 'come' and does not require the user to know that أَﺗَﻰ is the canonical form of that verb, nor that ي أﺗ *'-t-y* is its root.

Full form search is extremely convenient not only for learners, who often find it difficult to determine the root or the canonical form from the inflected form, but also for advanced users since it provides quick access to any verb, no matter how irregular.

## 2.4 Multiple Search Modes

CAVE provides several search modes to enable even complete beginners to quickly locate the conjugation paradigm for any verb from any of its inflected forms, from the canonical form, from the root, or from the English meaning.

1. **Full Form Search** allows the user to input any inflected form of the verb. For example, typing *ya'tii* or ي أﺗ will directly locate the entry for أَﺗَﻰ *'áta* and does not require the user to know the canonical form أَﺗَﻰ nor the root ي أﺗ.
2. **Verb Search** enables searching from the canonical form, e.g. inputting *kataba* or ك ﺗﺐ displays كَﺗَﺐَ 'write'.
3. **Root Search** allows the user to input the root to find the canonical forms of all the corresponding verbs, e.g. typing *Eml* or عمل displays عَمِلَ *εámila* 'work', عَمَلَ *εámala* 'treat', ﺗَﻌَﺎمَلَ *taεámala* 'deal with', and others.
4. **English Search** allows the user to quickly find a verb from any of its English meanings, including partial and included matches. For example typing *return* or *back* will locate such entries as أَعَﺎد *aεáda* 'return, give back, repeat, restore'.
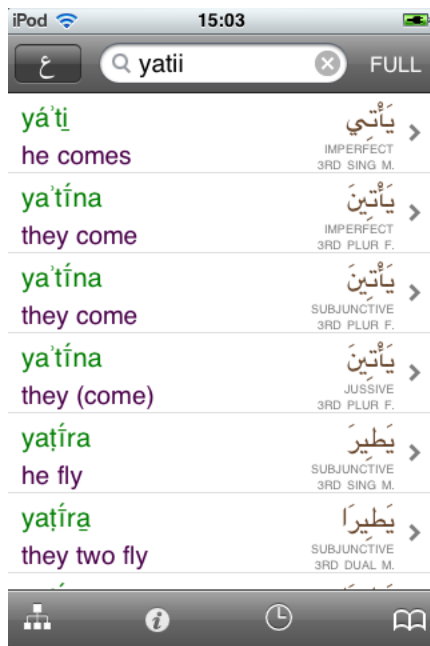
Figure 4: Entries can be located from any inflected form.



Figure 5: Detailed information in large, easy-to-read fonts.

## 2.5 Other Features

All Arabic forms are romanized using CARS, a new romanization system designed for learners that indicates pronunciation accurately, including word stress and neutralized vowels, e.g. لَا أَكْتُبُ *lạ ʾáktubu* (*á* is stressed and *ạ* is neutralized).

Search keywords can be entered either in roman or Arabic scripts. The roman input mode accepts the most common romanized spellings. For example, إِخْضَرّ *ʾikhḍárra* 'be green' can be input as *ikhDarra*, *ikhDarra*, *'ikhDarra*, *'ikhdarra*, while the Arabic input mode accepts both vocalized and unvocalized Arabic.

Clear and concise English meanings, based on CALD, are given for each inflected form. Listed in order of importance, these meanings have been fine tuned by native speaker editors to satisfy the needs of the learner.

Several filtering features limit the display to specific subsets, giving quick access to the desired forms only, such as negative or affirmative forms, plural or singular, English or CARS, and more.

## 2.6 Functional User Interface

Special efforts were made to design a functional user interface that ensures maximum user friendliness and rapid access. This includes an interface object

known as a "scroll wheel" that provides quick access to all verbs of a specific category, various filters that limit display to subsets like plurals and negative forms, easy-to-read large fonts, support for Arabic, roman and English input, and clearly pronounced audio for all inflected forms.

## 2.7 Pedagogical Effectiveness

CAVE was designed to function as an effective learning aid that stimulates a desire to learn. Its ease of use, richness of content and functional user interface give the learner rapid access to detailed information on all inflected forms.

CAVE allows the learner to quickly access all inflected forms and their meanings without knowing any conjugation rules. Typing any form in any common romanization displays a list of candidate matches. As the learner is increasingly exposed to Arabic using CAVE, she gradually internalizes the rules by osmosis, rather than through a conscious process of rote memorization. Eventually, producing the correct form becomes a mostly unconscious process.

Some well-known educators such as Karin Ryding consider CAVE "beneficial for mastering Arabic verbs" (CJKI, 2011), while others have praised it as a tool that is likely to transform Arabic pedagogy for both native and non-native speakers alike.

Figure 6: Scroll wheel to quickly access verb categories.


Figure 7: Explicit indication of stress and neutralization.

# 3   ROMANIZATION SYSTEM

## 3.1 Background

There is an unfortunate misconception among Arabic educators that vocalized Arabic is sufficient for pronouncing Arabic correctly and therefore learners should avoid romanization. However, Halpern (2009) has shown that even fully vocalized Arabic cannot convey pronunciation accurately, and that a romanized transcription is highly desirable in the critical initial stages.

## 3.2 Aims and Target

The CJKI Arabic Romanization System, or CARS, is an innovative phonemic transcription system developed specifically to enable learners to pronounce Arabic accurately and with ease (2009a). The new system, which is making its debut with the appearance of CALD and CAVE, has several unique features, including a symbol set that unambiguously represents all Arabic phonemes, and, for the first time, symbols that explicitly indicate stress and neutralization.

For example, in ٱلْحُكُومَةُ ٱلْيَابَانِيَّةُ *alḥukúmatu lyabaníyyatu* 'the Japanese government', long vowels (as in *kū*) are shown by a macron, word stress by the accent mark (as in *kű*), and, for the first time, long vowels that are *neutralized* (shortened) in actual pronunciation are indicated by an underline (as in *a̱*).

The table below shows how stressed and neutralized vowels are represented in CARS.

Table 1: Vowels in CARS.

| CARS | Description |
| --- | --- |
| a̱ | neutralized /a/ |
| i̱ | neutralized /i/ |
| u̱ | neutralized /u/ |
| ā́ | stressed long /a/ |
| í | stressed long /i/ |
| ű | stressed long /u/ |

## 3.3 Word Stress and Neutralization

An innovative feature of CARS is the indication of word stress. Though grammar books do give stress rules, these are inadequate and give the erroneous impression that stress is easily predictable (Halpern, 2009b). To avoid these complexities, CARS makes stress explicit by placing an acute accent over the stressed syllable, as in يَعْمَلُ *yáɛmalu* 'he works'.

Neutralization has been neglected by dictionaries and learning materials. Learners are misled into believing that long vowels, as in أَنَا *ʾána̱* and كَتَبوا *kátabu̱*, are pronounced long, and this myth is

perpetuated by misguided educators who hypercorrect by pronouncing these vowels long in recordings (but never in natural speech).

A unique feature of CARS, which is of great utility to the learner, is the explicit indication of both stress and neutralization, as in هٰذَا *hádha*. Ignoring neutralization, as is the common practice, results in "theoretically correct" but unnatural or stilted pronunciation. CARS encourages learners to pronounce correctly by making shortened vowels explicit.

## 3.4 CARS Sample

Below is a sample of a text written in fully vocalized Arabic followed by the CARS transcription and the English translation.

كَانَ عَلَاءُ ٱلدِّينِ يَبْلُغُ مِنَ ٱلْعُمْرِ ٱثْنَيْ عَشَرَ
عَاماً فَقَطْ، وَلَكِنَّهُ كَانَ يَعْمَلُ فِي مَحَلِّ خَيَّاطٍ
لِيَكْتَسِبَ مَا يَعِيشُ مِنْهُ هُوَ وَأُمُّهُ.

*kána ɛalāʾu ddīńi yáblughu mína lɛúmri ʾithnáy ɛáshara ɛáman fáqaṭ, walakínnahu kána yáɛmalu fị maḥálli khayyáṭin liyaktásiba mạ yaɛīśhu mínhu húwa waʾúmmahu.*

Aladdin was only twelve years old, but he worked in a tailor's shop to support himself and his mother.

As can be seen, the CARS transcription enables the reader to pronounce Arabic with precision, shortening vowels when necessary and stressing the correct syllable.

## 4   FUTURE WORK

This paper introduced a series of tools that promise to transform the traditional methods of learning Arabic as a second language. To this end, CALD satisfies the special needs of non-native learners by addressing the major shortcomings of previous works. Every effort has been made to meet those needs by providing such features as a learner-oriented romanization system, part of speech codes, alphabetical ordering, user-friendly design, and illustrative examples. The paper also introduced CAVE, a bilingual verb conjugator for the smartphone platform that helps learners master the Arabic verb system by making the process of looking up verb paradigms fast, easy and enjoyable. The smartphone edition of CALD, in addition to including all the features of the printed one, offers a user-friendly interface, full form search for locating any inflected form, and seamless integration with CAVE, giving the user immediate access to full conjugation paradigms.

The number of learners of Arabic worldwide is steadily increasing, which has led to a constantly growing demand for pedagogically effective learning aids. The CJK Dictionary Institute is dedicated to continuing to meet this challenge through the ongoing development of electronic dictionaries and pedagogical applications. It is hoped that lexicographers and educators around the world will contribute to this effort through advice, constructive criticism and, above all, through direct collaboration.

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