

# A way of Supporting Non-Arabic Speakers in Identifying Arabic Letters and Reading Arabic script in our new E-Learning System

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## Abstract

This paper reports how a new multimedia, for developing Arabic e-Learning, supports the beginners of non-Arabic speakers in identifying Arabic letters in a word by using colored script, and reading Arabic script by using our new reversed phonetics, right to left. In Arabic, letters are connected to each other in the word. Each Arabic letter has three different figures according to its position in a word (beginning, middle or end). Users' study was conducted with 77 examinees in Japan to find which one is preferable for identifying letters of two alternatives: coloring letters or separating letters with spaces. Results showed that colored alternative is preferable. Another study was conducted with another 20 examinees in Japan to confirm that our new system supports the beginners in reading Arabic letters comparing with the conventional phonetic system. We develop an e-learning system incorporates our multimedia to support learners in identifying and reading Arabic script by themselves.

**Keywords:** Multimedia, Reversed images, Arabic Learning, Phonetics transcription.

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## 1. Introduction

Arabic specific features may be obstacles for non-Arabic people to learn Arabic. Arabic script runs from right to left, as opposed to the other languages. There are 29 letters which are connected in a word, not only in hand writing but also in printed materials. Letters change their figures in the script depending on their position in a word: at the beginning, in the middle, or at the end, as exemplified in Table 1, as for the letter “ ب ”, which represents the consonant “ B ”.

Each Arabic letter represents its specific consonant. A word consisting of only letters does not show its pronunciation. Usually letters appeared in Arabic script are attached with one of 10 diacritics to show how that letter be pronounced with/without one of three Arabic vowels, as exemplified in Table 2. Thus, once one can identify each letter appearing in a word as it is, one can easily read/pronounce the word.

In Arabic language, there are more than 900 different symbols used for Arabic scripting. Figure 1 shows Arabic greeting “Hello?” as an example. Usually, diacritics could be omitted as shown in figure 2. Note that they should be read from right to left.

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Table 1. Example of the three figures for the letter "ب"

Position			The letter
End	Middle	Beginning	
ب	بـ	بـ	ب

Table 2. Arabic script with diacritics

Pronunciation	Arabic script
BaBiBu	بَبَبُ
BuBiBa	بِبِبُ
BiBaB	بِبِبُ



Figure 1. An Arabic greeting

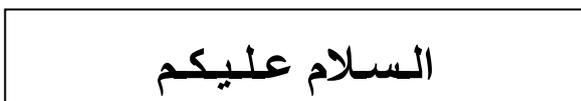


Figure 2. An Arabic greeting

Children may start reading in traditional way of repeated drilling on Arabic script as it is. Grown-ups find difficulty in reading/pronouncing Arabic script, especially in identifying each letter and recalling its pronunciation, since they do not endure simply repeating drilling. Multimedia of Arabic, especially e-learning, should provide support for learners to get used to right-to-left reading, and identifying letters of a word to recall their pronunciation when intended learners may include grown-ups.

## 2. How to identify letters in a word in an Arabic e-learning system

### 2.1. Two ways to identify every letter

There are two existing alternatives or ways, found in our surveying of Arabic teaching materials [1], [2], [3] and [9], to show every letter in a word for readers; first one is inserting spaces between each two letters as shown in figure 3, and second one is coloring each letter alternating two

colors, as shown in figure 4. E-learning system should be designed and developed depending on effective multimedia to support the learning and its activities [4]. So in our developed multimedia for reading Arabic generally and for reading Arabic through the e-learning system, one of the alternatives of Arabic letters identification should be used according to the learner request as a multimedia support.

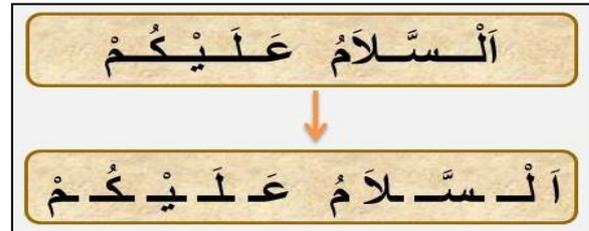


Figure 3. Identifying letters in a word by spacing

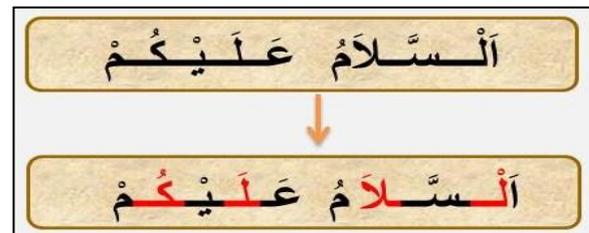


Figure 4. Identifying letters in a word by coloring

### 2.2. Investigation of users' preference

To find out possible users' preference, a user study was conducted in Japan with 77 non-Arabic examinees in Arabic classes, culture exchange meetings and laboratory activities. Examinees were Arabic students in the Islamic center, volunteers from Muslims with different nationalities and from students of the computer Science department at Waseda University. They were of 7 nationalities and had difference in their speaking ability (only one language, two or three languages). They were 44 male and 33 female. Among 77 examinees, 66 were interested in Arabic learning and 49 have experience in Arabic language. Examinees are covering wide range of personal prosperities, profiles and ages. Some of them are university students and others are graduated.

Examinees were taught about Arabic letters and their changing figures depending on their positioning in a word. Then examinees were shown two cards, like figure 5 and 6, exemplifying two ways of helping identification of letters in a word, and asked which one they prefer: (A) by coloring each letter one after another with alternating colors, or (B) by putting a space between adjacent letters.

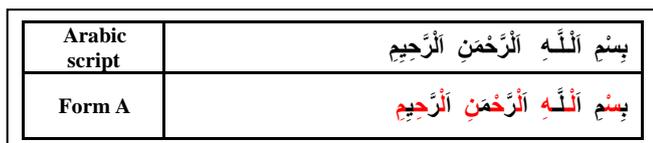


Figure 5. A card shows two ways of letter identification

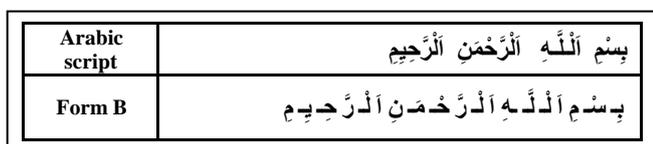


Figure 6. A card shows two ways of letter identification

### 2.3. Results of the questionnaire on users' preference

Among 77 examinees, 60 preferred the coloring more than separating. Namely a great percentage (78%) of the examinees in all prefer coloring to spacing, as seen in Figure 7.

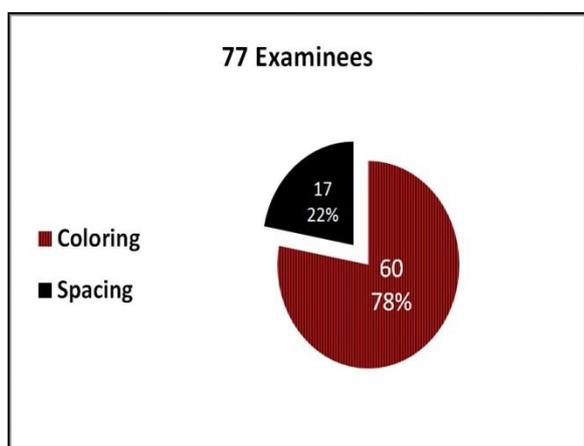


Figure 7. Preferences of identification way

Table 3. Gender

	Male	Female	Total
Coloring	33	27	60
Spacing	11	6	17
Total	44	33	77

Table 4. Interest in Arabic

	Male	Female	Total
Coloring	52	8	60
Spacing	14	3	17
Total	66	11	77

Table 5. Experience in Arabic

	Male	Female	Total
Coloring	41	19	60
Spacing	8	9	17
Total	49	28	77

## 3. Designing an interactive support for an Arabic e-learning

### 3.1. Reversed images of phonetics transcription representation

Arabic letters are unfamiliar to the novices, and Arabic letters with diacritics represent the pronunciation. There are lots of combinations, and some consonants have quite different sounds comparing to sounds in other languages. It is important to have phonetics shown time to time for novices. Arabic is written right-to-left. It is also hard for the novices to get used to the right-to-left reading. Phonetics are written left-to-right in available and common transliterations systems [13]; those phonetics themselves are easy to read, but may obstruct the novices to get used to right-to-left reading. Phonetics for Arabic shall be also right-to-left. If we use Roman letters as phonetics arranged right-to-left, the novices may read them left-to-right since Roman letters are usually read left-to-right.

We decided to use Roman letters in reversed form right-to-left along with the direction of Arabic script. Roman upper-case letters are for Arabic letter and Roman lower-case letters are for diacritics [5] and [6]. Phonetics will be displayed under Arabic script, and as far as possible phonetics are in the same length to the Arabic script, as far as possible, in order to help learners to see easily and to feel correspondence between Arabic letters and their phonetics [7] and [8], as shows in figure 8.

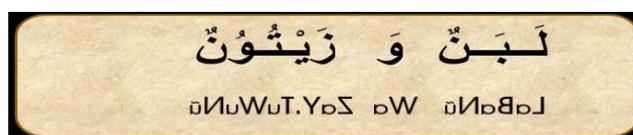


Figure 8. Preferences of identification way

### 3.2. New multimedia in the e-Learning

New and reversed images of Roman phonetic codes have been prepared and were taken into account through some experiments. The results showed that the reversed phonetic codes can promote non-Arabic speakers in reading Arabic script from right to left without direct instructions. Also, the reversed form can help them in pronouncing Arabic sounds correctly. The phonetic codes are pop-upped below the

Arabic scripts on learners' requests: [5], [6], and [8], as shows in figure 9.

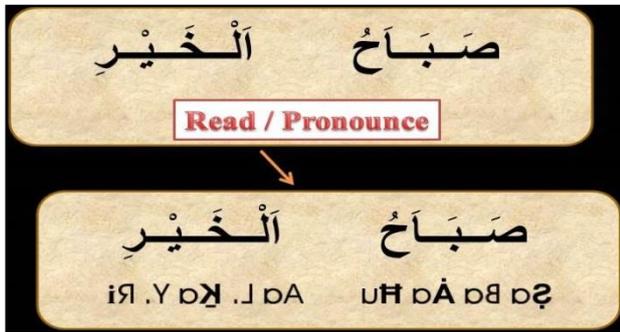


Figure 9. Pop-up Roman phonetics under Arabic script in ETaJWa

### 3.3. Support on demand

We decided to provide supports discussed above for users in our e-learning system for Arabic learning: letter identification in a word and reversed Roman phonetics [10]. Our philosophy for providing supports is: any support shall be provided on a user's demand, and shall be provided only while a user is demanding in action: [5]. When a system provides some support for users automatically or unconditionally, users get used to the environment and might become lazy enough and could not live in the actual world without the support by the system.

- i. First support on demand is displaying Arabic letters in two colors as long as the learner is pressing down the button for letter identification help. Once he/she releases the button, the script turns back to all the black, in order to let him/her identify the letters of the script. The system, then asks the learner to submit his/her writing (hand writing/keyboard writing), as shown in figure 10, to receive instructor feedback/judgment.

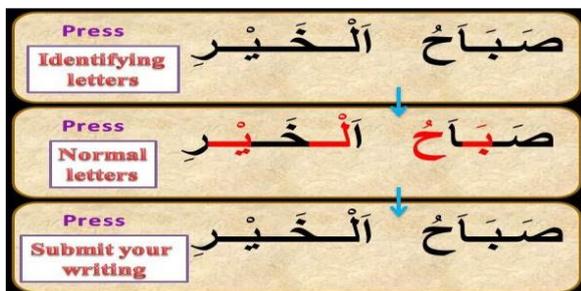


Figure 10. Identifying Arabic letters By coloring

- ii. Second support on demand is displaying the reversed Roman phonetics (right-to-left) corresponding to the

Arabic script [8] and [7], as long as the learner is pressing down the read/pronounce button, according to his/her need. Once he/she releases the button, reversed Roman phonetics disappear, in order to let him/her to read/pronounce the script, and then the system asks the learner to record his/her reading/pronouncing (Audio/video) files, as shown in figure 11, to receive instructor feedback/judgment.

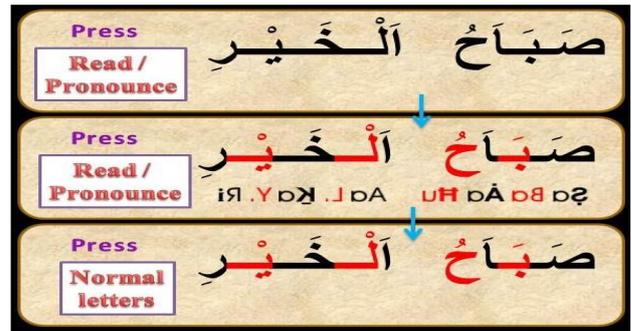


Figure 11. Displaying reversed phonetics right to left

### 4. Exploratory experiment on colored reversed image of our new Phonetic transcription system for identifying and reading Arabic script

To confirm our developing, there was exploratory experiment with 20 beginners through the first lesson of the beginners' Arabic learning class.

We prepared the Arabic greeting which means "Hello", into 4 forms. Form 1 is Arabic without diacritics, Form 2 is Arabic with diacritics, Form 3 is mono color Arabic with diacritics accompanied by mono color conventional phonetic system, and Form 4 is colored Arabic with diacritics accompanied by our new colored reversed phonetic unit, all forms are shown in Fig. 12.



Figure 12 Identifying and reading Arabic.

The experimentation was implemented in Japan in Arabic classes. Some of the examinees were non-Arabic students in the Arabic School belong to the Islamic center in Tokyo; they were Muslims and non-Muslims, and they were of different nationalities. Examinees were non-Arabic speaker in different personal properties, they cover a wide range of profiles, including cultural backgrounds, ability of foreign languages learning, nationalities, age, gender, studying major, jobs, and experience in Arabic, as shown in Table 6. Some of them are high school students, university students, or have already graduated.

Table 6. Students of the exploratory experiment

Numbers		20
Nationalities	Bangladesh	2
	China	1
	India	2
	Indonesia	1
	USA	1
	Japan	13
Foreign languages	No foreign language	6
	1 foreign languages	10
	2 foreign languages	2
	3 foreign languages	2
Ages	10 - 20 years	4
	20 – 30 years	7
	30 – 40 years	5
	40 – 50 years	4
	70 – 80 years	-
Gender	Male	7
	Female	13

To implement the experimentation, we showed Form 1 to the examinees, and asked them to read the Arabic greeting to confirm that they still cannot read/pronounce Arabic in general. We found that 2 among 20 examinees can say it, as they know this greeting from regular use, but they cannot identify or read/pronounce the letters. So, still all 20 examinees have no experience in Arabic. We got the same results when we showed Form 2. Then, we showed Form 3 to the examinees and asked them to use the conventional system to identify and read/pronounce the Arabic script as a whole and each letter. By using Form 3, examinees could read the conventional system itself and pronounced it fluently, but they could not identify or read Arabic letters except first and last ones when we asked them to read the letters.

After that, we showed Form 4 to the examinees, and asked each one to use our reversed phonetic unites in reading/pronouncing each Arabic word and each Arabic letter with its diacritic. By using Form 4, all of the examinees could find out the pronunciation of each Arabic letter and its diacritic easily and pronounce it correctly, because (a) presenting Arabic script in separated units using different two colors, and presenting our new phonetic in separated units using reversed forms and using different two colors, (b) presenting our phonetics units Arabic units in the

same direction right to left, and (c) showing each Arabic unit and its reversed phonetic unit in the same color. Of course, the examinees asked us about the sounds of the unfamiliar phonetics symbols, we provided them with their sounds. Then, we showed Form 2 again to confirm if our system really support the examinees in identifying and reading normal Arabic script with diacritics, 16 among 20 examinees could identify Arabic letters and read/pronounce Arabic itself. The other 4 examinees tried to start, but they could not complete.

Most importantly, that we asked each one to read some Arabic letters randomly, for example we asked each one separately to read the 5<sup>th</sup> and 3<sup>rd</sup> Arabic letter of each word of the greeting, specially that the 5<sup>th</sup> is same Arabic letter in both of the words, but they are different in their diacritics, so 5<sup>th</sup> letter in first word is pronounced as “Mu” yet 5<sup>th</sup> letter in second word is pronounced as “M” without vowel. 12 among 16 examinees answered correctly. We showed Form 4 gain, and then they learned to read the greeting as a whole and read each letter well. Then, we showed Form 1 again to confirm if our way of supporting really helps the examinees in identifying and reading the same Arabic greeting without diacritics, most of the examinees could identify Arabic letters and read/pronounce them as words and as random letters.

The results are completely different between using Form 3 and Form 4, because in the case of using Form 3, examinees read the phonetics left to right and generally did not try to read Arabic script, but in the case of using Form 4, examinees used our reversed phonetics system as a support when they need it to read Arabic itself and readily identified and read it.

To confirm the progress of reading the mentioned Arabic greeting with the beginners of Arabic, we asked the teacher of Arabic in the Islamic Center to check the examinees ability of reading/pronouncing the Arabic greeting; he tested them, and got same results of reading Arabic words and letters. Then he said that this progress of Arabic learning with absolute beginners in the first lesson usually could be done after lesson 3 and/or lesson 4 in beginners’ Arabic course.

## 5 Discussions

Our target is providing possible multimedia for non-Arabic speakers to read/pronounce Arabic as a whole, then identify each Arabic letter and recall it. For that purpose we provided the coloring way of presenting the Arabic script and we avoided the separated letters, depending on the examinees preferences. Examinees found that presenting Arabic script into two colors in connected form is a natural Arabic script, but separated Arabic letters does not show natural Arabic script. Moreover examinees can identify each Arabic letter form through the script.

Our new phonetic transcription is showing Arabic sounds by new way which is each Arabic letter should be presented by one Roman symbol (uppercase), and each Arabic diacritic

should be presented by one lower symbol (lowercase). As whole Arabic script is presented as units and phonetic transcription is presented as units.

Our new reversed images of the phonetic transcription units arranged from right to left enable the learners to read/pronounce Arabic script and its sounds in the same direction.

Showing each reversed phonetic unit under its Arabic unit correspondingly in same color help the learners in looking to Arabic unit in the script and finding its phonetic unit under it.

Generally, our new colored and reversed images of the phonetic transcription could be used as a support according to the learner need to read/pronounce Arabic script, as well as identifying each Arabic letter and recall it.

There is another support which is the teacher sound. Students can ask for the teacher sound or pronunciation to listen to difficult or unfamiliar Arabic sounds, also to listen to the sounds of the unfamiliar phonetic symbols to pronounce it correctly in the next times.

We are developing an e-learning system for Arabic learning called ETaJWa, with user supports on demand described above. A course is designed on this system for novices, to learn daily greetings, daily life conversation, introduction of themselves and talking about their families, as shown in figure 13.



Figure 13. E-Learning system: lessons menu



Figure 14. E-Learning system: Lesson window format

In the main window of this system, the learner can explore the lessons menu; choose a lesson to study, as shown in figure 14. Also, learner can ask for support and explanation, as well as he/she can press button to study Arabic alphabet. Moreover, he/she can press the button for services on demand to obtain feedback from the instructor to guide him/her in improving his/her skills and can press a button for online and/or offline contact.

Every lesson is displayed in a window of the same format, as seen in figure 14. For identifying and reading/pronouncing, a learner can press a button of “reading/pronouncing”, so a new window appears with three supports on demand, as shown in figure 15. First button on the right side is for showing Arabic script accompanied by Arabic diacritics; Second button is for showing Arabic letters and diacritics in a word using alternating colors to be as separated units accompanied by our new reversed units of the phonetic transcription using also alternating colors. Third button is for showing the independent Arabic letters of the current Arabic expression.

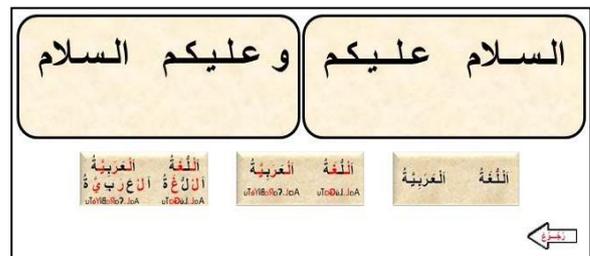


Figure 15. E-Learning system: Identification and reading/pronouncing facilities

Figure 16 shows Arabic expression into two alternating colors to support the learners in identification each Arabic letter in the script. Figure 17 shows the support of the reversed units of phonetics correspondence with Arabic script in the same direction. Figure 18 shows the independent Arabic letters under Arabic script just to enable the learners in comparing the independent form with the connected form of each Arabic letter.

A learner can ask for a support of listening to the correct pronunciation especially for the unfamiliar phonetics and the unfamiliar Arabic sounds. Also, there is a possibility of recording the learner reading/pronouncing as an audio file or as a video file in order to listen or watch his pronunciation and compare it with the teacher/instructor pronunciation.

A learner can press a button to practice the required activities such as handwriting and or keyboard writing. A learner can press a button for support to know the meaning and the usage of the sentence/expression.

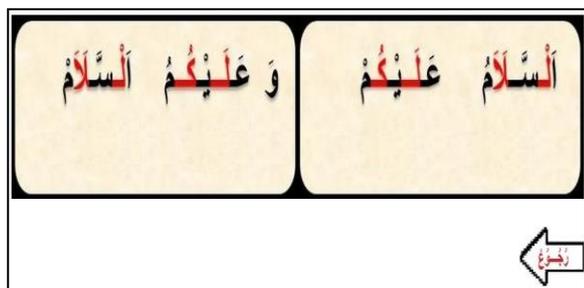


Figure 16. Identification of Arabic letters in the e-Learning system

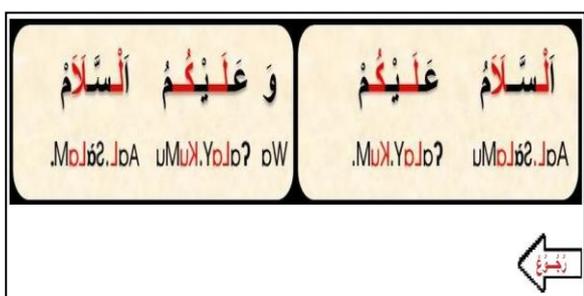


Figure 17. Phonetics transcription support in the e-Learning system

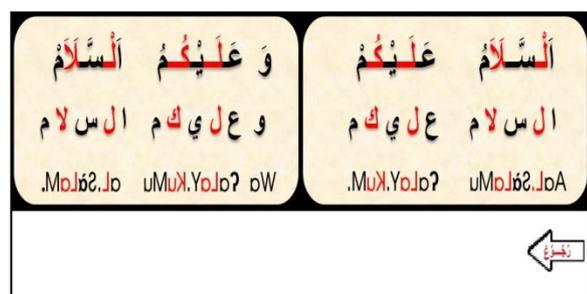


Figure 18. Phonetics transcription support and independent Arabic letters in the e-Learning system

## 6 Conclusion

Arabic e-Learning system should provide possible multimedia for training non-Arabic speakers to get used to identify and read/pronounce Arabic letters, as well as for training them to pronounce Arabic sounds in easy way. Colored Arabic letters help students in reading/pronounce each Arabic letter in the concocted Arabic letters. Our new reversed image of the phonetic transcription unit (uppercase and lowercase Roman symbol) located under Arabic unit (Arabic letter and its diacritic) requires just looking at Arabic unit position and looking under it in the same direction to read/pronounce its pronunciation correspondingly and easily, without instructions. Our system

enables learners to start reading/pronouncing right to left. Comparing our new reversed phonetic system with conventional system show, that our system provide a unit of phonetic sound for each Arabic letter with its diacritic, our reversed phonetic units are arranged right to left in the direction of Arabic, our units are presented in different two colors to show the sound unit of each Arabic unit, and recorded teacher pronunciation support the learners to pronounce correctly especially for difficult Arabic sounds by using unfamiliar phonetic symbols.

Generally our new multimedia of phonetic transcription, sound units, reversed images, colored way and teacher pronunciation support the beginners of the non-Arabic system to read/pronounce Arabic and identify Arabic letters. The examinees have variety of the general properties such as the nationality, ages, gender, difference in the interesting in Arabic, different levels in the experience of Arabic learning, in addition to the volunteers who have no experience or interesting in Arabic learning. So, they could have been chosen randomly. It is assumed that they are good representative of the non-Arabic speakers.

We assumed that the experiments were performed on randomly chosen examinees; we can conclude that multimedia system is effective and significant supportive as it is better compared to the conventional one in identifying and reading/pronouncing Arabic letters. That is why we applied our multimedia system in our new Arabic e-Learning system.

Results of using our multimedia system on reading/pronouncing and identifying Arabic script/letters as a complete Arabic course for beginners will be reported in other paper.

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