Through the Looking-Glass: Roman letters in phonics for Arabic as a part of multimedia support

MOSA AHMED EBRAHIM MOHAMED
Computer Science Department
WASEDA University
Okubo, Shinjuku-ku, Tokyo
JAPAN
Educational Technology Department
TANTA University
Tanta, Al Gharbya
EGYPT
Ahmed_mosa_egypt@fuji.waseda.jp

KAKEHI KATSUHIKO
Computer Science Department
WASEDA University
Okubo, Shinjuku-ku, Tokyo
JAPAN
kakehi@waseda.jp

Abstract: - As a part of multi-media support system for Arabic e-learning, some vehicle should be provided for training students to pronounce Arabic text themselves. Since the Arabic alphabet is phonetic, it seems a good idea to transliterate Arabic into Roman, the most popular language, but there exists a big gap between Arabic and Roman besides a difference between their alphabets; scripting directions. Arabic script is written from right to left, whereas Roman from left to right. What kind of transliteration would let students jump over this gap? Our solution is to render transliteration results as if seen Through the Looking-Glass. We report our process of trials and errors for seeking solutions, and our ultimate solution.

Key-Words: - E-Learning, Multimedia supporting, Arabic learning, Arabic transliteration.

1 Introduction

Islamic religion and Arabian countries are increasing their presence in the world. The Arabic language is one of the most popular languages in the world, as there are about fifty seven Islamic countries in Africa, Asia, Europe and South America, in addition to the twenty two Arabian countries in Africa and Asia.

There is a strong desire to learn the Islamic culture and Arabic language worldwide, as well as a huge numbers of tourists all over the world who choose to visit the Arabian and the Islamic countries for cultural purposes and sightseeing. Moreover the foreigners who want to work in the Arabian countries for many purposes, such as political relations, trade relations, cultural exchanges; in addition to the Non-Arabic learners who want to study the Islamic religion and the Arabic language in Saudi Arabia and Egypt.

We are living in the age of the e-Learning and multimedia. This is why there is an increasing need for cultural exchange and language learning all over the world. Also there is wide range of demand for learning Arabic worldwide. However learning Arabic is not easy for many people. There are lots of reasons make it difficult; Arabic scripting is one of them.

Arabic way of scripting is as follows. A sentence is a sequence of words arranged from right to left. A word is a sequence of 29 Arabic letters, arranged also from right to left. Each letter shows a syllable with an accompanying diacritic. Basically each letter itself designates a leading consonant of the syllable. Each of the 10 Arabic diacritics designates whether the syllable consists only of that leading consonant, or the syllable contains one of the 3 Arabic vowels “a”, “i” and “u”, in one of the three ways: having the ending consonant “n”, doubling its leading consonant, or having no consonant
modification. Every letter has three different forms depending on the position in a word, i.e., at the beginning, in the middle, and at the end. In total, there are more than 900 different symbols used for Arabic scripting.

There have been many studies (Abdalla, A., 2006), (Kurdi, M., 2002) on the learning of Arabic; but these studies produced only Arabic materials, textbooks, slides by slides, courseware and e-books. However there is no completely correct transliteration for Arabic in the available textbooks and Arabic e-Learning systems, also there is no determined method to transliterate Arabic alphabet, syllables and sounds which depend on the Arabic diacritics. Moreover we have not found any complete Roman transliteration for Arabic diacritics, so we provide a complete Roman transliteration for Arabic alphabet, diacritics, syllables and sounds. There are no educational methods to train the very beginner students of the Arabic to read (pronounce) Arabic texts by themselves. There is no e-learning system with full multimedia support for Arabic learning especially Arabic transliteration into Roman letters.

2 Problem Formulation
Multimedia has a great effect generally in knowledge acquisition and skills development. Also it has a good effect particularly in languages teaching for introducing the basics, grammar and vocabulary, and developing the skills of the reading, writing, listening and talking.

It is important to establish and build-up a new educational multimedia support system for Arabic e-learning to help very beginner learners to read (pronounce) the Arabic text. There are lots of studies on the Romanization of Arabic (Hassan, Heba, 2012), (Nagato, Y., 2011). However they do not match our requirement that transliteration be displayed just under the original Arabic text as exemplified in Fig. 5. We had to invent a new Roman transliteration for Arabic. Here, we present our study that concerns how to transliterate an Arabic text into a sequence of Roman letters as phonetics signs with the help of computer. The transliteration should be written and read from right to left since an Arabic text runs in that direction.

3 Objectives
Research objectives are finding out the most suitable Roman symbols to transliterate Arabic diacritics. Moreover we are looking for arranging the Roman transliteration from right to left to match Arabic text direction, and to be ready for appearing under the original Arabic text in the Arabic multimedia support. Also, we are looking for representing the new transliteration according to the idea of “Through the Looking-Glass”, this means every English letter and symbol will be reversed horizontally to match Arabic direction from right to left.

4 The Study
Arabic has 29 alphabets; that means Arabic has several letters whole leading consonants designate unique sounds other than English ones. Most of the current Arabic learning sources concerned about using Roman letters to transliterate Arabic text without taking care of these Arabic special sounds. As a result of current and available Roman transliteration, there are some mistakes leading to wrong pronunciation.

We started our study by analyzing a lot of the current and available Arabic textbooks, courseware and online learning materials that were published and introduced for non-Arabic speakers.

These analyses helped us to find out some of the weak and wrong Roman transliteration which belongs to the Arabic Special alphabet and sounds. Then we prepared a new Roman transliteration for Arabic Special alphabet into some Roman letters and symbols, to have a clear Arabic transliteration into Roman and to avoid the wrong pronunciation and any misunderstanding.

We choose a non-English letter for each letter of Arabic specific sound; yet choose symbols resembling an English letter of nearest sound, as shown in Fig. 1.

Our second trial was holding up workshop workshops with Arabic speakers, teachers and non-Arabic speakers from Japan, Indonesia and Mexico to determine the new transliteration.

The results are that each Arabic letter with a diacritic is transliterated to a pair of Roman symbols, one for the letter by Table1 and another for the diacritic by the Table 2.
An experiment took place for this new Roman transliteration by asking the students to read (pronoun) the Roman transliteration. Also, questionnaire has been arranged to find out the preferable students choices and opinions to build up the best Roman transliteration. There were 29 students in all, and they volunteered for our experiment. Students were non-Arabic speakers and living in Japan. In each class our Roman transliteration system. So, we found that it would be better to be represented from right to left as a correct transliteration. Then we decided to re-arrange it to be presented as “muk yalaâ umalâa laa” which runs from right to left, as shown in Fig. 2 B.

We noticed that the form of the Roman symbols is designed for reading from left to right and students are all accustomed to read Roman script from left to right. Moreover, some students complained that they tended to read the transliteration from left to right. We thought that it would be better to put the students in a situation as if they were in a world of “Through the Looking-Glass”, where everything looks reversed horizontally. We decided that every Roman symbol appearing in the transliteration will be mirrored in its form. So Roman transliteration of Arabic greeting could be re-transliterated from right to left and every letter could be reversed using computer effects, as shown in Fig. 2 C.

The results of the reading (pronunciation) and the students suggestions were that it is better to capitalize only the initial of the whole sentence to be transliterated as shown in Fig. 2 D., this is for sentences which include only two words.

For the sentences which include more than two words, the students suggested capitalizing the first (right most) symbol in each word, i.e. a complete Arabic greeting 

\[ \text{"السلام عليكم ورحمة الله وبركاته"} \]

could be transliterated as shown in Fig. 2 E., in which each initial letter of a word is capitalized to indicate its right-to-left direction.

This way of transliteration was welcomed, but confusion remained in lower case letters that have mutually mirrored figures to each other. Some students’ suggested using only the upper case symbols for the Arabic transliteration.

The third trial was that we established a questionnaire to find out the most suitable style for using the Roman symbols as phonetics signs. This questionnaire has been applied for three weeks, with Japanese university students, some of them are interested in Arabic and the others are not interested. The targets were asking about the better style and
the easy way for them to read (pronounce) from right to left “Upper case Roman letters for the transliteration” or “Lower case Roman letters for the transliteration”. We also asked about their opinions, suggestions and views as shown in Fig. 3.

Fig. 3 Questionnaire about the Arabic transliteration writing style

![Questionnaire](image)

The results showed that the students do not agree with the new mirrored style for the transliteration from right to left because it is unfamiliar style for them. Moreover according to their suggestions and points of views, there were a lot of confusion and notes related to the lower case symbols as shown in Table 3.

Table 3 Confusing between mirrored form and normal form

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Some of the students preferred to use the upper case for the transliteration, others said that it is easy for them to use lower case letters for the transliteration and others could not decide which writing style they want to use. Through the experiment, students’ attitudes and opinions were rewards to the mirrored style.

As a result of these procedures, we decided that it should be better to use mirrored upper case letters to transliterate Arabic letters and use mirrored lower case symbols to transliterate. Current transliteration of each Arabic letter and each diacritic is shown in Table 4 and Table 5.

According to the confusion of the mirrored letter “َّش”, another experiment took place to find out the preferred and best font type to be used in the representation without confusion. As far as experiments up to now are concerned the best available font has been the Decker. For example the letter “َّش” is rendered as “١ُش” in this font, so there will be no confusion between the mirrored letter “َّش” and other letters as mentioned.

Table 4 Arabic letters transliteration

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Table 5 Arabic diacritics transliteration

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The fourth trial was that our new Arabic transliteration has been implemented as the follows: Arabian greeting is “لاَسْلَامَ عَلَيْكَ نَّ”. According to this transliteration, it could be transliterated in mirrored style from right to left as shown in fig. 4.

Fig. 4. Arabian greeting

To check if it works well, we presented this mirrored transliteration (One word and one sentence) as shown in Fig. 5, for three times during three weeks, to the Japanese volunteers who have the desire to study Arabic and to others who have no the desire to study Arabic.

The results showed that the average time (measured by second unit) spent in reading (pronouncing) have been reduced as shown in Fig. 6.

Fig. 5 Implementation of the new transliteration

السلام عليكم
The students have become accustomed to read (pronounce) this expression. Moreover, the students can remember for most of the time Arabic script without completely reading the transliteration. Thus, another experiment (under proceeding) is to find out and measure this transliteration effect on remembering the usual Arabic expression especially for the very beginner Arabic student.

Using the feedback from the students’ responses, there were some modifications in representation style which help putting the new transliteration under the original Arabic text, especially on the Arabic e-Learning screens which is under structure. The modifications included some changes in the font size, font type, font colors and distances between the letters. The results could be shown when we compare Arabic transliteration in Fig. 5 to Arabic transiliteration in Fig. 7.

5 Findings
The above findings gave us helpful guidelines on how to represent the Arabic script transliteration in Roman letters presented just under the Arabic text. This is to help the students studying alone through Arabic e-Learning system without direct help. Fig. 8 shows the model of intended Arabic transliteration in the multi-media support system for Arabic e-learning as the follows:
• Firstly Arabic text will be appeared on the screen,
• If the student has experience in Arabic, he/she will try to read (pronounce) it.
• If the student has no experience in Arabic, he/she has a chance to ask for Separated letters and transliteration.
• Arabic script will be appeared as Separated letters in two colors, black and grey to help the student recognize and remember each letter.
• Then, the new transliteration will be appeared on the screen under Arabic script.
• Student will read (pronounce) the new transliteration as if they read Arabic text.
• The transliteration will be hidden to give the student the chance to read the Arabic text and remember it.
• If the student fined difficulty, he/she can ask help again for independent Arabic letters.
• Arabic letters will be appeared in a sequence of independent letters.
• Student can also ask help to know how Arabic letters could be connected to each other.
• Arabic script will be appeared in connected form.
• The student can repeat these proceeds as much as he/she wants.

Fig. 6 Average time spent in reading (pronunciation) the new transliteration (Second unit)

Fig. 7 Recommended Arabic transliteration

Fig. 8 Intended Arabic transliteration style in online system

• The student can ask for extra help referring to listening or graphics tools or watch a movie on the human sound system during the pronunciation as a multimedia support. Student to repeat any kind of help. Moreover, student can go to the online chat room to talk and/or ask Arabic teacher and/or native speakers.
This is why we recommend this mechanism to be used in the Arabic learning textbooks and courseware. We will provide it in our multi-media support system for Arabic e-learning.

5 Conclusions
We achieved the following:
• Finding out complete transliteration for Arabic alphabet and its diacritics.
• Roman symbols should represent the Arabic alphabet and its diacritics.
• There is a need to use some unfamiliar Roman symbols to transliterate the Arabic alphabet (Exceptional cases).
• There is a need to use some Roman symbols to transliterate the Arabic diacritics.
• Roman transliteration should be represented from right to left.
• Each Roman symbol should be mirrored to be looks like reversed horizontally.
• Each Arabic letter should be represented in an upper case symbol; each diacritic should be represented in a lower case symbol.
• This way of transliteration let students read (pronounce) Arabic words without teachers’ direct help. This mechanism could be useful or different work.

6 Future works
Further experiments are necessary, because there are still unresolved issues. So we plan a long-span experiment to show our method of transliteration really promotes students’ ability to read (pronounce) Arabic words and sentences without help.

We started investigation on various assignments of Roman letters in Table 4 and Table 5 to find a better one. Also, we are preparing to study the Arabic alphabet (Alphabet name, shape, pronunciation), this is to the very beginner of the Arabic leaners, for the language skills (read, write, listen, talk). Moreover, how to recognize the Arabic alphabet shapes depend in the different positions in the word (First, middle, End). How to recognize the Arabic pronunciation according to the diacritics which representing the vowels. In addition to how to read and remember the Arabic transliteration from right to left. We intend to incorporate our transliteration into developing our e-learning system as a real-time multimedia support for non-Arabic speakers.

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