Teaching Arabic to Native Speakers
Educational Games in a New Curriculum

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Abstract: This paper presents nine educational games and activities for learning the Arabic language. The games are developed for Arabiyyatii project, a three-year endeavor that involves re-conceptualization of the curriculum of standard Arabic as a first language in kindergarten. The applications presented in this paper are developed on tabletop surface computers that support a collaborative and interactive learning environment. These applications focus on speaking drills, word production, and sentence recognition of Modern Standard Arabic. This work incorporates an interdisciplinary research framework exploiting best practices used from related disciplines namely: computer-supported collaborative learning, language learning, teaching and learning pedagogy, instructional design and scaffolding.

1 INTRODUCTION

This work builds on a previous work to develop a technology-based curriculum for the teaching of Modern Standard Arabic (MSA) to kindergarten children who are Arabic native speakers. Tabletop surface computers are used in the curriculum to facilitate the educational games and activities, creating a student-centered learning environment.

Technology has been a primary part of the growing up of the new student generation. The fact that the students are "Digital Natives" make the students have a different way of thinking, compared to their parents' generation (Prensky, 2005). Hence to speak the language of the new student generation, new technologies have to be introduced in some aspects in the classroom. Many studies, including Brown's (1989), had shown that a class utilizing technology is more motivational than one which does not use technology.

Information and Communication Technologies (ICT) in education promote student-centered learning environment, as automatic feedback reduce teacher supervision and interruption (Wettasinghe and Hasan, 2007). Moreover, in a classroom that utilizes ICT in learning, the teacher acts as a coach, rather than an instructor. Collins et al., (1989) classify coaching pedagogical practice as "successful pedagogical model" for its reported results on improving the learner's performance in reading, writing, and mathematics.

Although integrating learning and technology had been around since the 1960's (Warschauer and Healey, 1998), it is still argued whether the teacher applies the learning pedagogies when using technology in the classroom (Beetham and Sharpe, 2013). Hence this work aims to apply modern language learning pedagogy in a technology enhanced teaching environment.

In this paper, we describe the new technology-based Arabic curriculum and the basic pedagogical foundations which lead us to the choice of the technology. Then, we specify the tabletop version used and preliminary testing results. Afterwards, we present and describe the applications developed each with its learning objective. Lastly we discuss how each of the applications contribute to fulfil the learning goals of the new curriculum.

2 THE ARABIC LANGUAGE

Arabic is a diglossic language that belongs to the Semitic language (Mccarus, 2008) which has a high and a low form. The high form is used in formal context which is called Modern Standard Arabic (MSA), and the low form is the one used in daily life (Ferguson, 1959; Ferguson, 1991). As many other

diglossic languages, the high form (MSA in case of Arabic) is taught in schools whereas the low form is the mother tongue of the speakers of the language.

The Arabic alphabet has 28 letters, including three long vowels. The diacritics of the language include three short vowels as well as other diacritics. Arabic writing is from right to left where most letters are connected having different form in relevance of their position in the word. It is important to note that writing and pronunciation has a one-to-one connection in MSA, hence learning MSA pronunciation is vital to learn the Arabic language writing.

Although this work focus is Arabic as first language, the developed applications can be applied to any first language curriculum for young learners. Refer to the applications section where the description of each language acquisitions goal is reinforced with respective educational application.

3 THE TECHNOLOGY-BASED ARABIC CURRICULUM

The designed curriculum, which this paper describes the technology it uses, covers the Arabic language classes taught in kindergarten (5-6 year old students) Arabic native speakers. The overall goal of the course is to teach the students basic linguistic skill in MSA: vocabulary development, letter recognition and writing, pronunciation and speaking in MSA. The first year's curriculum focuses on letter recognition and production. However the second year focuses on the word and sentence level of the Arabic language. This paper presents the educational games and activities used in the first and second years, which are inspired by modern pedagogical practices. The curriculum involves (Papadopoulos el al., 2015):

- student-centered curriculum based on storytelling,
- physical classroom reconfiguration, and
- interactive software centered on multi-player, collaborative games.

The educational games and activities developed are based on instructional design that incorporates cooperative, collaborative learning, and scaffolding. Cooperative learning activities allow students to engage in dialogues and learn to listen to each other's ideas, and have shown increase in students' gain of the subject (Gillies, 2014). Collaborative learning activities increase peer interaction and could be a powerful tool in improving student

performance on group and individual level (Sandoval and Millwood, 2005; Teasley et al., 2008). Scaffolding is achieved when the student is supported on a gradual level of independency until they can carry a task on their own, which is the ultimate goal of teaching (Palincsar and Brown, 1984).

It is also important to note that student-centered environment is encouraged, where most of the educational applications we present use automatic instant feedback, which is preferred to human feedback and it encourages self-learning (Malmi and Korhonen, 2004).

The competitive nature of some of the applications is a motivational incentive for the students as it is expected to increase interaction and engagement (Papadopoulos et al., 2014).

The technology used in this research is chosen to comprehend all the above criteria (is a platform multi-user, interactive, friendly to the user – the kindergartners). In the following section the designated technology is presented.

3.1 Technology Choice: Tabletops in Language Learning

The technology used in this work is the Samsung SUR40 tabletop surface computers with Microsoft PixelSense (table for the rest of the paper). The table recognizes more than 50 simultaneous touch points, allowing many students to participate in a given activity. Also, the given size of the active display area is 0.8 x 0.4 meters, where the display can be divided into different parts allowing different group sizes to participate depending on the nature of the activity.

The technology choice based on the literature showing promising results in using touch multimodal technologies in learning (Kerne et al., 2006) as they support creative processes and they enhances idea formation. More specifically, multi-touch technologies (a.k.a. touch device that allows multiple users) have many advantages over other single user, as they can support cooperative learning (Piper, 2008).

3.2 Preliminary Testing

In the early stages of this work we focused on testing the tabletop user experience for children. This happened in three stages: first we tested the tabletops with a small group of children (Papadopoulos et al., 2013): 4 and 9 year old boys and 5 and 7 year old girls. This was to evaluate the

interaction among the children and between the children and the tabletop. The observations yielded that learning curve is very steep and the children were highly enthusiastic.

The second test was carried out by observing a 6 year old boy using the technology (Papadopoulos et al., 2013). The goal of this evaluation was to check if the system is suitable for the targeted age. The height of the screen was suitable that the boy could interact with the table but not the whole screen, something that would be useful in designing collaborative activities in which students control different areas in the interface.

The third stage involved a richer experiment carried over 9 weeks to a kindergarten class of 17 students at a local school (Papadopoulos et al., 2014). That was while introducing the new technology-based curriculum. The experiment went smooth; students were swiftly familiarized with the educational games.

4 THE APPLICATIONS

In this section, we present nine educational applications to train and test the Arabic language acquisition. An application represents either an educational activity or a game. An educational activity helps the student to exercise a certain language skill, hence it allows an unrestricted time and is trial-and-error based. An educational game on the other hand focuses on the fun factor, hence it presents timed questions and can be based on competition among the students.

There are three main categories of the applications we present in this paper: Educational Activities, Educational Games, and applications that are both Educational Activities and Educational Games. The Educational Activities category involves four applications: "Construct your Story", "Order the Alphabet", "Writing Letters v.2" and "Writing Words". The Educational Games category involves two applications: "Pairing: Intermediate" and "Pairing: Advanced". The Educational Games and Activities category involves three applications: "Describe the Image", "Fill in the blank" and "Word Ordering".

4.1 Educational Activities

4.1.1 "Construct Your Story": Speaking Drills

This is a collaborative activity that fosters children's

speaking and listening skills. It is based on the listening activity "Aladdin and the Magical Lamp", a folklore story adapted to fit the students culture and language proficiency. A series of 26 episodes were created, with each episode having an audio track with a static image sequence. In "Construct your Story", groups of students work collaboratively to place the scenes of an episode they watched in any order they choose. Then they retell the new story based on their imagination.

yThis exercise encourages students to listen to each other's version of the story which develops their critical thinking and listening skills (Pech, 1989). It also helps to cultivate their cognitive skills by means of their communicating orally (Van Groenou, 1995). A recent study has shown that storytelling promotes the development of the four language skills; reading, writing, speaking, and listening (Atta-Alla, 2012).

While the previous activity improves speaking and listening skills, the following application helps young learners revise the Arabic alphabet.

Figure 1: "Construct your Story" application.

4.1.2 "Order the Alphabet": Alphabet Drills

This is a collaborative activity that helps students review the Arabic alphabet. In the curriculum developed by us, each class is dedicated to teaching one letter and only after covering all letters of the alphabet is this application made accessible. At the start of this activity, all the letters are scattered on the screen in the form of an earthworm. Each group collaborates to arrange the letters in the correct order. Once they are arranged, only misplaced letters are scattered to give the students another chance to arrange them correctly. See Figure 2.

While the previous activity focus on the letter level, in the rest of the paper, we present applications that focus on the word and sentence level.
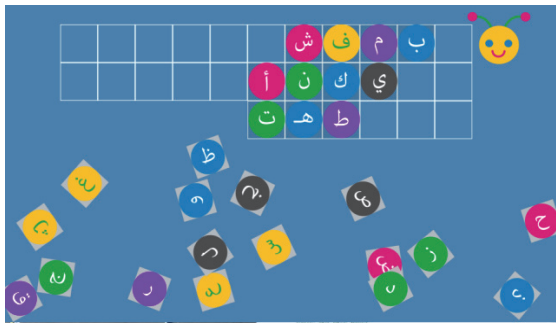
Figure 2: "Order the Alphabet" application.

4.1.3 "Writing Letters V.2": Writing

This is an individual educational activity that aims to help students practice writing the letters of the Arabic alphabet. In a previous paper (Papadopoulos et al., 2014), the "Writing" educational activity was introduced and we enhanced in this paper based on student feedback. The screen of the table is divided into four parts allowing four students at a time to have their own individual workspace. Each student is presented with a keyboard of the Arabic alphabet including vowels. Upon choosing a letter, a writing pad appears with the letter on it and arrows showing the right way of writing, the letter without arrows, several outlines of the letter, and empty lines for writing without scaffolding. Moreover, writing tools are provided to allow the student to undo, change color, and erase their input. In addition they have the option to use either two or three lines for writing. The two lines pad has bigger fonts that are easier to copy, while the three lines pad has smaller fonts but more space to write copies of the letter (Figure 3).
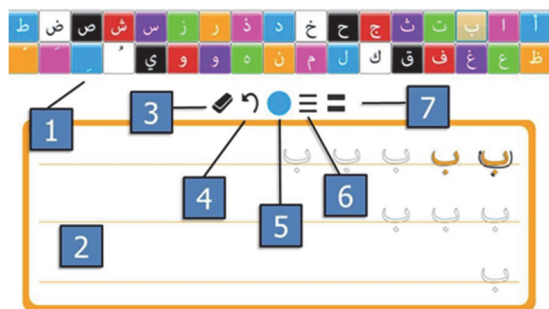

Figure 3: "Writing application v.1". 1: Letter bar; 2: Writing pad; 3: Write/erase mode; 4: Undo; 5: Color wheel; 6: Three lines; 7: Two lines.

The modification we made to the second version of this activity is that instead of using static arrows around the letters, we added a video component in which a pen traces the first few occurrences of the letter (Figure 4). This is a clearer demonstration and

an easier way for the young learners to learn the correct way to write.

4.1.4 "Writing Words": Writing

Similar to "Writing Letters", this is an individual educational activity that aims to help students practice writing. "Writing Words" is developed to help students practice writing the letter in the connected form and consequently writing complete words. Upon choosing a letter, a writing pad appears with words including the chosen letter and letters learnt in previous classes. Moreover, this application displays a pen tracing the displayed words, to show the student the right sequence of writing each word. Moreover, an occurrence of each word is presented in dotted lines, followed by an empty line (Figure 5). The gradual level of transferring control to the student gives them more confidence in completing the task independently.
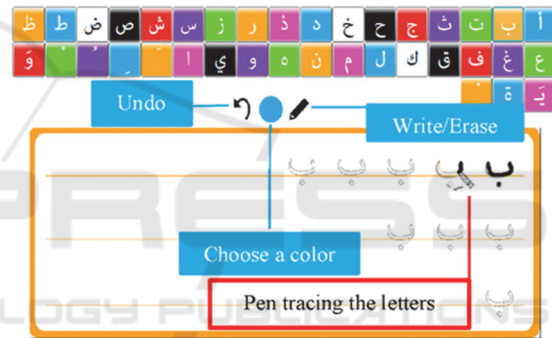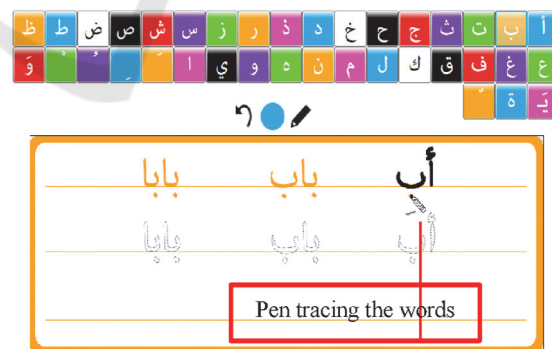

Figure 4: "Writing letters application v.2".

Figure 5: "Writing Words" application.

While the previous application focuses on word production, the next application is the educational game "Pairing", which focuses on word recognition.

4.2 Educational Games

The "Pairing" game has three different difficulty

levels: basic, intermediate and advanced. The first level, "Pairing Basic", is presented in a previous paper (Authors, 2015) and it focuses on practicing word pronunciation where the task is to match two images that start with the same letter in MSA (Figure 6). In the next section, we explain the second and third levels of "Pairing".

Figure 6: "Pairing Basic" application.

4.2.1 "Pairing Intermediate": Letter Recognition

This is a competition-based educational game that develops the reading skills of the students. The design of this game allows four students to compete against each other while collecting points. The screen is divided into four sections, one per student. In each of the individual displays, a set of images and words appear in a random order, and the challenge is to match an image with the correct word. Each word starts with a different letter. Hence if the student can recognize the first letter of the word, he/she can guess the matching image (Figure 7). This game utilizes trial-and-error learning where the student gets immediate feedback on the correct or wrong answer.

Figure 7: "Pairing Intermediate". The window shown per student, correct vs. wrong matches and the current score.

4.2.2 "Pairing Advanced": Word Recognition

The "Pairing Advanced" game is the more difficult

version of "Pairing Intermediate" where all the words presented start with the same letter, pushing the student to read the whole word before they could match it with the correct image. The same pedagogy of "Pairing Intermediate" is applied here, where students try to answer correctly to overtake their peers, questions are generated randomly until the target number of points is reached. The winner is the player who reaches the target points first.

While the previous "Pairing" games aim to develop the students' reading of MSA at the word level, the following games and activities develop and test the students' reading ability at the sentence level.

4.3 Educational Games and Activities

The following applications, designed for students with good word level comprehension, come in two forms: Activity based and Game based. We present the applications according to their difficulty. The first application is "Describe the Image" where the student picks the best descriptive sentence to describe a picture. The second application is "Fill in the blank" where the student chooses a word that fits in the sentence. This activity requires a deeper level of understanding to determine the gender, the number, and other features of the word. The third application is "Word ordering" where the student needs to know sentence structures to be able to solve the challenges, making this application more difficult than "Describe the Image" and "Fill in the Blank".

Although these activities are typical language learning activities that can also be performed on pen and paper, it is very important to note the advantages of carrying them out in a group and in a responsive technology-enabled environment:

1) **Affective Role of Feedback:** The student is encouraged to be more independent in the learning process. Malmi and Korhonen's (2004, p. 1) analysis work on feedback shows the following agreeing result:

   "Learning tools that automatically assess and give feedback on learners' performance provide valuable help for both teachers and learners. From teacher's point of view, the main motivation is to save time and increase the amount of feedback on large courses. For learners, automatic feedback is very useful, because it supports self study and distance learning. It is often much better to get instantly even simple feedback than to get advanced human feedback many days

afterwards, or even worse to get no feedback at all."

The applications in the coming section follow the above recommendation, where just the basic feedback is given to the students as hints, indicating whether their answer was right or wrong.

2) **Collaboration between Team Members:** A version of the application is designed to allow team formation and collaboration. Instead of solving the questions individually, a group of students team up to solve the questions correctly. Collaboration in learning is a social interaction that has been proven to develop individual cognitive skills (Chapelle 2001). Also it improves the student's performance on group and individual levels (Sandoval and Millwood 2005; Teasley 2008).

3) **Creating the Same Application for Different Purposes:** We created two versions of the applications: an activity and a game version. The activity version is designed to allow the students to practice reading as they have no time limit to solve an exercise and repetitions are allowed. The game version on the other hand aims at testing the reading skills of the students against time and mistakes constraints.

Due to the research time constraints, game version is created only for two of the applications: "Describe the Image" and "Fill in the Blank"

4.3.1 "Describe the Image": Sentence Level

This application can be individual or competition based for reading drills. In the activity version, the application starts with prompting the teacher to select a theme (food, birds, toys, etc.), see Figure 8. Corresponding to the theme selected, each of four students is presented with an image with multiple

descriptions, where the challenge is to find the best description. This activity gives feedback while giving the student an opportunity to try one or more answers (Figure 9).

In the game version of the application, two teams of students compete to get maximum amount of jewels in their necklace (Figure 10). Each team is rewarded with jewels for a correct answer they made (Figures 11). Similar to the previous application, the following application tests the students' reading and comprehension skills at the sentence level.

Figure 8: "Describe the Image application" start page displaying themes of; food, birds, predators, toys, pets, transportation, insects, daily activities, and hobbies.

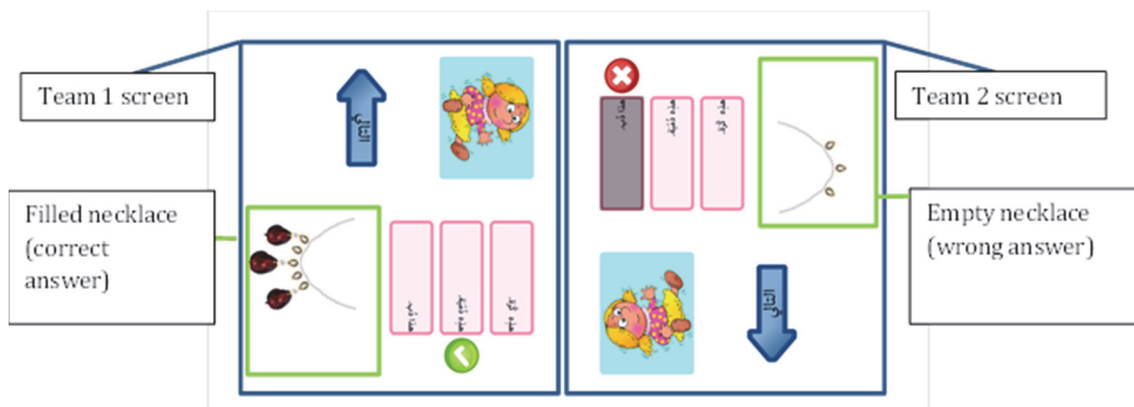Figure 9: "Describe the Image Activity" question from "Toys" theme, displaying feedback on the answers.

Figure 10: "Describe the Image Game" two teams' setup. A correct answer is rewarded by jewels to the necklace.

Figure 11:"Describe the Image" reward for zero, one, two, and three points, shown by the image respectively.

4.3.2 "Fill in the Blank": Sentence Level

Similar to the "Describe the Image" application, this activity can be individual or competition based for reading drills. In the activity version an incomplete sentence with a blank to indicate a missing word is presented along with multiple word choices. The student is challenged to pick the most suitable word for the blank. If a wrong choice is made, the application gives the option to restart the question, shuffle the choices and the player can try again, see Figure 12.

In the game version two teams of students compete. The setup is similar to "Describe the Image" two player game; refer to Figure 10 and 11.
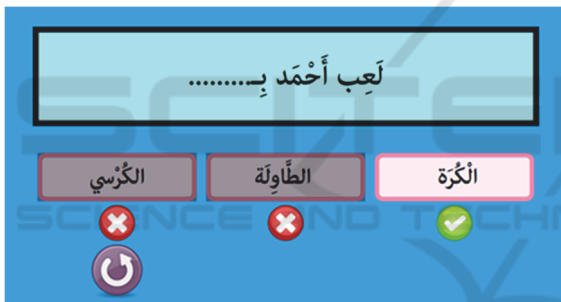

Figure 12: "Fill in the Blank" question example from "Toys" theme, displaying feedback on the answers.

4.3.3 "Word Ordering": Sentence Level

This application helps the student practice sentence construction. At the start of the application, the teacher selects a theme as in Figure 8. According to the selected theme, a set of words (two to five) are scattered on the screen, and the students are challenged to rearrange them into a meaningful sentence. When they arrange them in the wrong order, a second attempt is allowed until the right order is achieved (Figure 13). This activity is commonly used in language learning; see for example Mangoville English language learning program for kids (Sørensen and Meyer, 2007).
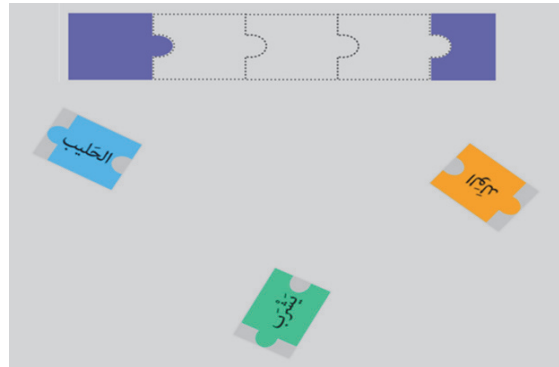

Figure 13: "Word ordering" Activity.

5 CONCLUSION

The paper presented nine of the educational games developed in the context of the Arabiyyatii project. Previous applications in the project have already been used in classrooms and have been proven beneficial for the students at the letter level. The current work builds on what had been tested, extending students' experience to the word and sentence level. The impact of the new applications is still to be evaluated in classrooms and this could be the goal of future research activities.

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