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DESIGNING OF A BASIC ARABIC SOUND LEARNING COURSEWARE USING OUTCOME/CHANGE

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ABSTRACT

Nowadays, early childhood education becomes a trend in parenting to optimize the children brain development of the children. It is proven to be important as a child's brain is experiencing a rapid development during this period. It is important to be able to recognize Arabic letters, in particular to the Moslems; without this it will be difficult for them to perform their daily rituals such as reading the Quran and performing solah (prayer). Thus it is important to begin introducing and teaching the Arabic language at the early age. However, teaching Arabic language to young children is difficult as they usually have a limited focus time. The objective of this paper is to design the outcome/change matrix that contains motivational elements for early childhood learning. An Arabic learning courseware that includes the identified component in the outcome/change matrix was developed. The courseware was tested among the children between 18 to 36 months old. The post test, pre test and observation were conducted to evaluate the courseware. The finding shows there is significant improvement among the children in recognizing the Arabic basic sound. It's also proven the courseware is able to motivate and simulate the children's cognitive and sensory development.

Keywords: interactive learning, Al-Furqan, behavior change support system, outcome/change matrix, persuasive technology.

INTRODUCTION

In recent years, studies on how information technology can change user's attitude or behavior have been conducted. One of the main points of these studies is to apply the concept of persuasion, where it is a trial to change user's attitude or behavior or both without forcing the user. Persuasive technology is an interactive information technology that was designed to change user's behavior or attitude (Kukkonen & Harjumaa, 2008). One of the available methodologies to design information technology in persuasive technology is Behavior Change Support System (BCSS) (Kukkonen, 2010).

Designing and developing BCSS requires details for delivering persuasive messages as well as designing software features (Pijnen *et al*., 2013). In BCSS the combination of software features and psychological theories are used such that it can help user to set or alter their goals, to give and show significant interaction between user and technology, and to allow social interaction with other users of the same application (Langrial et al., 2013).   Most of the research about BCSS explains theories intended for behavior change. However these theories did not provide guidance for implementation of systems that support behavior change (Oduor et al., 2014). The designers, such as computer science researcher, system developer or experts of behavior change, so far have failed to bring the permanent change of user's behavior (Langrial *et al*., 2013). (Kukkonen, 2010) highlighted several challenges in BCSS, and one of the challenges is how to design an information system to represent the actual behavior change on human behavior and system. The outcome/change (O/C) design matrix is a study on design and evaluate the BCSS (Pijnen et al., 2013). To the best of our knowledge there is only one study that evaluate outcome/change matrix in the health

area (Langrial et al., 2013). According to Langrial *et al.* (2013) there is less study on intent of outcome while developing and analyzing human behavior change in BCSS. In this paper, we design the O/C matrix to study the children change behavior on the proposed courseware. Education is important as it will help individuals to develop skills and enhance their potential (Alexander & Ignjatovic, 2012). In early childhood, education is important for a well physical, psychology and brain development (Platt, 2010). Brain is the most important organ in the individual's cognitive development (Muhamamad & Nawi, 2011). Cognitive development refers to the increasing abilities in children's mental and intellectual (Damovska et al., 2009). Additionally, it also refers to the development and growth of imagination, memory, logical and idea of environment surrounded (Bartolotta & Shulman, 2013). It is a progressive process that occurs when children interact and communicate with people and environment. It is important to give children education program at early age because brain will be develop rapidly at the age of birth to 5 years old (Eddie & Schmid, 2007).

Senses are primary source for obtaining knowledge and a new born baby could use all the five senses. The intellectual ability is influenced by the ability of the senses (Muhamamad & Nawi, 2011). The five senses are hearing, sight, touch, taste and smell. However, for early childhood, the most important senses are hearing and sight (Muhamamad & Nawi, 2011). Multimedia learning is a learning environment that uses multimedia elements, which are audio, video, text and graphic (Crews *et al*., 1997). According to a study conducted by (Wah, 2007), learning by using multimedia elements increases the effectiveness of teaching and learning in early childhood. A courseware, a computer based learning tool,

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is believed to assist students in learning the particular topic (Zaini & Ahmad, 2011). Courseware is used for educational purpose and widely used in multiple domains such as health, education, safety, and marketing. According to Kamaruddin (2010), a good multimedia courseware with interactive interfaces can increase effectiveness and level of understanding and experiences for young children (Kamaruddin, 2010).

Several Arabic courseware have been developed by previous researchers, there are two main types of courseware which are learning Al-Quran (Faryadi et al., 2007, Rosmani et al., 2012, Bakri *et al*., 2014) and learning Arabic language (Ahmad & Rozaimee, 2010, Baharudin *et al*., 2010, Salim *et al*., 2010, Sahrir et al., 2013). The courseware developed in previous research has some similarities and differences with existing Arabic Alphabets coursewares. All previous and our developed courseware uses interactive multimedia, such as picture, sound and animation as the medium of knowledge delivery. The major differences in our courseware compared to previous courseware are the Arabic learning method used, design model and the age of children to use the courseware.

In this study, we are focusing on the courseware that teaches children learning Al-Quran which are BAIK (Faryadi et al., 2007), i-IQRA (Rosmani *et al*., 2012), IQRA (Bakri *et al*., 2014). The Al-Quran learning method being used is simple Al-Quran word (Faryadi et al., 2007), IQRA (Rosmani et al., 2012 and Bakri et al., 2014).

The previous courseware was developed using different design model. For example, BAIK applied Mayer's cognitive load, Gagne's nine steps of instructional events, Keller's ARCS model of motivational design, and ASSURE Model of instructional Design intervention (Faryadi *et al*., 2007). I-IQRA adapted elements of e-flashcard, persuasive system design and cognitive theory multimedia learning (Rosmani et al., 2012). The design model for IQRA (Bakri *et al*., 2014) is the combination of elements which are persuasive technology principles, multimedia principles, cognitive theory multimedia learning and e-flashcards.

Bahasa Arab Interaktif Kurikulum (BAIK) by (Faryadi et al., 2007) was developed in order to improve Arabic learning for 3rd grade of primary school student. i-IQRA' by (Rosmani & Wahab, 2011), was developed for students of age between 5 to 8 years while IQRA (Bakri et al., 2014) target children age between to 18 to 36 months to learn basic sound of Arabic alphabets.

Al-Furqan (Harun & Yob, 2001) is an Al-Quran learning technique based on singular word called 'hijaiyah'. It consists of six books in the full set of Al-Furqan that aims to learn basic Al-Quran consists of six books. In Book 1, it contains only 14 basic sound of Arabic alphabets. The content of this courseware is based on Book 1. Al-Furqan was selected because the sound of Arabic alphabet was arrange based on first word that come out form baby's mouth such as 'ma'and 'ba'. Baby is sensitive towards language sound as they keep on repeating the word that sounds like 'bababa', 'mamama', 'nanana' and 'kakaka' (Muhamamad & Nawi, 2011).

To the best of our knowledge, this is the first study that focuses on the design and development of the courseware for basic Arabic sound using Al-Furqan for age between 18 and 36 months old. We also had applied the outcome/change design matrix to design the toddler behavior that maps with persuasive principle in BCSS. The adaptation of the BCSS is to give motivation to the toddler unconsciously and without any force in learning process.

In this paper we highlighted four sections which are introduction, literature review, method and data collection, finding and conclusion. In introduction section, we point out the importance of persuasive system to motivate users to change their behavior by designing a courseware and also stated the importance of this study. The literature review section covered the concepts of BCSS, O/C design matrix and the proposed O/C design matrix for the courseware. In the finding section, the design model is shown and the evaluation of the courseware was conducted. Lastly, the conclusion section discussed how the O/C design matrix was implemented and tested in the courseware to toddler. The pre and post test result show there is a significant improvement for toddler to recognize the basic Arabic sound.

LITERATURE REVIEW

Behavior Change Support System (BCSS)

According to Kukkonen (2010) Behavior Change Support System (BCSS) is an object study within persuasive technology field. BCSS is define as "an information system designed to form, alter or reinforce attitudes, behaviors or an act of complying without using deception, coercion or inducements" (Kukkonen, 2010).

In BCSS, the idea was inherently transformative whereby it will directly change the behavior as well as attitude or social issues of user (Kukkonen, 2010). BCSS has enabled information system become central research of persuasion in various platform such as web-based, and mobile application (Harjumaa & Muuraiskangas, 2013). Previous studies showed that there are lots of study regarding BCSS in health area and less in educational area. The example of study in health area is Fit4Life (Purpura et al., 2011). It was developed in order to encourage an individual to reduce obesity problem and start a healthy lifestyle for obese people.

Smoke Shooter (Ismail et al., 2012) was developed in order to introduce and inform school children about the dangers of smoking. We4Fit (Pereira et al., 2014) was developed to change the eating habits of user who are seeking for healthy lifestyle. While V-Hajj by (Yusoff et al., 2011) was developed as an additional learning material for Hajj for elders is in education area.

The Outcome/Change (O/C) Design Matrix

The outcome/change (O/C) design matrix was design to identify variety of design goals and persuasive

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strategies. It requires us to develop an application with a specific focus on how to support Attitude-Change, Behavior-Change or Compliance-Change (Langrial et al., 2013). The behavior change consists of three categories which are complying name as C-Change, the behavior or called B-Change and the attitude as A-Change. Next, we identify the outcomes which are the formation, alteration or reinforcement of attitudes, behaviors that will combine with C-, B- and A-Change to produce a complete matrix (Kukkonen, 2010). The combination can be expressed in the form of 3 x 3 matrix as shown in table 1 (Kukkonen, 2010).

Table-1. Outcome/Change Design Matrix (Kukkonen, 2010).

	C-change	B-change	A-change
F-Outcome	Forming an act of complying (F/C)	Forming a behavior (F/B)	Forming an attitude (F/A)
A-Outcome	Altering an act of complying (A/C)	Altering a behavior (A/B)	Altering an attitude (A/A)
R-Outcome	Reinforcing an act complying (R/C)	Reinforcing a behavior (R/B)	Reinforcing an attitude (R/A)

METHOD AND DATA COLLECTION

The software involved in the development of this Arabic courseware is Adobe Flash. The design of the courseware is suitable for early childhood where it uses the concept of e-flashcard, persuasive principles, children's learning style and multimedia component. E-flashcard has been use as an academic tool to helps educators in the learning process. The courseware was developed based on the combination of children's learning styles which are visual, audio and kinesthetic. The audio is the sound for each basic Arabic alphabet. The visual part included the related picture that was being displayed to represent the sound of Arabic alphabet. The kinesthetic element uses the animation to represent an action that related to the Arabic alphabets. For example, 'ba' represents 'bahu' and an animation of moving the shoulder is shown. The colours chosen for this courseware are primary color which are black, white and red. This is because baby only able to see this three main color (Muhamamad & Nawi, 2011). Baby's sound us used in the courseware as they are more familiar with baby's sound.

In this study, the courseware evaluation was conducted using pre-test, post-test, video observation and three checklists which are motivation checklist, behavior checklist and time focus checklist. The data was collected in a Taska at Kangkar Pulai for five days consecutively

with five toddlers. The average age of toddlers is between18 to 36 months old.

The pre-test and post-test was conducted to measure the effectiveness of Arabic alphabets courseware towards children age 18 to 36 months old. The purpose of pre-test is to determine how many Arabic alphabets can the toddlers recognized by randomly choosing seven alphabets. On the first day of experiment, the pre-test was conducted for every toddler individually as they need to choose sound of Arabic alphabets. There are seven flashcards of Arabic alphabets which are 'a', 'ba', 'ta', 'ma', 'ja', 'da' and 'ka'. Two flashcards was given out to them to choose as we ask for the sound of Arabic alphabets. For example they are required to choose 'ma'. They need to pick out 'ma' card from seven random alphabets flashcards. The results were then recorded using video recorder.

After that, they were given the Arabic Alphabets Courseware to learn. They use the courseware in a group of five toddlers for about 10 minutes and repeated three time. This activity was being repeated every day for five days. On the last day, the toddlers were given a post-test after learning through Arabic Alphabets Courseware. During the post-test, we did the same activity as in pre-test where they were given flashcards to choose to recognize the sound of Arabic alphabets. The objective of the post-test is to find out the significant change in recognizing basic sound of Arabic alphabets after learning using courseware.

FINDING

In this study, we managed to produce two types of finding which are the courseware outcome/change (O/C) design matrix and the evaluation of the courseware.

Courseware Outcome/Change (O/C) Design Matrix

Table 2 below shows an O/C design matrix of basis Arabic sound from the alphabets learning courseware. Each of the nine slots in the matrix will be filled with the requirement given by original outcome/change in the design matrix as stated previously (Kukkonen, 2010). The intent of outcome/change is being analyzed through the understanding of outcome for each change and the design goals of Arabic courseware. For formation outcome of compliance change, the children must comply with system as they need to pass the current level in order to proceed to next level of learning Arabic alphabets sound.

In order to form a behavior of behavior change, we put the persuasive element towards interesting learning. For example animation of baby pointing to eyes when they learn 'ma'. While to form an attitude of attitude outcome, we gave a "Muhamad praised" rewards for each activity being done. In order to alter act of complying, we guide the children if they answer wrongly.

In order to alter the behavior of behavior change, we motivate them to move to the next level or stage. While altering attitude of attitude change, we keep children focus on screen by using the flashcard concept.

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To reinforce the outcome of compliance change, the children continue to the learning process included games to make the process interesting and make them curious about the next level. While to reinforce outcome of behavior change, it can be done by keeping them stay on screen without feel bore and induce motivation on showing performance and giving out scores. Lastly is to giving them double rewards in order to make them keeps on learning by reinforce outcome of attitude change.

We also map the persuasive principle in the O/C design matrix. In the persuasive software features there are four categories which are Primary Task, Dialogue, Credibility Support and Social Support. The Primary task refers to target behavior and the seven principles are Reduction, Tunneling, Tailoring, Personalization, Self-monitoring, Simulation and Rehearsal (Kukkonen & Harjumaa, 2009). Meanwhile Dialogue Support refers to the feedback of system's offer to user in order to change behavior as planned and the seven principles are Praise, Rewards, Remainders, Suggestion, Similarity, Liking and Social Role (Kukkonen & Harjumaa, 2009). Credibility Support describes on how to design a credible and more persuasive and the seven principles are Trustworthiness, Expertise, Surface credibility, Real-world feel, Authority, Third-party endorsements and Verifiability (Kukkonen & Harjumaa, 2009).

Lastly Social Support describes the greater effect of system persuasiveness and the seven principles are Social learning, Social comparison, Normative-influence, Social-facilitation, Cooperation, Competition and Recognition (Kukkonen & Harjumaa, 2009). There are 28 principles that have been derived from those four software features (Kukkonen & Harjumaa, 2009). Those 28 principles should have been chosen carefully based on system goals. In this study, eight persuasive principles which are reminder, social facilitation, reward, reduction, suggestion, self-monitor, tailoring and liking was selected as shown in Table-2.

Table-2. The O/C design matrix for the courseware.

	C-change	B-change	A-change
F-Outcome	Reminds children if the activity is done or not yet done by clicking or using voice. For example, children cannot proceed to the next stage if it is not finished and instruct them to finish up the current stage. **Potential features: Reminders**	Supports children in forming the desirable condition of learning. **Potential features: Social facilitation**	Encourage children to like to learn Arabic by giving rewards for every activity they done. The reward will apply the Nabi Muhamad praisal tehchnique likes *"Bagus percubaan yang baik, semoga Allah memberi pahala"* **Potential features: Reward**

	C-change	B-change	A-change
A-Outcome	Children are guided through voice instruction if answer the questions wrongly. **Potential features: Reduction**	Guide children to move to next stage of learning. For example, gives them a guideline on how to move on to the next stage. **Potential features: Suggestion**	Helps children keep focus on screen. Apply flashcard concept. **Potential features: Tailoring**
R-Outcome	Motivate children to continue learning and not to stop halfway. It can be done by using interactive game such as car driving game that will hit the Arabic character when touch. Additionally, instruct them to do the active activity such as mention the word and show them human body. For example, "ma=mata". **Potential features: Liking**	To sustain the mood of the children, prevent them from any boredom. Monitor performance graphic and score through games or quizzes. **Potential features: Self-monitor**	Give double awards as a big reward in any success activity. For example animation of stars or balloons are used. **Potential features: Reward**

Courseware evaluation

There are few of general techniques used in evaluating a courseware such as usability testing (Yussof & Zaman, 2009), heuristic testing (Lauesen & Musgrove, 2007), observation (Piaw, 2012), questionnaire (Piaw, 2012), interview (Piaw, 2012) and pre-test and post-test (Piaw, 2012). Usability evaluation is used to evaluate the interface of courseware and also the effectiveness of learning for students (Yussof & Zaman, 2009). Usability testing is used to in evaluate the effectiveness of interface interaction and user (Donker & Reitsma, 2004). The example of related study that performed usability evaluation is IQRA' by (Rosmani *et al*., 2012) in order to access the effectiveness of IQRA' application with coordination of Persuasive Technology. While heuristic evaluation is an evaluation of courseware user interface design where the researchers search for any lack or

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drawback of that courseware (Lauesen & Musgrove, 2007). Observation is a method to observe people's behavior, attitude, feeling or motivation action by using checklist, video recording or taking note (Piaw, 2012).

Observation involves visits to one or more users and conduct limited activity so that it will not interfere their work (Yussof & Zaman, 2009). It is necessary to record a video during the session in order to increase the accuracy and reliability of the result. Based on the literature review, most studies on early childhood used observation method. A study that was conducted by (Price et al., 2009) on 25 participant that aged between 18 to 27 month old showed the comparison of time between exposed and none exposed picture.

Questionnaire is a method of obtaining information from participant such as opinion, interest, experiences or effectiveness of a courseware (Yussof & Zaman, 2009). Interview is a meeting between user and evaluator that is being conducted in order to obtain information related to courseware (Yussof & Zaman, 2009).

Lastly pre-test and post-test is an experimental research that is being conducted to compare result from different groups (Piaw, 2012). Most used conducted on early child was using pre-test and post-test method. For example, a study that conducted by (Kubicek et al., 2014) on 49 participants that aged 12 month old aimed to compare the efficiency of ID (infant directed) versus AD (adult directed) to see stimuli inter sensory or interaction of physical and cognitive system. White & Morgan (2008) conducted a study on 41 participants that aged 19 month old to determine sensitivity varying degrees of phonological mismatch when the visual display contains a familiar object paired with an unfamiliar object. While Spencer et al. (2012) conducted a study on 9 participants of 4 years old to determine vocabulary mastering by using automated vocabulary and comprehension.

In other previous study, the evaluation on courseware for children was conducted by using pre-test and post-test method. Faryadi (2012) has conducted a pre-test and post-test to measure the effectiveness of BAIK courseware. The result showed that BAIK motivate users to continue learning Arabic language in class and it showed that the performances of final examination are also improved. Besides that, Rosmani et al. (2012) also showed the effectiveness of IQRA' application by doing pre-test and post-test on 5-8 years old children where it motivates users to learn Arabic.

As in our study we choose pre-test, post-test and observation to evaluate the effectiveness of courseware. The reason to choose pre-test and post-test is because we want to see if there is any improvement of recognizing the alphabets between toddler before and after the treatment. In order to see the behavior change of toddler during learning session we use observation checklist and video recording. Thus, we can analyze the level of acceptance of toddlers and their reaction towards Arabic Alphabets courseware.

Pre and Post Test

The result obtained from pre-test, post-test was analyzed using SPSS 16.0 as the method of analyzing are Sign Test and Paired Sample T-Test. Sign test was conducted in order to get directional information from result such as number of toddlers that gives positive change, negative change or no change at all (Baharun, 2012). While T-test was carried out to find out any significant differences between the scores of pre-test and post-test in recognizing the Arabic alphabets by comparing the mean values of both tests. The statistical data analysis is needed in order to see the relationship and pattern of data (Longnecker & Ott, 2010). Table-3 and Table shows the data of pre-test and post-test respectively. Therefore data analysis is needed in order to see the relationship or pattern of the data collected (Longnecker & Ott, 2010).

Table-3. Pre-Test Result.

(n)	بَ	أ	مَ	تَ	جَ	دَ	اَ	√(x)
	Pre-Test							Result
Toddler 1	×	√	×	√	×	√	√	4
Toddler 2	×	√	×	√	×	×	√	3
Toddler 3	×	×	×	×	×	×	×	0
Toddler 4	×	×	×	×	×	×	×	0
Toddler 5	×	×	×	×	×	×	×	0

The data collected in pre-test and post-test were analyzed in numerical form in order to see the difference of improvement. In pre-test, five toddlers were given an Arabic alphabets flashcard one by one. Then, they were asked to recognize the alphabets. The results of pre-test shown that Toddler 1 recognized four alphabets out of seven and Toddler 2 able to recognize three alphabets out of seven. The other three toddlers who were Toddler 3, Toddler 4 and Toddler 5 did not recognize the alphabets. In five consecutive days on, the toddlers then was exposed to Arabic alphabets courseware for ten minutes per day. After five days, the toddlers then were given out a post-test evaluation.

Table-4. Post-Test Result.

(n)	بَ	أ	مَ	تَ	جَ	دَ	اَ	√(x)
	Post-Test							Result
Toddler 1	√	×	√	√	×	√	√	5
Toddler 2	√	×	√	√	√	√	√	6
Toddler 3	√	×	×	×	×	√	√	3
Toddler 4	×	×	×	×	×	×	×	0

The result of post-test in Table-5 showed significant improvement. Toddler 1 showed improvement in recognizing alphabets from four to five alphabets out of seven. Meanwhile Toddler 2 was able to recognize alphabets from three to six alphabets out of seven. The other two which were Toddler 3 and Toddler 5 also showed improvement by recognized zero initially to three alphabets while Toddler 4 remains the same, he did not recognize any alphabets.

Table-5. Sign Test Result.

Toddler	Pre-test	Post-test	Post-test – pre-test	sign
1	4	5	1	+
2	3	6	1	+
3	0	3	3	+
4	0	0	0	No Change
5	0	3	3	+

Result: 80% →improve, 20% →same score

The result of sign test shows that four toddlers contribute to positive sign while one toddler shows no change in recognizing Arabic alphabets. It shows that there is significant reason for their improvements which are the span time of their attention towards courseware is much longer that same score toddlers. The average of focus time is 4 minute and above except for one toddler which is 2 minute and 13 second.

The data collected from the tests were being analyzed. In order to compute the t value from the paired T - test, the formula used is:

$$t = \frac{\bar{d}}{\sqrt{s^2/n}}$$

Where:

$\bar{d}$ = mean difference between two sample
s^2 = sample variance
n= sample size

1) Based on the table-5 above that shows the difference of result between post-test- pre-test, we can make following hypotheses:

Ho: There is no significant difference in number of recognizing the Arabic alphabets before learning Arabic Alphabets Courseware and after learning by toddlers.

Ha: There is significant difference in number of recognizing Arabic alphabets before learning Arabic Song Courseware and after learning by toddlers.

(Note: d =after-before (if there is an effect on toddlers' scores, d>0)

2) Significance level (α) = 0.05

3) Reject the null hypothesis if p-value<= 0.05

4) Result of Test Statistic

Table-6. Result of Paired Samples Statistics.

Test	Mean	N	Standard Deviation	Significance (2-tailed)
Pre-test	1.4000	5	1.94936	0.034
Post-test	3.4000	5	2.30217	0.034

The result Table-6 shows the mean value of two samples which is 1.4000 for pre-test and 3.4000 for post-test. There is a significant difference between those two mean values which is 2.0000.

As shown in Table-6, the difference of mean value between samples of pre-test and post-test is 2.44. The p-value in Table-6 is 0.034 which is smaller than the significance level (α) of 0.05. Thus, this suggested that the null hypothesis is rejected as p-value is smaller than significance (α) level. It shows that there is significant difference between the pre-test result and post-test result. As a conclusion, it shows that the toddlers are having an improvement in recognizing Arabic alphabets after learning using the Arabic Alphabets Courseware. This study also proved that this courseware could give a positive impact towards the toddlers. They have shown significant improvement in their learning process using basic sound of Arabic alphabets courseware by achieving better score in the post-test. This courseware design is suggested to be a suitable design for the toddlers as it is effective where it implemented interactive learning by using multimedia elements such as basic color (black, white and red) and simple pictures, clear audio, high quality of videos and appropriate flashcard. For example the sound and animation representing the Arabic alphabets sound are related with human body such as 'ta' for 'tangan', 'ba' for 'bahu', 'ka' for 'kaki' and 'ma' for 'mata'. It is to provide them with better understanding of the Arabic sound using familiar thing on the children body. We also suggested that the courseware should be related to the learning styles which includes visual, audio and kinesthetic. In this courseware we encourage the children to do movement, for example when the sound of 'ma' is produced; the baby in the video point to his eye.

Motivation Result

This motivation checklist was used as an item on the participant's observation process to indicate whether the toddlers are motivated or not during the basic Arabic sound learning session. Based on ten evaluation criteria on the motivation checklist eight criteria were positively responses. Even though the other two criteria was recorded and showed zero responses, it still showed a positive result as the toddler did not complain during the learning session and also they did not show any annoying action or feeling during the process. All the toddlers did show that they are

in a happy mood as they enter the class with an excitement when the courseware is going to be used. Five of them pay attention towards the courseware during the courseware was being played. They seem to be motivated when they imitated the animation as well as pronounce the alphabets. For example, in the learning page of the alphabet 'ta' they followed the animation to wave their hand. During five days observation period, the toddler did remember the lesson and continue to learn even though same courseware was being used. The understanding on the learning session using the courseware is being proved in post-test as they manage to recognize more alphabets. They also showed a happy mood during the session as they laughed and clapped their hands while playing the courseware. Moreover, they feel confident in using the courseware during the session. The result in Table-7 below indicates that toddler were enthusiastic to learn.

Table-7. Motivation Checklist.

Evaluation Criteria	Responses
	Yes
1.Did the student enter the class with happy mood?	5
2.Did the student pay attention to courseware?	5
3.Were student motivated during learning session?	5
4.Did the student remember and continue to learn?	4
5.Did the student remain happy in class?	5
6.Did the student understand the lesson?	3
7 Did the student complain during learning session?	0
8.Were students confident in the class?	4
9.Did the student annoy during learning session?	0
10.Did the student feel important in class?	4

Behavior Result

This behavior checklist was used as an item to monitor the behavior of toddlers during Arabic Alphabets learning session. Behavior checklist elements were being chosen according to the behavior that will be act or shown by toddler age of eighteen to thirty six month old towards cognitive development and sensory development (Platt, 2010; Muhamamad & Nawi, 2011). There are fourteen behavior elements being chosen that mapped to the content and interface design of the courseware.

Based on Table-8, it showed that two toddlers gave responses by imitating sound or murmur when the courseware was played. The most frequent alphabets that imitate by toddlers for those five days were 'ma' and 'ba'. While there are three toddlers that showed their responses by smiled towards screen during learning session, they were initially not smiling for the whole time as the courseware was played, but when the time there is alphabets that attracted them or when the animations were

shown, they smiled. However, there is only one toddler that showed a happy feeling when he see the screen which is toddler 1. This showed that he pay attention towards the screen with smiling and clapping hands. Most of the time where the screen starts to makes sounds; the toddlers listened to the sounds even though some of them did not see the screen but they did not leave the class. It is noticeable; when new sounds of alphabets produce from the screen they turn their head towards the screen. One toddler laughed and clapped his hands when sounds are produced from the screen. Two toddlers babbled the alphabets with a long babbling such as 'bababa' then mimic the sound of animation saying 'bababa' 'saya ada bahu' and 'mamama' 'saya ada mata'. The alphabets were repeated four times for each alphabet in courseware. One toddler showed an action of imitating the animation in the screen where he points to the part of his body. Nine out of fourteen behavior elements was react by toddler towards Arabic Alphabets courseware. As a conclusion, the behavior checklist would summarize how toddler react and learn by visual and sound. Although not all the behavior was performed by toddler, it still shows that we did stimulate the toddlers' cognitive development and sensory development. They also were being given an evaluation on pre-test and post-test and it shows that they improved from time to time.

Table-8. Motivation Checklist.

Evaluation Behavior Element	Responses
	Yes
Murmur/babbles and imitate sound-	2
Smiles when see screen	3
Happy when see screen	1
Listen when the screen make sound	5
Notice screen make sound	5
Pay attention to song	0
Laugh when see screen	1
Babbles using short or long word ('mama','baba','tata')	2
Point to the screen that show picture or animation	0
Repeat the action on screen	0
Imitates different speech sound of Arabic character	0
Turn and look into the direction of sound	3
Point to the body part as the screen ask	1
Name the object on screen such as 'mata','kaki'	0

Time Focus Result

The focus time on screen for each toddler was being recorded in Table-9 below as an indicator to see how long toddler can focus on one activity. The average time allocated for courseware during learning session was ten minute. The result shows that every toddler has different time on focusing or paying attention in one activity. The highest recorded time is done by toddler 1 which is five minutes. After five minutes, he went to play with his friend next to him, touching his shirt and looking

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around. Toddler 5 recorded the second highest focus time which is four minute and fifty second. After that, she moved around and start touching things. Then, it is followed by toddler 3 with four minute and thirty seconds. After that, she started to touch her friend. Toddler 3's focus time was four minutes. After that, she started to look around. Lastly, toddler 4 with the lowest time focus which is two minutes and thirteen seconds as he cannot sit still where he likes to touching thing and looking around. As the time focus is different for each toddler, it shows that the amount of time spent by toddler on Arabic Alphabets courseware would also differ in term of information acquisition. Besides that, we also can see how toddler react towards the courseware and how it would differ with others courseware. This courseware would attract toddler attention on average of four minutes and six seconds.

Table-9. Time Focus.

Toddler	TimeFocus (minute:second)
Toddler 1	5:00
Toddler 2	4:30
Toddler 3	4:00
Toddler 4	2:13
Toddler 5	4:50
	Average time focus = 4:06

CONCLUSIONS

O/C Design Matrix has been successfully implemented in various domains. Since it is proven to motivate people in changing their attitude and behavior, this research will fully utilized the concept of BCSS which used to form, alter or reinforce attitudes, behaviors or an act of complying or obeying without using force, coercion or inducements towards the toddlers. It can be done by pushing them in a situation of interactive learning where they can play and learn at the same time. It happens with their own wills and voluntary without being asked to do so. The concept of interactive learning and interactive game are combined in order to produce a game that can provide an enjoyable learning and exciting game play experience. Additionally, there are many cases of the success or failure of an application that can be attributed to the fluent navigation and smooth interaction arising from the technological infrastructure rather than to the design of the system. Result from this research shows that Arabic alphabet courseware can motivate toddler in learning Arabic and can improve toddlers performance in recognizing Arabic alphabets.

FUTURE WORK

As for future work, this courseware will be developed based on the practical of the Arabic O/C design matrix in mobile environment. The purpose is to compare the design model in different environment.

ACKNOWLEDGEMENTS

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