Development and Innovation of Multimedia Courseware for Teaching and Learning of KAFA Subjects

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Abstract - Nowadays, the development of technology is affecting the educational sector. Courseware is one of the approaches that can be used in teaching and learning process so that it becomes more effective and interesting. This paper demonstrates the process of development of multimedia courseware that can be used for teaching and learning of KAFA subjects. Development of the courseware is to deal with some issues that arise in teaching and learning of KAFA subjects. The courseware is developed based on selected methodology to ensure that it fulfills the teaching and learning objectives. It is integrated with multimedia elements such as graphics, audio and video to make it more attractive to be used by students in their learning process.

Keywords- courseware; multimedia; KAFA subjects

I. INTRODUCTION

In contemporary education, teaching and learning environment should be set in such a way that students could learn in an easier, economical, and attractive manner. Many developments in the field of courseware have been made in the last few decades with the aid of computers as a tool for instruction and learning. Courseware is learner-centered, which promotes self-paced learning. Integrative courseware provides a complete learning environment, including target content, personalization, feedback, remediation, and various learning and evaluation methods [8]. The use of interactive multimedia integrates various skills such listening, reciting, and comprehension, together with authentic learning experiments, learners’ control over their learning and a focus on the content [10].

Courseware is also called instructional or educational software and is widely available for school children at primary level and can be used as an integral part in the delivery of their courses. Indeed, courseware or multimedia integration into instruction and learning has become a very effective tool for learning [5]. In general, courseware can play the role of a teacher and serves as an interesting tool for students to interact during their learning process.

Kelas Pengajian Al-Quran dan Fardhu Ain (KAFA) organized by Jabatan Kemajuan Islam Malaysia (JAKIM) has been introduced for students under the age 6 to 12 years old in all countries in Malaysia. The aim of this program is to ensure that all children in that age category are able to recite Al-Quran properly, and also can learn and practice basic things that are necessary (fardhu) for a muslim. In order to form a strong foundation of Islamic Studies and knowledge of Islam among these children, KAFA subjects are taught in primary schools in this country. Alternatively, the program is also conducted in other places such as mosques, kindergartens, and other places deemed appropriate for its delivery.

This paper focuses on the study of development of multimedia courseware that can be used for teaching and learning of KAFA subjects. Innovative elements such as storyboarding, scripting, pedagogy of teaching, Islamic content presentation, user interface design that improve visualization and presentation, simulation, drill and practice, tutorial, multistage quizzes, test, game, and links to web-based learning are integrated in this courseware. In essence, the courseware is designed based on characteristics of analytical and global learning styles, preferred verbal and visual modality and cognitive and constructivism learning theories. It is believed that this paper could contribute added values to multimedia applications that could fulfill the government’s ambition in order to promote the development of multimedia applications in Malaysia.

II. DEMAND FOR KAFA COURSEWARE

The courseware was developed based on several problems that we find in teaching and learning of KAFA subjects. Current learning style is unattractive as it is merely teacher-centered. In addition, KAFA classes at primary schools are normally held in the evening where in this time students can easily get bored and they cannot focus entirely on the subject taught. Such teaching-learning approach, if not assisted by attractive multimedia tools, may not produce optimum result [6,7].

In this technology era, the government of Terengganu, Malaysia takes an initiative by distributing an e-book (a
mini laptop) to standard five students in primary school. The government’s intention is not only to produce students who not only excel academically, but also for them to be prepared to face global challenges. However, we find lack of IT materials or contents for KAFA subjects in the e-book hence we believe the effort to integrate the courseware into e-book is crucial.

In addition, certain subject matters in KAFA especially subjects that involve practical aspects such as performing the ablution or wudhu' and the process of hajj require students to attend for class in order to get the knowledge. If students cannot attend the class for any reasons, they will be left behind to learn about the subject. Consequently, this courseware provides and alternative where students can learn the practical aspects through video elements.

Today, teaching and learning of KAFA subjects only employs static contents where the teaching materials are only available in the text books hence making it tedious to improve or update the subject materials.

III. COURSEWARE DEVELOPMENT METHODOLOGY

In order to ensure effective learning outcomes from educational courseware, careful planning are required before the development process begins. The basic steps used to develop the courseware in this study are shown in Fig. 1 [9].

3.1 Phase I: Background Analysis
The background analysis for the courseware was conducted by interviews, literature review (KAFA text books) and by conducting a survey on related courseware in the market. The requirement analysis obtained include aspects such as target group, course content, learning time, learning style, learning objectives, and learning outcome.

3.2 Phase II: Data mining, Selection & Learning the Content
In this phase, materials that are relevant to the subject matter are selected from textbooks, reference books, original source materials, CD, and most importantly, people knowledgeable in the area. The main topics selected for KAFA courseware are Akidah, Ibadah, Sirah, Akhlak and Jawi for year 4 and 5.

Designers must also learn the contents to become thoroughly familiar with the contents even though working in conjunction with experts in the area. This is to ensure effective courseware that includes instruction which challenges the student in creative ways. Shallow understanding can only produce a shallow lesson.

3.3 Phase III: Structure the lesson and Production of Content
A structure is a series of diagrams describing flow of operations in a computer regarding any related applications. Structure is important because computer-based instruction should be interactive, and interactions are best depicted as a visual representation of decisions and events. While the structure does not include the actual text and pictures for the lesson, it should include their sequence. The structure in flowchart form includes information about when the computer will draw or animate pictures, what happens when the student makes mistakes, and when the lesson should end.

Flowcharting can be done in varying amount of details. Different amount of details for different instructional methodologies can be used. For simpler operations such as tutorial, drill, and tests; simple flowcharts give an overview on the scope of the lesson. For complex methodologies such as simulations and instructional games, more detailed flowcharts that include the algorithms underlying the simulation models, game rules, and so on are recommended. Regardless of the amount of details, producing flowcharts in a series of drafts can be beneficial.

3.4 Phase IV: Digitization of content
Hand drawn sketches can be digitized by scanning and transferred them to Adobe Photoshop or Adobe Illustrator. Color, typography, or composition or certain features such as shading can be added to produce attractive drawing. Audio are recorded using Sony Sound Forge and edited to make it suitable for specific modules. Video are also captured and edited using Adobe Premiere by combining video clips, sound and graphics together in a way that can convey meaning and fulfill attractive learning process.

3.5 Phase V: Multimedia Design
The courseware design is essential to the effective use of multimedia and educational technology so that the interaction between the meaning and media can be conducted in the learning process. The courseware attempts
to incorporate major principles for the effective use of multimedia: modality, contiguity, multimedia, personalization, coherence, redundancy, pre-training, signaling, and pacing[2,3]. In the courseware, Jawi texts with audio narration, practices of certain content, on-line tests with instant checking, graphical images and multimedia movies (whenever appropriate) are all presented in the courseware, both temporally and spatially contiguity principle [2]. They are implemented in learner-paced segments so that students can control their learning pace and deliberate practice and self-evaluation with the courseware, corresponding to the pacing principle: the pace of presentation is controlled by the learner, rather than by the program [3].

The content of the courseware is laid out with simplicity and consistency. The content is divided into three thematic sections: Introduction to the topics; theories and practical aspects; and evaluation for understanding of the topics. Each section includes several topics, each with several learning activities or on-line tests. Narration and animation are combined to aid students into visual and virtual contexts in order to engage them with real understanding. The well-structured content of the courseware plays a scaffolding role to help students develop or improve understanding and knowledge for KAFA subjects.

Multimedia design for KAFA courseware has to consider the followings:

- Interface design – can be based on eyes movement which begins from middle of screen to the top left and to the right bottom screen in form of ‘zig-zag’ pattern. The interface design must also include number of screens, which objects on which screen and the positions of the objects on the screen, definition of audio channels and input devices. It is also imperative to consider the functionality of object, the content of menu bars, and the specific controls [1].

Storyboarding is also part of multimedia design process. It is a place to plan out digital story in two dimensions. The first dimension is time: what happens first, next, and last. The second is of interaction: how does the voiceover (the story) interact with the images, how do visual transitions and effects help tie together the images, how does the voiceover interact with the musical soundtrack? Any elements can interact with any other one, and the storyboard is the place to plan out the impact intended to make on the audience.

In order to ensure concrete graphic design, contribution from graphic designer about of the use of color, typography, or composition can be taken into account.

- Content presentation – use, integration, and manipulation of certain multimedia elements that include video, audio, texts, graphics, animation and script to present the content. Script writing is the art of writing dialogue, character and plot for a specific topic. The information related to a subject matters gathered during the previous phase are compiled to form a draft, followed by strict proof reading to ensure accuracy of it content. Once users either the expert users or KAFA teachers are satisfied with it, the development process will begin.

### 3.6 Phase VI: Development and Implementation

Once the previous five phases have been carried out, the courseware can be developed. The multimedia objects are blended together in order to produce courseware that help students into an engaging experience during their learning process. Contents are delivered to students in an interactive format, ensuring high audience retention. The advantages and flexibility of this medium is extremely valuable, especially when time/student enthusiasm/student ability is a factor.

The main authoring software used for development process is Adobe Flash and Adobe Director. Adobe Flash can manipulate vector and raster graphics which are representation of images, and supports bidirectional streaming of audio and video. It contains a scripting language called ActionScript. Adobe Director is used because it has a powerful scripting language called Lingo which allows sufficient interaction with external files and certain Windows APIs. It can also be used to create graphical user interfaces and create prototypes of applications, as well as create self-running Kiosks on CDs and DVDs. It has also been used to author interactive games with rich graphics and embedded QuickTime movies. Director supports many different bitmap, audio, and video formats. Adobe support both 2D and 3D multimedia projects.

### 3.7 Phase VII: Testing, Consultation, and Modification

The development of this courseware employs the technique of user centered design where testing from the beginning of the development to its final phase is important to avoid errors to be left until the last minutes when errors that should have been corrected at the beginning. Information can be obtained from future users, content experts or those who have gone through the material. Modifications have to be made to the courseware after
consultation to ensure usability and acceptability of the product.

3.8 Phase VIII: Completion of Project

A software project is said to be completed once all the modules have been tested and accepted by the product owner. In this project, multiple topics are developed in parallel by the development teams and then related topics are combined to form a complete courseware product prototyping.

IV. 4.0 RESULTS

The main finding of this research is KAFA multimedia courseware that is anticipated to assist in individual learning styles. The courseware created can be used by students and teachers in the process of teaching and learning of KAFA subjects. The students can use the courseware based on their learning pace, according to their preferred learning styles. As examples, Fig. 2, 3 and 4 show the interfaces of KAFA courseware.

Figure 2: Interface of the courseware that uses graphics, text and animation.

In Fig. 2, we can see that there are some buttons at the top of the page that could link to another page. Therefore, users can easily switch to other content without having to complete the topic on a particular page. If any user has difficulties in reading Jawi, they can still use this courseware using the icon that is provided to read the contents. Likewise, the user could click the stop button if he doesn’t want the icon to read the content. Furthermore, colorful background image is used in order to attract children to use this courseware. Besides there is an animation of the butterfly flying around the interface.

Figure 3: Video element that provides training in performing prayer.

In Fig. 3, video is used to replace text as a tool to explain the contents. The use of the video is useful for teachers since it can assist the teachers in explaining certain practical aspects such as how to perform the ablution, prayer and the processes in performing hajj. The student will clearly see a scenario and could enhance their understanding in the subject matter. This innovative part of the courseware combines a few types of multimedia elements such as audio, video and image.

Figure 4: Interface showing an example of related exercise.

Fig. 4 shows an example of an exercise for a topic. At the end of each topic, this courseware provides exercises to test students’ understanding of the subject materials. There are three formats of the questions in the exercise: multiple choices type of question, fill in the blanks and match the correct answer. In the exercise, when the student gives the correct answer, they will proceed to next question otherwise the courseware will do the correction and at the same time the student can learn from their mistakes. When the students complete an exercise, the courseware will compute the score obtained.
Links will also be provided to the selected materials and webpage on the internet to expose the users to various related issues. A website is to be made available that enables the teachers to add more materials and exercises related to certain topics in the effort to improve understanding and to fulfill the required learning outcomes.

In addition, new technology in multimedia development such as storyboarding and scripting are used to improve visualization and presentation. The courseware is also designed by considering KAFA teaching pedagogy and Islamic contents to fulfill the teaching and learning requirements.

In order to ensure usability and effectiveness of the courseware, the most appropriate testing approach will be proposed and carried out by considering domain expert, teachers and students.

V. CONCLUSION

Multimedia courseware offers many benefits over traditional methods of delivering information. Information can be displayed in various formats that enable users/students to interact with the materials being presented as needed in their own time. Multimedia courseware has the potential to present information more effectively compared to the traditional teaching approach using textbook, classroom teaching, and practical exercises. Thus, teaching and learning of KAFA subjects has to be assisted with interactive multimedia courseware to enhance learning and understanding without regard to time pace.

In terms of future work for this research, we are to determine whether this KAFA courseware really improves the quality of teaching and learning of the specified subjects. In order to do this, an evaluation will be performed in order to analyze this new medium. This can be done by analyzing the medium itself and by comparing the courseware with other traditional means. One of the techniques is using questionnaires and the results will be analyzed statistically. Follow-up program will also be carried out and analyzed later on in order to study the effectiveness of various components of the courseware.

It is anticipated that the courseware will benefit many stakeholders that include not only KAFA students and teachers, but also those who are interested to learn about Islamic teachings. This courseware is also designed as a tool to support the government’s inspiration toward knowledge society via the use of information technology and multimedia applications.

REFERENCES