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Standards of Multimedia Graphic Design in Education

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Abstract
This study aims to determine Standards of Multimedia Graphic Design in Education through the analysis of the theoretical basis and previous studies related to this subject. This study has identified the list of standards of Multimedia, Graphic Design, each of which has a set indicator through which the quality of Multimedia can be evaluated in education. These course standards are: General Standards, Standards for using colors, Printed text, Illustrations and photographs, Cartoons, Video clips, using vocal sound, Sound effects and Music.
Keywords: standards, Graphic Design, Education, Multimedia.

1. Introduction

Human kind is currently facing a situation of continuous change stemmed from the non-stopping technological advances. The recent thorough change in technology helped to come along with the scientific advancement and to make best use of their possibilities with the aid of cumulative human's keen effort. Currently we can find and utilize the best that matches our needs and preferences within the community where we live. Such a revolution involves the information, technology and communication as well as their applications in various fields. The influences of such amazing breakthroughs in the communication technologies and their capabilities extended to the education field, which employed the modern technology to help both the teacher and learner. This is due to the technology's impressive potential in setting the goals, the objectives, the planning of the learning environment, the selection of teaching methods, and assessment of the overall instructional system (Tahar, 2006). Educators, however, are supposed to maintain consistency among the instructional system components such as: inputs, outputs and processes, where the instructional competency level is identified by the outputs that are associated to the quality and size of the system inputs. The greatest development in the information technology and communication could open new horizons for education development and quality instructional service (Abbas, & Aldalalah, & Alhalaq, 2014). These horizons in turn impose a better employment of the emergent techniques, capabilities and technologies in developing new educational approaches that respond to the most recent trends. The most prominent of such technological progress is the computers and their applications, which became an integral part of the instructional system. Computer-based instructional approaches have developed to cover new fields and extended to all over the world. Computers are one of the most critical technological advances that participated in spreading knowledge in a short time period (Aldalalah & Fook, 2008).

2. Multimedia

Many educational institutions have developed their own curricula over the World Wide Web with the aid of multimedia facilities. The components of the material of such curricula and related textbooks are compatible with the level of technology used, self-explanatory with a logical sequence in terms of their format and artistic demonstrations (Abu Khtwah, 2012). These characteristics help to meet the different aspects of the individual learners in terms of the age, the student's grade, the logical sequence of the contents, with the up-to-date developments in the different educational fields, in addition to focusing on the extracurricular activities (Evans & Gibbons, 2007).

The advantage of such curricula would be inclusive of everyone having an interest in the teaching process, particularly students, and teachers. Students, for example, would benefit from the way in which the textbook contents are demonstrated (Al-helah, 2003). This will motivate their self-learning abilities by pursuing audio-video supported illustrations, graphics, texts, and drawings, whereas teachers would benefit from the model on a daily basis as they get exposed to new endeavors and to the recent developments in the field of curriculum under consideration (Abo Shkar & Hasan, 2008).

In the course of action to improve the teaching-learning process, many techniques were developed by mankind to deliver the contents to the learners. Such techniques have been changing over time (Garaj, (2010). The most prominent of such techniques were particularly the sound, images, text and film in the form of multimedia procedures (Alttaher, 2006). However, computers in present days, created a quality revolution in the capability of dealing with such techniques and procedures where many software programs are designed to employ such aids in the teaching process (Schar & Kaiser, 2006).

Multimedia techniques and instruments can be employed in the educational process by applying them on the educational models. Malik and Agarwal, (2012) indicated that an educational designer who intends to

design through multimedia should adopt an educational theory as a guideline for his design of an educational strategy, interaction patterns among the learners and the suitability to their individual differences.

Kearsley (2003) emphasized the importance of having a theoretical (cognitive, behaviorism, or structuralism) educational approach to the design of the instructional process.

Multimedia has been one of the main edges of scholars interested in computer programs and internet software due to the increasing advancement in communication technologies (Herrington and Oliver, 1996). Multimedia is a means of combining the elements and components of different content forms that are interrelated (Kim & Gilman, 2008). It uses computers to enhance the ability to process different kinds of data, figures, letters, symbols, motion images, sounds and others to provide human beings with the different advances and increase the interaction and communication in the different life aspects (Clark & Mayer, 2008).

New technological and computer advancement have opened the door to present instructional material in different forms such as audio (i.e., Spoken words, sound effects and music), visual images, printed text, pictures and motion images. All types of multimedia are found within one computer suite, which has opened the way to present learning more effectively (Al-Jundi, 2002).

Arab League Education, Culture and Science Organization defined multimedia "as the integration between more than one multimedia means when instructing or delivering the learning material" (Al-Helah, 2003, p25). Shelbaia et al (2002, p 41), "definition multimedia as integrating different systems (computer, visual, audio, communication) in one system that is accessible to human beings. This means that multimedia is a set of tools and technologies that enable humanity to use the potential of multiple devices within one system". Different definitions for Multimedia have been proposed in the literature. For instance, Schawartz and Biechner (1999) definition multimedia as using different means when presenting the instructional material. Another definition states that multimedia combine between printed text, motion and still images, music and sound and other sound effects. This means exerting all stimuli that are capable of motivating human senses and emotions to cooperate together to present a certain material or to deliver a message for certain individual / individuals (Mansour and Masoud, 1999). Maddux and Johnson Willis (2001) definition multimedia as a computer software containing a printed text and at least one of the following components: sound or music, images, pictures and motion images. Alfar (2002) went further by defining it as the tools that help to symbolize the educational contents in writing or oral forms using different kinds of symbolization approaches such as charts, diagrams, fonts, demonstrative cartoons, animation and video clips to show an idea, a concept or a. Al-Shomaly (2007) states that multimedia is blending different kinds of technological means such as the film slides, music and light in one set for instructional purposes or just for entertainment. Greenlaw and Hepp (1999) definition multimedia as presenting information in the form of drawing, pictures, images, sounds, videos and films. Mayer (2001) on the other hand, characterizes multimedia as presenting any material using words and images which may be either still or in motion, any material presented verbally, printed texts and audio texts.

The previous definitions can be summarized as using different kinds of technologies and integrating them in one single computer. By emphasizing the role and the efficiency of multimedia technologies, Al Far (2002) points out that multimedia concept is related to e–processing via the computer and its use is connected with two major principles, integration, that is blending several means to serve a certain idea or information and the interaction between the learner and what is shown on the computer screen. Further, Mansour (1999) identifies other features of multimedia. He claims that they are the best methods to meet the challenges of rapid growth in the different disciplines. As he also claims, multimedia are the best way to deliver information in an integrated system based on technologies. Moreover, Seufert, Schutze, & Brunken (2009) assert the role played by multimedia in attracting students' interests, motivation, meeting their desires and preferences and increasing their experiences. This process is enhanced by the involvement of all human senses, thus much more positive participation by students. Multimedia also help in developing new desired attitudes among students as it considers individual differences and delivering learning material in an organized sequence that has positive effects on students' understanding.

Using multimedia provides more than one learning opportunity meaning that multimedia is not directed to one human sense only, it simply communicates with different human senses and thus more effective learning takes place (Evans & Gibbons, 2007). From linguistic perspectives, multimedia mean integrating two or more means to serve a certain purpose. From a practical point of view, multimedia mean using printed text with verbal sound and still or animated pictures to deliver a certain idea via the computer (Shelbaiah et al, 2002). The Multimedia focused on multiple ways for information process causing a various presentation ways; these media are multiple modes of the component- text, Image sound… etc.. Embodied in a digital formula designed, saved and presented by the computer and its improved and developed ability. These media are used interactively; the focus on the interaction among the used media by one application makes their performance, mare attractive as an information system (Abo Shaker, & Hasan, 2008). The technological progress has opened the door to deliver instructional material using different forms. Verbal "e.g. Words" and non-verbal "e.g. Drawings, pictures, sound and motion images" in one technology, that is, the computer and Information Technology (IT) applications have

opened the door for a massive revolution in instructional technologies resulting in emergence of multimedia (Jonassen, 2002). The interaction between the learner and the multimedia is fulfilled by a screen enabling him to enter the multimedia program functions by using the mouse lists and icons (Aljundi, 2003). The components of this screen are everything is displayed infront of the learner in a specific moment A multimedia screen mixes among more than two media, including the text the image the sound the motion and video and that demands a good designing for this screen for more efficiency (Lal, 2011). The emergence and use of computer is the key factor in developing and improving multimedia (Kozma, 1991) as computers have supper processing abilities. Using computers, students are able to transform figures and data into several presentations means such as diagrams. Delivery Media implies the use of certain tools to present the learning material. This includes using books or computers. Presentation Mode means the symbol system used in presenting the learning material such as word system or images system. Sensory Modalities means the method that the learner uses to process data presented to him, either visually or auditory (Mayer, 2003). Multimedia design is a complete process starting from planning to implementation. Although multimedia applications are expected to be profitable investments, a good design should also consider the esthetic aspect that fits the pleasure and the relaxation of the soul (Muller, 2008). These bases are as an idea or concepts distinguish the multimedia characteristics and lead to the excitement and achieving the objectives these bases arrange and organize the design elements. The design pedagogic bases are (Annan, 2005);

Clarity: using the multimedia in the computer programs gives the opportunity for complementing the information, multimedia forms and presenting them clearly on the screen causing an active institutional environment. When the presentation succeeds in presenting the message, with all its meanings, quickly and clearly, then the learner becomes able to see the details clearly and easily.

Variety: The variety is using the simplicity and difficulty gradually at handling the different ideas, ways and media for presenting the same base or concept wanted to be learned.

Consistency: The consistency means that the screen is familiar to the learner and consistent with the other used applications.

Integration: The good design is an organized effort aims to collect the whole elements that serve the final aim, into one integral unit the multimedia programs don't depend on only a single medium for caring the meaning.

Interactivity: define the interactivity in the multimedia programmers with a binary- direction response, from the learner in the program and from program to the learner.

Attention: The learner should notice the suitable effects for learning the multimedia program subject. These effects represented in the media that the program contain, and that because the living being learn everything attracts his attention even with the lowest level of learning.

Balance: Balance in the relationship between the different components leading to the understanding. The balance in the reasonableness either in choosing from the media or the locations where these media will be put on the screen, using a various media, then organizing these media on the screen equally we can also achieve the balance by categorizing the presented elements on the screen and gathering the similar elements to be treated as all can't be divided.

Effectiveness: The effectiveness is the screen usability by the user with high capability and satisfaction of achieving a specific aims in a specific environment by this screen.

The simplicity: the simplicity, that doesn't effect negatively on the meaning and achieving the objectives is an important condition for succeeding any deductive medium. When we use the multimedia for making one medium, the didactic program that needs, then simply in designing each element the program multimedia especially the face of user interaction with the program.

Unity: the unity is the relationship among the different multimedia elements making these elements work together and complement each other.

3. Statement of the Problem

The goal of transforming teaching and learning by increasing access to, and use of, technology in schools and classrooms has been near the top of most educational reform agendas since the early 1980s. The use of multimedia in education offers a tool that has the potential to change some of the existing educational methods, in order to prepare students for the information age. Contended that "multimedia can drive a shift from a traditional instructional approach toward a more eclectic set of learning activities that include knowledge-building situations for students.

Multimedia opened a wide opportunity for educators to integrate technology supported materials in the classroom settings by encouraging inquiry, helping communication, constructing teaching products, assisting students' self-expression and overall improving the achievement of students. Despite significant spending by governments on ICT infrastructure, technical support and training, levels of multimedia use in Education institutions in Jordan, the process of teaching and learning through multimedia are not as expected, because there

is a lack of standards in the use of multimedia in education. The present study explores the best utilization of multimedia technologies in learning through development of a list of multimedia Standards in education.
Thus, this study attempts to answer the following broad research question namely:
What are the Standards of Multimedia Graphic Design in Education?.

4. Methods

The purpose of this study was to determine Standards of Multimedia Graphic Design in Education. Research design is a plan for conducting the whole research study. The study used Cross-sectional survey design and Descriptive design was selected to investigate the Standards of Multimedia Graphic Design in Education.

4.1. Study Setting

The study took place in the Departments of Educational Technology, Departments of Graphic Design and Curriculum and teaching in Jordan. The list of standards was in paper-and-pencil format. The list of standards was administrated and collected in-classes with the help of research assistants. The panel experts in the study were completely voluntary. They were asked to respond to the list of standards anonymously.

4.2. Instruments

The instrument used in this study was a list of standards. It consisted of 106 items categorized into nine dimensions: General Standards, Standards for using colors, Printed text, Illustrations and photographs, Cartoons, Video clips, using vocal sound, Sound effects and Music. Based on the previous literature review of the trends in using multimedia in education, the researchers adapted and adopted the list of standards from (Abbas, & Aldalalah, & Alhalaq, (2014); Abozgeya, (2012); Abu Ammar, (2012); Abu Khtwah, (2012); Elbatta, (2012); Malik and Agarwal, (2012); Lal, (2011); Abu Aziz, (2009); Al Umrani, (2009); Elbatta, (2008); Kim & Gilman, (2008); Elshrief, (2008); Muller, (2008); Khamis, (2007); Ghanem, (2006); Schar & Kaiser, (2006); Tahar, Amal. (2006); Annan, (2005); Muhammed, (2005); Al-Mubarak, (2004); Shboul, (2002); Saleh, (1999); Herrington and Oliver, (1996)).
To answer the research questions: What are the Standards of Multimedia Graphic Design in Education?
The researchers have followed the following:

Based on the literature review of the trends in using multimedia in education, the researchers developed the list of standards.

Benefit from specialists in the field of educational technology, curriculum and instruction, e-learning, and Graphic Design and previous experience of the researchers in the field of e-learning and multimedia.

After determining the list of standards in this research (Arabic version) the validity of the list of standards consisted of a review panel of several. The panel of experts comprised 11 specialists in the field of educational technology; 5 specialist in Graphic Design 3 specialist in curricula and teaching methods, 2 specialists in Psychology, 1 specialist in computer science and 1 specialist in measurement and evaluation, To express their views on the clarity of the wording of each standard and scientific validity, and the adequacy of standards and items, and relevance of items standard belonging to it, and add, delete or modify the standard and items as they see fit. The instruments were evaluated during the development of the research study. The feedback and comments received from the panel of experts were employed to establish the necessary clarifications, changes, and modifications. Meanwhile, the research list items were translated by two bilingual experts who reviewed both the English and Arabic versions. The Arabic version of the questionnaire was checked and translated back into English by an independent translator to ensure there was no loss of meaning during the translation. The purpose of translating the questionnaires and interviews items from the English version into Arabic version is to make it easier for participants to answer the questions. To ensure that the translation of questionnaires and interviews items is accurate, the instruments were professionally translated of the survey to ensure the validity of the instruments.

5. Results

To answer the study question the researchers collected the opinions of experts and compare responses to see the degree of agreement, the results showed a high degree of agreement between the experts as shown in Table 1.

Table 1 lists of standards of Multimedia Graphic Design in Education

1	**General Standards:**
	1. Simplicity in designing each element of the multimedia. 2. Considering unity between visual and audio elements. 3. Clarity in presenting multimedia. 4. Diversity in using multimedia. 5. Consistency in multimedia screen designs. 6. Integrating all elements of multimedia. 7. Interactivity between multimedia elements. 8. Balancing the use of multimedia within the same screen. 9. Efficiency in suing one multimedia screen.
2	**Standards for using colors:**
	1. Using color for a particular purpose. 2. Avoiding unnecessary colors. 3. Using colors to differentiate between colors. 4. Using a different color to present the title. 5. Connecting related elements suing colors. 6. Coloring some symbols of words to facilitate the search for a particular topic. 7. Avoiding exaggeration in colorless use. 8. Using special colors for key words, another color for titles and a different color for notes. 9. Avoiding glaring colors. 10. Avoiding putting contrasting colors next the each other. 11. Considering variability in color between the background and other elements. 12. Avoiding the use of clear colors such as glaring red, blue in long texts. 13. Considering color blindness.
3	**Printed text:**
	1. Presenting a small number of words on each screen. 2. Avoiding long spacing in the text. 3. Using short lines. 4. Combining between text and images as text may be sometimes a part of the image. 5. Using a small number of words to increase the effect of images. 6. Sentences used must be connected. 7. Clarity in text presented. 8. Selecting the paper writing size using a polite study. 9. Avoiding exaggeration in differentiating the text as this may distract the learner. 10. Using proper procedures to differentiate titles and key words. These include mainly: - Using italics. - Using bold. - Using glaring colors. - Using underline. - Using brackets for important words. - Using shading. - Using distinguishing colors. - Putting the important phrases in frames. - Using a pose before important text. - Using audio stimuli in important texts.
4	**Illustrations and photographs:**
	1. Using unshared lines on maps, geometric drawings and abstract symbols. 2. Using discontinuous lines. 3. Using discontinuous line in some special cases "music notes." 4. Using shaded lined drawing to differentiate part or the drawing. 5. Using colors in drawing to indicate a particular "using red to indicate blood." 6. Using the third dimension of possibilities. 7. Using a map key. 8. Considering the natural percentages. 9. Using cartoons

	10. Similarity between the natural form and the illustrations presented to in the same form. 11. Avoiding the use of unnecessary images and drawings. 12. Using photographs for more reality. 13. Avoiding the use of filtered images. 14. Avoiding exaggeration in the photograph size 15. ,combining between linear and photographic images when teaching a new topic.
5	**Cartoons**
	1. Using cartoons to express moving or changing objects. 2. Using cartoons to present a process consisting of stages. 3. Expressing abstract concepts. 4. For stimulation and virtual reality environments. 5. Attracting the attention of the learner for the material presented. 6. To explain long situations that are hard to record using video. 7. To express situations that happened in the past and were not recorded. 8. Avoiding exaggerating in the use of colors inside the drawings. 9. Audio commentary is preferred on the content. 10. If the textual commentary is used, it is preferred to integrate it with the drawings. 11. Cartoons may be used as feedback. 12. If we wish to highlight an element, it is preferred to show it as a cartoon. 13. Three dimension drawings may be used. 14. Allowing students to repeat cartoons more than once.
6	**Video clips**
	1. To show skills and events depending on motion. 2. Attracting and motivating the learner. 3. Immediate feedback. 4. Not used in reinforcement. 5. Not exaggerating the use of video clips as they need large storage capacity. 6. Video clips must focus on moving, not stable, situations. 7. The right angle for shooting must be selected to show the learner the material appropriately. 8. Considering the resolution of the video clips 9. The camera movements must be natural 10. Avoiding promotion. 11. Eliminating small element hard to shoot. 12. The shooting must be related to the lesson content. 13. The filters are not preferable in camera as they change the natural resolution. 14. The learner must be allowed to change video clips. 15. If the motion is not important, still image are preferred.
7	**using vocal sound**:
	1. Sound is a main tool for attracting learners. 2. Sound is used to send explanatory messages. 3. Sound is used in the feedback. 4. Sound is used in reinforcement. 5. To comment on lessons. 6. Not exaggerating in the use of sound. 7. Clarity of race sound. 8. Correct and meaningful vocal language. 9. The sound must be related to what is shown on the screen. 10. It is not necessary to connect what is shown on the screen with a particular sound. 11. To motivate learners. 12. To add value for the cartoon elements. 13. 13. Avoiding the use of echo.
8	**Sound effects**
	1. Used in reinforcement to indicate correct and wrong answers. 2. Giving warning signs. 3. Convincing the learner about the learning environment. 4. Appropriate with the sounds used. 5. Not exaggerating in the use of sound effects. 6. They are quick stimuli.

	7. Natural sounds must accompany sound effects. 8. If the sound effects were accompanied by vocal commentary, the sound effects must be finer in tone than the vocal sound. 9. Echo is not preferred.
9	**Music use**
	1. .Music is used in reinforcement. 2. Music is may be used as a background for the learning situations. 3. When used as reinforcement, music must be limited to tow tones: one for the correct answer and the other for the wrong answer. 4. Music is used as a background to connect differently 5. Music must appear and disappear gradually. 6. It is preferred to use midi music files. 7. When reinforcement or something important appears on the screen the music must disappear. 8. Music may be used some as a part of the lesson "social studies, tourism others."
TOTAL	

Table 1 shows that the standards' list is grouped into several dimensions, each linked to multimedia a component; which confirms that they are comprehensive and integrated, and covers all the multimedia elements.

The list also included standards of the high degree of importance which confirmed previous studies. Thus, the list of standards to a high degree of importance and comprehensiveness, suitability for the application in assessing graphic design for multimedia in education. The majority of these standards are derived from the results of scientific research and reported on more than one search, and then the list of standards confirms from several experts.

6. Recommendation

- In light of previous results, the researchers recommend with the necessity of training teacher and designer during and after the vocational preparation in skills of design and evaluating educational software depending on the standards of graphic design for multimedia.
- E-courses will be evaluated in light of the standards of graphic design for multimedia to verify the efficiency and effectiveness in education.
- Taking into account the multimedia function of the educational performance In their cognitive, emotional and motor.

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