The Technology of Creating a 3D Systematic Methodological Guide to the Lessons of Literature

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ABSTRACT:A systematic review of the scientific literature in a specific area is important for identifying research questions, as well as for justifying future research in said area. This process is complex for beginners in scientific research, especially if you have not developed skills for searching and filtering information, and do not know which high-level databases are relevant in their field of study. The method proposed leads the researcher from "My" to "The" current state of the problem; we propose an adaptation of the method by Kitchen and Baca, which divides the process into three sub-parts: planning, conducting and reporting results. From the approach of the research problem in the preliminary phase research questions (recommended between 3 to 5) and refactor conceptual" is drawn; this last one gives originality to the method and facilitates the development of the thesaurus for searches and inclusion and exclusion criteria. Early research requires doing a basic systematic study to identify work done to review the literature in the area and, if any is found, to verify if those results yield an answer to our research questions. As part of planning the search process, general and specific inclusion and exclusion criteria were defined, along with some complementary inclusion and exclusion parameters. The method followed with rigor, returns to the researcher a list of impact journals in the study area, and a detail of articles that are related to each category of the research questions. A study case has been considered as a guide to expose each of the phases of the methodology in a practical way, with results that support the proposal.

I.INTRODUCTION

Multimedia is a combination of more than one media type such as text (alphabetic or numeric), symbols, images, pictures, audio, video, and animations usually with the aid of technology for the purpose of enhancing understanding or memorization. It supports verbal instruction with the use of static and dynamic images in form of visualization technology for better expression and comprehension. The hardware and software used for creating and running of multimedia applications is known as multimedia technology. Multimedia technology has some characteristics like integration, diversity, and interaction that enable people to communicate information or ideas with digital and print elements. The digital and print elements in this context refer to multimedia-based applications or tools used for the purpose of delivering information to people for better understanding of concepts.

Indeed, various aspects of human endeavors, especially the educational sector, are being transformed by the advent of Information and Communication Technology (ICT). ICT involves the use of hardware and software for the purpose of collecting, processing, storing, presenting, and sharing of information mostly in digital forms. Multimedia technology is an important aspect of ICT that deals with how information can be represented and presented digitally, using different media such as text, audio, video, among others. It involves the combination of several technologies provide information in the best possible formats, packages, and sizes.

However, when used in the classroom or for educational purposes, the design quality and sophistication of multimedia application must be high enough to combine the different elements of the cognitive processes so as to achieve the best mimicking of the teacher. There are different types of multimedia applications available in the market today. These applications have been deployed for different educational purposes such as the works deployed for Mathematics classes, Social Sciences, Sciences, Physiology, Physics and Physical Education Studies (Al-Hariri and Al-Hattami 2017; Anderson, 1993; Chen and Liu, 2008; Chen and Xia, 2012; Ilhan and Oruc, 2016; Jian-hua & Hong, 2012; Milovanovi et al., 2013; Shah and Khan, 2015).

The central problem, however, remains the same. Which is, the problem of how to use the applications to provide students with stimulating experience by delivering information for better understanding of concepts. While it is important to develop various applications for effective teaching delivery, each of these applications has its own focus area, peculiarities, target age, merits and demerits. Thus, the taxonomy and component synthesis for the development of the multimedia application need to be extensively investigated as these would affect the teaching delivery, learning and wider applicability. Some of the multimedia solutions have been deployed tested and recorded significant success, while some did not record marginal success.

The success stories also vary with location, target age and deployment purposes. Therefore, the aim of this paper is to provide a systematic review of the scientific published studies that examined different multimedia tools in the teaching and learning process with a view to identifying the existing multimedia-based tools, understanding their usage, application areas and impacts on education system. In order words, the study, through a systematic review of literature, aims at identifying the existing multimedia-based tools for teaching and learning; understanding their usage and limiting factors, application areas, evaluation methodologies, technology components synthesis and impacts on education system.

Teaching Methods

Method	Characteristics
Lecturing	Verbal transmission of knowledge and information to the children. Efficient use of time, but tendency for the children to become passive learners.
Discussion	Fostering shared thinking through discussion and debate with the aim of identifying and solving problems.
Q & A	Broadening and deepening of learning through format in which children respond to questions posed by the teacher. Need to put emphasis on eliciting questions from the children. Danger of excessive prompting by the teacher.
Presentation	Letting the children present feelings, opinions, or investigation results obtained through individual or small-group study.
Revision	Central focus on drills and revision exercises aimed mainly at ensuring that basic skills and elements of knowledge are thoroughly learned.
Experiments and Observations	Locates the basis of learning in direct, hands-on experience, acquired through experiments and observations.

To this end, the study is guided by the following research questions:
(1) What are the existing multimedia tools in teaching and learning?
(2) What type of multimedia component fits an audience?
(3) What types of multimedia components are adopted in the existing tools?
(4) What evaluation methodologies are useful for successful outcome?
(5) What factors aid success or failure in the use of multimedia tools for teaching and learning?

The outcome of this study is aimed at serving as a guide for teachers and education administrators while selecting multimedia tools and applications for teaching in schools. So, in this study, the taxonomy and component synthesis of some widely cited multimedia applications are provided. Various case studies and results are examined. Furthermore, barriers limiting the usage of ICT and multimedia in teaching and learning are identified; and some unresolved cases and future research decisions are outlined.

The subsequent parts of this paper include Section 2, which is the literature review that examines multimedia technology and its place in teaching and learning; Section 3, the research methodology; Section 4, presentation of results; Section 5, discussion of the findings; and Section 6, the conclusion, recommendations and suggestions for future work.

II. MATERIALS AND METHODS

Multimedia or digital learning resources assist learners to get on well with mental representations with the use of different media elements, which support information processing. Information, which is made up of content and sometimes learning activities, presented with the use of the combination of text, image, video and audio by digital learning resources. It has been demonstrated, by research on using multimedia for learning, that there are more positive results observed in learners who combine picture and words than those who use words only (Chen and Liu, 2008; Mayer, 2008). As stated in Eady and Lockyer (2013), different pedagogy methods were implemented by the use of digital resources. Their paper presented how the authors were able to introduce topics to students, demonstrate to them, stimulate a group, make different text types available and engage students in an interactive manner.

Generally speaking, multimedia technology for educational purposes can be categorized according to whether they are used for teaching or for learning. Some of the different multimedia or digital learning resources are listed in Eady and Furthermore, according to Guan et al, several studies have established the importance of multimedia technologies to education and the widespread adoption of multimedia tools. Multimedia generally involves the use of technology and the widespread adoption of multimedia applications in education is as a result of its many benefits. Some of the benefits of the multimedia application tools for teaching and learning are summarized as follows:

(1)Ability to turn abstract concepts into concrete contents

(2) Ability to presents large volumes of information within a limited time with less effort

(3) Ability to stimulates students' interest in learning

(4)Provides teacher with the ability to know students position in learning. Multimedia designed for learning refers to the process of building mental representation from words and pictures in different contexts. They are designed to assist learning with tools which can be used in presentations, class room or laboratory learning, simulations, e-learning, computer games, and virtual reality, thereby allowing learners to process information both in verbal and pictorial forms. Multimedia designed for learning requires understanding of some theories such as cognitive theory of multimedia learning, which postulates three assumptions that describe how people learn from instructional multimedia materials. These assumptions can be phrased as dual-channel, limited capacity, and active processing.

Dual-channel assumes that learners have many channels to separate visual and auditory information. The restricted/limited capacity assumes that there is a limit to the load of data that can be processed in each channel. Understanding these will allow teachers not overwhelming learners with much information. On the other hand, learners will be aware of their information processing limitations or capabilities. Active processing proposes that when it comes to information selection, organization, and integration, human beings are active agents and are capable of managing the forms of information they are interacting with.

The appropriate use of ICT in teaching transforms the learning environment from teacher-cent red to learner-cent red just as it is transforming all aspects of human life. Coleman et al., emphasized that the shifting from teaching to learning creates a student-cent red learning where teachers are there as facilitators and not sages on the stages, thus changing the role of the teacher from knowledge transmitter to that of a facilitator, knowledge navigator and a co-learner. Keen we et al., concluded that the application of multi-media technologies ensures a very productive, interesting, motivating, interactive and quality delivery of classroom instruction while addressing diverse learners' needs.

2.2. Role of multimedia technology in teaching and learning

Technology is evolving and scholars in the areas of Information Technology (IT) and education technology are continuing to study how multimedia technologies can be harnessed for the enhancement of teaching and learning. A software tool can be used to expand teaching and learning in various fields. It is important to provide students with practical experience in most fields of learning.

The importance of multimedia technologies and applications in education as a teaching or learning tool cannot be over emphasized. Multimedia communication has close similarities to face-to-face communications. It is less restricted than text and ensures better understanding. Multimedia technology helps simplify abstract content, allows for differences from individuals and allows for coordination of diverse representation with a different perspective. The use of the computer-based technique as an interface between students and what they are learning with suitable fonts and design can be very valuable.

Certainly, multimedia technology brings about improvement in teaching and learning, however, there are a number of limitations in this technology for educational purposes. Some of these limitations include unfriendly programming or user interface, limited resources, lack of required knowledge and skill, limited time and high cost of maintenance among.

2.3. Multimedia evaluation techniques

Evaluation entails assessing whether a multimedia programme fulfils the purposes set including being useful for its target audience. Kennedy and Judd make the point that developers of multimedia tools have expectations about the way they will be used which could be functional (focused on the interface) or educational (involving the learning designs, processes and outcomes). It is important to note that there are different methods used in the evaluation of multimedia and most evaluations entail experiments, comparisons and surveys.

III. CONCLUSION

The primary goal is to balance assessment validity with efficiency of the evaluation process.

Survey research has two common key features – questionnaires (or interviews) and sampling, and is ideally suited for collecting data from a population that is too large to observe directly and is economical in terms of researcher time, cost and effort when compared to experimental research. However, survey research is subject to biases from the questionnaire design and sampling including non-response, social desirability and recall and may not allow researchers to have an in-depth understanding of the underlying reasons for respondent behaviour.

Generally, comparison studies follow the format of comparing outcome from an experimental group using the multimedia being evaluated against a control group. This method has been criticized for having inadequate treatment definition, not specifying all treatment dimensions and failure to measure treatment implementation, among others.

Faced with the subjective nature of surveys and the limitations from comparison studies, eye tracking and other student behavior such as emotional response, provides information not consciously controlled by the student or researcher and is used as an objective data gathering technique. Eye tracking research is a multi-disciplinary field that tracks eye movements in response to visual stimuli. Data from eye-tracking allows researchers to validate empirically and objectively, how learners comprehend the multimedia content, the attention of the learner while analyzing the multimedia content, and the cognitive demand of the content. Eye tracking is quite interesting as it provides a useful source of information in the case of children. This is because gathering information using the traditional techniques is more difficult especially when it involves children's interests and preferences.

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