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## **Framework for Evaluating Authoring Tools used in the Development of E-learning Platforms for University Education.**

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### **ABSTRACT**

Different types of technological tools have been developed to cater for diverse backgrounds and demands of learners in the universities. One of fundamental technological innovations in higher learning institutions is e-learning. There are quite several authoring tools for creating and presenting e-learning content on the World Wide Web. The widespread deployment, evolution and emerging of information technology especially in the area of e-learning, the demand for authoring tools is inconsistent. The choice of a suitable authoring tool is becoming a challenge in the industry, especially in producing a satisfactory environment for e-learning. A developer can quickly identify the key features and components of each tool from a framework. This paper describes the evaluation of authoring tools using a framework which should be an efficient and accommodative method to a developer in choosing a suitable tool to author a standard e-learning platform for university education.

**Key words:** *Authoring tools, Evolution, E-learning, Framework, Learning platforms, Standard, Word Wide Web.*

## 1. Introduction.

The use of Information and Communication Technologies (ICT) for educational purposes has increased and the spread of network technologies has caused e-learning practices to evolve significantly. In recent times, there have been advances in the development of social software technology in particular in the field of education. Blended learning strategies and software can optimize the integration of multi-modal, multi-channel and multi-source learning which includes online and traditional learning. E-Learning approach is becoming an important tool to allow the flexibility and quality requested by such a kind of learning process [9].

Blended learning strategies and software helps learners develop and improve their learning autonomy, self-manage their learning style, lifestyle and work style. Such software applications are generally developed on web 2.0 tools, for example m-learning applications, twitter, YouTube, slide share, Picasa, media wiki, etc. Authoring tools provide a good start for defining and translating to Learning Management Systems (LMS) adaptation issues. [6] Staying on top of the changes to existing tools as well as to those on new tools is challenging but fun. Ganci Joe find it remarkable that certain tool vendors seem to assume that they know what developers need without really asking their intended user base, though others vendors seem to really know what they are doing. Other tool like power point add-ins tools has survived in development of e-learning resources and in some cases thrived because they meet the need of a certain segment of the developer user base [6]

There is no widely accepted single method to evaluate authoring tools in terms of effectiveness and efficiency. In some cases, It is difficult to decide which authoring tool to choose towards learning objectives and use because there are various authoring. When considering diversity of authoring tools and evaluation methods, the criteria for evaluating usability properties is imperative. Authoring tool adhering to international standards can be used to create learning object which can be used by E-learning systems and also help in sharing learning objects [10].

The rest of the paper is organized as follow; related work, the methodology used, framework requirements, stages of the framework development, developed framework, validation and evaluation of the framework and conclusion.

## 11. Related work.

### E-learning.

E-learning system, is expressed as an integrated use of new multimedia and internet technologies to increase access to education and improve the quality of learning through a facilitated resources sharing and services within a remotely improved collaboration in a virtual environment [5]. The instructional content or learning experiences delivered or enabled by electronic technologies and it incorporates a wide variety of learning strategies and technologies. E-learning ranges from the way students use e-mail and accessing course work online while following a course on campus to programmes offered entirely online. It is thus an alternative solution, which enlarges accessibility to training and becomes essential to complement the traditional way of teaching. Therefore, this considers e-learning as the use Learning Management Systems that enable the management of

educational resources and the communication between students and teachers during a learning process. [5]

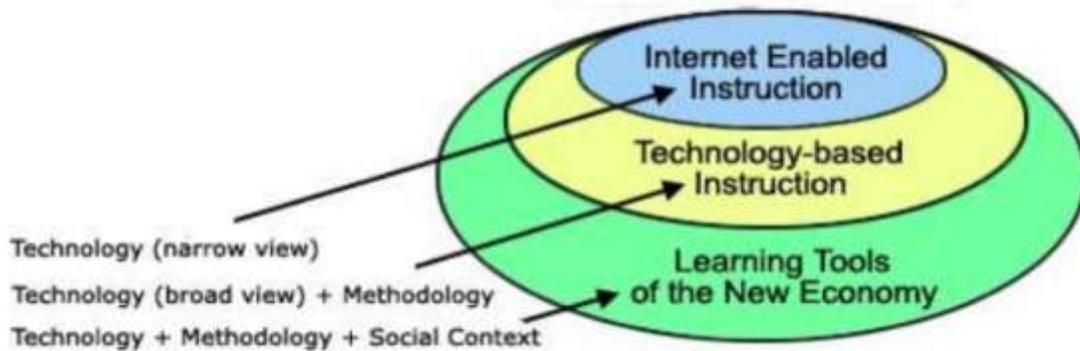


Fig 1. Conceptual view of e-learning.

The figure above, explains e-learning in different forms, focus narrowly on technology view, others expanded by considering technology and the methodological viewpoint. The last category of e-learning understanding includes the social context in which e-learning is integrated [5]

[12] A beginner on approaching various e-learning sites is overwhelmed by the information available. To manage this information, to sift the relevant parts and then to comprehend and digest the information requires the support of an experienced lecturer hence calling for a standard platforms for university education [12]

### **Authoring Tools.**

Authoring is integrating different digital media elements such as text, graphic, sound, animation and video into a coherent interactive application in a computer to convey a message or information [3]. Authoring tools allows the user or author to perform the authoring process. Digital media elements that are stored separately can be brought together through this software through sequencing and synchronization into a seamless application, and finally delivered to the target audience through storage media [3].

Authoring tools are used to develop e-learning systems however there are a number of things a developer must be familiar with regarding e-learning before selecting the correct tool [4]. Several major factors should be taken into account to choose the appropriate content authoring tool; objectives and delivery method, media, interactivity, interoperability and standards, content longevity, skills, time and cost. When we imagine e-learning authoring tools as simply as programs designed to output files for consumption, it's important to envision a spectrum of different program capabilities. Some e-learning authoring tools are extremely difficult to use, yet are so versatile and robust that they allow for the creation of simulations (aircraft, trucking) and game elements for the purpose of training. Other tools are quite easy to pick up, but are merely designed to display information. This same balance exists within commercially available e-learning authoring tools, like Adobe Captivate, Articulate Storyline and Lectora, which are software programs designed, specifically, for online course development and the creation of e-learning modules for training and education purposes [4].

### **Comparison of e-learning development tools.**

Always, there is no right answer for all [6]. The key metrics are ease of use, expected output and budget. All the three authoring products have their upsides and downsides. Storyline, for one, is easy to learn but it lacks the bells and whistles of Captivate or Lectora. Articulate seems to be a great choice for creating nice-looking basics. Lectora is the way to go if your ambition and imagination know no bounds, e-Learning nerds will love the ability to tweak and tune here. However, you can't help being sticker-shocked every time you check out the Tri-

vantis website. Adobe Captivate is suitable for budget-savvy content developers, yet getting started with it is not that fast and may result in a frustrating experience [6]

Table 1

Features	Articulate Story-line 2	Adobe Captivate 9	Trivantis Lectora 16	Articulate studio' 13
<b>Content authoring</b>				
Audio/video editing	5	4	3	5
Screen capturing /screencasting	5	4	4	4
Level of interaction/collaboration	5	4	5	4
Quizzes/surveys/assessments	4	3	5	5
Software simulations	5	5	5	5
Navigation	3	3	4	5
<b>Publishing</b>				
HTML5 publishing quality	3	5	5	4
Flash publishing quality	4	4	5	4
Publishing to MP4 /YouTube	NO	5	4	5
<b>Mobile support</b>				
Tailored to mobile device players	No	Yes	Yes	Yes
Mobile app viewer	5	No	5	4
<b>LMS compliance</b>				
Third party LMS support	5	5	5	5
Integration with proprietary LMS	5	5	5	5
Price	\$1,398	\$1,099	\$2,374	?

Winstead (2016) rating; 1 is the lowest and 5 is the highest rate.

## **State of e-learning development tools.**

Many vendors are moving away from desktop-based authoring applications since they cannot be used collaboratively and others are retaining desktop-based versions as an option. Desktop-based applications generally perform better than their web-based cousins and have more features. Some desktop tools for example those with features like video editing tools do not have web counterparts due performance requirements. Examples of these tools include Captivate, Content Publisher, Course Builder, Course Lab-Learning Suite, Expert Author, iSpring, Learning Suite and Lectora Inspire[6]

## **11.1. Methodology**

A descriptive field study surveys using questionnaires was undertaken to establish the requirements of an authoring tools framework.

### **Sampling Population and Sample Size**

The survey was carried out and interviews conducted using questionnaires which were distributed to the respondents. The research used stratified research method of grouping [7]. The target population was clustered into one category namely stratified population. ICT students' population target of 503 and IT staff a population target of 120. This research targets namely; ICT students was a sample size of 116 and IT staff with sample size of 28. In order to control biasness and impartiality, this study utilized controls for differences in level of skills, level of expertise and tool preference which may affect authoring tools usage. At least 30% of the accessible population is enough for the sample size [7]. Using the formula used to get the sample size as adopted [7].

### **Sampling Method and Data analysis.**

The questionnaires were collected both from the ICT students and ICT Staffs, each questions were analyzed separately according to the objectives, even respondents had little knowledge on the e-learning tools, most of the objectives were achieved, and each question was analyzed using a chart which the draw conclusion of the targeted objective.

### **Framework development**

The framework was built based on the information obtained in the literature review and the interview/survey findings which is already documented. The framework identifies the features, benefits and depicts several inclusions within the framework.

### **Stage of framework development.**

The findings consists of both the field research and information obtained online on an individual tools. These findings are summarized in comprehensive tables which are arranged according to authoring tool in the following format; Features of the authoring tool; Programming skill/ Level of prerequisite knowledge, Level of Support available, degree of interoperability, Collaboration/communication tools, Monitoring tool, Usability, Content, Availability Open source/ free tool, Versions available.

#### IV. Results and Discussions

A smart art tool was used to create the framework which incorporated all the components extensively discussed. The table below shows all components and their corresponding features of the tools. Using the framework one can easily and quickly identify a tool with the features of choice.

#### E-learning tools comparison.

Table 2

	Authoring tools			
Features/functionality	Articulate Presenter	Claro	Articulate storyline	Composca
Level of Programming skill.	No programming required	Moderate Usability, some degree of previous experience required.	Moderate	
Level of support	Template, Animation, online, multimedia, mobile support, simulation		Mobile support, template	Multimedia, multi-lingual,
Interoperability	Ability to incorporate media across a number of different software programmes in the Suite. -Text images sound and video also embedded in the programme.		Different Software, browsers.	Ability to incorporate media across a number of software. Text images sound and video.
Collaboration/communication	Branching, collaboration	Moderate collaboration	Less power of collaboration	High level, social center state of art,
Monitoring and evaluation	Provide feedback, quiz, assessment	Assessment, quiz		Grading, feedback, quiz, Powerful assessment.
Usability	Ease to use			Moderate to use
Content	Longevity, re-usable	Less navigation, content edit	Content re-usability, content edit	Re-usable
Availability	On cost, free trial			On cost, free-trial

The above tables shows a comparison of authoring tools, an e-learning developer can use the framework in guide with the tables to come up with a suitable tools depending with the kind of platform intended.

### The developed framework.

The framework contains some key components which are further elaborated for the user to understand well. The components includes; Level programming skills, Level of support, Interopability, Monitoring and evaluation, Usability, Content and Reliability. Each component has its features stated in the framework.

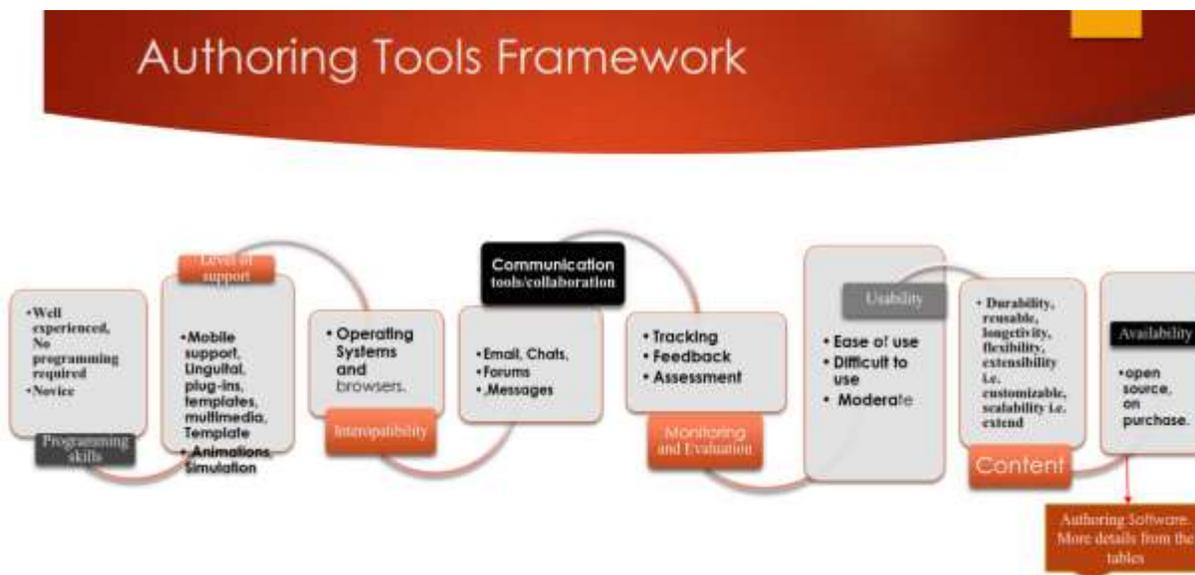


Fig 2.Developed authoring tool framework.

### Validation and Evaluation of the framework.

In order to validate the framework, it is quite imperative to determine whether the framework captures the e-learning developers' requirements and quality attributes or deliver the intended outcome as specified in the requirements, it was necessary to compare with other frameworks discussed in the literature review.[1] provides comprehensive tables showing functionalities and properties of each authoring tool, the features are provided after every component stated, this helps the user to compare the tools with the framework components which in line guides the user in choosing the authoring tools according to his needs.[3] makes a clear comparison using tables of the tools in the format of their content features and functionalities and distinguish in either a desktop or a web based tools, the user will compare the authoring tools features and make a conclusion on the suitable tools to choose.[2]provides an authoring tools content showing its properties of the tools which guides the user in choosing the tools. Therefore, by adopting the same procedures used by other authors, it shows a vivid significant approach in the authoring tools framework validation.

After the framework and tables were developed, it was necessary to evaluate them in order to confirm if they meet the objectives. The main aim of the framework was to aid the user when choosing an authoring tool. The requirement was to develop a flexible framework which is expressed in diagrammatic structure and was highly achieved. Ambiguous language was avoided when completing the framework and tables. The e-learners developer should have sufficient knowledge to understand the terminologies used. The components and features are clearly shown in the framework in bold text which guides the user to go back to the tables for a more comprehensive list of features and functionalities which provides extensive comparison of the authoring tools.

In order to evaluate the effectiveness of the framework in meeting the objectives, user participation was necessary. Participants in the evaluation were presented with the tables and the framework developed, depending on the degree of experience and knowledge of the developer. The following are some of the views that were raised from the evaluation process.

- The tables are very comprehensive and provide an elaborative insight into each authoring tool, hence the information available on these tables are useful but when making the final decision between the recommended tools further guidance is required.
- The diagrammatic representation is visually attractive and easy to use and follow and provide adequate information to make a quick decision if needed.
- The tables contains an abundance of information which may be over whelming for some e-leaners developers. The presence of a wide range of text can sometimes overwhelm the user however, the dramatic framework available is a positive addition.
- A number of respondents would like to use the authoring tool framework when it comes to choosing tools for developing e-learning resources, which was one of the key objective.

A quite positive respond was impressed regarding the tables, the framework and its use, ideally it would be better to further use and test the framework for a longer duration with many authoring tools, however with the constraints this was not possible.

## **V. Conclusion.**

This paper has provided a way forward on how to evaluate the suitability of authoring tools used in the development of e-learning platforms. Majority of the objectives have been achieved throughout the course of this thesis. The authoring tools and the related literature review were clearly identified in the literature review thus achieving the objective.

A procedure which defines what a suitable authoring tool should contain was also developed through both the tables and the frameworks containing the key components was also achieved. The tables provide a comprehensive summary of the tools showing the features and functionalities, whereas the framework is more specific and brief to allow for quick comparison. An extensive survey was conducted into what an e-learning developer deems a suitable tool. The results of the interviews and surveys provides a base for the main objective which was to develop a framework for evaluating authoring tools. The framework must be able to be understood by the e-learning developer when deciding on what tool to use and provide a fast method of evaluating and selecting a tool. This objective was well achieved resulting to creating tables and authoring tool framework. The evaluation feedback shows that the framework gives a positive remarks which will aid the authors in making the choice of authoring tool. Always, there is no right answer for all [6].The key metrics are ease of use, expected output and budget [6]

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