

# ELECTRONIC EDUCATION SYSTEM MODEL-2

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## ABSTRACT

In this study we presented new EES Model-2 extended from EES model for more productive implementation in e-learning process design and modelling in higher education. The most updates were related to uppermost Instructional layer. We updated learning processes object of the layer for adaptation of educational process for young and old people, taking into account interests and abilities of students of the different age groups. Important added objects of the uppermost layer are cultural diversity and language. We updated communication object of the Instructional layer and added human and social factor. The methods of study of Instructional layer were updated with selective object “religion”. We added to E-paradigm layer an object “combination” that explains by combination of synchronous and asynchronous objects.

Our study has high significance for increase of quality of e-learning in higher education in specific cases. We strongly recommend application of this updated EES Model-2 to support high educational standards of higher education and provide rights of students with different needs and abilities.

## KEYWORDS

EES model, EES Model-2, higher education, e-learning

## 1. INTRODUCTION

Because enabling technologies present many opportunities as well as challenges in the realizing of electronic learning (e-learning), it is imperative that educators and institutions planning to embark on the development of e-learning systems, have a clear and accurate understanding of the capabilities, limitations and influences of these technologies (Cloete, 2000). Creative approaches and competent strategies to manage these limitations at the instructional design, the user levels as well as integration to other systems, need to be established and understood in order to ensure a degree of quality comparable to that of traditional learning. Without the integration of well-established methods and techniques, many of the e-learning efforts may be futile, leaving frustrated facilitators and badly educated students in their make (Cloete, 1999, 2001).

The creation of an e-learning system needs to have a model. The first generation of e-learning system was to manage and measure the learning process, display some kind of learning objects but they didn't deal with reusability and organization. These were the Learning Management System. The second generation electronic learning systems, based on Ismail (2002), has to be able to manage searchable, reusable and platform-independent learning objects. Cloete (2001) has improved the system and developed a layered model for second-generation e-learning systems: Electronic Education System (EES) Model. The aim of the model is to assist the designers of different e-learning settings to plan and implement a specific learning situation, with the focus on the individual requirements and milieu of the learning group (Cloete, 2001). The multilevel EES model contains four layers (Fig. 1, Cloete, 2001).

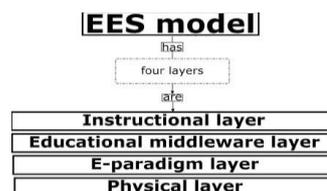


Figure 1. Four-tier model for Electronic Education System (modified after Cloete, 2001)

These layers are strictly separated in their functions and each layer uses the services of the lower level layers (Dulai et al, 2013). The strategic development of e-learning can be carried out either on top-down or bottom-up manner, or as combination of both (Gullu et al, 2014). These approaches were implemented by many universities. Their target is application of the potential of e-learning to enhance teaching and learning. In addition, staff training is seen as essential to successful e-learning but flexible support structures and mechanisms are seen as even more important (MacKeogh and Fox, 2009; Drlik and Skalka, 2011).

The need to update existing EES model raised from the modern issues influenced on educational process in our society. We explored that diversities of age, religion, language, culture are making significant influence on educational process of current generation of students. According to number of studies based on personal interviews and detailed research we found that current students can be older, more religious and with strongly marked commitments to language, culture and nationality (e.g. Stolzenberg et al, 1995; Myers, 1996; Sherkat, 1998; Sherkat, 2007; Terry and Irving, 2010; Cavazos, 2015).

In this study we extended the EES model, explaining in details each layer, and presented new EES Model-2 taking into account described issues.

## **2. EES MODEL-2 STRUCTURE**

The basis for extended EES Model-2 is EES model developed by Cloete (2001). This is a model where can be implemented a top-down and a bottom-up algorithm approaches to design of a strategic model for a particular e-learning situation. Cloete (2001) described in detail implementation of these approaches and basic design of the EES model. In this study we updated some layers adding new elements into the EES Model-2 and described them in detail.

### **2.1 Instructional Layer (Uppermost)**

The purpose of the instructional layer is to serve as a window between the learning process and the underlying strategies necessary to establish the learning environment. The instructional layer is composed of various objects, each containing one or more methods (Cloete, 2001). In our EES Model-2 the Instructional layer consists of intermediate elements, Learning process and Learning environment strategies, and main objects (Fig. 2). The Learning process can be adopted for young and old people, who have different needs and ways for study. The main objects are containing different methods of study (by watching, reading, discovering, observing, listening, doing and cooperative learning). We added religion into the methods of instructional layer as an important object, which can strongly motivate students for seeking of knowledge in countries where religion has big importance (i.e. Turkey, Arabic countries, Malaysia and Indonesia). This element is mentioned as selective due to its specific implementation.

The main object element contains of communication objects and objects of content. The communication objects describe differences of students by social and human factors. Human factor means that every person is individual and specific approaches can be implemented for different persons. We found that social factor is important element in Turkey. Turkish people are very sensitive for social status of different persons and respective environment must be applied in such cases.

Objects of content describes cultural and language differences. We analysed cultural and linguistic situations in Estonia and Turkey and found that these elements have high importance for e-learning. Implementation of cultural element and language preferences of different groups of students into the e-learning environment will increase interest for education and motivate students of different cultural and linguistic societies for study.

### **2.2 Educational Layer (Middleware)**

The educational middleware layer provides services for a reliable and effective learning environment (Cloete, 2001). It contains (1) user authentication, (2) assignment, (3) course enrollments and (4) testing services.

### **2.3 E-paradigm Layer**

The objective of the e-paradigm layer is to provide an electronic learning paradigm composed of technological strategies possible in electronic learning. The objects found on this layer form the basis of the specific learning situation. They often prescribe which objects from upper layers may be suitable for selection (Cloete, 2001). The E-paradigm layer 2 represented by “Possible technological strategies” (synchronous, asynchronous and combination). The synchronous and asynchronous objects are commonly identified on the e-paradigm layer. In synchronous learning environments geographically dispersed, students and lecturers share a virtual classroom within the same physical time frame. Examples include remote lecture rooms with video conferencing, or students attending real-time lectures from home. The asynchronous object is characterised by its being independent of location, time, and learning speed of the learner. A typical example is that of the learner who prefers to study at his/her own pace and time. The number of methods for objects on this layer is limited, and is realised on other levels. For example, selection of the asynchronous object will have a direct influence on the methods of the course distribution object found on the educational middleware layer. Methods may be through web downloads or precompiled CDs while in the synchronous environment, e-books and on-line material may be more relevant (Cloete, 2001). In our EES Model-2 we added to this layer an object “combination” that explains by combination of synchronous and asynchronous objects. An example is that learner who has unstable time schedule on his job has opportunity to choose and combine between two main ways of study: synchronous (to study in the same time frame with lectures attending real-time lectures) and asynchronous (to be independent of location, time and speed of the learning process).

### **2.4 Physical Layer (Bottom)**

The physical layer provides for the transparent transmission of messages (which may be course communication, course material or course directives) between students and lecturers tied together in an e-learning scenario. The physical layer includes the specification of hardware and software technology objects necessary to accomplish e-learning. The number of methods included in these objects is usually limited to one but may sometimes extend to two. For example, an object on this layer may be an Internet connection. The methods of the Internet connection object describe the prerequisite hardware and software strategies necessary to accomplish an Internet connection. The Physical layer of the EES model was extended in the EES Model-2 to: “Government purchased devices” (e.g. laptops, tablets), “BYOD” (Bring Your Own Device, multiplatform, single platform), “computer laboratories”.

### **2.5 Evaluation Plane**

An evaluation plane stretches across the top two layers. This plane performs evaluation functions related to these two layers as a whole. The purpose of the evaluation layer is to determine whether or not the methods selected from the instructional layer and from the educational middleware layer are accomplishing the established goals and objectives. The evaluation plane is divided into a summative evaluation sub-plane and a formative evaluation sub-plane. Formative evaluation is typically conducted during the lifetime of a process, whereas summative evaluation is conducted at the end, or after the lifetime of a process (Wills 1995; Cloete 2001). In an e-learning system, one may for example choose to do both types of evaluation and must then include objects from both sub-planes, or one can include only one type of evaluation, analysing one's learning situation through various methods (from selected objects) as found in that particular sub-plane. More detailed description of evaluation plane can be found in Cloete (2001).

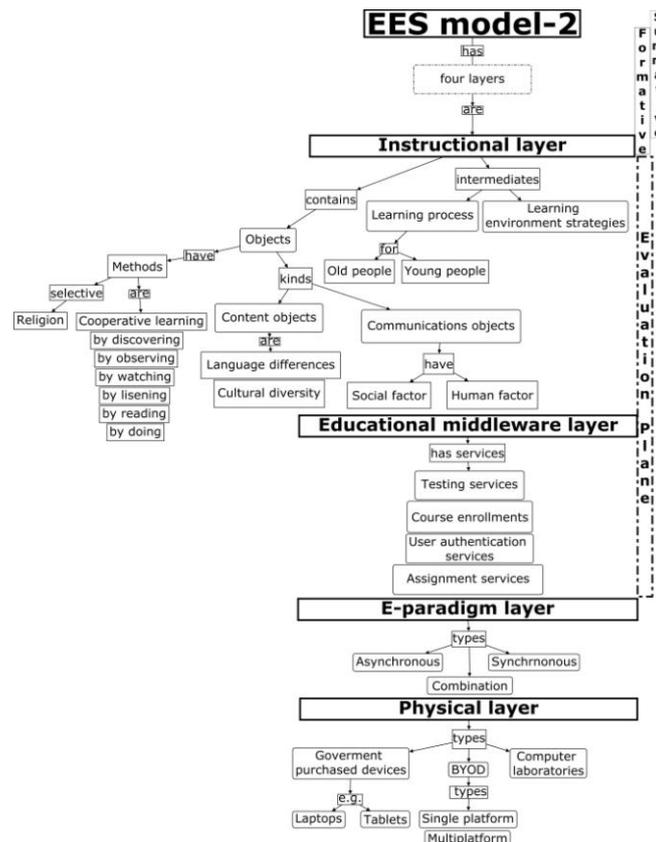


Figure 2. Electronic Education System Model-2

### 3. DISCUSSION

The Cloet’s (2001) EES model was updated and extended in this study (EES Model-2). We found that several factors, such as student’s age, differences of students by social-cultural and human factors, language differences and religion were not included into EES model. According to many studies in the field (e.g. Sherkat, 2007; Terry and Irving, 2010; Cavazos, 2015), nowadays these issues are very actuals in modern society and have significant influence to education and higher education in particular. Thus we added them into the EES Model-2. This updates are important for further studies related to e-learning process modelling.

The most updates were related to uppermost Instructional layer. First we updated Learning processes object of the layer taking into account interests of students of the different age groups. For example, older people are more conservative in implementation of new technologies into to their life and need more time for adaptation to the new environment.

Other important objects of the uppermost layer are cultural diversity and language differences. Cultural preferences must be taking into account during e-learning process design. In Turkey customs are very important part of life of young people and can be used to design more productive educational process. For example, respect of old people and teachers is still common in this country.

It was found that language differences factor is very important and sensitive for young and old students in both countries, Turkey and Estonia, which are very different. Thus, we highly recommend apply this object in e-learning design.

Next updates were related to communication object of the Instructional layer. We added human and social factors to be implemented in e-learning modelling in the part of communication specifications. Human factor contains individual specific needs of every student. Taking into account this factor the efficiency of the e-learning can be increased. For example some students can be more familiar with some objects of study, other need more time for explanation. Or some students are very flexible for change of software environment

and other needs more time to adopt. The social factor is important element in Turkey. Turkish people are very sensitive for social status of different persons. It is not a rule in Turkey, but, for example, we found it very often that young people grouping into clusters by social status and don't allow access this groups for the people of lower social class, as people came from villages or from families with low income. In such situations, to support more effective education, it is recommended to provide different virtual classes for such students.

We added religion into the methods of study of instructional layer. This element is mentioned as selective due to its specific implementation. Religion can strongly motivate students for seeking of knowledge in countries where religion has big importance. Islamic religion prescribes and motivates all age people to learn and discover the world in all the ways. This factor has absolutely importance in such Islamic countries as, i.e., Turkey, all Arabic countries, Malaysia, Indonesia, some African countries, etc. From the other side some authors (e.g. Sherkat, 2007) found that there is a fundamentalist Christianity problem in our society, in American society in particular. According to this study, young sectarian and fundamentalist Christians often have difficulty dealing with environments. E-learning will ease educational process in this particular case. Anyway, e-learning system model have to take into account this factor for societies, where this problem exist. This issue is case specific and preliminary explorations must be provided in each particular study.

Our study has high significance for increase of quality of e-learning in higher education in specific cases. We strongly recommend application of this updated EES Model-2 to support high educational standards of higher education and provide rights of students with different needs and abilities. The new developed EES Model-2 will be used for our future work to enhance quality of e-learning in higher education in particular countries (like Turkey), as well as in the field of study in general.

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