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Use of digital e-learning technologies through the application of the SAM instructional design model in online medical education

Dan Alexandru SZABO[1, 2*]

1. Department of Human Movement Sciences, George Emil Palade University of Medicine, Pharmacy, Science, and Technology, Romania, Address: Str. Gheorghe Marinescu, No. 38, C.P. 540139, Târgu Mureș, Romania, e-mail: dan-alexandru.szabo@umfst.ro
2. Department ME1—Faculty of Medicine in English, George Emil Palade University of Medicine, Pharmacy, Science, and Technology, Romania, Address: Str. Gheorghe Marinescu, No. 38, C.P. 540139, Târgu Mureș, Romania, e-mail: dan-alexandru.szabo@umfst.ro

* *Corresponding author*

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Abstract: Several instructional design behaviors are carried out by department operatives in higher teaching who lack formal learning theories and instructional science training. Teachers primarily use multimedia to deliver lectures in the form of power-point presentations. Even though there is a wealth of literature on using the program correctly, there are still some instances where the output is subpar. The application of digital technology in medical education is now regarded as a critical component of learning resources. The SAM method is defined as approximating an appropriate attention model successively. The first stage, evaluation, is divided into four sections: analysis, objectives, goals, and results. Design components are interaction, equivalence, technological options, appearance, and quality. The final stage is development, in which the objects and processes of design composition, development, and improvement are integrated.

Keywords: SAM model, instructional design, digitalisation, digital technology, medical education

Introduction

Scientific technology and digitalisation have a tremendous impact on increasing labour efficiency and productivity in almost every field of modern times, from agriculture to health services and innovation. They have proven to be an effective tool for making human life better and easier (Knopes, 2019; Li, 2018). The

expansion of e-learning globally depends on technology-enhanced active learning tools and e-learning options, and their role in health education cannot be ignored (O'Doherty et al., 2018; Masic, 2008).

The use of digital technology in medical education is now considered to be a crucial aspect of learning resources (Barteita et al., 2020). It increases the understanding of the subject, but it also prepares students to deal with real-life scenarios more practically (Vahideh and Mohammad, 2011). The 2019 Coravavirus Pandemic (COVID-19) calls for virtual classrooms to stimulate creative thinking and problem-solving. The existing digital platform has made it possible to communicate with students with a lower barrier. Online teaching has proven to be a method that has challenged our traditional approach (Newman and Beetham, 2007).

Instructional design has been described in several ways, but it is designed to solve instructional problems based on systematic analysis. Given the above, instructional design refers to developing plans based on principles that have been successful in the past, which brings benefits in the future. It helps choose the best possible decision (Kirsh, 2003).

In higher instruction, numerous directions plan exercises are carried out by workforce individuals who have no formal preparation in learning speculations or directions science. Learning theories serves as the foundation for selecting training strategies and accurately predicting their effectiveness. Instructional design models are utilised to direct the improvement of guidelines and plan methodologies that lead to proper cognitive forms to attain viable learning results (Khalil and Elkhider, 2016; Cheung, 2016). Teachers use multimedia mainly to give lectures in the form of power-point presentations. Abundant literature provides instructions on how to use the program properly, but there are still some cases where the production is poor. This preparation should give all learners an ideal and steady learning encounter. This preparation may be unstructured, casual, variable among understudies, or fragmented if not well outlined (van der Heijden and Bem, 1997).

This paper aims to analyse the volume of the material taught, the quality of transmitting the digital e-learning knowledge presented by the teacher, and the perception and applicability of receiving the information. Finally, the concrete aim is to pursue online education's positive and negative effects on medical training.

Materials and Methods

SAM Model

The SAM method is defined as a method of successive approximations to an appropriate attention model. Everyone knows the phenomena summarised by attention: concentration, focus, limitation, selection and intensification. Problems arise quickly in terms of what needs to be explained and the style of explanation. We can list the issues of lack of adequate focus, repetition of words, ideas several times, and low concentration (Mason and Strike, 2003).

The SAM model is divided into three main areas: evaluation, design, and development (Figure 1). The first stage, the evaluation, consists of four sub-branches: the analysis, objectives, goals, and results. During this stage, specific

essential points need to be considered, such as the target audience, skills, learning needs, doing, understanding, knowing, learning context, and type of delivery. The design consists of interaction, equivalence, technological choices, appearance, and quality. The last stage is the development, in which the objects and the processes of composition, development, and improvement of the design are integrated (Wickstrom et al., 2000).

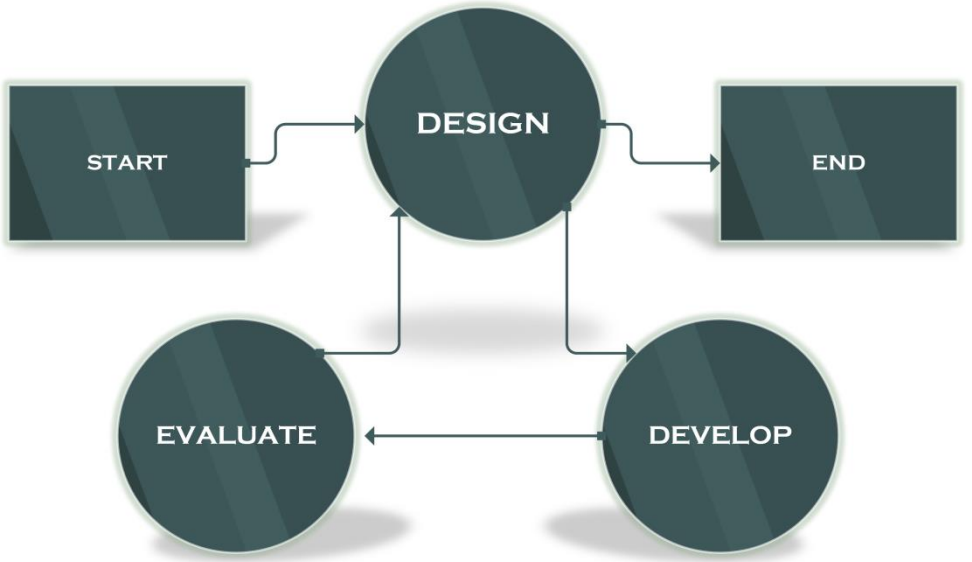

Figure 1. *SAM* instructional design model

As we go through the SAM analysis, we need to answer the following questions: Who is the target audience? What is their level of training? What are the learning needs/requirements?. In our case, the target audience is the students, so we need to analyse what they need and what they need to do to understand the course. At the same time, we need to pay attention to what they can apply after the course procedures or not the learning method was adequate learning context, and how the information is transmitted. These questions are part of the assessment part of the SAM method. To integrate them into the analysis, we must receive all eligible answers, reaching the necessary points for resolution (Levinson, 2010).

In the next step, the second, Design is analysed. The design part needs to be based on technical analysis, content, and quality of design training. This stage includes several benchmarks: the type of documents, tutorials, accessibility to learning, internet access/technology, mobility, and how to design from student to student and from student to teacher (Levinson, 2010).

The technical part of the design is based on specific criteria, which after their observance, it will lead to the content placement at a high level in terms of quality and be easy to access. For a more sophisticated presentation, we must pay attention to the colors used, organize the items, select the context, search, manifest, and scroll. Regarding the quality of the design, there are some fundamental aspects to respect for quality content: avoiding plagiarism, presenting real opportunities, community, and equivalence of learning opportunities in different ways (Levinson, 2010).

The third part, called development, integrates the objects and processes of design, development, and design improvement. Here it develops step by step what until now was only at the stage of questions and specific goals to be achieved (Levinson, 2010).

Online Education

The COVID-19 pandemic's impact on higher education, particularly interprofessional education programs, has yet to be determined. On the other hand, this pandemic alters how we live, learn, and work. Online instruction is becoming the modern standard in the scholarly world, but it may be a puzzling improvement for a few. Interprofessional instructors anticipate online instruction. Still, some may not have the capacity to form and encourage a lock-in, positive, and controlled online environment for their understudies. The pandemic infection generated many malfunctions in everyday life of the human being in all domains starting from the sanitary domain, economic, transportation, and not the last, the educational system (Sopa and Pomohaci, 2021).

Online education has become a critical training method in medical education; however, there is a limited understanding of what it is like to teach online. Online teaching differs from traditional classroom teaching in various ways (Yadla and Rattigan, 2003; Davis et al., 2013; Rose, 2020).

For more than a decade, medical schools have gradually embraced online learning in pedagogical methods. While some health educators are hesitant to accept these changes, the current coronavirus 2019 (COVID-19) pandemic poses a threat to traditional health education, hastening the inevitable adoption of online learning. This abrupt change may present a new challenge for medical educators who are new to the field. The authors begin by defining three key concepts: transactional distance, presence, and independent learners. Value-based space becomes more imperative than the physical separation in online learning, as decided by exchange and structure. In addition, compelling and successful online education requires realising and adapting cognitive, social and teaching presences. It is additionally essential to perceive understudies as dynamic, capable, and autonomous people instead of inactive beneficiaries of data predefined by an instructor (Elsayed et al., 2010; Griffiths and Roberts, 2005; Rose, 2020).

***SAM* Model Adapted to Online Education**

The authors then discuss practical guidelines for designing an effective online curriculum. Five online pedagogical approaches are presented: creating structures and flows to embrace experiential learning, adapting to synchronous and asynchronous learning, developing/facilitating interactions, promoting practice opportunities, and promoting a learning community (Griffiths and Roberts, 2005; Khalili, 2020).

Evaluation

The evaluation is based on setting concrete objectives, having high expectations, and bringing results as accurate as possible by applying analyses to achieve the ultimate goal.

Objectives

•Capturing students' attention;

•Appropriate means and teaching materials for providing the highest quality information for everyone to understand;

•The matter should remain in memory for as long as possible;

•Following the taught subject, she should develop the ability to apply all that she has learned in her profession;

•Be able to adapt the information learned according to the context in which it is;

•The initial evaluation from the perspective of the teacher on the level of student's knowledge to improve and develop them;

•Analysis of the learning/teaching environment—the platform used;

•Analyzing interactions between student and teacher;

•Facilitating / creating a more comfortable environment for students and teachers (Khalili, 2020).

Analyse

Through the analysis of online education, we can notice some strengths and some weaknesses of it (Gazza, 2017).

The strengths of online learning are the life-saving solutions to these difficult times. Online learning is student-centred and offers excellent flexibility in time and location. Online learning methods allow us to customise procedures and processes according to the needs of students. Many online tools are available that are important for an effective learning environment. Teachers can use a combination of sound, video, and text to convey information to students during this time. This can help create a collaborative and interactive learning environment where students can provide immediate feedback, ask questions, and work in groups or individually (Gazza, 2017).

Online education also has some weaknesses in the form in which it can impede communication between the student and the teacher, i.e., direct contact is lost. Users may face many technical difficulties that hinder and slow down the teaching-learning process. Time and location flexibility, while a strong point of online learning, are fragile and problematic. Bad behavior and flexibility of students can cause a lot of problems. There may be issues where some students do not feel comfortable learning online, which leads to increased frustration and confusion (Rhim and Han, 2020).

Results and discussion

As for the analysis, results on online education should be as concise as possible, clearly indicating both the positive and negative effects of online learning. At the same time, it is crucial to mention what level of understanding the students

started from and where they positioned themselves after browsing the subject on online platforms (Alabdulmonem et al., 2020).

The results should be specified following the analysis throughout online learning. They can be classified according to what each university student pursues, such as the level of understanding of the subject, the understanding and explanation of specialised terms, and solving specific main problems/cases outside of online classes, if they can cope with the situations. It may be encountered at work, at home, or even during classes when working in teams or individually during a project or test/exam (Burki, 2020).

It should be noted that these results must belong to a whole process of analysing the entire development of the SAM method on online education, containing both weaknesses and strengths, but also the inclusion of conclusions based on all information gathered and debated throughout the study (Burki, 2020).

Design

In our case, the design considers the entire content to understand the different varieties of online learning. The aim is to design and prototype the material so that it can be evaluated. We must pay attention to the interaction, equivalence, technological choices, appearance, and quality (Ng and Peggy, 2020).

One of the most common design issues that students talk about is boredom. Some teachers strive to make presentations as enjoyable as possible to increase the students' attention (Ng and Peggy, 2020).

Regarding the technological choices, the taught courses are accessible and posted by the teachers on the teaching platform. The smaller the file size, the better; the most common file type is universal pdf, doc, ppt. In some subjects, students receive tutorials, which in some cases help them to understand better what is being taught. Nevertheless, they do not benefit as much as face-to-face courses would bring in some cases. We have to keep in mind that many students use the phone to access online curricula for various reasons (Ruiz et al., 2006).

It is essential to build an online learning community. Student interactivity is the most important, and teachers need to think about making the courses more exciting and involving more students. Teachers need to reduce transactional distance. The interaction between students and teachers during online courses is low. Teachers should create and maintain a high degree of trust, using terminology that is accessible to all. Imposing rules, such as compulsory attendance at courses, cannot increase their interaction or involvement in studies (Ruiz et al., 2006).

Students during online courses do not need an instructor to keep them motivated; they need someone to guide them in their learning. At the moment, teachers should pay attention to what students need to learn and encourage autonomous learning. In some courses, the presentations are very well structured. The colours and the arrangement are appropriate, but the colours are inappropriate in some. The incorrectly worded texts, correctly and adequately, contain a lot of information that most of them do not explain. The presentations are not organised in such a way as to arouse the interest of the students (Ruiz et al., 2006).

Quality is essential in design. The practical opportunities are fragile; they cannot be achieved only with specific tutorials. For this reason, some systems become boring, even useless. Students may not have the necessary experience in online education as they did during face-to-face courses. Fundamental aspects to be respected for the best quality content would be avoiding plagiarism, presenting real opportunities, the community, and the equivalence of learning opportunities differently.

Development

Development processes versus Objects—Materials

For online education on a program as a branch of medicine to be at a higher level, it must be as concise as possible for all to understand, to capture the attention of those in front of a monitor. It must have the best information resources, access the best methods of exposing and transmitting information, and practically apply the theory, even if it is shared online. All this can be done with a lot of training, even if most people think it is unnecessary, stating that basic online learning platform training is enough. This information is entirely false because to make a presentation at the highest possible standards and, at the same time, to allow it to be put into practice. The creator of the material must access specific programs through which the presentation has a clear, simple aspect but provides everything necessary for the student to understand exactly what he wants to convey.

Development materials or objects used to successfully transmit information in the online environment are just a few essential objects that the vast majority have. For example, a computer, a laptop, a phone, a tablet. All these are objects used to participate in courses and the transmission of information to the receiver by the sender, in our case, teachers (Ruiz et al., 2006).

It is not enough for the objects available to a teacher to be the basic ones mentioned above because the information transmitted will be seen. In compiling their video presentations, they must have that will be useful in explaining some procedures, some diagnoses, and cases that some of the students may not understand to have access to some databases and digital platforms. To bring new innovative ideas on treatments to support their point of view by getting examples of studies based on specific topics sponsored and presented by him (van Putten, 1996).

The information in a program such as PowerPoint or Microsoft Word is helpful. The leftmost of the time, the dull ring or more confusing for the student, just reading times talking about them “for the most part”. The most significant gaps are during online teaching.

As a method of adapting to everyday life, in real cases, working in teams can be used, where the roles of the patient, doctor, and physiotherapist can be established; here, it is possible to set a specific time for solving the project and after solving it to allow asking questions, questions. Teamwork with the teacher can give suggestions, help where needed or even provide additional information.

The above are just a few examples of how an hour or two should go. Going back to our times, only a tiny part of the above is applied to conduct some classes. Only basic materials and objects are used, such as a computer, laptop or telephone, and a platform where courses are loaded and presented.

The learning processes are preferred by most, the simple ones that do not require much effort to transmit the information. The teacher often uploads the material, presents it without explaining the content and ends his class. It does not involve interaction with other students or the teacher, just a monologue.

Suppose a course is more prolonged, longer and with a very high presentation load. In that case, it does not necessarily mean that it attracts attention, captures the student, and arouses interest. Still, it becomes a unit, resting and very difficult to process most of the time. The content is skipped in a hurry because time does not allow it to be explained. Last but not least, the inattention of participants who prefer to find another occupation while connected on the platform appears to be present, with the minor exception of those who are at work who cannot give their attention 100% that they have other duties to perform (O'Neill et al., 2011).

Therefore, the content of the presented material, the way of presentation, with what objects/materials are essential. There are countless ways online courses can be made interactive, engaging, useful, practical, and highly practical (O'Neill et al., 2011).

Conclusions

Following the above arguments, we can say that the instructional design applied in the online environment is a mirror design of the best learning methods. They include materials of the best quality to achieve a qualitative presentation as concisely as possible of the ideas put in theoretical and practical form. They are built on a pattern, which helps train and guides those who will use such an instructional design model.

First of all, in the form of a surface analysis of online education, it has many benefits, such as flexibility, convenience, pleasant environment. A certain relaxation regarding the conduct of the exams, because they are no longer a stress for the one who is going to take it, but are given online, presenting the courses is a simple one, without too much information to explain. From this point of view, the content of the materials presented in the online environment is comprehensive, with many new terminologies and a lot of structured and taught information.

Other benefits of online education would be providing extensive information, easy-to-access scientific sites, easy-to-find and easy-to-study specialised studies.

As far as it is concerned in informing the population, the Internet cannot reproduce reality; it cannot teach us how to put into practice everything we have learned, interact with the patient, and treat and recover a specific pathology. The whole online learning system is often overrated in medicine, medical procedure or branches of medicine.

From the point of view of medical practice, the online learning system is outdated, limited to human interaction, face to face, patient-doctor, doctor-student and more. By uploading a presentation on a particular digital platform, we cannot say that we will have a performance in education or the assimilation of information. The theory explained in complex terminology without being accompanied by a visual stimulus is not as well understood by the student. For a student in a bachelor's / master's program in a medical school to perform, they must interact

with patients, physicians, and people to explain and present the situations they will encounter in their lifetime, day by day. Not only to be explained but also to be a form of practical learning after teaching the theory.

The online learning environment has many weaknesses that many fail to overcome or solve by turning them into strengths. The type of teaching on digital platforms on medicine does not bring benefits from the point of view of medical practice. Here we can only talk about theoretical performance, but this will also be achieved only if students are attentive to what is taught and manage to put the theory into practice.

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