Preliminary Design of an Application to Improve the Teaching and Learning Process

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Abstract

Information in its multiple forms (oral, textual, hypertextual, audio, video, iconic, multimedia ...) is the raw material of the current era. The development and evolution of our civilization is symbiotically linked to the Information and communications technology (ICT). Proposals for teaching and learning in the context of the knowledge society must integrate an educational system that target the thought operations, not only under the traditional logical thinking, but also within a model where thought operations can be expressed in complex active competences, in which abstract knowledge is mixed with the experiential, defined as technological thinking. Currently, the use of devices such as smartphones and tablets is widespread in the youth and the University community. This development reflects not only the growing penetration of these devices in the academic environment, but also that technological applications are increasingly commonly incorporated, which can be used for professors with academic purposes. Currently, there is software available that allows designing and developing applications for smartphones and tablets with academic content. In our case, we intend to design an academic app for Android and iOS systems, which can facilitate the study of various subjects through seamless student-professor communication. The subjects to which the app is addressed include complex physiological phenomena, cell exchange processes and inter-chamber interactions. The lack of time to deal with many contents and concepts is a major problem for professors when it comes to developing the subject, and they are overwhelmed by an enormous amount of information. In this context, the app can lead to a profound change in the subject teaching. This represents a huge challenge for professors, related to innovation, technology, science and education. Tablets, smartphones and applications will be increasingly present in everyday life including university classrooms. Therefore it is imperative that professors have a motivated attitude to the use of these tools and they should be specially trained in its use to develop appropriate educational activities. Knowing devices, products, resources for selection, content is essential to maximize the potential of technology in teaching.

Keywords: Apps, teaching innovation, multimedia resources, learning, information and communication technologies (ICT).

1 INTRODUCTION

Information in its multiple forms (oral, textual, hypertextual, audio, video, iconic, multimedia ...) is the raw material of the current era. Current time has been tagged as the information and/or knowledge era or society [1], among other reasons, because subjects of urban societies are immersed in an informational environment [2] that overwhelms us on a daily basis. Information is the essential element of the new companies and digital technologies are the tools to produce, disseminate and access to the information. Therefore, the development and evolution of our civilization is symbiotically linked to the Information and communications technology (ICT). Proposals for teaching and learning in the context of the knowledge society must integrate an educational system that target the thought operations, not only under the traditional logical thinking, but also within a model where thought operations can be expressed in complex active competences, in which abstract knowledge is mixed with the experiential, defined as technological thinking [3]. Technological thinking, on the other hand, requires approach problems from its resolution, which transcends the limits of scientific and academic disciplines, because the problems in teaching are never discipline but interdisciplinary.

The use of ICT is one of the key axes of the new approach to University education: to train competent individuals to improve their skills in information and communication. This approach is consistent with
the current trend in most European countries and other developed countries where the trend is the construction of a solid curriculum (both school and university) using a competency-based learning. In this sense, the Spanish Organic Law of Education, has legitimized and formalized for the first time a training competence that includes many of the statements, approaches and objectives of the digital and information knowledge. This competence is the Treatment of the Information and Digital Competence (TIDC), which is an achievement and breakthrough for the first time since the Spanish school curriculum has legitimized the need for training to integrate and use technology and digital resources.

Currently, the use of devices such as smartphones and tablets is widespread in the youth and the University community. Among children, the average age of first-time access to a mobile phone is between 10 and 12 years. This development reflects not only the growing penetration of these devices in the academic environment, but also that technological applications are increasingly commonly incorporated, which can be used for professors with academic purposes [4]. In this sense, YouTube scholar or google scholar are considered clear references of how an initiative of this nature generates its own academic resources. Some universities, especially internationally, are using apps as a channel of communication and dissemination of knowledge [5], and currently, there is software available that allows designing and developing applications for smartphones and tablets with academic content. In our case, we intend to design an academic app for Android and iOS systems, which can facilitate the study of various subjects through seamless student-professor communication.

2 AIMS

The project proposes to design an application (app) to improve the learning of students in the Degrees of Pharmacy, Human Nutrition and Dietetics and Food Science and Technology. The framework that aims to develop the project is the subject Human and Cell Physiology.

In addition to the main objective, we also aim to get these specific objectives:

- Analyze the difficulties of students in the Degrees of Pharmacy, Human Nutrition and Dietetics and Food Science and Technology when raising learning processes for our app.
- Design and develop an app that will provide students study the different systems studied in the subject and its teaching and learning.
- Testing the app and study improvements in the learning process.

3 METHODOLOGY

The app we propose to design is an autonomous learning tool, not a complementary or substitute for other educational tools in teaching. However, like any medium we use to teach, this app follows a specific methodological model, based on the cognitive constructivism proposed by Ausubel [6]. Therefore, information regarding academic concepts will be exposed in a clear and simple way, anticipating the proposed activities, or in other cases including these as a structuring element to complete the meaning of each activity. In turn, in order to generate interest in students, an attractive vocabulary and graphic style will be used, making them feel comfortable while using the application to assimilate knowledge.

We will use software that allows creating applications for Android and iOS through a web browser. It uses a drag and drop editor for generating graphical interfaces and a block system to manage the application behaviour. The projects generated by this tool are automatically stored on web servers, allowing carry at all times monitor and control the project. The software environment has three main parts: designer, editor and emulator blocks. The designer is the place where the application components are selected. The components are the basic elements used to make applications on your smartphone. There are components of different types, some of them are: Label (displays text on the screen), Button (shows a button on the screen that when clicked will initiate an action), Canvas (drawing canvas storing still images and animations), Accelerometer sensor (motion sensor), etc. The block editor is where the program logic is created. Here we program the behaviour of our application, we will tell the components what to do and when to do it. The block editor runs in a separate window designer components and is implemented as a Java Web Start.

The aim of this application is to generate a fully autonomous acquisition of knowledge by the student, so this project has a gradual construction of knowledge, away from any magisterial doctrine or
dependent on the figure of the professor. However, taking into account possible differences in the speed and way of learning of each student and according to Pappas [7] the app should promote motivation and gamification strategies, the app will feature the information in a friendly manner.

The application is based on the pedagogical principles of constructivism, and it is intended to be used as an added tool in the learning process, never a substitute for this. The constructivist conception of learning is based on the idea that the purpose of the education provided in institutions is to promote personal growth processes student in the context of the culture of the group to which it belongs. This learning will not occur satisfactorily unless a specific aid through student participation in intentional activities, planned and systematic to promote constructivist mental activity [8]. By conducting meaningful learning, students construct concepts that enrich their knowledge, thus enhancing their personal growth. In this sense, the three key aspects that should encourage the teaching process are: the achievement of meaningful learning, comprehensive memorization of academic contents and functionality of learning [9]. Under these three principles (meaningful learning, memorization and comprehensive functionality) this application is being designed.

The design of the application will result in a paper prototype, which together with the interaction of several students with the prototype, will serve as a test model to assess the application and elucidate if it conforms the proposed parameters. Such design, in addition to complying with the premises already listed, will be aimed to be used in the subjects taught (Physiology, Pathological Physiology, Clinical Physiology and Biochemistry). Once we have located the context in which the application is located, we can move to develop an effective design, with a gamification system adapted to our needs and expectations.

4 RESULTS AND DISCUSSION

It is evident that the simple use of tablets or smartphones in the classroom does not increase educational quality [10], not just mere student motivation for the use of devices to justify their presence, if such use will not accompanied by appropriate integration into the learning process, a correct selection of products that actually lead to the desired skills and training of professors in the use of devices and applications. While tablets create new learning opportunities, can not to use in any way if we want to ensure the development of skills [11] (because sometimes it seems that technology distracts from the main aims) [12]. Therefore, the attitude of professors and their training is decisive to obtain benefits of the technological advantages and transform pedagogy. The more open display to change, higher capacity adaptation, most appropriate jurisdiction digital and media, more deeper and faster It will be the change of educational culture and more effective will be the use of new technological resources [13].

We intend to develop and implement an app that constitutes a set of activities and learning tasks which goes beyond the mere repetition of notes or textbooks and requiring a high level intellectual effort by the students (analysis, classification, selection, synthesis, transfer, etc.). Therefore, to design the app, we have planned a didactic model based on an active learning process of the student, that is, a model that facilitates "learning by doing" rather than "learning by receiving". We aim to take advantage of information resources, technological and didactic materials of diverse nature (books, virtual classrooms, blogs, web pages, audiovisuals, etc.), so the student has a quick access to the resources via app and can carry out the corresponding learning activities, using the information available in libraries, databases or digital journals. We will try that the app facilitates the development of skills and abilities to search, select, analyze and re-elaborate information through the multiple sources presented in the app. The app will be a tool for collecting materials that can be used at different times for various educational purposes, which will allow and facilitate the student's regulation of their own learning process.

The subjects to which the app is addressed include complex physiological phenomena, cell exchange processes and inter-chamber interactions. Sometimes the students are offered multimedia resources such as videos, animations or simulations, however, they are limited by the adaptation to the curriculum and to the teaching guides. This fact translates into a lack of stimuli aimed at innovation in young students. The lack of time to deal with many contents and concepts is a major problem for professors when it comes to developing the subject, and they are overwhelmed by an enormous amount of information. In this context, the app can lead to a profound change in the subject teaching. A new approach to how information is provided to students and to enhance the idea of a "guide" or "facilitator" professor who contacts and guides the student via the app, against the conventional idea of a "transmitter" professor could be of great help. The orientation, the practical development and the
personal evolution of the students are issues that will be fundamental in the development of the app, so that each student is able to advance in its learning process.

According to a study of digital environments, social networks, educational gaming, etc. will be a reality in classrooms in 2020. In the near future, digital technologies are increasingly present and that will lead to a new way of teaching and learning, more active and participatory in which the tablets can get to have a prominent role. Mobile devices and applications designed for them, can add value in the process of teaching and learning, promoting the development of certain skills and competencies while constituting an extra motivation for students. But we will take into account that their use has limitations and problems, technical, management and linked with its pedagogical use [13]. Among the imitations, we include: equipment failure, software problems, incompatibility between devices, digital keyboard discomfort, lack of educational content, distractions with other recreational applications, social networks, etc.

When facing teaching in the classroom it is important to consider the reality and the circumstances surrounding the students. Pappas [7] reveals statistics which report the benefit of using multimedia in teaching. The eLearning through gamification offers students the boost in the motivation they need to become an active participant in the learning process. It also serves as an incentive for those who can be more competitive. According to this study, participants in the experiences of gamification online demonstrated a 14% increase in assessments skill-based knowledge, an increase of 11% in terms of factual knowledge, and an increase 9% in the retention of ideas. In this sense, Gutierrez [14] states that the convergence of computing, telematics and mass media has led to significant changes in the transmission of information and knowledge creation. With digitization and convergence of multimedia technologies increases the access to information, its processing speed and distribution, segmentation of audiences and the creation and broadcast of messages, emerging new languages to communicate, new ways of knowing and thinking.

When designing the app, we have encountered a generation of University students who have had no access to new technologies, but they are born with them and face the knowledge from different perspectives. This represents a huge challenge when designing the app, related to innovation, technology, science and education. Knowing devices, products, resources for selection, content is essential to maximize the potential of technology in teaching.

5 CONCLUSIONS

The challenge of the information society is assuming new methods for education and learning. We have encountered a generation of University students who have had no access to new technologies, but they are born with them and face the knowledge from different perspectives.

The subjects to which the app is addressed include complex physiological phenomena, cell exchange processes and inter-chamber interactions. The lack of time to deal with many contents and concepts is a major problem for professors when it comes to developing the subject, which are overwhelmed by an enormous amount of information. In this context, the app can lead to a profound change in the subject teaching. This represents a huge challenge for professors, related to innovation, technology, science and education. Tablets, smartphones and applications will be increasingly present in everyday life including university classrooms. Therefore, it is imperative that professors have a motivated attitude to the use of these tools and they should be specially trained in its use to develop appropriate educational activities. Knowing devices, products, resources for selection, content is essential to maximize the potential of technology in teaching.

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