Integrating Online Tools to Support University Education

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Abstract:

As student-centered institutions, universities set their missions to enhance the learning experience and thus profile of their students. Since the introduction of the internet in the early 1990's of the past century, the world of education has witnessed a great leap in the use of information and computer technology (ICT). ICT based tools are considered as important enablers for students' learning, efficiency and effectiveness. When students are well educated and informed, they are more likely to excel in their professional careers. However, there are so many available ICT tools that provide a variety of features and functions on the institutional and student levels. Selecting or implementing an appropriate and suitable set of tools may be difficult and challenging. This paper presents a module of an online university management system (UMS) at the largest and fastest growing private university in Lebanon; the Lebanese International University, LIU which has multi-campuses across many geographical locations and countries. It is crucial for any UMS to provide support and access for faculty and the students. The interface for faculty will be the focus of discussion in this paper.

Keywords: ICT; higher education institutions; e-learning; online educational tools.

1. Introduction

Using new technologies in new revolutionary ways sparks learning, creativity and innovation. Across the globe, universities are facing challenges with the integration of technology into class. The platform to establish a complete ICT-based environment to help improve the students' learning while ensuring the quality of education is readily available and has been for quite some time. However, the main challenge with this is to properly choose the technologies and systems that are adequate and provide a wide range of interoperability. Recent attempts merely map applications to parts of the "Knowledge Domains Hierarchy", yet they do not present nor propose any homogeneous eco-system supporting this mapping; neither describe a working mechanism that fosters the objective of learning and/or operational performance.

The focus of the system which will be described in this paper is to enable instructors to create customized content with specific purpose. As such, the system must allow the association of content with course objectives and to associate courses with programs and groups of programs. The content must also comply with the approach of the knowledge domains hierarchy pyramid (see Figure **1**).

The main features of the system which will be described in this paper are knowledge domain management, major management along with association of majors with knowledge domains and course management with corresponding association of courses with majors. The system is built to allow the collection of feedback at multiple levels. This is achieved by defining outcomes for each activity, course, major and domain and then tracking how well those outcomes have been achieved through surveys, key performance indicators and student achievement monitoring. Student achievement is weighted according to the "knowledge domains hierarchy pyramid" with more emphasis placed on creative achievement.

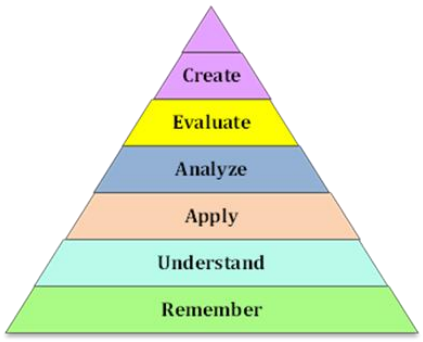


Figure 1: Knowledge Domains Hierarchy Pyramid

2. Research Design

ICTs are progressively getting acknowledged as significant instruments for teaching and learning on both the educational and the organizational levels [1].

ICTs are seen as powerful technical instruments for achieving social change and they are likely to be viewed as ascribed capabilities that can beat other innovations [2]. Consequently, nations are striving to succeed in attaining this change given that the nature of worldwide technology is based on information. According to Nawaz and Kundi, technology has turned out to be incorporated into our reality so rapidly that we cannot completely retain and grasp the full aspect of changes that has happened [3]. The need to provide instructors with knowledge and leadership to be able to integrate technology into the classroom is more crucial than just having them acquire the technical skills only. In addition, they will not be able to teach people how to solve educational problems, instead they will teach them only how to use technology [4]. Phillips et al. found out that web-based learning situations have been focused more on innovative sides than usage of instructional aspects [5].

ICTs assert that the use of technology is effectively useful in programs and have necessary tools and devices in order to access, restore, switch, save, arrange, handle, control and present data and information. In other words, e-learning boosts, develops, and supports educational teaching and learning through integrating ICTs [6]. Different forms of e-learning are offered in many universities and it is evident that computers are playing a major role in altering higher education at the levels of organization and the process of delivery. There are several reasons that drive higher learning institutions to integrate ICTs in teaching and learning; most are pedagogical and socio-economic reasons. Both instructors and students have an increased access to all types of information; an essential need to get greater communication; an intention to teach and learn cooperatively; a desire to improve cost-effectiveness of colleges; and a greater demand for pedagogical development [3] [7].

Managing online learning requires educators to have pedagogical, technical, information and communication skills, so they are able to design and deliver e-learning systems, programs and applications. However, neither the educational nor the corporate sectors have adopted a definite technological system that fits all educational institutions and programs [1]. Although educational institutions are working hard to follow changes and integrating educational technology into their systems, many are failing to achieve such adaptation for several reasons including: choosing inadequate technology, lack of professional skills to set appropriate strategies that cope with political and social changes, lack of program updates and lack of implementation management [8].

2.1 Levels of Integration

Experience shows that different cultures of education can go through various periods of development with respect to change, progress, gradual decrease or without any change [9]. According to Dinevski and Kokol [10], e-learning evolution is subject to changes which may originate from:

1. Sequential learning arranged along a straight line to hypermedia learning.
2. Guidance-based learning to construction and discovery.
3. Education focused on teacher to education focused on student.
4. Grasping material to know how to command and how to learn.
5. Get educated through school to learn as long as you live.
6. The same kind of "learning for all" to modified learning.
7. Learning as kind of punishment to learning for pleasure.
8. The instructor is only a transferring person of material to the instructor as an assistant.

Since e-learning has many dimensions, it should be well comprehended in basic and original terms as well as identified with the social surrounding and conditions inside which it is connected. That is, being surrounded by variety of media agencies and educational institutions and government, instructors are driven into utilizing technology unintentionally [11]. Typically, administrative departments of educational institutions boost faculty through providing IT experts with enough funding to their greatest potential fulfilment according to Ezziane [12].

There are three main levels of technology that should be integrated into any e-learning system irrespective of the kind of ICT related establishments. Integration should occur at the planning, development and use levels respectively. Planning at the IT level must be proportional to planning at the organizational level [9] [12]. Performing e-learning advancement must be lined up with the developer and user necessary needs and demands [13] [14] and the user practice and experience must be based on analysing the user requirements [2] [11] [15].

2.2 Integration at the Planning Level

Aaron et al. stated that ICTs integration requires identifying clear goals on the pedagogical level in order to set a successful plan based on decisions made regarding technological needs [9]. However, it is not easy to create and execute an action plan that includes educational technology. Educational technology has a framework of basic organizational structures and a system of methods and techniques that should be all conducted within the teaching and learning environment. Through using technology and other resources collaboratively, instructors need to determine teaching requirements, prepare for a strategic plan and

implement it according to new demands, and assess classroom instruction [16].

Planners often know that every successful strategic plan should have a clear mission and vision. Therefore, integrating technology into a strategic plan of an educational institution should be related to the institution's mission and vision and the strategy should be connected to its culture, values, tradition and history. At the planning level, teaching technologies should be integrated systematically by using a set of various instruments, tools, mechanisms and methods. Since e-learning improvement is indeed an activity that is related to more than one branch of knowledge, it involves many participants and employs processes which are interdependent. As education is a continuous, cyclic and dynamic process itself, any attempt to shape and represent it should undergo series of processes including planning, implementing, evaluating and revising [9].

Holding specific responsibilities at the planning level is very important, so that the plan could be updated progressively without being a fixed and unchangeable document. Therefore, selecting the best planners who fit for the best responsibilities of planning and updating posts should be worthy enough. But such changes and developments couldn't take place within any educational institution before five to ten years. These obstacles can have negative influence on technology users, not to mention that many instructors are to some extent techno-phobic. Therefore, higher education institutions must set an educational strategy to enhance and advance plans including IT integration that contribute to minimize these barriers on the one hand and meet the needs of different academic plans and various levels of strength and advantage with technology [12].

2.3 Integration at the Development Levels

Since learners may differ per nationality, gender, and the style of learning, student characteristics should be taken into consideration through setting and designing e-learning systems to avoid facing difficulties regardless that educators can benefit from these systems at the theoretical level [15]. Despite of the fact that technology designers are in charge of streamlining the usage of their items, the educational training group such as instructors, directors, administrators, lawmakers, and so forth must be dependable stakeholders of technological products of education [14]. However, technology developers face some challenges in application communication. In other words, sometimes it is hard to let application integrate and intercommunicate [3] [13].

To achieve success of the utilization of PCs in the classroom, it is important to get instructors' commitment to do so. Different players like school councils, directors, and government organizations play different roles in directing the framework of goals set by the institution, work situations, execution assessment, and the asset distribution [9]. As for educational institutions in developing countries, some researchers propose that universities ought to incorporate e-learning systems to enhance teaching and learning skills and practices taking into consideration didactic and instructive factors as well as technical and cost issues [7]. There is a debate about whether to utilize an instant available solution from an outside provider or to build up a local internal solution.

2.4 Integration at the Use Levels

A recent survey reveals that there are four distinctive uses of ICT: (1) as an object, (2) as a helping instrument, (3) as a medium for teaching and learning, (4) as a device for management and organization in schools. First, it is important to add a learning course about ICTs in the educational curriculum which assists both instructors and students to be able to know how to use ICTs in education in particular and in life in general. Second, no one can ignore the role of computers as being an educational aid that saves effort and time in collecting data, conducting research and completing assignments. Third, ICTs play a role in fostering a teaching and learning environment by connecting instructors and learners as well as ease pedagogical practices and training. Fourth, ICT is known for its administrative use in educational institutions [17].

It is true that technical training for technology integration is essential to achieve ICTs goal, but it makes no sense without adding many other aspects of e-learning [11]. E-learning is applied in many different sectors depending on their meanings. For example, its economic meaning entails that it is a sector of e-business whereas the educational meaning implies that it is an approach for developing new instructional styles of teaching and learning. Thus, there is a relationship between e-learning and the academic teaching environment.

2.5 Problems of Integration

Numerous instructors and educational program designers have been exploring the different application and use of technology in education. Despite such attempts, research shows that scholars and instructors aren't completely able to incorporate technology into their learning and teaching practices and they feel uncomfortable with technology integration. Some teachers believe that it seems hard to integrate ICT into their classrooms because it restricts them from having the opportunity to use diverse educational approaches in their academic systems and limits them to the models of technology in teaching and learning activities [2]. Whereas others believe that using e-learning in higher education holds both advantages and disadvantages both for instructors and learners [18]. However, universities are still facing many obstacles in ICT integration due to the lack of advanced development, lack of technical and management support, absence of awareness toward ICT and absence of programs and

systems for implementing ICT properly in the institution [7].

Numerous institutions have been exploring different avenues regarding the utilization of innovation. There are still difficulties and concerns with respect to instructor's capacity to incorporate innovation into instructing and learning exercises and their solace in doing as such, regardless of their endeavours, as declared by Oh and Russell in 2004. Buzhardt et al. [19] noted that the coupling between training and innovation has frequently been rough. Sife et al. reported that colleges still face a great deal of difficulties in attempting such a procedure like absence of fundamental way to deal with ICT execution, mindfulness and state of mind towards ICTs, regulatory help, specialized help, changing advanced education and self-improvement [7].

Level of importance and relevance of ICT integration depends on subject material. According to research, teachers of humanities and social studies are less likely to use technology or computers in the classroom than mathematics and science teachers [20]. E-learning users decide the level and nature of integrating ICTs in higher education. Therefore, attitudes differ based on the characteristics of individuals, staff and institutions [21].

2.6 Technology Integration Management

Universities seek to contribute to social community through expanding learning and teaching practices by applying advanced research, enhancing social integration, progressing competent development and being a local economic contributor. However, teachers face some barriers while applying ICT in the classroom. They not only challenge the task of using ICTs properly in classes, but also, they have to show learners the benefit of using ICT in education. On the other hand, some teachers confront restraints from administration and management which may not be willing to embrace such change [14].

ICTs are less likely to achieve success without integrating the suitable technology into instructional models of teaching and learning. Each educational institution has its unique model of instruction that is adopted to its own learning process [1]. In some developed countries, ICTs have become critical in educational institutions [18]. Choosing the appropriate environment that fits the learning styles of students plays a critical role in the learning process. For example, some students prefer to work within groups or teams while others like to work individually.

3. Proposed ICT-Based University Ecosystem

The proposed ICT-based university ecosystem is a complete university information system that will enhance the students' learning experience and will provide academic and administrative university management with accurate information analysis and statistical data. This is an advanced decision support system that has an integral role in making based-evidence decisions.

Furthermore, the ICT-based university ecosystem will support faculty members to measure students' performance and course learning outcomes. In addition, it will be a key factor for academic planning and monitoring by providing relevant institutional information in various areas of concern. The ICT-based university ecosystem will include:

3.1 Course Digital Material

Shared material prepared by instructor and shared to students as shown in Figure 2.

Figure 2 Course Material Sharing View

3-1 Online Course Syllabus

This interface will provide automation for producing the course syllabus according the pre-defined template based on best practices. This includes a course description, course learning outcomes, covered topics, textbook and references and the breakdown of topics chronologically as illustrated in Figure 3.

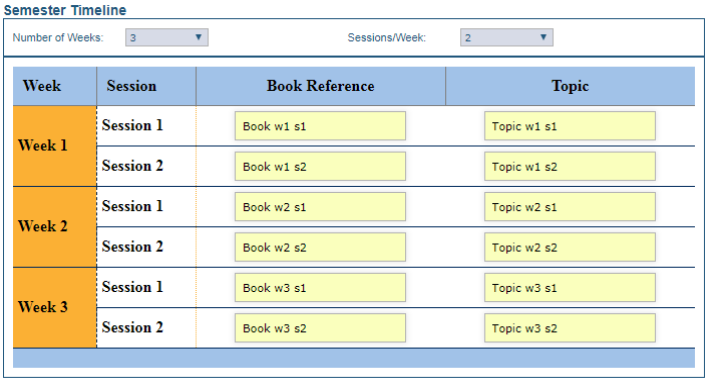


Figure 3: Chronological Breakdown of Course Topics

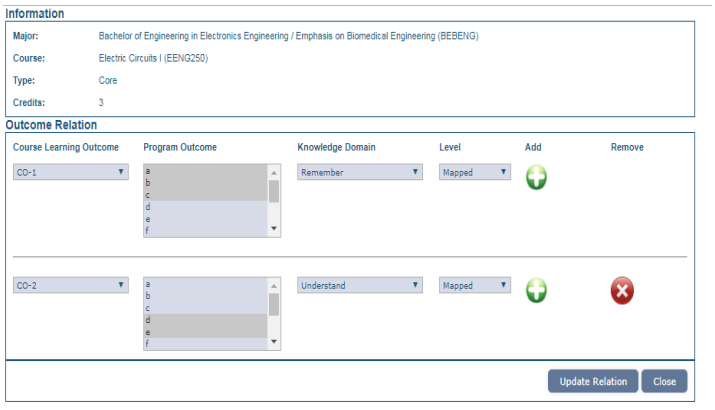
3.2 Course Assessments Associated with Course Activities

As many exam elements as needed may be entered (**A** in the Figure 4), but the summation of all elements must be equal to 100 (Here 70+30). In each exam element, we can add many outcomes and the summation of outcomes grades must be equal to element percentage (Here 40+30=70). When done, the user may click on "Add Exam Structure" button and the structure will be created.

Figure 4: Course Assessment Entry

3.3 Alignment of Course Learning Outcomes with Program Outcomes

All course activities and their associated elements should map to the course learning outcomes which in turn should map to the program outcomes. The system ensures that this is done as depicted in Figure 5.



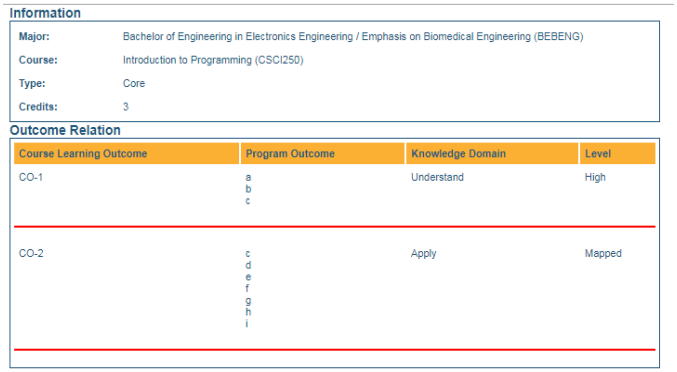


Figure 5: Mapping Learning Outcomes with Program Outcomes

3.4 Evidence-Based Decisions

Figure 6 shows a graphical chart that provides statistics on the course activities and how the students fared.

Historical data over a certain interval of time which is settable by the user may also be displayed to view and analyze trends and make adjustments and decisions accordingly as shown in Figure 7.

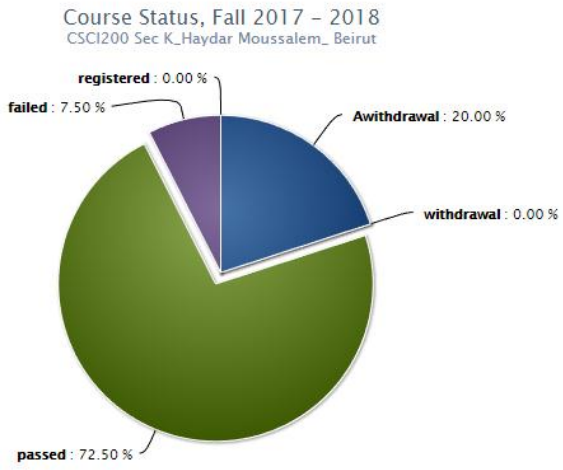


Figure 6: Passing Percentages

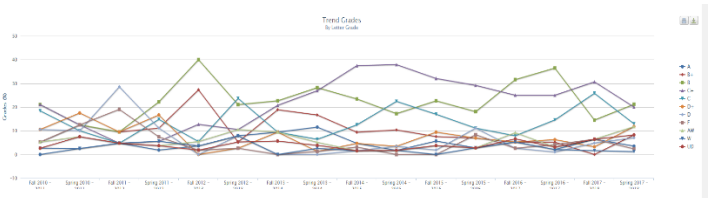


Figure 7: Trend of Letter Grades

Moreover, the trend of course enrolment over the years may be displayed to monitor variations as Figure 8 shows. The administration's approval of grades may also be displayed as illustrated in Figures 9.

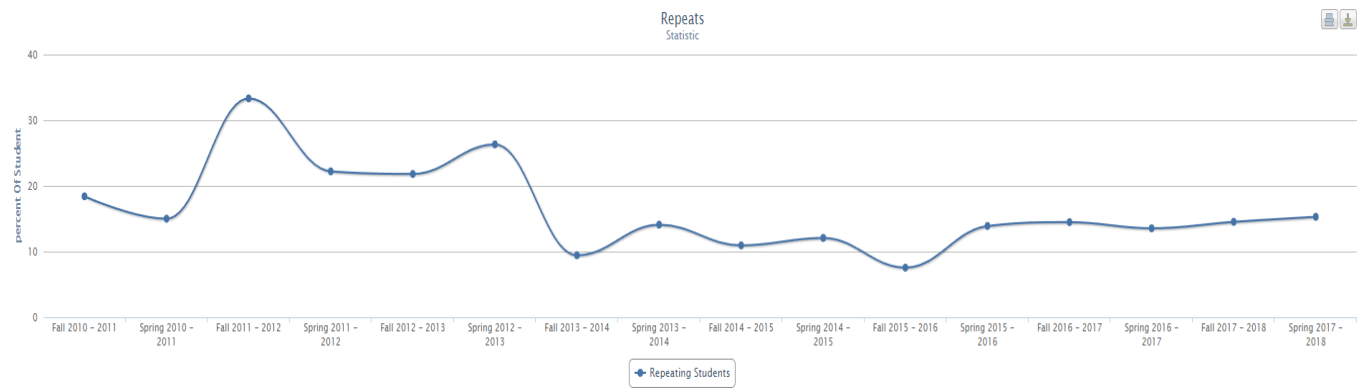


Figure 8: Trend of Course Enrollment

Figure 9: Administration Grade Approval

4. Conclusion and Future Enhancements

The ICT-based higher education ecosystem for enhancing students' learning and operational performance is very useful for universities, comprising a variety of useful functionalities that provide a clear, accurate and valid assessment for all stakeholders in key areas. Some functionality of the implemented system was presented including the ability of instructors to share resources with students, and course coordinators to build a dynamic course syllabus, the assessment measures alignment with course learning outcomes, and the alignment of course outcomes with program outcomes. Tools that can help in the decision making were also presented and briefly discussed. The full system will include many other feature and modules to support other important functions and it is actually being implemented and is slated for deployment in service before the end of 2018.

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استلام البحث ٣٠ /٨ /٢٠١٨

قبول البحث ٩/١٨ /٢٠١٨

ملخص:

تسعى الجامعات كمراكز تعليم عالٍ للتركيز على تقديم تجربةٍ تعلمية قيمة ومفيدة لطلابها. مما لا شك فيه أن بروز الشبكة العنكبوتية في أواسط تسعينيات القرن الماضي ساهم كثيراً بترويج استخدام تقنية الحاسوب والمعلوماتية. وفي أيامنا هذه هناك عدد كبير من التطبيقات التي تستخدم من أجل إغناء تجربة الطلبة التعلمية. إن نجاح الطلاب المهني يرتبط بشكل وثيق بالعملية التعليمية واكتساب المعلومة ،ومن أجل ضمان النجاح فإنَّ الوسائط التكنولوجية تساهم بتحقيق ذلك بكفاءةٍ وفعالية. بناء على ما تقدم، أصبح هناك تطبيقاتٌ كثيرةٌ متعددةُ الخصائص والإمكانيات لدعم المؤسسات التعليمية والطلاب على حدٍّ سواء. ولكن يبقى هناك العديد من المُعوِّقات التي تحول دون بناء أو اختيار التطبيقات الملائمة للاحتياجات المتخصصة وخاصة للجامعات المتعددة الفروع. ولذا فإنّ هذا البحثَ يعرض تطبيقاً من منظومة إدارية جامعية لأكبر جامعات لبنان الخاصة وأسرعِها نُموّاً وهي الجامعة اللبنانية الدولية والتي لديها العديد من الفروع في لبنان والعالم. والتطبيق الذي سيتم تناوله في هذا البحث يرتبط باستعمال الأساتذة والطلاب وسيتم شرح المميزات والخصائص بالتفصيل.

الكلمات المفتاحية: تكنولوجيا المعلومات والكمبيوتر، مؤسسات التعليم العالي، التعلم الإلكتروني، أدوات التعلم الإلكتروني .