

Planning and Implementing a new Assessment Strategy Using an e-Learning Platform

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Abstract: One of the most difficult issues of e-Learning is the students' assessment. Being this an outstanding task regarding theoretical topics, it becomes even more challenging when the topics under evaluation are practical. ISCAP's Information Systems Department is composed of about twenty teachers who have been for several years using an e-learning environment (at the moment Moodle 2.3) combined with traditional assessment. They are now planning and implementing a new e-learning assessment strategy. This effort was undertaken in order to evaluate a practical topic (the use of spreadsheets to solve management problems) common to shared courses of several undergraduate degree programs. The same team group is already experienced in the assessment of theoretical information systems topics using the b-learning platform. Therefore, this project works as an extension to previous experiences being the team aware of the additional difficulties due to the practical nature of the topics. This paper describes this project and presents two cycles of the action research methodology, used to conduct the research. The first cycle goal was to produce a database of questions. When it was implemented in order to be used with a pilot group of students, several problems were identified. Subsequently, the second cycle consisted in solving the identified problems preparing the database and all the players to a broader scope implementation. For each cycle, all the phases, its drawbacks and achievements are described. This paper suits all those who are or are planning to be in the process of shifting their assessment strategy from a traditional to one supported by an e-learning platform.

Keywords: e-learning, e-assessment, team work, organizational processes, higher education, LMS, Moodle

1. Introduction

Since the first Correspondence Course Learning, from the mid-nineteenth century, until the contemporary e-learning courses, a long path was followed concerning distance learning courses. Nowadays, to describe this type of learning process the most used terms are e-learning and b-learning, considering it is over Internet (Folden, 2012).

E-learning processes are widely supported by Learning Management Systems (LMS). LMS usage had grown throughout the last years and nowadays LMS are very popular and vastly adopted in several organizations, including Higher Education Institutions (HEI) (Babo, et al., 2012) (Cerioli, et al., 2012) (Kruse, et al., 2012) (Omar, et al., 2011; Salas-Morera, et al., 2012). Several LMS are available (Babo & Azevedo, 2009), presenting a myriad of tools/functionalities, for example, announcements, assignments, blogs, chat, content delivery, content sharing, discussion, e-mail, tests/exams, FAQs, forums, glossaries, gradebook, group work, learning paths, mailing lists, news, podcast, pools, schedule/calendar, self-assessment, student portfolio, student tracking, surveys, syllabus, tasks-exercises, videoconference, wiki, whiteboard (Llamas, et al., 2010; Lonn, et al., 2011). Similarly to other aspects of LMS platforms, online assessment is naturally gaining popularity, and is being sustainably adopted. Assessment is one fundamental aspect to consider and an abundant volume of research can be found in the literature (Stödberg, 2012).

The research presented in this paper took place at ISCAP, the School of Accounting and Administration from the Polytechnic Institute of Porto. The information systems department teachers used LMS Moodle long ago, exploring some of the available functionalities, including quizzes for summative tests. Tests were, so far, used mainly to assess theoretical topics with multiple-choice questions, in the format of Moodle Quizzes. As a result of this research it is intended to assess a practical topic, namely the use of a spreadsheet, with multiple-choice questions through Moodle quizzes.

One of the main difficulties identified in traditional project management is the organization of the work team (Schwalbe, 2010) (Meredith & Mantel Jr, 2011). This research project was not an exception. Thus a reflection about team organization and leadership was necessary and is included in this paper.

Two cycles of the action research methodology were developed. The first cycle comprises the development of a database of questions, afterwards used to generate the tests (Moodle quizzes). The second cycle comprises the resolution of the problems identified in the first cycle, and the application of the tests to assess the students. Each phase is described, the main problems are identified in each of the phases, and the encountered solutions are presented.

The novelty of this paper is to present the implementation of a new way of doing the assessment of practical topics, relating it with the important issue of organizing the team work, which was found to be a great difficulty. Its main contribution is to show that it is possible to implement the assessment of practical topics using Moodle quizzes, considering some constraints.

The structure for the rest of the paper is the following. Firstly, related research is presented, namely assessment using learning management systems, and team group organization. Following, the research development is presented, starting with the Action Research methodology, continuing with planning an assessment strategy using a LMS and Implementing and monitoring an assessment strategy using a LMS. The paper concludes with discussion and future research directions.

2. Related research

In this section some of the related research is presented. This consists mainly in two topics, namely, Assessment using Learning Management Systems and Team Group Organization.

2.1 Assessment using learning management systems

As a consequence of the adoption of Information and Communication Technologies (ICT) in education and learning, e-assessment is being increasingly adopted in Higher Education Institutions (HEI), and has been attracting attention from researchers worldwide. Some researchers develop specific environments to perform e-assessment (Llamas-Nistal, et al., 2013) (Dascalu & Bodea, 2010) (Boticki & Milasinovic, 2008).

Another approach to assess higher education students which is gaining momentum as time goes by, is the use of Learning Management Systems (LMS). In the literature several research examples can be found. For instance, starting from the definition of a taxonomy for question design, a formative assessment was implemented by Burrow (Burrow, et al., 2005). A new teaching method which includes e-assessment, both formative and summative was successfully developed and implemented by Salas-Morera (Salas-Morera, et al., 2012). This new method uses several tools included in LMS platforms, such as forums, quizzes and tasks.

One important topic of research intends to ascertain the effectiveness, validity, and quality of e-assessment comparing it with traditional assessment (Prakash & Saini, 2012) (Ventouras, et al., 2010). Commonly, those studies' conclusions suggest promising results for e-assessment applications either for specific environments as for LMS.

According to (Stödberg, 2012), the majority of the research in the topic of e-assessment focus on formative purposes, but research focused in summative purposes can as well be found. Also according to (Stödberg, 2012) most of the research focus on closed-questions based e-assessment, mainly including multiple-choice questions.

Thus, one of the most widespread kinds of e-assessment consists in the use of multiple-choice question tests. Triantis & Ventouras (Triantis & Ventouras, 2012) present an interesting approach to multiple-choice question tests introducing a new penalty method in order to avoid the main drawbacks of this type of tests.

This paper focus on summative e-assessment supported by a LMS (Moodle) using multiple-choice questions tests.

2.2 Team group organization

A project is a temporary group activity undertaken to produce a unique product, service or result (Schwalbe, 2010) (Meredith & Mantel Jr, 2011) (PMI, 2013). A project is "constituted by teams within or across organizations to accomplish particular tasks under time constraints" (Wikipedia, 2013). According to

Macapagal (2010), the vital factors which impacts on the quality and speed of the project are people, process, and technology. The relationship among these elements "can result in projects optimum performance" (Macapagal, 2010, p. 4). Through all the paper, process and technology factors are presented and discussed. This section is about people, namely about the teamwork organization.

In any project it is important to have an "understanding of stakeholders, their behavior, and its effect on success to be able to manage project (...) effectively and efficiently" (Beringer, et al., 2013, p. 2). Also, it may be taken into consideration that "heterogeneity or diversity among employees may lead to intra-organizational tensions" (Arvidsson, 2009, p. 99). The group leader must be one of the members of the staff, and a member of management, may be one of the senior staff, being an acknowledged member of the system under change (Fowler & Rifkin, 1990).

During the development of a project, task and tasks timing should be clearly defined and allocated in order to avoid misunderstandings, delays, and tensions inside the team. (Meredith & Mantel Jr, 2011) (Schwalbe, 2010) (Arvidsson, 2009) (Beringer, et al., 2013).

The use of pilot groups revealed to be useful in projects involving many people, due to the risk of not achieving the of goals, and the consequent effect on the organization. Small groups are easier to monitor in order to identify and resolve problems as soon as they occur. Some other successful research can be found using pilot groups (Beevers, et al., 1995) (Bindl & Schuler, 1988).

All these aspects were taken into consideration in the selection and in the definition of individual responsibilities and tasks on the project described in this paper, accordingly to each of the intervenients know-how.

3. Research development

In this section the developed research will be presented. Firstly, introducing the Action Research methodology, continuing with planning an assessment strategy using a LMS and following with implementing and monitoring an assessment strategy using a LMS

3.1 Action research methodology

According to Baskerville and Stage "action research assumes that complex social processes cannot be reduced for meaningful study. A complex social process is best studied by introducing changes into that process and observing their effects." (Baskerville & Stage, 1996, p.14). Regarding the researcher role and citing Avison, "the action researcher is directly involved in planned organizational change. (...) the action researcher is concerned to create organizational change and simultaneously to study the process" (Avison, et al., 2001, p. 28). Considering the research and researcher characteristics, Action Research (AR) was chosen as the most adequate research methodology. The five phases cyclical process proposed by Baskerville, for AR in the information systems area (Baskerville, 1999) (Baskerville & Wood-Harper, 1998), was adopted. The first cycle consisted in the production of a database of questions tested with a pilot group. The second cycle consisted in solving the problems that were identified in the first cycle. Table 1 presents each of the five phases in both cycles, and in the next sections the research is presented in more detail.

Table 1: Phases of the two action research cycles

Phase	First Cycle	Second Cycle
Diagnosing	Primary problems: Necessity of continuous assessment Limited computational resources Need to create several different tests for various student shifts, several times through the semester Difficulty to assure that all the exams assesses the same	Primary problems: Slow access of the client computers to the server, due to the demanding characteristics of the Moodle 2.3. version Problems with the questions (lack of questions in some categories, low quality of some figures, figures missing in some of the questions, questions not accordingly to the defined standards)
Action Plan	Definition of a task force group of teachers Meeting with the task force group	Meeting with the task force group Definition of an iterative plan to solve

Phase	First Cycle	Second Cycle
	Definition of a pilot group of students Necessity to define standard categories of questions Necessity to cross-validation revision of the questions	the problems with the design of the questions Decision to use Moodle version 2.1, previously tested
Action taking	Definition of categories to include each question Elaboration of a set of example questions Definition of rules for elaborating the questions Meeting with all the teachers for explaining and involving them in the project Developing the database of questions Implementation of one test	Revision of the questions in the database, accordingly to the agreed plan Migration of the questions to Moodle 2.1. version platform Implementation of a second test
Evaluating	Not enough questions to generate a random test with Moodle Difficulties in accomplishing the deadlines and the defined rules, by all the team Technical problems related with the upload of the test by each student	Still not enough questions to extend the project to all the students/courses Observation of some resistance to the extension of the project to all the students/courses
Specifying Learning	Focus on technical issues analyzing why did they happen Importance of the design guidelines in order to complete, to improve, and to delete errors in the database of questions Improve procedures to monitor the workflow	Focus on meeting all the forecasted technical needs before starting any project Redefinition of the way to extend the project Understanding of how the behavior of internal stakeholders influence the project success

3.2 Planning an assessment strategy using a learning management system

ISCAP is the Business School of the Polytechnic of Porto that offers undergraduate and graduate studies with different programs involving, in the academic year 2012/2013, about 3778 students and 274 teachers. The offered undergraduate degree programs are: Accounting and Administration, International Commerce, Administrative Assistance Translation, Business Communication, Management of Tourism Activities and Marketing.

The Information Systems and Technology department is transversal to all the degree programs teaching courses, supporting the ICT teaching in all of them. The use of spreadsheets to solve management problems is one of the topics included in the curricula of six degree program courses taught to a sum of 1196 students by 20 teachers who belong to the Information Systems and Technologies department.

Since 1999, accordingly to Bologna agreement, students have been continuously assessed. One of the components of the assessment consisted in accomplishing several tasks using a spreadsheet tools. This procedure reveals to be a tough workload for the teachers due to several reasons. First of all, being necessary that students' assessment involves a computer per student and considering that ISCAP only have around 120 available computers, it implies several shifts and consequently as many different exams as the number of shifts. Secondly, this procedure is repeated several times through the semester. Finally, due to the different number of exams, it is difficult to assure homogeneity, which means to assure that all the exams has the same degree of difficulty, and assess the same. Consequently, a process that helps the teaching group to develop a more efficient assessment is the challenge.

This group of teachers is already expert in the use of an e-learning platform – Moodle – to assess theoretical topics, through mini test of multiple choice questions, using the Moodle quizzes tool. Thus, the use of Moodle to solve this issue arises naturally. However, the use of spreadsheets to solve management problems' topic is of a practical nature, asking for a different approach comparing with the other already assessed topics.

Being aware that it would not be a good strategy to start implementing such a big project with the entire group (6 courses, 1196 students, 20 teachers), and based on the literature (see section 2.2), it seemed to be

wise to start the project with a small pilot group. However, as this project is to be implemented futerely to the entire workforce group (20 teachers) it is needed that all are involved since the beginning.

The head of the information systems department who intentionally is the team leader, in order to develop the project and to assure the involvement of all the stakeholders, organized several preparatory meetings with a smaller but significant group of teachers. The participants in those preparatory meetings were namely, the responsible for the Moodle platform that is also a chair of one of the courses, and the chairs of the other two courses (each one running in different semesters) that usually are attended by the biggest number of students and consequently involve the biggest number of teachers. Afterwards, the first meeting with the formed task force group took place. This group was composed by the team leader plus the six courses' chairs.

Consequently, the task force agreed to develop the project and decided to choose just one course, one teacher and one subset of students belonging to the chosen course/teacher as the pilot group. The chosen course is part of the Marketing Degree, the teacher is the team leader, and 84 students were under this assessment project.

The next step consisted in developing the database of questions. First of all, it was necessary to define categories to include the questions to be designed. The first strategy was to use a course syllabus as a guide to the categories. However, as there are some differences among the several courses' syllabus, a different standard was defined. This standard was defined based in the content of a commonly adopted book which author is one of the teachers¹.

Secondly, it was identified the need to design some example questions to facilitate the subsequently communication with the whole teachers group. Each one of the six member of the task force group designed two example questions which were reviewed by another task force group member.

Some guidelines were defined for the questions design:

- each question should have five different optional answers. One of these answers should be "None of the other answers is correct.". This kind of answer prevents any inadvertent error either in the question or in the four possible answers.
- there is only one correct answer assigned with 100%;
- there is at least one completely wrong answer assigned with -20%;
- as it is desired to design answers with different accuracy levels, i.e. not only correct or incorrect answers, it was decided that each teacher could decide a weight between -20% and 95% to each answer.

Regarding the extension of the project to all the teachers a planning document was prepared including the following:

- A code was assigned to each category. The code consisted of the initials of the category designation, for instance FM stands for "Funções Matemáticas" (portuguese for Mathematical Functions)
- The explanation of the question codification methodology. The code for each question was obtained by the concatenation of a two digit sequential number at the end of the respective category code, for instance, FM01, FM02, FM03,etc.
- The number of necessary questions for each category was defined. The questions were distributed equitably among the teachers.
- To each author was assigned a reviewer to warranty the accuracy of the work.
- A schedule was defined with all the tasks and due dates. (design the questions and send to the reviewer; after receiving the revision proceed to the suggested revisions and insert the camera ready version in Moodle; validation of the questions previously introduced in Moodle)

Following, a meeting with all the teachers took place to present the project and to start implementing it.

¹Rodrigues, L, 2011. *Utilização do Excel 2010 para Economia & Gestão*. Lisboa: FCA - Editora Informática.

3.3 Implementing and monitoring an assessment strategy using a learning management system

The Moodle version in use was 2.3. When all the development phase was considered completed the project team leader attempted to create a quiz test.

During this attempt several problems were found out limiting the number of well-designed questions. As there was a chronogram to accomplish with the students and a test was scheduled, the option was to select the questions one by one, instead of allowing Moodle to randomly generate them, thus assuring a well-designed quiz test.

The students answered the test and several problems occurred. The main problem was related with the slow access to the server where Moodle was allocated, and the demanding characteristics of the new Moodle 2.3. version, and consisted in: slow display of the quiz and images, and impossibility to close the quiz text because it seems to be going into an infinite loop as it kept hanging. Unfortunately, some students had to repeat the quiz test.

The grades were not shown after finishing the quiz to prevent that something could go wrong since it is a pilot experiment. Students were asked to answer two questionnaires to evaluate this new way of assessment. The first one was answered the day after the quiz and the second one was answered after the students being informed about the grades.

Due to all the occurred problems, the trust and the reliability of the final result could have been compromised. Hence, in the end of this first phase it is the moment to evaluate, identify constraints and develop strategies to solve the problems, preparing an enhanced future assessment moment.

Two types of problems were identified.

The first one cannot be easily solved by the team. It is a technical problem related with the server low performance when running Moodle 2.3. A solution could be the acquisition of a new server not possible at the moment. Therefore, it was decided to return to a previous Moodle version (2.1) used in the past with acceptable results. This migration can cause other estimated issues (for example: loss of images path) which can be solved simultaneously with the other type of identified problems.

The other type of problems concerns questions' design. These problems were: lack of questions in some of the categories, missing or low quality figures in some of the questions, questions with seven answers instead of the five previously defined, and inaccurately designed questions.

Consequently it was necessary to do a new revision of the questions, mainly performed by the task force members. A new category, called "draft", was created to allocate the questions with problems. Each member of the task force was in charge to review a fixed number of questions. The following iterative action plan was adopted:

- each task force member reviews the assigned questions identifying the faults;
- questions with faults were moved to the DRAFT category;
- the authors were informed about the respective questions' faults and the deadline to correct them;
- after correcting the faults in the questions the authors should notify the reviewer (task force member) about the accomplishment of the task;
- when the process is finished the reviewer move the question from the Draft folder to the correspondent category folder.

After the completion of the revision process a second quiz was created. These two different moments of students assessment were estimated in the course agenda and were related with different spreadsheet topics.

The second quiz was generated still with some constraints due to the few number of available questions. Regardless this point everything went smoothly because the questions were at this point very well designed without any errors or problems.

During the second assessment session no technical problems were verified. The server performance was quite good and every detail occurred according to the plan.

4. Discussion and future research

ISCAP's information systems department developed a new challenging project in order to use Moodle platform to assess a practical topic, namely, the use of spreadsheets to solve management problems. This group of teachers was by that time expert in the use of Moodle platform to assess theoretical topics. However, the assessment of practical topics introduces other challenges.

As real problems were intended to be solved and both researchers were involved in the "planned organizational change" and simultaneously were studying the process, Action Research methodology was used to structure this research (Avison, et al., 2001, p. 28).

With the objective of implementing the new assessment strategy the researchers adopted the following process implementing structure which can also be used by those who are or are planning to be in the process of shifting their assessment strategy from a traditional to one supported by an e-learning platform:

- Identification of a group leader
- Definition of a task force group
- Well-designed project management: clearly define tasks, timing for tasks achievement, and who will perform action
- Involvement of the whole team
- Assure the necessary resources (technical – servers, client-computers,... -, human – time to develop the tasks)
- Start with a well-chosen pilot group
- Apply the project to the pilot group
- Evaluate the results
- Solve the drawbacks
- Iterate 7, 8 and 9
- Apply to an extended group
- Evaluate the results
- Solve the drawbacks
- Iterate 11,12 and 13

The main contribution of this paper is to show that is possible to implement multiple-choice questions tests in Moodle to assess practical topics considering there should be a:

- special focus on technical issues analyzing why did they happen;
- clear definition of the procedures in order to complete, to improve, and to delete errors in the database of questions;
- definition of the procedures to monitor the workflow;
- focus on meeting all the forecasted technical needs before starting the project;
- clear definition of the way to extend the project;
- understanding of how the behavior of internal stakeholders influence the project success.

One of the main issues during the project development was related with one identified vital factor in any project management - the teamwork. It was difficult to achieve the commitment of some members of the teamwork with the project, jeopardizing the desired quality of the final results.

ISCAP is a public Polytechnic University. Consequently, their workers are governmental workers. The careers definitions and all the hierarchies at governmental institutions as well as all the last 40 years of institutional

culture promotes the lack of responsibility and the absence of consequences to those who do not carry out their tasks. On the other hand it is difficult or impossible to reward those who works hard and are always willing to improve the system. In authors opinion this is one of the reasons for the difficulties with the teamwork.

In the future, it is planned to improve the database of questions two-fold: creating different difficulty level for questions, and raise the number of questions in the Moodle database. Doing that, the project can be adequately extended. Firstly, extend the project to all the teachers and students of the same course. Secondly, extend the project to all the degree programs teaching courses that use the spreadsheet to solve management problems. It is also intended to extend the application of assessing practical topics to different courses, such as the use of database management systems.

During this phase of the project two questionnaires were answered by the students in different moments. The analysis of the implications of this new form of assessment from the point of view of the students is an important issue to be developed in a next work.

Like Stöðberg, we “believe that e-assessment will be increasingly used in higher education, (...) as soon as the higher education sector has the confidence to take the plunge” (Stöðberg, 2012, p. 602).

References

- Arvidsson, N., 2009. Exploring Tensions in Projectified Matrix Organisations. *Scandinavian Journal of Management*, Volume 25, pp. 97-107.
- Avison, D., Baskerville, R. & Myers, M., 2001. Controlling Action Research Projects. *Information Technology & People*, 14(1), pp. 28 - 45.
- Babo, R. & Azevedo, A., 2009. *Learning Management Systems usage on Higher Education*. Marrakech, Morocco, Proceedings of the 13th IBIMA Conference - Knowledge Management and Innovation Economies: Analyses & Solutions, pp. 883-889.
- Babo, R. et al., 2012. Differences in Internet and LMS Usage: A Case Study in Higher Education. In: R. Babo & A. Azevedo, eds. *Higher Education Institutions and Learning Management Systems*. Hershey PA: IGI Global, pp. 247-270.
- Baskerville, R. L., 1999. Investigating Information Systems with Action Research. *Communications of the Association for Information Systems*, 2(1), p. Article 19.
- Baskerville, R. L. & Stage, J., 1996. Controlling Prototype Development through Risk Analysis. *MIS Quarterly*, 20(4), pp. 481-504.
- Baskerville, R. & Wood-Harper, A. T., 1998. Diversity in Information Systems Action Research Methods. *European Journal of Information Systems*, 7(2), pp. 99-107.
- Beevers, C. E., Mcguire, G. R., Stirling, G. & Wild, D. G., 1995. Mathematical Ability Assessed by Computer. *Computers Education*, 25(3), pp. 123-132.
- Beringer, C., Jonas, D. & Kock, A., 2013. Behavior of Internal Stakeholders in Project Portfolio Management and its Impact on Success. *International Journal of Project Management*, 31(6), pp. 830-846.
- Bindl, J. & Schuler, J., 1988. Small Steps, Big Reward: Quality Improvement Through Pilot Groups. *Training & Development Journal*, 42(7), pp. 56-58.
- Boticki, I. & Milasinovic, B., 2008. *Knowledge Assessment at the Faculty of Electronical Engineering and Computing*. Cavtat, Croatia, Proceedings of the ITI 2008 30th International Conference on Information Technology Interfaces, pp. 23-26.
- Burrow, M., Evdorides, H., Hallam, B. & Freer-hewish, R., 2005. Developing Formative Assessments for Postgraduate Students in Engineering. *European Journal of Engineering Education*, 30(2), pp. 255-263.
- Ceriolli, M., Ribaudó, M. & Rui, M., 2012. LMS Adoption at the University of Genova: Ten Years After. In: R. Babo & A. Azevedo, eds. *Higher Education Institutions and Learning Management Systems*. Hershey PA: IGI Global, pp. 271-291.
- Dascalu, M. & Bodea, C., 2010. Challenges in Building E-Assessment Services from Project Management Knowledge Perspectives. *International Journal of Global Management Studies Professional*, 2(1), pp. 35-50.
- Folden, R. W., 2012. General Perspective in Learning Management Systems. In: R. Babo & A. Azevedo, eds. *Higher Education Institutions and Learning Management Systems*. Hershey PA: IGI Global, pp. 1-27.
- Fowler, P. & Rifkin, S., 1990. *Technical Report CMU/SEI-90-TR-24 ESD-90-TR-225 - Software Engineering - Process Group Guide*, Carnegie Mellon University: Software Engineering Institute.
- Kruse, C., Tan, T.-T. P., Koesling, A. & Krüger, 2012. Strategies of LMS implementation at German Universities. In: R. Babo & A. Azevedo, eds. *Higher Education Institutions and Learning Management Systems*. Hershey PA: IGI Global, pp. 315-334.
- Llamas, M. et al., 2010. *Use of E-Learning Functionalities: Results of a survey Along Spain*. Madrid, Spain, Proceedings of IEEE EDUCON Education Engineering 2010 - The Future of Global Learning Engineering Education.
- Llamas-Nistal, M., Fernández-Iglesias, M. J., González-Tato, J. & Mikic-Fonte, F. A., 2013. Blended E-Assessment: Migrating Classical Exams to the Digital World. *Computers & Education*, 62(13), pp. 72-87.

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- Lonn, S., Teasley, S. D. & Krumm, A. E., 2011. Who Needs to do What Where?: Using Learning Management Systems on Residential vs. Commuter Campuses. *Computers and Education*, 56(3), pp. 642-649.
- Macapagal, M., 2010. *APCICT Briefing Note No. 7 - ICT Project Management in Theory and Practice*, Incheon City, Republic of Korea: United Nations Asian and Pacific Training Centre for Information.
- Meredith, J. R. & Mantel Jr, S. J., 2011. *Project Management: A Managerial Approach, 8th Edition*. Hoboken, NJ: John Wiley & Sons.
- Omar, A., Kalulu, D. & Alijani, G. S., 2011. Management of Innovative e-Learning Environments. *Academy of Educational Leadership Journal*, 15(3), pp. 37-64.
- PMI, 2013. *What is Project Management?*. [Online] Available at: <http://www.pmi.org/About-Us/About-Us-What-is-Project-Management.aspx> [Accessed 19 07 2013].
- Prakash, L. S. & Saini, D. K., 2012. *E-assessment for E-learning*. Kottayam, Proceedings of the IEEE International Conference on Engineering Education: Innovative Practices and Future Trends (AICERA), 2012.
- Salas-Morera, L. et al., 2012. Effective Use of E-Learning for Improving Students' Skills. In: R. Babo & A. Azevedo, eds. *Higher Education Institutions and Learning Management Systems*. Hershey PA: IGI Global, pp. 292-314.
- Schwalbe, K., 2010. *Information Technology Project Management, Sixth Edition*. Boston, MA: Cengage Learning.
- Stöddberg, U., 2012. A Research Review of E-Assessment. *Assessment & Evaluation in Higher Education*, 37(5), pp. 591-604.
- Triantis, D. & Ventouras, E., 2012. Enhancing Electronic Examinations through Advanced Multiple-Choice Questionnaires. In: R. Babo & A. Azevedo, eds. *Higher Education Institutions and Learning Management Systems*. Hershey PA: IGI Global, pp. 178-198.
- Ventouras, E., Triantis, D., Tsiakas, P. & Stergiopoulos, C., 2010. Comparison of Examination Methods Based on Multiple-Choice Questions and Constructed-Response Using Personal Computers. *Computers & Education*, 54(2), pp. 455-461.
- Wikipedia, 2013. *Project*. [Online] Available at: <http://en.wikipedia.org/wiki/Project> [Accessed 19 July 2012].