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## E-learning platforms supporting the educational effectiveness of distance learning programmes: a comparative study in administrative sciences.

Ani Matei<sup>a</sup>, Catalin Vrabie<sup>b\*</sup>

<sup>a</sup>*Faculty of Public Administration, National School of Political Studies and Public Administration  
Street Povernei, no. 6, sector 1, Code: 010643, Bucharest, Romania*

<sup>b</sup>*Faculty of Public Administration, National School of Political Studies and Public Administration  
Street Povernei, no. 6, sector 1, Code: 010643, Bucharest, Romania*

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### Abstract

Over recent decades, the transformation of education through technology has created a more extensive tool for enhancing the Bologna process for increasing the quality, effectiveness and accessibility of higher education. In this context, literature supports the importance of Web platforms for education, in particular through comparative analysis, focusing on educational effectiveness and promoting quality education. Few studies have integrated the analysis with the economic issues. This paper aims to achieve a comparative study of Web platforms, in terms of raising the effectiveness of distance education, and the economic costs required to implement them. The research methodology is using, for the first time, an adapted version of cost-effectiveness analysis. Empirical research will be carried out on two platforms of e-learning - Learning Management System (LMS) and Moodle - used by our university to support distance education programs. The working hypothesis starts from the fact that open source software is cheaper than that developed internally, even if it does not fully meet the needs of the university.

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### 1. Introduction

E-learning, a term introduced in 1998 by Jay Cross, founder of the Internet Time Group, has become extremely popular. Nowadays, it has become a viable alternative to traditional education methods, so it has been adopted by many universities, especially because of the possibility of continuous training benefits or those of its wide

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\* Corresponding Author: Catalin Vrabie. Tel.: +40-723-689-314  
E-mail address: [cataloi@yahoo.com](mailto:cataloi@yahoo.com)

application in various organizations. Specialized studies, published in the last five years, show a continued increase in the use of e-learning in organizations (Towards Maturity, 2012).

Today the term e-learning has come to be classified as:

- E-learning based on CD: students receive courses on CDs, which can be installed on their computers and they can start learning.
- E-learning based on networks: courses can be accessed via a network (intranet or Internet).

The subject of this article is focused on the second classification.

## 2. Cost-effectiveness analysis in implementing electronic systems in education

The Web potential for e-learning platforms has reached an impressive configuration, with several prestigious universities and institutions shifting to open source solutions for their organization or online courses.

### 2.1. Elements of analysis

In order to assess projects, institutions must appraise the efforts required and measure the expected impact. Efforts should be seen as the infrastructure costs associated with the particular project, its implementation and the running and management of it. On the other hand, the expected impact has two components: the benefits that are expected to arise from the project's implementation and the risks associated with achieving those benefits. To calculate the costs, benefits and risks, agencies can apply NPV methodology in project evaluation. Such an assessment will also show the strengths and weaknesses of the project, allowing the agency to make recommendations to improve project value. The analysis compares the costs related to the preparation, implementation and project management.

### 2.2. Costs

Most estimates take into account only the operational costs of e-learning portals. "Few analysts consider infrastructure development costs or internal transfers. [...] This rigorous and objective analysis, [...] rare" (Brookings, 2001). This gives a distorted picture of cost-effectiveness, because it ignores the costs of preparing and implementing the project. Since e-learning projects require a very high initial investment, this strongly affects the overall profitability of the project. It is therefore important to take into all costs into account, both initial investment and operating expenses.

There are three major categories of cost:

- Domestic investment to shift to computerized databases and information management;
- Costs of building an e-learning portal / implementation costs for open-source solutions;
- Management and maintenance costs of the portal.

2.2.1. *Domestic investment* is often ignored in analyses, although it is likely to be the biggest expense, as most educational services today are still stored on paper (Schuppan, 2009).

The main types of cost will be:

*Hardware:*

- Servers and workstations, peripherals, network and communications infrastructure.

*Software:*

- Computer operating systems, communications software and document management software;
- Software needed for executing a specific task: Database Management, ERP, CRM, etc.

*Data digitization:*

- The transfer of records to computerized databases, which can be a lengthy and costly process.

*Staff:*

- Training - employees will have to acquire operational skills. With newly created departments, some employees will have to transfer and acquire new skills (ECDL, 2012);
- Recruitment - in many cases, existing staff may not be ready to adapt to changes, so there will be a need to recruit new employees;
- Some existing employees, especially those performing routine tasks, may have to be offered compensation to take on new or additional tasks;
- There is a need to increase wages in order to motivate people to accept change (Matei, 2009).

2.2.2. *The cost of building an e-learning portal* is a type of capital investment, usually large (especially for complex portals), however, much lower than the domestic investment detailed above (Meijer, 2011).

*Hardware and software to host the Web site:*

- Servers, server operating software, data transmission / high bandwidth.

*Website design and creation:*

- Even if the work is outsourced, the process requires mobilization of personnel designated to coordinate the development; staff members should also be involved in the testing phase (Baltac, 2008.). All this can lead to an increase in personnel and / or payroll.
- If open source systems are used, such costs are zero.

*Data digitization and integration between systems off-line and on-line:*

- Even if different departments (financial, educational, management) transfer all their information onto computer databases, the site will need many of these databases to be completely useful. In the first stage of implementation, both old and new systems (those on paper and databases) will be used together until all computer platforms can be migrated. Database migration and integration is a difficult and expensive process and often requires hiring external consultants (Janssen, Charalabibis, Kuk and Cresswell, 2011).

2.2.3. *Management and maintenance costs are as follows:*

*Portal maintenance and support:*

- The more complex the portal site, the more employees will be required to handle maintenance and support for the hardware and software used. If these functions are out-sourced, the additional costs must be accounted for (Webster, 2011).

*Updating:*

- Site users expect a much higher frequency of updates than used in traditional methods of service delivery. Information pages will also need to be updated often. This will require more people to work full-time to carry out the updates (Weill & Ross, 2000).

*Modernization and upgrading:*

- The development of IT and the internet is fast: private companies are modernizing their websites every few years (some even faster, depending on the industry); users will have similar expectations from educational portals (Musso, 2000). Educational institutions will need to add bandwidth, new features and faster processing capabilities.

*Security issues:*

- These are more serious in developing countries than in developed countries because of higher rates of hacker activity (Tapscott, 2009). Educational institutions will have to pay special attention to increased security features of web sites.

*Marketing and Advertising:*

- Given that public institutions have a high degree of media-interest, e-learning projects are likely to receive wide media coverage, reducing the need for marketing activities. However, if such projects launch several campaigns, PR will lose its efficacy and there will be a need to develop separate advertising campaigns (MacDermott, 2008). Costs for such campaigns can be quite large.

*2.2.4. Case study: Learning Management System (LMS) vs. Moodle*

Distance Learning Departments that initiate educational programmes sustained by electronic learning platforms must, according to the current regulations (elaborated by the National Council of Academic Accreditation and Evaluation – CNEAA), assure access to the interface for internal and external users, and assume the need for flexibility as a *sine qua non* condition for achieving success in the context of educational programme dynamics. So, Learning Platforms that support the electronic education offered must have all the facilities for integrating the services used in the study environment.

Looking at those aspects means that one of the most important issues is related to the cost of development, implementation and maintenance. We've used annual financial reports in order to find and calculate with the required accuracy, the costs for using two e-learning platforms during 2001 – 2012.

Below we present, in a shortened version, some aspects of these two software platforms:

Table 1. (LMS) vs. Moodle

System	LMS	Moodle
<b>Feature</b>		
<b>period</b>	<b>2001 - 2006</b>	<b>2006 - 2012</b>
<b>Students / classes / teachers</b>	1312 12 24	5755 17 34
<b>Access levels</b>	3 (student, teacher, admin)	3 (student, teacher, admin)
<b>Features</b>	Design/simplicity - 5 Navigability - 4	Design/simplicity - 3 Navigability - 4
<b>Costs</b>		
<b>Inward investment</b>		
Hardware	0 EURO	2500 EURO
Software	0 EURO	400 EURO
Digitizing data	1350 EURO	1350 EURO
Staff	525 EURO*12months*5years	525 EURO*12months*5years
<b>Developing costs</b>		
Hosting	5 EURO*12months*5years	0 EURO
Projection	6000 EURO	0 EURO
Digitization	1350 EURO	1350 EURO
<b>Administration costs</b>		
Maintenance and support	525 EURO*12months*5years	525 EURO*12months*5years
Updating	1000 EURO*2months*5years	0 EURO
Modernization	1000 EURO*2months*5years	0 EURO
Security	400 EURO*5years	400 EURO*5years
Marketing	10 EURO*12months*5years	10 EURO*12months*5years

## Acknowledgements

We can observe from studying Table 1, LMS vs. Moodle that the differences are not significant, but they exist. We can see that the LMS hardware and software costs were zero, because it was the responsibility of the institution's developer but on the other hand Moodle incurred costs because it was necessary to purchase a server for information storage and an operating system, although this eliminated the cost of hosting.

The design also cost zero for the open source software and updating and upgrading are all free as well as the main package.

All other costs were the same because they involved infrastructure investment or HR.

As assumed at the beginning of the analysis, we see that the cost savings exceeded 20,000 euros during the five years of operation of the open-source version; therefore our university will continue to use this solution.

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