

Comparing and Evaluating Open Source E-learning Platforms

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Abstract — Because of the huge development in E-learning and the spread of its open and close source platforms, and the necessity to have the benefit of it in universities and graduate institutes as basic education or supportive of the traditional education, we have to know how to choose the suitable E-learning Platform from available platforms or to adopt it to suit us. In this paper we explained how to evaluate Open source E-learning Platforms and tried to integrate some of them to produce new platform with great capabilities, more flexible and efficient, Also we used metrics like security, performance, support, interoperability, flexibility, easy of using, management, communication tool, administration tools, course delivery tools and content development to evaluate this E-learning Platform. We obtain that there are differences between E-learning Platforms for each metric so we selected the best four (Moodle 1.9, Claroline 1.8.1, Mambo 4.6.1 and Atutor 1.5.4) to integrate it to make a new platform with 97.72 average weights of the metrics while the best Open Source E-learning Platform is 89.4.

Keywords— Comparison, Evaluation, E-learning, Open Sources.

I. INTRODUCTION

No doubt that the network and Internet technology have become more important and produce a lot of application that rapidly developed and spread, the E-learning management application is one of the applications interested by a lot of developer and organization, certainly it is become a new tool in the education system. There are many common terms used in ICT systems like Learning Platform (LP), Content Management System (CMS) and Learning Management System (LMS) which are used to deliver, support learning, content management and manage users' activities; but Learning Content Management Systems (LCMSs) have more function[7]. Many of Open Source E-learning Platforms have recently been spread in Arab world Universities such as Moodle, but the question is how we can choose the appropriate platform to our University or Organization from available platforms or make it suitable. In this study we will answer of these questions.

II. EVALUATION OF OPEN SOURCE E-LEARNING PLATFORMS

The users of E-learning systems, managements, and designers involve in the evaluation of these systems in order to reach the best performance with least cost, evaluation of the system is required at each stage of the system development lifecycle, and it is required if the administration wants to compare available systems to choose the best, even if there are no numbers of alternatives, evaluation of the system will help in

making decisions on its quality, and the needs for improvement [1].

Generally, the steps of evaluation of a system are selecting the evaluation criteria, suitable environment, and correct tools. In this study we used the following Steps to compare and evaluate the E-learning Platform:

- 1) Putting the evaluation and comparison criteria.
- 2) Listing available platforms.
- 3) Choosing harmonized platforms.
- 4) The result of the evaluation and selection Platforms which allow the production of the desired platform.

A.Evaluation and comparison criteria

The following table shows the list of criteria we have used to compare and evaluate the Open Course E-learning Platform.

Table I: evaluation and comparison criteria

No	Category
1.	Security
2.	Performances
3.	Support
4.	Interoperability
5.	Flexibility
6.	Easy of using
7.	Management
8.	Communication tools
9.	Administration tools
10.	Course delivery tools
11.	Content development

We must cover the following technical specifications to merge the better platforms.

- 1) Database: MySQL.
- 2) Programming Language : PHP
- 3) Web server: Apache

B.List of Open Source E-learning Platform

Some of Open Source E-learning Platforms have been selected to be a sample of platforms that have used in this study; table II below shows this list and additional information about its type of database, server and program language [7].

C.Harmonized Platforms

We have removed some Platforms from the available Platforms' list because of its unsuitability with the technical specifications we mentioned above; the platforms are DOTLRN/OPENACS5.1.2 ,LON-CAPA2.5.2 ,MYSOURCEMATRIX 3.14.0 ,OLAT5.2 ,PLONE3.0 ,SAKAI2.3 AND ANAXAGORA-LCMS.

Manuscript received on July, 2013.

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Table II: List of Open Source E-learning Platforms

NAME OF PLATFORM	SYSTEM REQUIREMENTS					
	APPLICATION SERVER	DATABASE	OPERATING SYSTEM	PROGRAMMING LANGUAGE	WEB SERVER	ARABIC LANGUAGE
+CMS 2.0.0	PHP 43.0+	MYSQL 4.1+	ANY	PHP4+	APACHE	
ATUTOR 1.5.4	PHP 43.0+	MYSQL 0.2+	LINUX, MAC	PHP4+	APACHE	YES
CLAROLINE 1.8.1	APACHE	MYSQL	LINUX	PHP	APACHE, IIS	
DOKEOS 1.6.4	APACHE	MYSQL	ANY	PHP, JAVASCRIPT,XML	ANY PHP ENABLE	YES
DOTLRN/OPENACS 5.1.2	APACHE	POSTGRES, ORACLE	UNIX AND LINUX	TCL	AOL SERVER	
DRUPAL 5.3	PHP 4. 3.3+	MYSQL, POSTGRES	ANY	PHP	APACHE, IIS	
ILIAS 3.8.3	APACHE	MYSQL 4.1.X	LINUX, UNIX, SOLARIS	PHP4.4+	APACHE	
LON-CAPA 2.5.2	MOD_PHP	MYSQL	LINUX	JAVASCRIPT	APACHE	
MAMBO 4.6.1	PHP 4. 1.2+	MYSQL	ANY	PHP	APACHE, IIS	
MOODLE 1.9	PHP 4. 3.3+	MYSQL, ORACLE, POSTGRES	ANY	PHP 4.3+	ANY	YES
MY SOURCE MATRIX 3.14.0	APACHE	POSTGRES, ORACLE	ANY	PHP 4.3+	APACHE	
OLAT 5.2	TOMCAT	MYSQL, POSTGRES, MSQL	ANY WITH JVM	JAVA	APACHE	
PLONE 3.0	ZOPE	ZOPE	ANY	PYTHON	APACHE, IIS	
SAKAI 2.3	TOMCAT	MYSQL, ORACLE	UNIX, WINDOWS	JAVA	APACHE	
ANAXAGORA - LCMS	TOMCAT 4	MYSQL 4.1	LINUX, WINDOWS	PHP 4	APACHE	

The following tables show the comparing of the Open Source E-learning Platforms with each other at different evaluation criteria which have many features and could have one of the values : Y (if exists), N (if doesn't exist), and omitted insufficient or limited data[3].

Table III: Comparing of Security's features

FEATURE NAME	+CMS 2.0.0	ATUTOR 1.5.4	CLAROLINE 1.8.1	DOKEOS 1.6.4	DRUPAL 5.3	ILIAS 3.8.3	MAMBO 4.6.1	MOODLE 1.9
AUDIT TRAIL	Y	Y	Y	N	Y	Y	N	Y
EMAIL VERIFICATION	N	Y	Y	Y	Y	Y	Y	Y
GRANULAR PRIVILEGES	Y	Y	Y	Y	Y	Y	Y	Y
LOGIN HISTORY	Y	Y	Y	Y	Y	Y	N	Y
SOME AUTHENTICATION	N	Y	Y	N	N	Y	Y	Y
PROBLEM NOTIFICATION	Y	Y	Y	N	N	Y	N	Y
SANDBOX	N	Y	Y	Y	N	Y	N	Y
SESSION COMMAND MANAGEMENT	N	Y	Y	Y	Y	Y	N	Y
VERSIONING	Y	N	Y	N	Y	Y	N	Y
ADVANCED CACHING	Y	N	Y	N	Y	Y	Y	Y
THE WEIGHT	60	80	100	50	70	100	40	100

Table IV: Comparing of Performance's features

FEATURE NAME	+CMS 2.0.0	ATUTOR 1.5.	CLAROLINE 1.8.	DOKEOS 1.6.	DRUPAL 5.	ILIAS 3.8.3	MAMBO 4.6.1	MOODLE 1.
		4	1	4	3	3.8.3	4.6.1	9
DATABASE REPLICATION	N	N	N	N	N	Y	N	Y
LOAD BALANCING	N	N	N	N	Y	N	N	Y
PAGE CACHING	Y	N	Y	N	Y	Y	Y	Y
STATIC CONTENT EXPORT	N	N	N	Y	N	Y	N	N
THE WEIGHT	25	0	25	25	50	75	25	75

Table V: Comparing of Support's features

FEATURE NAME	+CMS 2.0.0	ATUTOR 1.5.	CLAROLINE 1.8.	DOKEOS 1.6.	DRUPAL 5.	ILIAS 3.8.3	MAMBO 4.6.1	MOODLE 1.9
		4	1	4	3	3.8.3	4.6.1	1.9
CODE SKELETON	Y	Y	Y	Y	Y	Y	N	Y
MANUAL/SUPP/TRAINING	Y	Y	Y	Y	Y	Y	Y	Y
DEVELOP COMMUNITY	Y	Y	Y	Y	Y	Y	Y	Y
ONLINE HELP	N	Y	Y	Y	Y	Y	Y	Y
PLUGGABLE API	Y	Y	Y	Y	Y	Y	Y	Y
PUBLIC FORUM	Y	Y	Y	Y	Y	Y	Y	Y
PUBLIC MAILING LIST	N	Y	Y	N	Y	Y	Y	Y
USERS CONFERENCE	N	Y	Y	Y	Y	Y	Y	Y
THE WEIGHT	62.5	100	100	87.5	100	100	87.5	100

Table VI: Comparing of Interoperability's features

FEATURE NAME	+CMS 2.0.0	ATUTOR 1.5. 4	CLAROLINE 1.8. 1	DOKEOS 1.6. 4	DRUPAL 5. 3	ILIAS 3.8.3	MAMBO 4.6.1	MOODLE 1. 9
CONTENTSyndic.RSS	Y	Y	Y	X	Y	Y	Y	Y
FTP SUPPORT	Y	Y	Y	Y	N	Y	N	Y
ICAL CALENDAR	N	N	Y	N	N	N	N	Y
WAI COMPLIANT	N	Y	Y	N	N	Y	N	Y
WEBDAV SUPPORT	Y	Y	Y	N	N	Y	N	Y
XHTML COMPLIANT	N	Y	Y	N	Y	Y	Y	Y
INSTRSTANDARD COMPLIANT	N	Y	Y	Y	Y	Y	N	Y
THE WEIGHT	42.86	85.71	100	28.57	42.86	85.71	28.57	100

Table VII: Comparing of flexibility's features

FEATURE NAME	+CMS 2.0.0	ATUTOR 1.5. 4	CLAROLINE 1.8. 1	DOKEOS 1.6. 4	DRUPAL 5. 3	ILIAS 3.8.3	MAMBO 4.6.1	MOODLE 1. 9
CGI-MODE SUPPORT	Y	Y	Y	N	Y	Y	N	Y
CONTENT REUSE	Y	Y	Y	Y	N	Y	N	Y
EXTENS.USER PROFILES	Y	Y	Y	Y	Y	Y	N	Y
METADATA SUPPORT	N	Y	Y	Y	Y	Y	N	Y
MULTI-LINGUAL CONTENT	Y	Y	Y	Y	Y	Y	N	Y
MULTI-SITE DEPLOYMENT	Y	Y	Y	Y	Y	N	N	Y
THE WEIGHT	83.33	100	100	83.33	83.33	83.33	0	100

Table VIII: Comparing of Easy of using features

FEATURE NAME	+CMS 2.0.0	ATUTOR 1.5. 4	CLAROLINE 1.8. 1	DOKEOS 1.6. 4	DRUPAL 5. 3	ILIAS 3.8.3	MAMBO 4.6.1	MOODLE 1. 9
ROXIO™ DRAG&DROP CONTENT	Y	Y	Y	N	N	N	N	Y
EMAIL TO DISCUSSION GROUPS	N	Y	Y	Y	N	Y	N	Y
IMAGE RESIZING	Y	Y	Y	Y	N	Y	N	Y
MACRO LANGUAGE	N	Y	Y	N	N	N	Y	N
MASS UPLOAD	Y	Y	Y	N	N	Y	N	Y
SERVER PAGE LANG.	Y	Y	Y	N	Y	Y	N	N
SITE SETUP WIZARD	N	Y	Y	N	N	Y	N	N
SPELL CHECKER	N	N	Y	N	N	N	N	N
STYLE WIZARD	N	Y	Y	N	N	Y	N	Y
SUBSCRIPTIONS	N	Y	Y	Y	N	Y	N	Y
TEMPLATE LANGUAGE	Y	Y	Y	N	N	Y	Y	N
UI THROTTLING	Y	Y	Y	N	N	Y	Y	Y
UNDO	N	Y	Y	Y	N	Y	Y	Y
WYSIWYG EDITOR	Y	Y	Y	Y	N	Y	Y	Y
ZIP ARCHIVES	N	Y	Y	Y	N	Y	N	Y
THE WEIGHT	46.67	93.33	100	40	6.67	80	40	66.67

Table IX: Comparing of Management's features

FEATURE NAME	+CMS 2.0.0	ATUTOR 1.5. 4	CLAROLINE 1.8. 1	DOKEOS 1.6. 4	DRUPAL 5. 3	ILIAS 3.8.3	MAMBO 4.6.1	MOODLE 1. 9
ADVERTISING MANAG.	N	N	N	N	N	N	Y	N
ASSET MANAGEMENT	Y	Y	Y	N	Y	Y	Y	Y
CLIPBOARD BUTTON LOCATED AT	Y	Y	Y	N	N	Y	Y	Y
CONTENT SCHEDULING	Y	Y	Y	Y	N	Y	Y	N
INLINE ADMINISTRATION	Y	Y	Y	Y	Y	Y	Y	Y
ONLINE ADMINISTRATION	Y	Y	Y	Y	Y	Y	Y	Y
PACKAGE DEPLOYMENT	N	Y	Y	Y	N	Y	Y	Y
THEMES (SKINS)	N	Y	Y	Y	Y	N	Y	Y
TRASH	N	Y	Y	N	N	Y	Y	N
WEB STATISTICS	N	Y	Y	Y	Y	Y	Y	Y
WEBSTYLE/TEMPLATE	N	Y	Y	N	Y	Y	Y	Y
THE WEIGHT	54.55	90.91	90.91	54.55	54.55	81.82	100	72.73

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Table X: Comparing of Communication Tools' features

FEATURE NAME	+CMS 2.0.0	ATUTOR 1.5. 4	CLAROLINE 1.8. 1	DOKEOS 1.6. 4	DRUPAL 5. 3	ILIAS 3.8.3	MAMBO 4.6.1	MOODLE 1. 9
BLOG	N	Y	Y	Y	Y	N	Y	Y
CHAT	N	Y	Y	Y	N	Y	N	Y
DISCUSSION GROUPS (FORUM)	N	Y	Y	Y	Y	Y	N	Y
MAIL FORM	Y	Y	Y	Y	N	Y	Y	Y
MYPAGE (DASHBOARD	N	Y	Y	N	N	Y	N	Y
FILE DISTRIBUTION	N	Y	Y	Y	N	Y	N	Y
GROUPWARE	N	Y	Y	Y	N	Y	N	Y
THE WEIGHT	14.29	100	100	85.71	14.29	85.71	28.57	100

Table XI: Comparing of administration Tools features

FEATURE NAME	+CMS 2.0.0	ATUTOR 1.5. 4	CLAROLINE 1.8. 1	DOKEOS 1.6. 4	DRUPAL 5. 3	ILIAS 3.8.3	MAMBO 4.6.1	MOODLE 1. 9
CONTACT MANAGEMENT	N	Y	Y	Y	N	Y	Y	Y
DATA ENTRY	Y	Y	Y	N	N	Y	N	Y
DATABASE REPORTS	Y	Y	Y	Y	N	Y	N	Y
HELPDESK ORGANIZES BUG REPORT	N	Y	Y	N	N	Y	N	Y
HTTP PROXY	N	Y	N	N	N	N	N	N
GUEST BOOK	N	Y	Y	Y	N	Y	N	Y
IN/OUT BOARD	N	Y	Y	N	N	N	N	Y
THE WEIGHT	28.57	100	85.71	42.86	0	71.43	14.29	85.71

Table XII: Comparing of course delivery Tools features

FEATURE NAME	+CMS 2.0.0	ATUTOR 1.5. 4	CLAROLINE 1.8. 1	DOKEOS 1.6. 4	DRUPAL 5. 3	ILIAS 3.8.3	MAMBO 4.6.1	MOODLE 1. 9
DOCUMENT MANAGEMENT	N	Y	Y	Y	N	N	N	Y
EVENTS	N	Y	Y	Y	N	N	N	Y
EVENTS MANAGEMENT	N	Y	Y	Y	N	Y	N	Y
FAQ MANAGEMENT	Y	Y	Y	N	Y	Y	Y	Y
NEWSLETTER	Y	Y	Y	Y	N	Y	N	Y
PRODUCT MANAGEMENT	Y	Y	Y	N	N	Y	N	Y
PROJECT TRACKING	N	Y	Y	N	N	N	N	Y
SEARCH ENGINE	Y	Y	Y	N	Y	Y	Y	Y
TESTS / QUIZZES	N	Y	Y	Y	N	Y	N	Y
TIME TRACKING	N	Y	Y	N	N	Y	N	Y
USER CONTRIBUTIONS	Y	Y	Y	Y	Y	Y	Y	Y
LINK MANAGEMENT	Y	Y	Y	Y	N	Y	Y	Y
THE WEIGHT	50	100	100	58.34	25	75	33.34	100

Table XIII: Comparing of Development Content features

FEATURE NAME	+CMS 2.0.0	ATUTOR 1.5. 4	CLAROLINE 1.8. 1	DOKEOS 1.6. 4	DRUPAL 5. 3	ILIAS 3.8.3	MAMBO 4.6.1	MOODLE 1. 9
GRAPHS AND CHARTS	N	Y	Y	Y	N	N	N	Y
JOB POSTINGS	N	Y	N	N	N	N	N	Y
PHOTO GALLERY	Y	Y	Y	N	N	Y	N	Y
SEARCH ENGINE	Y	Y	Y	N	Y	Y	N	Y
SITE MAP	Y	Y	N	Y	N	Y	X	N
SYNDIC.CONTENT RSS	Y	Y	Y	N	Y	Y	Y	Y
THE WEIGHT	66.67	100	66.67	33.34	33.34	66.67	33.34	83.34

D. Comparison and evaluation of Open Source E-learning

E. Platform

The following table shows the compare of the selected platform with each metric and calculate the average of all metrics for each platform to get the total weight as show at figure (2) below; we used this weight to evaluate the platforms with each other and found that the better four Platform are moodle with 89.4%, claroline with 88.0%, atutor with 86.4% and ilias with 82.2%, the figure (1) shows the details of the comparative.

Table XIV: result of comparison of Open Source E-learning Platform with all criteria

Feature name	+CMS 2.0.0	atutor 1.5.4	claroline 1.8.1	dokeos 1.6.4	drupal 5.3	ilias 3.8.3	mambo 4.6.1	moodle 1.9
Security	60.0	80.0	100.0	50.0	70.0	100.0	40.0	100.0
Performances	25.0	0.0	25.0	25.0	50.0	75.0	25.0	75.0
Support	62.5	100.0	100.0	87.5	100.0	100.0	87.5	100.0
Interoperability	42.9	85.7	100.0	28.6	42.9	85.7	28.6	100.0
Flexibility	83.3	100.0	100.0	83.3	83.3	83.3	0.0	100.0
Easy of Using	46.7	93.3	100.0	40.0	6.7	80.0	40.0	66.7
Management	54.5	90.9	90.9	54.5	54.5	81.8	100.0	72.7
Communication Tools	14.3	100.0	100.0	85.7	14.3	85.7	28.6	100.0
Administration Tools	28.6	100.0	85.7	42.9	0.0	71.4	14.3	85.7
Course Delivery Tools	50.0	100.0	100.0	58.3	25.0	75.0	33.3	100.0
Content Development	66.7	100.0	66.7	33.3	33.3	66.7	33.3	83.3
Total weight	48.6	86.4	88.0	53.6	43.6	82.2	39.1	89.4

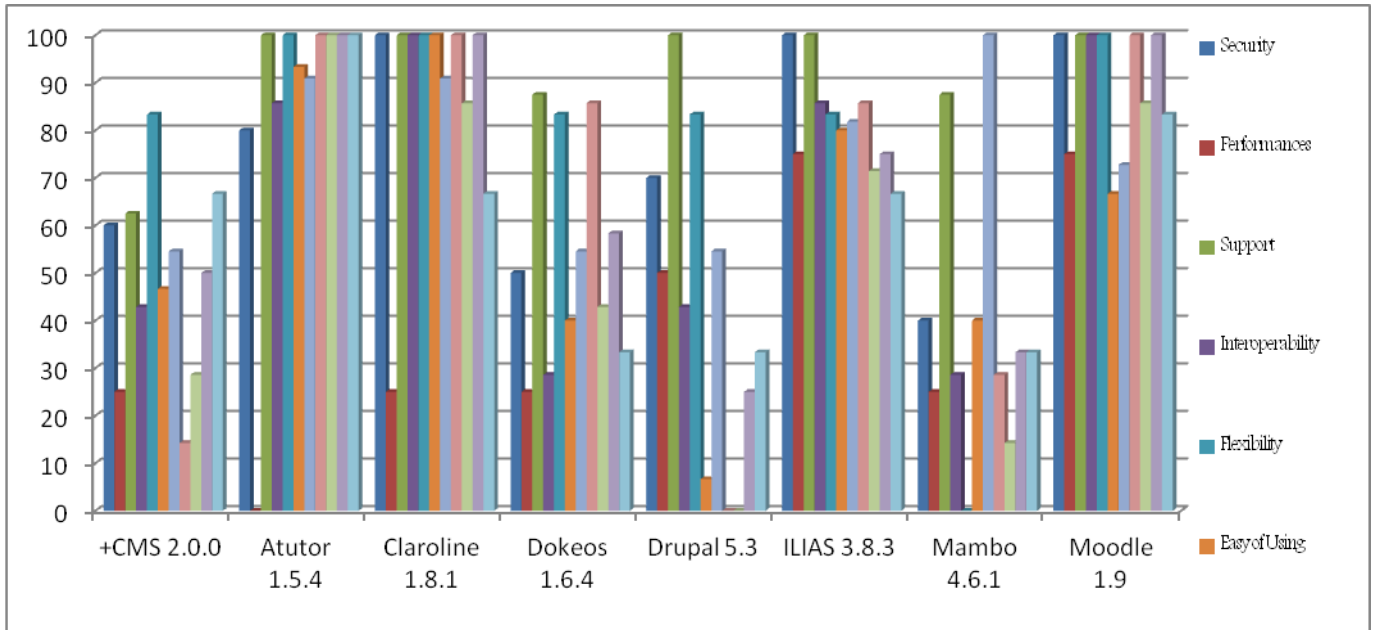


Fig. 1: comparative of Open Source E-learning Platform

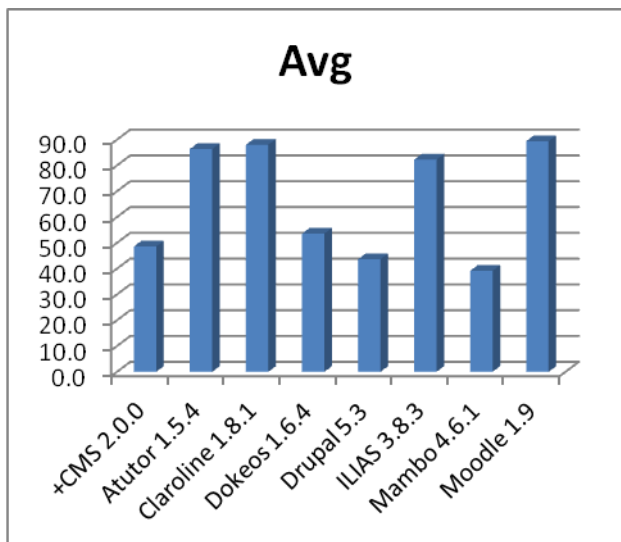


Fig. 2: The average result of Open Source E-learning Platform

III. DISCUSSION AND RESULTS

By concentrating on the better four platforms we found that moodle platform the best of ‘security’, ‘performance’, ‘Support’, ‘interoperability’, ‘flexibility’, ‘communication tool’ and ‘course delivery tools’ metrics, claroline platform

the best of ‘Easy of Using’ metric, mambo platform the best of ‘Management’ metric and atutor platform the best of ‘Administration Tools’ and ‘Content Development’ metrics so after integrate this four platform we got the total weight of the new platform is 97.72 while the best Open Source E-learning Platform is 89.4.

Table XV: integrate the best Open source E-learning Platform

METRICS	OLD PLATFORM	NEW PLATFORM
SECURITY	MOODLE 1.9	100
PERFORMANCES	MOODLE 1.9	75
SUPPORT	MOODLE 1.9	100
INTEROPERABILITY	MOODLE 1.9	100
FLEXIBILITY	MOODLE 1.9	100
EASY OF USING	CLAROLINE 1.8.1	100
MANAGEMENT	MAMBO 4.6.1	100
COMMUNICATION TOOLS	MOODLE 1.9	100
ADMINISTRATION TOOLS	ATUTOR 1.5.4	100
COURSE DELIVERY TOOLS	MOODLE 1.9	100
CONTENT DEVELOPMENT	ATUTOR 1.5.4	100

IV. CONCLUSION

Although there are many Open Source E-learning Platforms in the world and they have some similar function, some of them better than other when we compare them. As a result of this study and after making compare and evaluate our sample of Open Source E-learning Platform with metrics like security, performance, Support, interoperability, flexibility, easy of using, management, communication tool, administration tools, course delivery tools and content development, we got that we can integrate moodle 1.9, claroline 1.8.1, mambo 4.6.1 and atutor 1.5.4 to explore a new platform which have more capabilities.

REFERENCES

1. Raj Jain, "Art of Computer Systems Performance Analysis Techniques For Experimental Design Measurements Simulation And Modeling", Wiley Computer Publishing, John Wiley & Sons, Inc. ISBN: 0471503363 Pub Date: 05/01/91
2. The AMA Handbook of E-Learning: Effective Design, Implementation, and Technology Solutions, Piskurich (ed) ,ISBN:0814407218 , AMACOM © 2003.
3. CMS Matrix, <http://www.cmsmatrix.org/matrix/cms-matrix>
4. M. Scriven, Evaluation Thesaurus (4th ed.), Newbury Park,CA: Sage Publications, 1991.
5. An Evaluation of Open Source E-Learning Platforms Stressing. Adaptation Issues, Sabine Graf and Beate List, Women's Postgraduate College of Internet Technologies, Vienna University of Technology.
6. Evaluation of e-learning platforms, mSysTech, Stand: 02.03.2009, Version 1.00
7. Methods to Evaluate Open Source Learning Platforms
8. Tutor, <http://www.atutor.ca>
9. Dokeos, <http://www.dokeos.com>
10. dotLRN, <http://dotlrn.org>
11. Freestyle Learning, <http://www.freestyle-learning.de>
12. ILIAS, <http://www.ilias.uni-koeln.de>
13. LON-CAPA, <http://www.lon-capa.org>
14. Moodle, <http://moodle.org>
15. OpenACS, <http://openacs.org>
16. OpenUSS, <http://openuss.sourceforge.net/openuss>
17. Sakai, <http://www.sakaiproject.org>
18. Spaghettilearning, <http://www.spaghettilearning.com>

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