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Creating Blended Learning with Virtual Learning Environment: A Comparative Study of Open Source Virtual Learning Software

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Abstract

Virtual learning environment (VLE) provides students a common platform where they can get the subject-wise tutorial, course content, assignments, worksheets, notes, lectures, etc., anywhere, anytime. The slated features, unique characteristics, and availability of basic required features, consorting VLEs as the need of the today in academic sector. Besidesmaking, learning and teaching virtually real, VLEs are also equipped with tremendous, unique and never ending exhaustive features. Present paper is an endeavor to evaluate, compare, and assess the most widely used five open source VLE software tools. The VLE software studied are Chamilo, ILIAS, Forma.LMS, OpenSIS, and Opigno. It compares the features, pre-requisites, basic requirements for any organizational needs, uniqueness, and unison, etc. for each of the VLE. Based on the evaluation, observation, and comparison, the ranking in terms of excellent, very good, good, average was given to each of the five VLEs. The paper also sums up main comparisons among all the five VLEs especially in terms of the variety of the features available in them.

KeyTerms: Virtual learning environment, VLE, Chamilo, ILIAS, Forma.LMS, OpenSIS, Opigno

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Introduction

Education today has moved out of the vicinity of just class room. Not only on the university level or at higher education level, even small institute are devising new methods to teach and learn. Educators conceive and contrive new methods and adopting new technologies with the aim not only to just give tutorials as per the syllabus or the pre decided curriculum but to convulse the students to study with more angst, zeal, and conviction. Breaking the fringe of just lectures and tutorials, many universities initiated other methods like filmed lecture, audio tapes, video lectures, and also interactive discussion on local radio stations and dedicated television channels also.

As internet convulsed the every field, so it agitated the education field also and new brandish style of learning were adopted. Wikipedia is one of the open approaches to learning, where the accuracy and veracity of the article/information reckons on the author who is uploading/feeding the information. Another modus-operandi which was crafted with the proliferation of Internet was e-learning and customised learning based on the individual choice/subject/syllabus/curriculum, etc.

Massive open online courses (MOOC) is one of the style of e-learning which was first introduced in 2008, but gradually cognate and became popular by 2012. MOOC has no classroom restriction, allows anyone to enrol, uses social media and even have loosely structured courses which facilitate learner course environment. But they all are the open ended style of education and learning. Another form of learning which emerged beside and abreast present day are virtual learning.

Need of Virtual Learning Environment (VLE)

Virtual Learning (VL) is often correlated with e-learning, online learning, and distance learning. Several definitions are available which epitomise the aberration and equivalence with each other.

Some define that online, web-based, and e-learning are interchangeable terms when learning environment are described. Some stress that a course can be visualised as program of instruction, whereas program is referred as pluralised version of many courses[1]. VLE is not as virtual, but it is an oxymoron as it is blended learning education system. As it is known that present education system is not limited to class room teaching, and also as per the present curriculum and modules, it is required that students should get more practical exposure and not just theoretical lectures.To fulfil the present desideratum, it is obligatory that dedicated software should be implemented to facilitate students with many other features. For this virtual learning environments are the best solution. Arora and Lihitkar[2] in their paper stressed on the need of virtual learning software for library and information science field. Many foreign universities adopted these software, but Indian universities are gradually understanding their need and vexing it on their online websites.To create such virtual learning experience, various commercial and open access VL software are available today. Both commercial and open source software fulfil the basic structural requirement for any VLE. Some commercial and open source software fulfil the basic structural requirement for any VLE. Some of the commercially available VL software are:

- Blackborad
- Grovo
- Torch LMS
- Travitor LMS
- EZ LCMS
- WebCT
- Quest Track
- Matrix LMS
- Latitude Learning
- Easy Campus, etc.

The features and facilities provided by many of the commercial VL software are same as in many of the open access VL software. Some of the open access VL software available are:

- ATutor
- Claroline
- Chamilo
- Moodle
- Dokeos
- E-Front, etc.

Literature Review

Several studies been carried out in the past which not only give comparative data, but also evaluate the software and give allusive description of various available sources. Suri and Schuhmacher[3] carried out a study and compared two open source software Sakai and MOODLE with commercially available software Blackboard. His study was based on the feedback of six interviewees who gave their views that they liked the simple interface of Sakai and its Web 2.0 tools, but it did not have the functionality to compete at the same level as Blackboard. Some of them viewed that with improved functionality, modality and architecture, Sakai could become highly competitive. Some of them were dissatisfied with many aspects of Blackboard, it was seen as the preferred system. Bri et al.[4] technically studied various learning management software. They studied features of software, Blackboard, WebCT, MOODLE, Sakai with the features like uploading, sharing of documents, content creation, HTML, online discussions, grade discussions / participation, student peer review, online quizzes/surveys, etc. They conclude that virtual learning environments are the future in the academic field, not only at high education, but also at secondary education, where they are being introduced. They also studied about virtual learning platforms in the Spanish universities and observed that the most used platform is MOODLE. They graphically depicted their study and also give performance wise evaluation. Lihitkar and Arora[5] studied four open source software ATutor, Claroline, Dokeos, and EFront. They studied the licensing, downloading, installation, and also various features of each software. They gave comparative data and gave points to each software based on the application and features statistics. They observed that more than 40 languages are supported by eFront. They gave some interesting facts that eFront and ATutor can translate even in Hindi language.

Objectives

Present study endeavours to compare the five open source VL software. Its major objectives lie to find the most stable current version of each software. It compares the software for creating E-learning environment based on the predetermined parameters. It finds out and ranks the more user friendly open source software based on the comparative study. It also offers suggestions or guidelines for creating virtual learning environment for LIS education with the Indian scenario of education and curriculum.

Methodology

Though several studies are available which even does the comparative evaluation, but no such study was found which compared open source VL software, their comparison, evaluation, and ranking. Present study was carried out with these stated objectives. For carrying out such study five open source virtual learning environment software were downloaded. All the software were compared and evaluated based on the same criteria and pre-determined parameters. The criteria was centralised around the students specified and preferred requirements, functionalities, pre-requisite, user-friendliness, etc. for each individual software and also all were tested on a common evaluated standards, compared, and ranking was given to each of the VLE software.

Scope And Limitations

The study took only open source software, no closed type or commercial VL software been considered. There are many open source software available, the study evaluated and compared the five most widely used open source type VL software. The result and evaluation unconditionally surrounds on individual's way of handling any VL software and also perceive and observe how easy it is to customize and avail the flexibility of each of the software. Every VL software was evaluated on a common and pre-determined criterion, and a common and similar procedure was followed to rank it. For the present study only open source software which are used to create virtual learning experience by LIS departments/institutions/organizations were considered. The open source virtual learning software considered for present study are Chamilo,ILIAS,Forma.lms, Opigno, and OpenSIS.

Selected Features

For testing the various stated features and for comparing, evaluating, and ranking the selected features, all the five software were downloaded. The basic requirements as an administrator like creation of course, addition of materials, chapters, creation of users' account, managing users (students, professors, guest) accounts were tried, initial comparison done among each other as an individual user at the client end and also verification of each feature available and claimed. The ease, comfort, reachability, and accessibility as a user was considered as prime and significant.

❑ Chamilo

Chamilo is one of the easiest and simpler VL software developed by Chamilo community focusing on ease of use, re-usability, collaboration, and sharing. The developer's aim is to make the software tool as invisible as possible to learners but as useful as possible to teachers. Launched in January 2010 by the community of Dokeos (another VL software), is presently running in 1.9.10 version. Some of the basic features of Chamilo[6] VL software are:

- SCORM compatibility
- Compliance to accessibility standard WAI/WCAG AAA level
- Adaptive interface and compatibility with mobile devices
- Central management portal with multi-institutions mode
- Standard features like course creation, student tracking and management system, material uploading, etc.
- Social networking features
- SMS sending plugin
- Availability in many languages and translations even to Japanese, Chinese and Vietnamese
- API interface for mobile phone apps to get messages data securely
- Easy web panel installation

Fig. 1 shows the installed home screen of Chamilo software. The administrator can create the basic courses, can upload content, and also can assign rights to as per the role of users. In Fig. 2, a course is created with the name BLIS. Once the course is created, the administrator can add course description, submit papers, add a forum, and also can enroll students to the course.

Fig. 1: User Preferred Home Screen of Chamilo

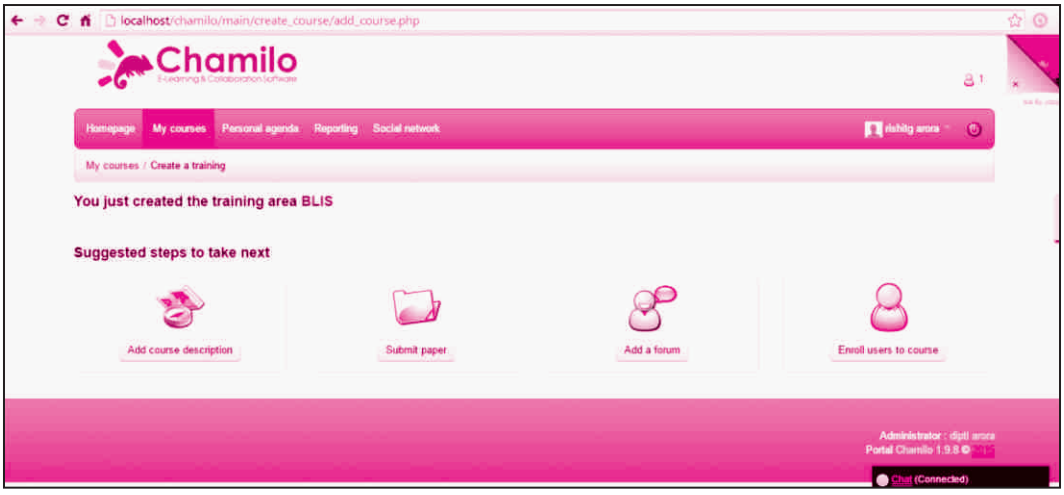

Fig. 2: Course Creation with Basic Features in Chamilo

ILIAS

ILIAS is SCORM compliant has a stable release with the version 4.4.5 in September 2014. ILIAS[7] is a German name which stands for IntegriertesLern-, Informations- und Arbeitskooperations-System with the English abbreviation as Integrated Learning, Information and Work Cooperation System. ILIAS was developed with the objective to offer a flexible environment for learning and working with online integrated tools. ILIAS can act as a library which provides learning materials and contents like any repository. With this feature ILIAS is just not bounded as a locked warehouse but seems like as an open knowledge platform where content can even be accessed by non-registered users too. The basic content, material, courses can come as a part of repository while the individual workspace acts a personal desktop. Its basic features are:

- Personalised desktop
- Course material creation and management
- Bibliography, blog, data collection, discussion forms, etc.
- ILIAS page editor, e-Portfolio, calendar, mail
- Learning module HTML, ILIAS, and SCORM
- Progress tracker, reporting and statistics
- Plugins, portfolio/search
- Survey, tagging, test pool, scoring
- User administration, usability, user Interface
- Personal profile settings like password and system language
- Bookmark management
- Personal notes
- External web feeds
- Internal news, etc.

Fig. 3 shows the installed ILIAS software home screen.

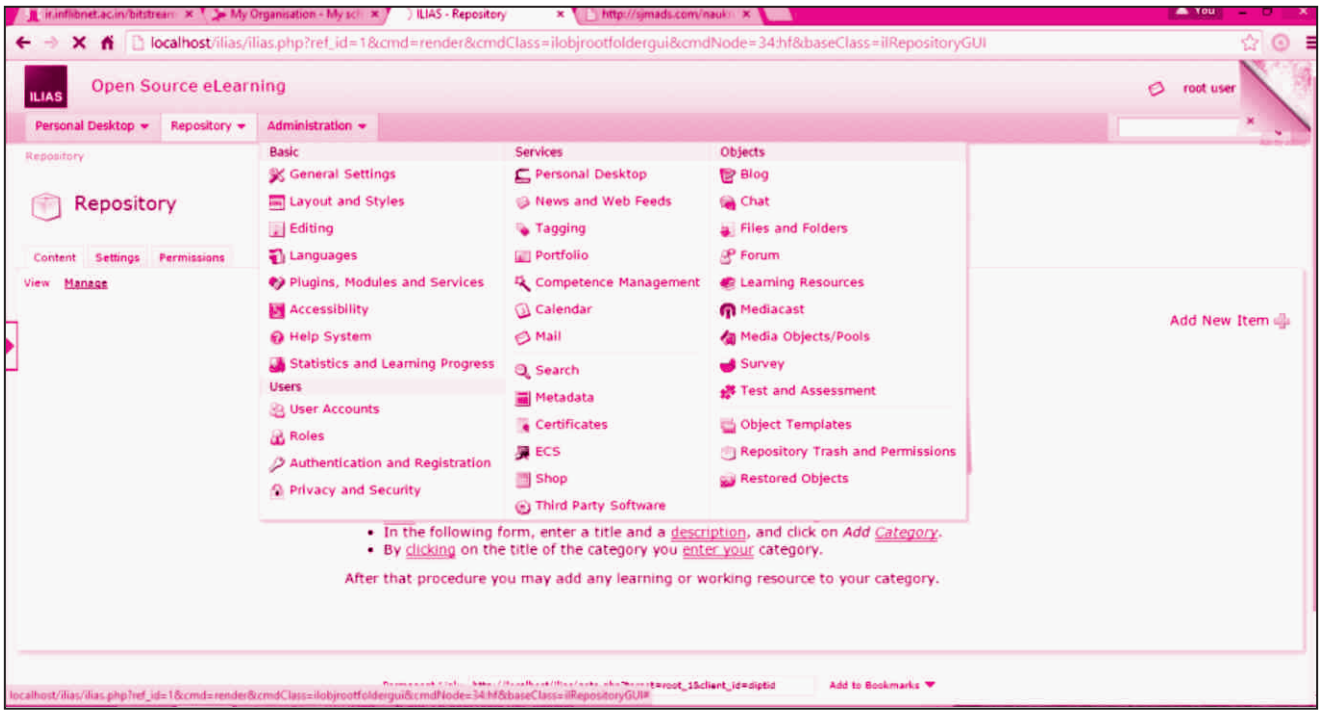

Fig.3: Administrator Mode Home Screen of ILIAS

FORMA.LMS

Born in 2012, and based on a network of companies that support it, FormaLms[8] is another virtual learning platform which is also used to manage and deliver online training courses. It is focused on corporate training needs, rather than on academic needs. It is originated from earlier existing Docebo (another VL software)with the efforts of many partners including Elearnit, Joint Tech, Purple Network, etc. who believed in the possibility of creating a new product centralized on companies which are interested for a powerful, customizable and scalable application to have control. Fig 4 shows the home screen of installed and customised Forma. LMS VLE software.

This virtual learning software is corporate oriented, therefore its features focus on the Teacher role and to the administration of courses and users. Some of its main features are:

- Usable interface for engaging user experience
- Packed with e-learning features like managing course, learning and collaboration
- User management flexibility to organize users in unlimited groups and in customizable fields
- Report generation, email scheduling

- Dynamic PDF certificate generation
- Ability to manage classroom courses, student presence, locations, calendars, etc.

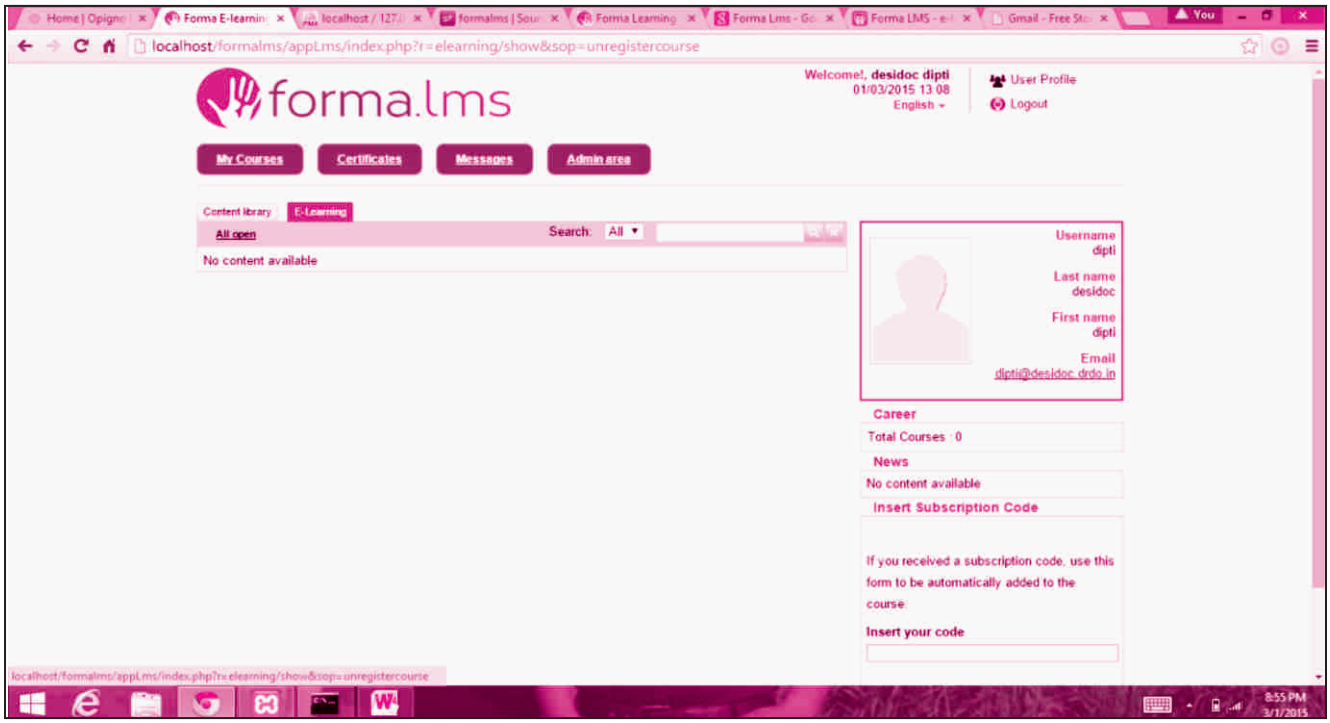

Fig. 4: Home Screen of Installed and Customised Forma.LMS VLE Software

❑ Opigno

Opigno[9] is an initiative to create VL platform based on Drupal. It is SCORM compliant and presently running in its 1.17 version released in December 2014. It facilitates users with their respective roles such as, Administrator, student manager, forum administrator, forum moderator, manager, teacher, coach, and student. Maximum rights are given to Administrator. Fig 5 shows the home screen of Opigno VLE software. Opigno also offer a special feature of group visibility. Its main menu has following tabs:

- Home
- Training catalogue
- Forum
- Calendar
- My achievement
- Messages
- Administration

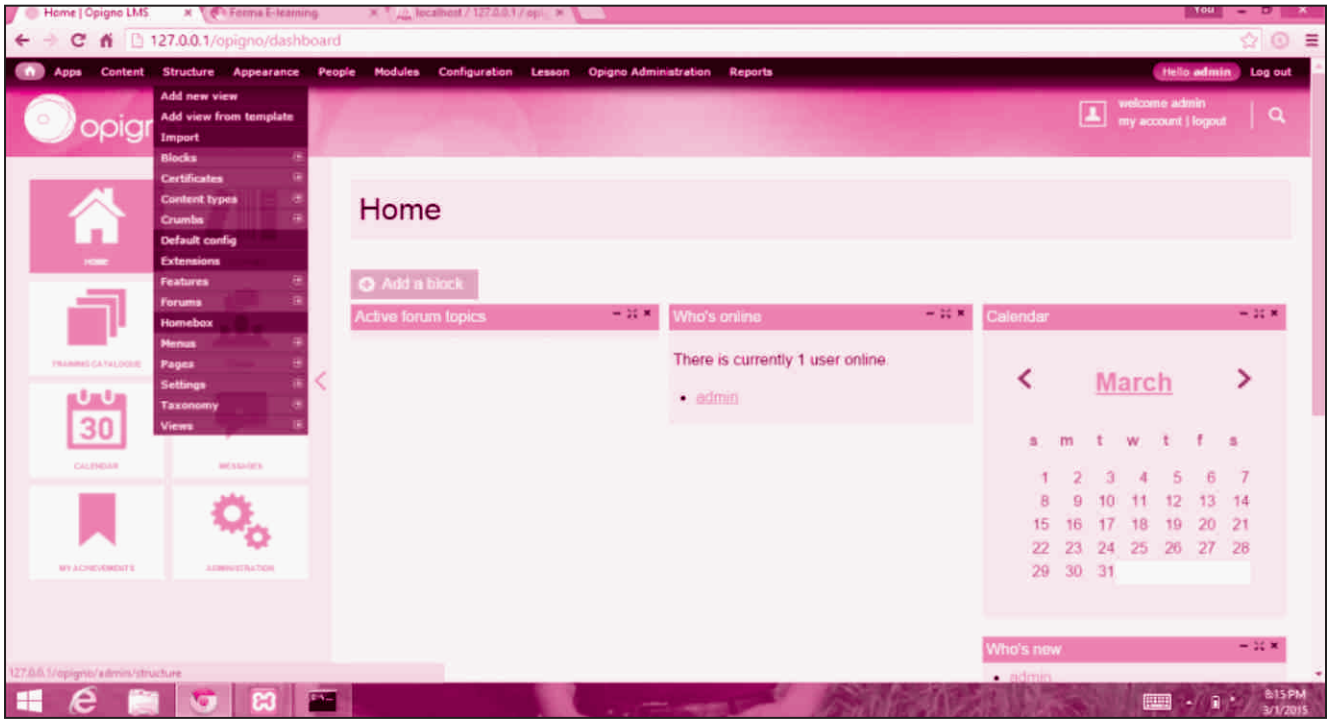

Fig. 5: Home Screen of Opigno VLE Software

❑ Open SIS

OpenSIS[10] is commercial grade, secure, scalable student information system developed by OS4ED. Developed by the team of experienced consultants and implementation partners it aims to provide turnkey solutions for implementing opnSIS and openIntel. Its methodology include:

- Current state analysis
- Future state analysis
- Application customization
- Data conversion
- Application integration
- User training and support

Fig 6 shows the uncustomised home screen of OpenSIS VLE software. Its website claims as it is the best solution for K-12 schools, trade schools and higher education, hybrid online schools, etc. Its community edition called OpenSISLite includes the core features required to create and run VL environment properly. For getting further features one can have premium version or can upgrade to OpenSIS pro or OpenSIS enterprise. Open SIS Lite version carry the following basic features:

- Content creation, course material uploading
- Goals and progress tracking
- Scheduling, gradebook, reports designing
- Transcripts, health record, attendance, parent portal
- User customisable preferences, security, etc.

Fig. 6: Uncustomised Home Screen of Open SIS VLE Software

Analysis And Interpretation

As there are various open source software available which can create such virtual learning environment, but for the sake of present study, only five such software were selected. The features of each software was studied, including various other parameters were also as a customised user like pre-requisite, ease of downloading and installation, customisation, features accessible to users (students, faculty), searching facilities, platform to run software, associated software requirement, languages available and translated, searching parameters, and most importantly user friendliness. After carrying out such analysis, grading of software been done on the basis of assigned points for each parameter.

❑ Five Virtual Open Source Software (OSS)

Table 1 shows the basic details about each software under study.

Table 1: Selected Open Source Software

OSS	URL	Free downloadable	Developed by	Contact details
Chamilo	https://chamilo.org/	Yes	community of companies, universities and voluntarypeople	info@chamilo.org
Ilias	http://www.ilias.de/	Yes	University of Cologne, Germany	info@ilias.de
Forma.LMS	www.formalms.org/	Yes	Elearning Community	info@ formalms.org
Opigno	https://www.opigno.org/en	Yes	Connect-i	info@capterra.com
OpenSIS	www.opensis.com	Yes	OS4Ed	-

❑ Version of Open Source Software

Table 2: License,Version, Site and Size of the Selected OSS

OSS	License	Version used	Year	Downloaded from	Size (MB)
Chamilo	GNU GPLv3	1.9.10	2015	https://chamilo.org/chamilo-lms/	64.5
Ilias	GNU GPLv2	4.4.6	2014	http://www.ilias.de/docu/	129
Forma.LMS	GNU GPLv2	4.0.5	2014	http://www.formalms.org/	23.8
Opigno	GNU GPLv2	1.17.0	2014	https://www.opigno.org/en/download	35.2
OpenSIS	GNU GPLv2	5.27	2013	http://www.opensis.com/	35.3

Table 2 shows the latest version of software that are available for the use and also gives the information about the year in which the new version, first version released. It also specifies the site address from which the user can download the particular software and other selected details. For the present study, most stable version of the software was chosen and analysed.

❑ Pre-requisite for Installation of OSS

Table 3: Pre-requisite/associated software for installation of selected OSS

OSS	Written in	Recommended Server	Database Support	Recommended Browser	Platform Support	Tested on
Chamilo	PHP	Apache 2+	MySQL 5.1+	Any	Linux,Windows (98, Me, NT4, 2000, XP, VISTA) ,Unix, Mac OS X	Fedora, Mandrake, Red Hat Enterprise Server, CentOS, Ubuntu , Debian,Windows XP, Windows 2000,Mac OS X 10.3
Ilias	PHP	Apache 2.2.x +	MYSQL, Oracle,PostgreSQL, MariaDB	Any	Linux, Windows XP and above, Mac OS X	Windows XP and above, linux
Forma.LMS	PHP	Apache	Multi database support	Any but preferably Mozilla Firefox	Linux, Windows	Windows XP, Windows 2000, Windows 8
Opigno	PHP	Apache	MYSQL	Any	Unix, GNU/Linux, FreeBSD, Windows, Mac OS X	Ubuntu, WindowsXP
OpenSIS	PHP	Apache	MYSQL	Any but preferably Internet Explorer	Linux, Windows XP	Windows XP, Windows 2000, Windows 8

Table 3 shows the pre-requisite requirements for each of the five OSS. It is being observed that Apache is the most widely tested and accepted web server recommended. But ILIAS can work with most current version of the Apache also. Chamilo, Opigno, and OpenSIS support MySQL database, ILIAS can support MYSQL, Oracle, PostgreSQL, MariaDB, whereas Forma.LMS have multi database support.

❑ Languages Included in OSS

Table 4: Total Languages Included in the OSS

OSS	Languages Supported	Points Assigned
Chamilo	40	4
ILIAS	20	2
Forma.LMS	25	2
Opigno	26	2
OpenSIS	49 (with multi language support version)	5

Table 4 shows the number of languages supported by the stated software and are readily available for use. Maximum number that is more than 49 languages are supported by OpenSIS. As per the user requirement, one can choose and change the language according to his convenience while customising the software.

❑ Facilities Provided by VLE

Table 5 shows the comparisons of basic facilities provided by the VLE software under study.

Table 5: Facilities Provided by Selected VLE Software

OSS	Searching/Browsing	Themes	Course Management	Multilingual Support	Test /Assessment	Portfolio	Poll	Survey	File Sharing	Certificate generation	Announcements	Text Editor	Points Gained
Chamilo	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	11
Ilias	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
Forma. LMS	✓	✓	✓	✓	✓	-	-	✓	-	✓	✓	✓	9
Opigno	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
OpenSIS	✓	✓	✓	✓	✓	-	-	-	-	✓	✓	-	7

❑ Features of OSS

Table 6 shows the added features provided by each of the VLE. Though it was little bit cumbersome to validate, still a comparative check was followed and a number is assigned to each of the VLE tool.

Table 6: Common Features of OSS

OSS	SCORM	Support Forum (Student Portal)	Chat	Forum	Newsletter	Authentication (LDAP Support)	Mail	Tagging	Glossary	Quiz	Built-in Authoring Tool	Points Gained
Chamilo	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11
Ilias	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	10
Forma.LMS	✓	✓	-	✓	-	✓	✓	-	-	✓	-	7
Opigno	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	10
OpenSIS	✓	✓	-	-	-	-	✓	-	✓	✓	-	5

❑ Communication Support for the VLE/OSS

Table 7 shows the communications support which each of the software, offer as communication whether personalized or mass.

Table 7: Communication Support for the VLE

OSS	Discussion Board	Audio-Video Conferencing	Blogs	Wikis	Podcasting	Shared White Board	E-portfolios	Social Software	Instant Messaging	Structural Conferencing	Points Gained
Chamilo	-	✓	✓	✓	-	✓	✓	✓	✓	-	7
Ilias	✓	✓	✓	✓	✓	-	✓	✓	✓	-	8
Forma.LMS	-	✓	✓	✓	-	✓	-	-	✓	-	5
Opigno	-	✓	✓	✓	-	-	✓	-	✓	✓	6
OpenSIS	✓	-	✓	✓	-	✓	-	-	✓	-	5

❑ Ranking of Selected OSS

Conjoining all the earlier study, and based on analysis of each of the table, ranking for each of the five VLEs were carried out. Table 8 shows such ranking.

Table 8: Ranking of Selected OSS

Parameters	Open Source Software					
	Points Assigned	Chamilo	ILIAS	Forma. LMS	Opigno	OpenSIS
Operating System						
Windows	5	5	5	5	5	5
Linux	4	4	4	4	4	4
Unix	4	4	-	-	4	-
Mac OS X	3	3	3	-	3	-
Others	2	2	2	-	2	-
Languages						
English and other		4	2	2	2	5
Communication Tools						
		7	8	5	6	5
Learning Objects						
		11	12	9	12	7
Usability						
		5	7	4	5	4
Personalization and Theme Management						
		7	7	5	5	4
Administration and User Support						
		10	10	7	8	6
Total		**61**	**60**	**41**	**55**	**40**

❑ Searching Parameters in the Software

Table 9 shows the number of searching parameters. Maximum points, i.e. 10 points were assigned, if the software offers open search.

Table 9: Total Searching Parameters in the Software

Software	No. of Searching Parameters	Points Assigned
Chamilo	4	4
ILIAS	Open	10
Forma.LMS	4	4
Opigno	Open	10
OpenSIS	4	4

❑ Analysis/Grading of OSS

Table 10 shows the analysis of grading of selected VLE software. Grading is based on the parameters as

1) 60-70 → Excellent 2) 50-60 → Very Good

3) 40-50 → Good 4) Below → 40 Average

Table10: Analysis/Grading of OSS

Software	Points Gained	Excellent	Very Good	Good	Average
Chamilo	61	✓	-	-	-
ILIAS	60	✓	-	-	-
Forma.LMS	41	-	-	✓	-
Opigno	55	-	✓	-	-
OpenSIS	40	-	-	✓	-

Findings And Conclusion

The present study restricted within the analysis of the features of the VLE software under study, ease of customisation, ease of learn and using the VLE software as a faculty, as a students and or how easy for the administrator to choose among all VLEs. They represent rather different perspectives, and have different and complementary goals and strengths and also someway able to achieve the claims contrived. One goal they share is that they are flexible, and can be customised and modified at many levels – including the programming level, since they are open source software. This gives the ultimate flexibility and also offers significant advantages over commercial VLE software.

- All the VLE software are freely available and are under GNU General Public License. This license gives the freedom to design, customize, share and change the software.
- It is observed that to run each of the VLE software, some of the pre-requisite software are required to make sophisticated computational techniques accessible for everyone.
- As observed from Table 4 maximum number that is 49 languages are supported by OpenSIS software. As per the requirement, one can choose and change the language while customizing the software.
- The Opigno developer website have the detailed documentation where each feature and its customization can be found out, but it was observed that ILIAS gives the best documentation manual out of the five VLEs under study.
- Out of the five VLEs under study, Opigno had slight different criteria as users and their roles. It offers eight roles as Administrator, Student Manager, Forum administrator,

Forum moderator, Manager, Teacher, Coach,and Student and at three levels, i.e. platform level, class level, and course level, where as other VLE do not categorise roles and responsibilities at such wide capacities.

- Out of the five VLEs, it was felt and observed that ILIAS offers more commercialized look and also its features can be accessed in one go. Not much efforts were required to check, scroll, or scan what and where.
- Though many of the features were tried on each of the VLE, but out of all Opigno offers most of the customized accessibility, interoperability, and compatibility as far as quiz, audio gallery, video gallery, external app features are concerned. They were found easier to be used in the Opigno software.
- With the present study, it was found that Chamilo and ILIAS can go for large organizations and academic institutes, Opigno and Forma.LMS can best be suited for medium level organisations, and OpenSIS is best suited for school level organisations and small academic institutions.
- One of the unique feature of OpenSIS which was observed with the present study was that it can schedule the input students' requests, and later on can mass schedule them to make adjustments. Its premium version can also be integrated with MOODLE, one of the premium used VLE open source software.
- Out of all the VLEs under study, ILIAS offers the most customizable and easy to use desktop with easy accessible buttons.
- Among all, ILIAS offers most learning content and authoring support like, XML based learning, SCORM, AICC (Aviation Industry CBT Committee) communication protocol compliance, LaTeX support, and also OpenOffice and LibreOffice import compatibility.
- The video conferencing feature of Forma.LMS was easy to use than others and also could be integrated with Adobe Connect, Teleskill, and Big Blue Button, etc.
- Best communication support was observed in ILIAS, where Chamilo only misses the discussion board, and was placed second.
- Navigating each of the available feature, and using and implementing them is found easier in all the software except OpenSIS whose comparative features less matched with other VLEs under study.
- The basic features like course generation, student data creations, assignments, grading, etc. was as similar in all of the VLEs under study.

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