



Open Source Social Technologies for Teaching Computer Programming

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Abstract— An estimated 87% of university students rely on Social Networking Sites (SNSs) in their daily communications, like sharing ideas, events, discussions and social activities. Some universities have adopted open source SNSs as a communication tool for teaching to improve students' academic performance and increases institutional revenues. This paper discusses the benefits of using open source SNSs, especially Elgg, in teaching Computer Programming. It is organized as follows: 1) A literature review to define open education, 2) a review of open source social networking technologies and their effects on education systems, 3) an overview of Elgg pointing out its features and benefits as a social learning engine, 4) a case study of implementing Elgg in teaching Computer Programming course, discussion of results is followed, and finally 5) a conclusion with a recommendation to adopt Elgg as a substitute for learning management systems.

Keywords— Computer Programming, education, E-learning systems, open source, social networks.

I. INTRODUCTION

People use social networking sites as a tool to connect with others around the world. Such tools can be used by institutions and organizations which provide teachers and students with community building capabilities. Specifically, open source SNSs include a lot of features that provide institutions with a tool to enhance learning capabilities. Institutions have adopted open source SNSs as an effective approach to improve students' academic performance where teachers and students can benefit from online services to achieve high level of cooperative learning platform.

The aim of this paper is to show the importance of using open source SNSs, especially Elgg, in teaching Computer Programming course at the department of Computer Science at the University of Balamand. It presents an overview about open source social networking and their effects on education systems. It emphasizes on the most included features that Elgg offers and makes it a right choice to be a good social learning tool for institutions. A questionnaire survey was conducted on teachers and students in order to assess the effectiveness of using Elgg as an open source learning engine.

The results of the survey obviously show a good satisfaction from all participants of using Elgg which offers them all the important features of a learning management system.

II. OPEN SOURCE SOCIAL NETWORKING TECHNOLOGIES AND THEIR EFFECTS

According to GNU project, free software can be defined as “a matter of the users' freedom to run, copy, distribute, study, change and improve the software” [1]. The benefits of open source philosophy are: less expensive, more secure, and easier to fix code bugs [2], [3]. Consequently, the world is moving towards open education by adopting online teaching. Open education is a new social process that can substitute traditional face-to-face class [4] where knowledge and learning materials should be free and open to use by students. By adopting open education, institutions can benefit from a wide range of advantages such as: cost-saving, developing education strategies, increasing collaborations among teachers and students, increased quality, superior performance, and improved functionality [5].

An open source social networking technology is an online site or platform that has a major role of building social relations among people. People use SNSs for a number of purposes: connecting with friends, sharing photos, discussions, activities, ideas, events and interests. In the past few years, institutions have started the implementation of open source SNSs as an online medium to deliver education online for many reasons: cost reducing, vendor dependency and rapid fixing of open source software bugs and problems. Students use some of SNSs in their daily social communication life [6]. Students want systems that place them at the epicenter, rather than being course-focused [7]. According to some academic researches, the greatest benefits of using open source SNSs are in their ability to promote student reflection, engagement, portfolio, and high-level synthesizing activities [8].



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Open source social networking presents many opportunities, which may be exploited by institutions to enhance learning. Furthermore, open source social networking platforms offer a numerous number of positive effects on enhancing the educational process:

- *Increase productivity:* Open source social networking sites allow students to work on projects and assignments online with their colleagues. Also, teachers can communicate with other international teachers and researchers which result in effective products in less time.
- *Cost saving:* Institutions adopt open source social networking platforms to reduce cost of ownership and maintenance. Educational institutions can customize open source technologies to meet their needs.
- *Advanced collaboration:* Open source social networking technologies allow an increasing activity among teachers and students. Students can communicate with other students from their community or other communities, link to resources, and share personal files. Also, teachers can locate expertise, collaborate with other researchers, and expand the range of their professional relationships.
- *Research support:* Open source social networking allows researchers the possibility to support their researches and developments. Researchers can explore their ideas and researches interest with researchers outside of their community.
- *Motivate students and enhance learning opportunities:* Students can build online collaboration to enhance their learning capabilities. They can post, and share their ideas. Also, they can receive feedback from others which allow them to improve and develop their ideas.
- *Creative teaching atmosphere:* Teachers use social networking sites to go beyond the institution walls. In this way, students can achieve high level of motivation and access large amounts of information anytime and anywhere. Moreover, teachers can track their students in an effective learning system.

- *Increase libraries visibilities:* Library in an institution can benefit from open social networking sites to increase their visibility and research assistance. Information grabbing could be much easier when library services are open and convenient for all communities.
- *Fruitful conversations:* Students can engage into online conversations and post comments on the site. Teachers can use such useful information to keep track of their students' activities, interact and give proper help.

III. ELGG

Elgg is an award-winning social networking engine, delivering the building blocks that enable businesses, schools, universities and associations to create their own fully-featured social networks and applications [9]. Elgg has a lot of social features including: Social networking, weblog, bookmark, instant messaging, files repository, access control, tagging, customization, and community building. These features provide an attractive environment that allows students to collaborate in an online learning community.

Elgg provides students with full control over their online profiles where they can maintain their own file gallery, blog, and personal customized templates. Further, Elgg provide its users with a full control over others in the community who can view their content. Wiki add-in component makes Elgg more practical for an academic course community which allows several students to have their own pages with same name.

The below table shows a set of features with their corresponding descriptions that Elgg combines.

TABLE I
ELGG FEATURES AND THEIR CORRESPONDING DESCRIPTIONS

Features	Description
Social Networking	Find, link and share knowledge and resources with others
Weblog	Personal and friends weblogging system which can link to items in repository and shared with others
Bookmark	Bookmark users favorite pages and groups
Instant Messaging	Allow users to carry on conversations and message each others instantly
Files Repository	Include different types of files
Access Control	Powerful access system feature which provides privacy to all users characteristics
Tagging	Search and find other users of similar interest
Customization	Users can customize their own groups and templates
XML-RPC	Use external blogging clients to post to an Elgg site
Community Building	Creating users own communities around shared interests

Elgg has been adopted by different international organizations and institutions: Australian government, British government, New Zealand ministry of education, the World Bank, UNESCO, NASA, Harvard University and many others.

In this paper, a comparison has been made among different social networking sites such as: Elgg, Moodle, Drupal, and Chamilo. The selection of these social networking sites was made based on their popular usage among millions of members. These applications have been used in many institutions as a social networking mean for educational purpose to provide both teachers and students with a motivated framework and cooperative online platform.

TABLE II
COMPARISON OF THE OFFERED FEATURES BY DIFFERENT SOCIAL LEARNING PLATFORMS

	Elgg	Moodle	Drupal	Chamilo
Open Source	Yes	Yes	Yes	Yes
Discussion Forum	Yes	Yes	Yes	Yes
Discussion Management	Yes	Yes	Yes	Yes
Personal File Sharing	Yes	No	No	No
Entire Class Single E-Mailing	No	No	No	Yes
Real-Time Chat	Plug-in	Yes	Plug-in	No
Community Networking	Yes	Yes	Plug-in	Yes
Full Administrative Tools	Yes	No	No	No
Full Course Management	Yes	No	No	Yes
Full Course Delivery Tool	Yes	No	No	Yes
Full Students Tracking	Yes	No	No	Yes
Multiple Institutions Support	Yes	Yes	No	No
Real-Time Notifications	Yes	No	No	No
Create Groups	Yes	No	No	No
Create Pages	Yes	No	No	No
Third-Part Integration	Yes	No	Yes	No
SCORM	No (Yes, with Moodle integration)	Yes	No	Yes



Based on the most included features that Elgg offers, Elgg could be considered as a powerful social network component for higher education institutions to improve student's interaction and flexibility in learning.

IV. CASE STUDY

A. Implementation

In this paper, we have implemented as a social networking platform to create an online community for teaching Computer Programming course in the Department of Computer Science at the University of Balamand – Lebanon. The main goal of adopting Elgg as a social networking platform is to provide teachers and students with a full set of features that are an asset for the educational process. Also, this motivated framework will lead to a cooperative online platform and enhance learning community among students and teachers. Such framework focuses on the on the importance of perceived learning of students and the academic activities in a cooperative learning community. Teachers and students used Elgg as a learning tool to post class materials, projects... They got engaged into class discussions and projects coordination.

B. Survey Questionnaire

Elgg has been adopted as a social networking platform to provide Computer Programming students with an efficient tool to create a collaborative learning community. Teachers used Elgg to communicate with their students, post information, and keep track of their students' online activities. On the other hand, students used such technology for social learning and interaction, build collaboration among others, work on projects and assignments with their colleagues, link to resources, and shared their personal files.

A questionnaire survey was conducted to assess the effectiveness of using Elgg in higher educational institutions as an open source learning platform. The survey covered 5 teachers and 172 students with a total of 177 participants. Teachers/students have given/taken courses using Elgg as a social learning platform over two consecutive semesters in year 2014 where both have previous experiences in using social networking sites such as Facebook, Moodle, and Drupal.

The survey contained questions related to the usefulness of Elgg features. A five-point rating scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used for this purpose.

Questions were asked about features related to people communication, file repository, blogs, customizability, instant messaging, resource publishing, discussions, class interaction, course management, and group collaboration.

C. Discussion of Results

The below table summarizes the Elgg's features with their corresponding number of teachers and students in each rating scale.

TABLE III
 CORRESPONDING ELGG'S FEATURES RATING-POINTS OF THE QUESTIONNAIRE SURVEY

Features	1	2	3	4	5
Customizations	0	0	2	45	131
Discussion Forum	0	0	11	48	118
Discussion Management	0	0	7	72	89
Personal File Sharing	0	0	9	47	121
Entire Class Single E-Mailing	0	0	13	36	128
Instant Messaging	0	0	9	44	124
Blogs	0	0	5	54	118
Resource Publishing	0	0	7	57	113
Full Course Management	0	0	4	58	115
Create Groups	0	0	8	56	103
Create Pages	0	0	9	64	104
More Interaction than Class	0	0	6	46	125
More Group Collaboration	0	0	11	30	136

The overall results show that most participants had an encouraged feedback for using Elgg as an open source for social learning. A positive response was received from students using such a powerful media for social education. The main reason of this positive feedback is that Elgg, as any other social networking site, can be used in their daily communication life to communicate with their colleagues, share news, share personal files, exchange interests, and meet new friends from other communities. In addition, students can use such a tool to collaborate in their classes, get involved into class discussions, share ideas, solve assignments, and projects' coordination.



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Overall, students can benefit from such an interactive environment to improve themselves and communicate with their teachers and remaining colleagues in their daily life and classrooms. Such adoption shows that students have more interests in learning and have achieved better results in their learning progression.

From another side, using Elgg, teachers can reach a high level of collaborative research with other colleagues. Teachers can post materials information related to their courses and keep track of their students. They can collaborate with their students and assist them in their assignments and projects. Generally, teachers can get into enthusiastic learning system with students.

Accordingly, this model will lead to better collaboration and high level of expertise achievement in an enhanced learning educational system. Most teachers and students show interest in using Elgg as a social networking in the educational system. Based on such satisfaction, Elgg should be adopted as an online social learning platform by the remaining departments in the university.

V. CONCLUSION

Many educational institutions and organizations have started the initiative of adopting open source social networking platforms. Elgg, can be used into different ways as an effective class social networking platform that empowers the learning process with a set effective features and facilitate online communications among teachers and students.

In this paper, we have presented a case study of implementing Elgg in teaching Computer Programming course at the University of Balamand.

The results promise that Elgg can be considered as an efficient tool that can be adopted as an open source social networking platform to enhance education. In conclusion, Elgg can improve students' social learning and teachers' satisfactions which can be adopted as a fully-featured substitute for learning management systems.

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