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Open Social Learning Network

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Abstract :
This paper considers the affordances of social networking theories and tools to build new and effective e-learning practices. We argue that "connectivism" (social networking applied to learning and knowledge contexts) can lead to a reconceptualization of learning in which formal and non-formal learning can be integrated as to build a potentially lifelong learning activities to be experienced in "personal learning environments". In order to provide a guide in the design, development and improvement both of personal learning environments and in the related learning activities we provide a knowledge flow model called **Open Social Learning Network** (OSLN) —a hybrid of the LMS and the personal learning environment (PLE)—is proposed as an alternative learning technology environment with the potential to leverage the affordances of the Web to improve learning dramatically and highlighting the stages of learning and the related enabling conditions. The derived model is applied in a possible scenario of formal learning in order to show how the learning process can be designed according to the presented theory.
Keywords: Open Social Learning Network **OSLN**, Learning Theory, Connectivism, Networked Learnin, Collaboration Technologies, Collaborative Learning and Relationship Classification**.**

• INTRODUCTION

Over the last few decades, the quality of education in many educational institutions has declined leading to unacceptable low academic performance, high level of functional illiteracy, growing population of unemployable graduates. Learning never was confined to classrooms. The changing sociotechnical context offers a promise of new opportunities, and the sense that somehow things may be different. Use of the Internet and other emerging technologies is spreading in frequency, time and space. People and organizations wish to use technology to support learning seek theories to frame their understanding and their innovations**.**

A social network is a structure formed by people and by connections between people, with the connections enabling interactions and exchange of information and influence [1][2], (Figure 1) we present first a very brief introduction. The recent emergence of online social networks enabled by social networking software, such as Facebook or Google Plus, resulted in renewed interest in social networks in e-learning research. In brief, the building blocks of social networks are the nodes or actors in the network and the connections between them. Examples include students; instructors; informal learners in an online forum; co-workers in an organization; colleagues on a research team; organizations in an industry or region; members of an academic discipline.

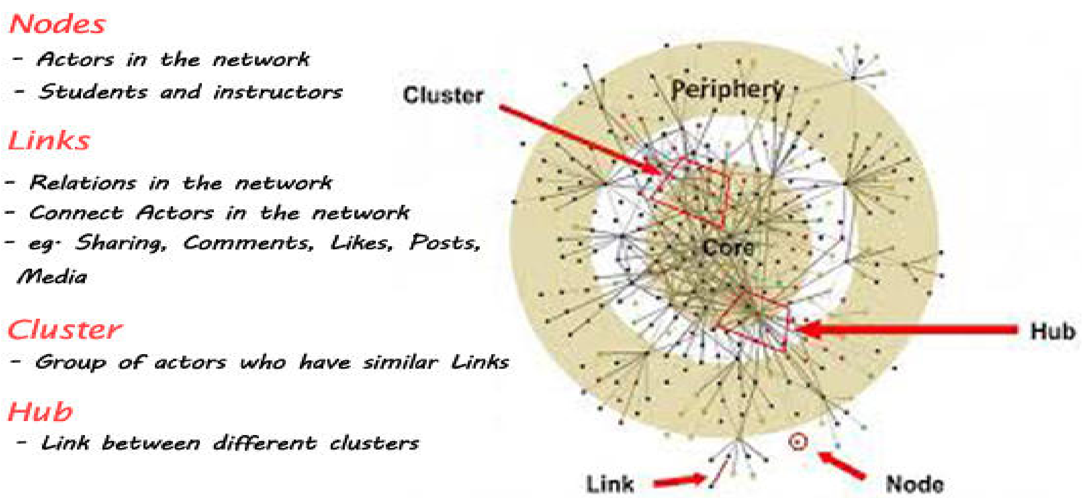

Fig. 1 . Social Network Specification

The connections between actors are known as relations. Actors may be tied by one or many relations, and these may vary from impersonal to intimate, be infrequent or frequent, and optional or required. When actors maintain at least one kind of connection, they are said to be tied. Such ties may be weak – where the interaction is infrequent, unimportant, or incidental; and ties may be strong – where the interaction is based on multiple kinds of interactions, reciprocity in the relationship, and self-disclosure.

The actors and the relations that tie them form networks – patterns of connections between members of a designated set of individuals, such a students in a class, team members on a project, or teachers in a school. Networks can be drawn based on any connection between people, e.g., by asking a general question such as "who do you talk to?" of each member of a given set of people.

Networks may also be drawn based on more specific questions, e.g., "who do you discuss important matters with?" or "who have you worked with in the last week?" developed an integrated multi method and time line approach to analyze evolving network dynamics [3]. This methodology aims to describe a more complete picture of the processes and activities involved when engaging in networked learning, by combining questions as "who talks to whom?", with "what are they talking about?" and "why are they talking as they do?"

Social networking software can be used by instructors to create e-learning experiences. More importantly, learners may use social networking software in ways that affect their learning engagement and learning outcomes even independently, outside the control of the instructors. Online social networks differ from offline social networks because they are not constrained by space. Online social networks can be built very fast because it is easy to establish connections and because it is easy to discover potential connections by using Internet search. Therefore, it is easy for a learner engaged in online social networks to connect to a broad variety of individuals (both other learners and non-learners). Consequently, social networks have a potential to influence learners in profound and unexpected ways.

The view that online and offline social networks can affect learning engagement and outcomes is consistent with a number of well-established theories emphasizing connections between individuals. Social constructivism asserts that learning happens via learners' interactions enabling negotiation of meanings. Social learning theory asserts that that individuals learn by observing others (models) and by copying behaviours perceived to lead to desirable outcomes. The theory of planned behavior suggests that an individual's behaviour is affected by subjective norm— the perceived beliefs of the individual's peers[4]. Nonetheless, learning thus attained may differ from what instructors aim to achieve; for example, social networks may be used to learn strategies for achieving formal success by superficial learning with minimal learner engagement. The better-connected distance learners achieve better outcomes in an online learning environment[2][5].

- **RELATED WORK**

Networked learning is a term introduced around the mid-1990's to refer to ways new communication technologies can influence teaching and learning. By networked learning we mean the use of c ICT to promote collaborative or cooperative connections between learners, their instructors, and learning resources. But, Social interaction is not, and has not historically been, because of limited to the level of online connectivity we have in the past. Communities of practice, personal learning networks and virtual learning environments have been around for years: they just existed without the same technology used today. Such networks began with in-person or mail correspondence and broadened through emails, forums, and chat rooms. Today internet and mobile technologies allow people to be in constant connection with the world at large [6][7].

This change is seen, for example, in virtual learning environments (VLEs). Combining technology and education, VLEs provide comprehensive course management tools and are often used in distance education. Traditionally, VLEs were simplistic and contained a lot of text, simple graphics, and included the lecturer's notes in an eBook format. "Today, we have the ability to create very sophisticated and complex interactive virtual environments," that include sound, video, and animation. These VLEs help students and teachers interact and communicate in ways previously not possible [8].

Users also change their behaviors towards the technology depending on their level of proficiency, personalization, and creativity [9]. Users are incredibly adept at creative applications of technology in ways it was not originally intended for. Educators demonstrate this by creatively using tools in the classroom such as Twitter, Pinterest, QR codes, or Skype that were created for other purposes entirely.

Shirkey observes, “The social uses of our new media tools have been a big surprise, in part because the possibility of these uses wasn’t implicit in the tools themselves. The use of social technology is much less determined by the tool itself. When we use a network, the most important asset we get is access to one another. We want to be connected to one another, one that our use of social media actually engages”. In a classroom environment, educators can use such tools to give their students access to the greater world [10].

Virtual learning environments (VLEs)

Virtual learning environments (VLEs), sometimes called learning management systems or managed learning environment, create a controlled virtual learning space where teachers and students interact, post and submit homework, give and receive feedback from their peers, and link to course resources and information. VLEs typically include curriculum modules, assessment rubrics, discussion boards, external links to related resources, and profile information on participants. Common VLEs in education are Edmodo, Schoology, Blackboard, and Canvas. These platforms help educators create a place that allows students to share their work in a virtual representation of a physical room personalization [8].

Global collaboration

Global collaboration takes such student engagement and learning outside the walls–or virtual walls–of the classroom and into the greater world. Learning communities, such as those established by communities or universities, provide a place for learners to pursue their interests, solve a problem, provide support, get feedback, or otherwise connect with people who share similar passions. Such constructivist interaction can be scaffolded in a classroom environment to allow students to work more independently and even help someone else solve a problem [11].

For example, one Flat Classroom Project called “A Week in the Life…” helps students in Grades 3-5 compare their lives to the lives of students in another country and make connections. The students collaborate to create a multimedia project that is shared online.

Adaptive-based learning

The objective of adaptive based learning(ABL) is to conceive a system which can model the description of pedagogic resources and guide the learner in his formation according to his assets and to the pedagogic objective that is defined by the trainer, This pedagogy objective presents the capacities that the learner must have acquired at the end of the formation activity [12][13]. Adaptive e-Learning systems would be a good solution for better e-Learning[14].System such **Moodle** use adaptive e-learning which creates the best possible learning experience for students by emulating the talents of great educators. This is achieved by using technologies that adapt and shape teaching to the needs of the individual student.

The process of applying rule mining over the Moodle data consists of the same four steps as the general data mining process [15]:

1. **Collect data**. The LMS system is used by students and the usage and interaction information is stored in the database. We are going to use the students’ usage data of the Moodle system.

2. **Preprocess the data**. The data are cleaned and transformed into a mineable format. In order to preprocess the Moodle data we used the MySQL System Tray Monitor and Administrator tools [7] and the Open DB Preprocess task in the Weka Explorer [16].

3. **Apply association rule mining**. The data mining algorithms are applied to discover and summarize knowledge of interest to the teacher.

4. **Interpret**, **evaluate and deploy the results**. The obtained results or model are interpreted and used by the teacher for further actions. The teacher can use the discovered information for making decision about the students and the Moodle activities of thecourse in order to improve the students’ learning[17].

Data preprocessing allows for transforming the original data into a suitable shape to be used by a particular data mining algorithm or framework. So, before applying a data mining algorithm, a number of general data preprocessing tasks has to be addressed (data cleaning, user identification, session identification, path completion, transaction identification, data transformation and enrichment, data integration, data reduction). Data preprocessing of LMS generated data has some specific issues [17]:

1. Moodle and most of the LMS use user authentication (password protection) in which logs have entries identified by users since the users have to log-in, and sessions are already identified since users may also have to log-out. So, we can remove the typical user and session identification tasks of preprocessing data of web-based systems.

2. Moodle and most of the LMSs record the students' usage information not only in log files but also directly in relational databases.

Project-based learning

Project-Based Learning (PBL), a strategy that encourages students to explore a problem through driving questions and authentic experiences, can be an excellent means to a social constructivist end. PBL helps teachers blend technology with hands-on materials to create imaginative and challenging student activities [18].

Teachers can build into each PBL unit Web 2.0 tools such as research and productivity tools, Google apps, mobile computing, or blogs that are designed to help students connect and cooperate. Students can use technology capabilities to collaboratively construct, share, and represent what they have learned [19]. The result is advanced, better prepared students, who have integrated their learning inside the classroom with their real-life experiences everywhere else.

- **THE PROPOSED FRAMEWORK**

  - Proposed Framework

In order to overcome the problem of traditional e-learning or adaptive e-learning, we proposed hybrid framewmork that satisfies the social e-learning framework but with some new features. Agent feature, each agent in the community holds a set of resources such (Profiles, Friendship, Courses and Exams) which are rated by proposed algorithm. Collaborative feature, each user (student, teacher) has own sharing and chatting tool which introduce availability. Semantic Support feature, each student or teacher has supported with intelligent process which suggest the closest friends. (Figure 3) shows proposed open social learning network framework. To measure the quality of framework must first ensure that framework satisfied 5th principles of connectivism. Principles of connectivism are the following:

1. Learning is a process of connecting specialized nodes or information sources.
2. Personality of connections with high level of security.
3. Maintaining Connections is needed to facilitate continual learning and Ability to see connections and recognize patterns.
4. Huge Capacity is needed for successful social learning network.
5. Decision making is itself a learning process. choosing what you learn and who you learned.

An online social network is often composed of users, links, and groups. As in all online social networks, to participate fully in an online social network, a user (often a human being) must register with the site. The user profile collected by the site contains the volunteered information about the users, which could be bogus sometimes. After a user registered in a site, the user can create links to other users in the same social network. Here users form links for various reasons: the users can be real-world acquaintances, or business contacts; they can share some common interests; or they are interested in each other's contents. For a user, the set of users with whom has links are called the contacts of the user.

Popular online social networking sites such as Flickr, Renren and Orkut, rely on an explicit user graph to organize, locate, and share content as well as contacts. For most online social networks (such as Renren net), a user's contacts and his/her profile are often visible to those users who visit the user's account. Some sites (such as LinkedIn) only allow users to view the information (contacts and profile) of its contacts. Most sites enable users to create and join special interest groups. Users can post messages to groups and upload shared content to the group. In many of these sites, links between users are public and can be crawled automatically to capture and study a large fraction of the connected user graph.

3.2 Classification Graph

Nodes which control our framework are actors such (Student, Teacher and Posts or Courses). Every node has one or more relations with other node. The strength of relation is calculated by graph classification techniques. (Figure 2) shows social e-learning concept graph. We suppose case study of 3 students, 3 courses and 3 teachers which I means number as (1,2,..n) and cursors means relations and nodes S means Student, C means Courses and T means Teachers.

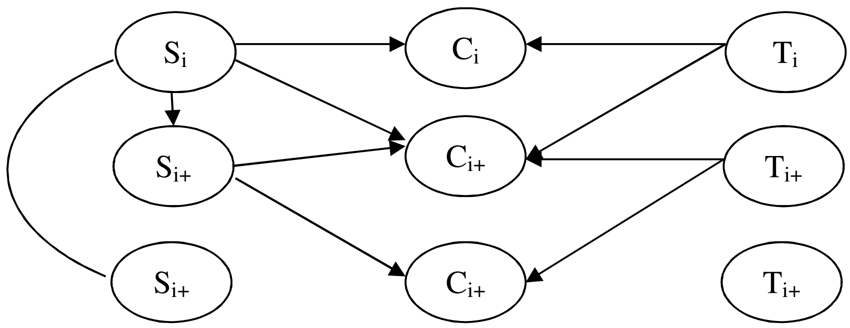

Fig.2 . The Graph of Social E-learning Concept

Every Relationship between different nodes has strength number come from matrix of this relationship. Relations are student's friends and favorite courses. With these relations, system can be determined which friend or course must be suggested first. From figure 2, we can demonstrate the following matrices of relationships in order to classified friends or courses and therefore enhance e-learning.

First, the friend relationship matrix =

Si Si+1

Si
Si+1
Si+2

$$\begin{bmatrix}0 & 1 & 1\\ 1 & 0 & 0\\ 1 & 0 & 0\end{bmatrix}$$

Then from this matrix, we can conclude that Si is friend of all students in our case study and Si+1 will be the first suggested friend to Si+2 because they subscribers in friendship of Si.

First, the favorite courses relationship matrix =

Si Si+1

Ci
Ci+1
Ci+2

$$\begin{bmatrix}1 & 0 & 0\\ 1 & 1 & 0\\ 0 & 1 & 0\end{bmatrix}$$

Then from this matrix, we can conclude that Si+2 has not any courses in our case study and will be the first suggested courses is Ci+1 because Ci+1 subscribers in friendship of Si and Si+1. Algorithm1 show the Relationship Classification Algorithm with overall steps.

Algorithm1 Relationship Classification Algorithm

Input: OSLN G=(S,C) with labeled links, actors and unlabeled friendship

Output: OSLN with labeled friendship

Algorithm:

1. We consider each vertex $ci \in$ C , assign a unique local index

$Dci\ (uj) \in \{1, \cdots, |N(ci)|\}$ to every neighbor $uj \in N(ci)$.

2. In the initial phase, we set

$$\mathrm{R(Ci, Ci+1)} = \mathrm{f(x)} = \begin{cases} 1, & \text{ifCi neighbor and friendship with Ci} + 1 \\ 0, & \text{other wise} \end{cases}$$

3.Repeat

4. t=1-1

3.3 Proposed Algorithms

In this paper, we formulate a social network as a graph $G = (V,)$, in which V is the set of users in the social network, and E is the set of links among users. We assume that the links in the social network can be classified into a set of categories $\mathcal{L} = \{\ell 0, \ell 1, \ell 2, \cdots, \ell k\}$, such as {friends, classmates, officemates, family, others }. In other words, each link $e \in E$ has one of multiple labels $\ell(e) \in \mathcal{L}$. Note that our scheme can also work when each link holds multiple labelings.

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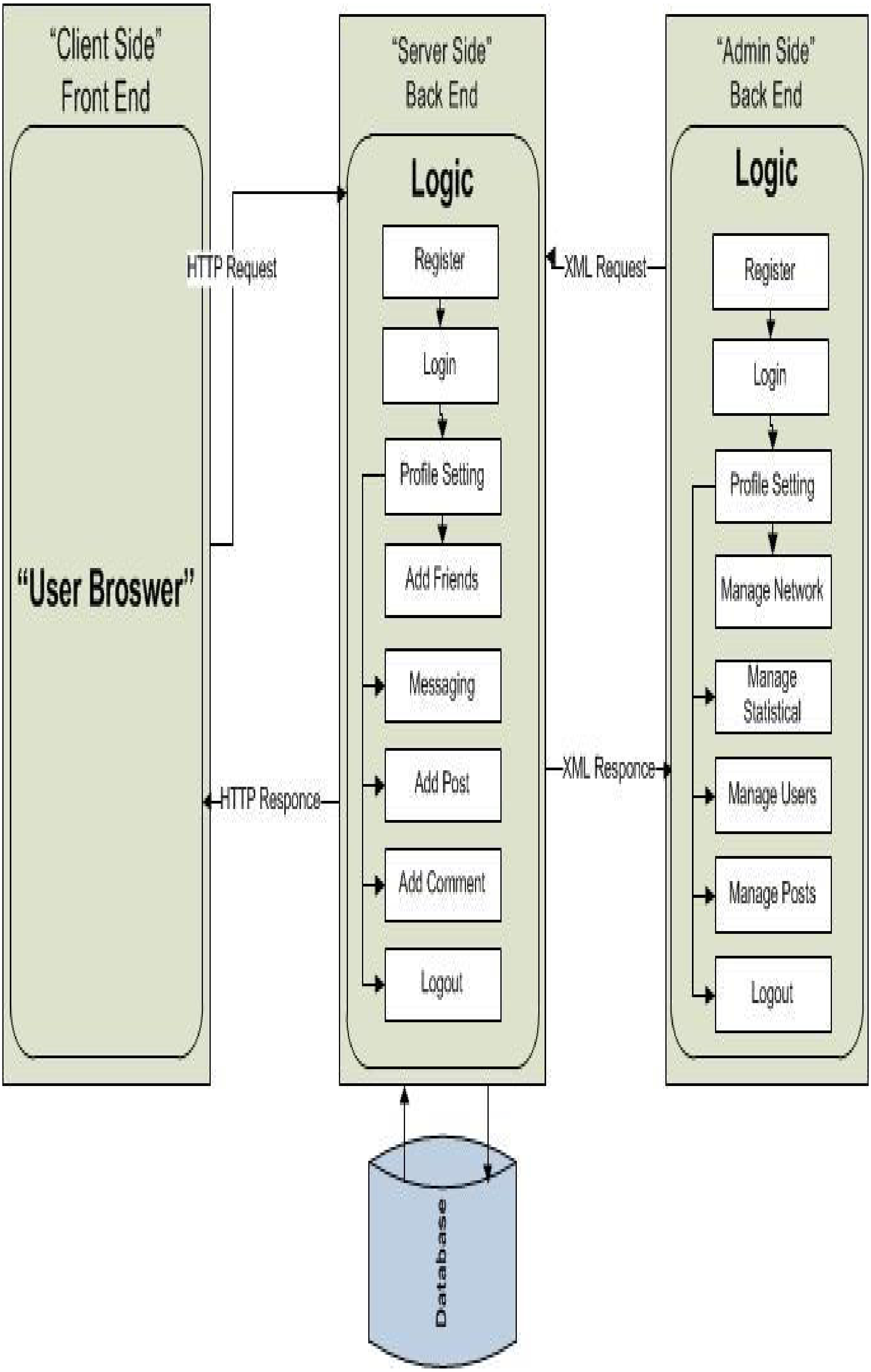

Fig.3. Proposed Framework

3.3.1 UML Specification Diagrams

3.3.1.1 Student use-case Diagram

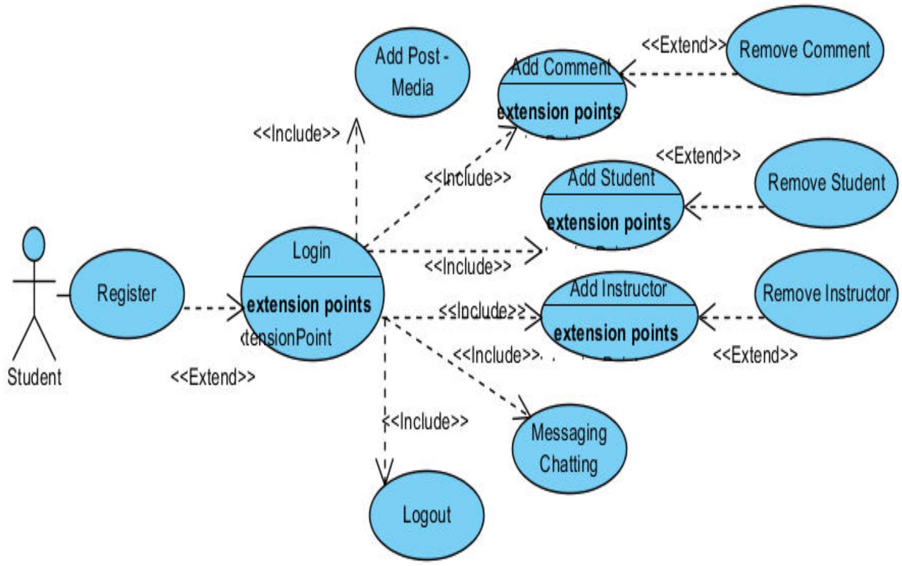

Fig.4 . Student use-case Diagram

3.3.1.2 Instructor use-case Diagram

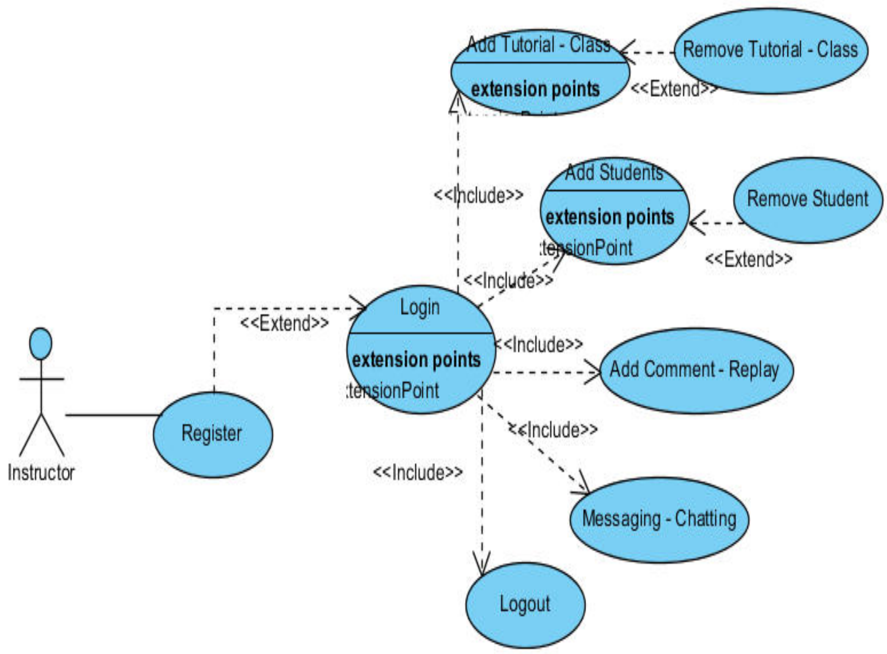

Fig. 5 . Instructor use-case Diagram

3.3.1.3 Student Sequence Diagram

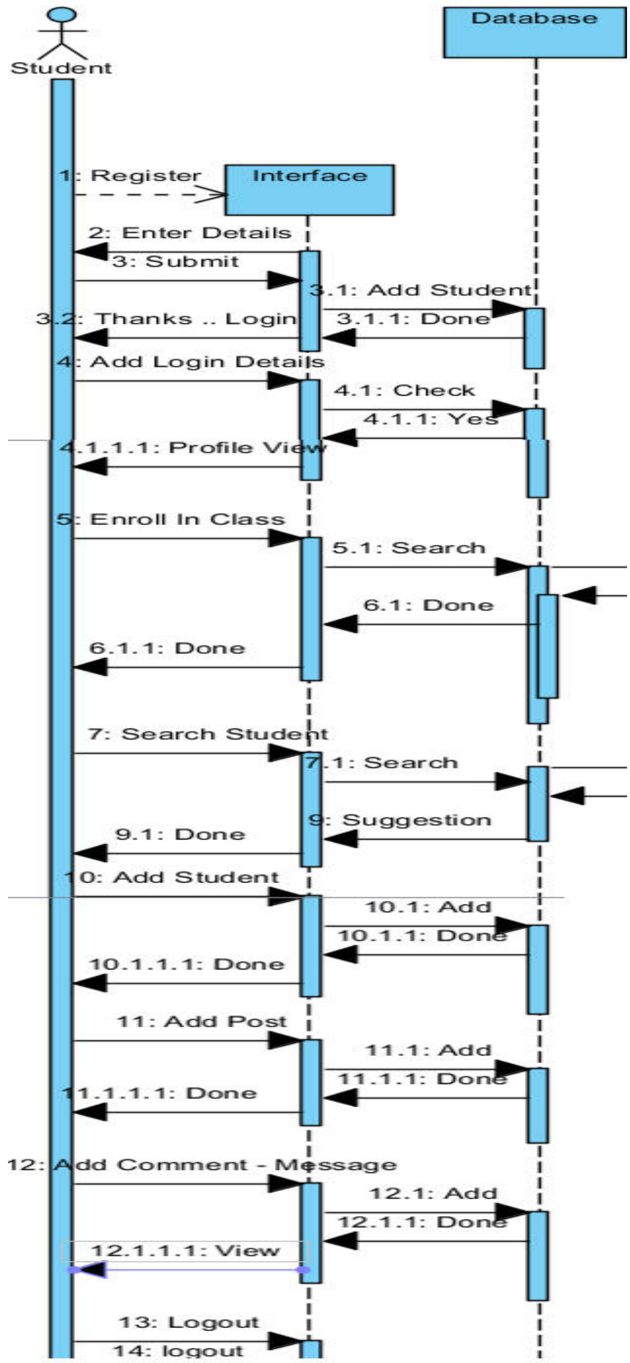

Fig.6. Student Sequence Diagram

3.3.1.4 Instructor Sequence Diagram

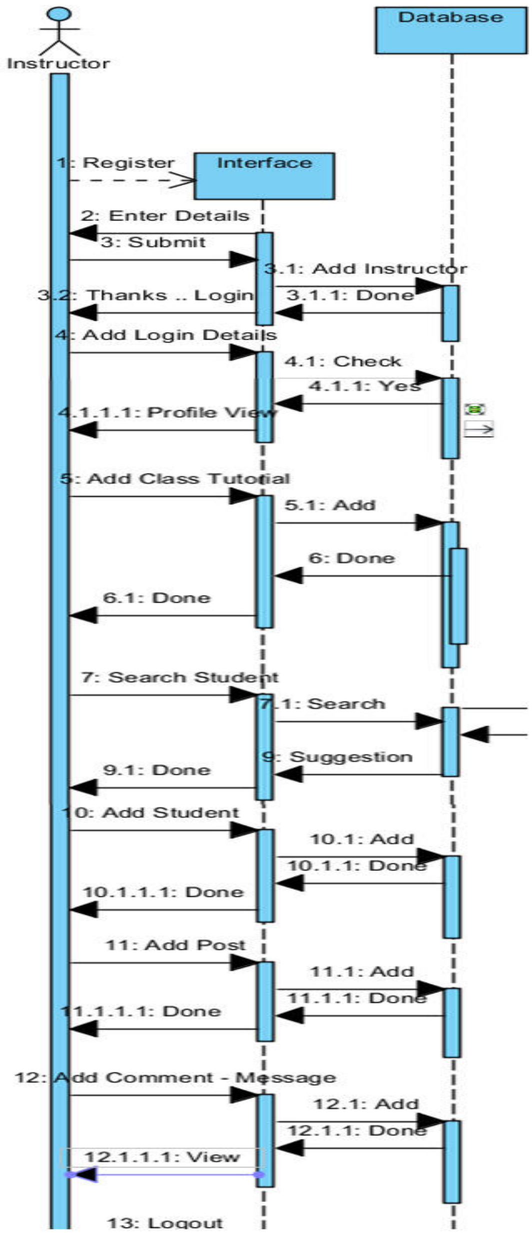

Fig. 7. Instructor Sequence Diagram

3.3.1.5 Class Diagram

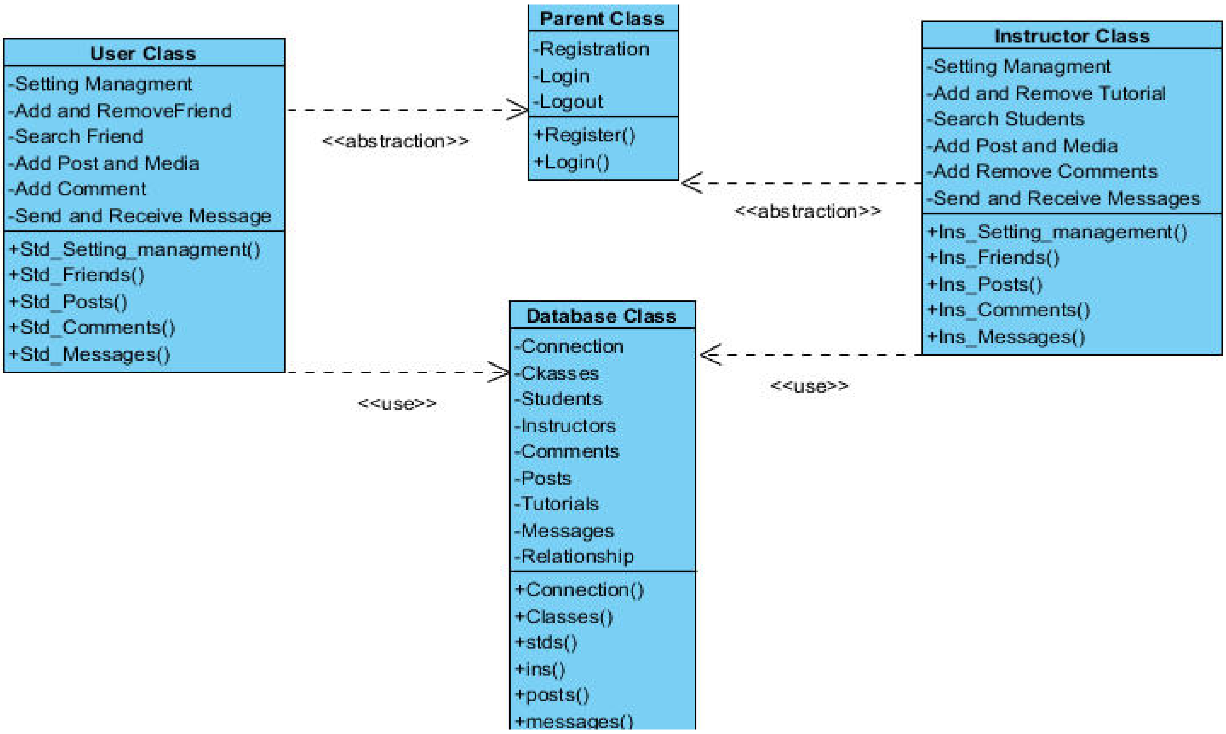

Fig.8. Class Diagram

3.3.2 Entity Relationship Diagram for Database

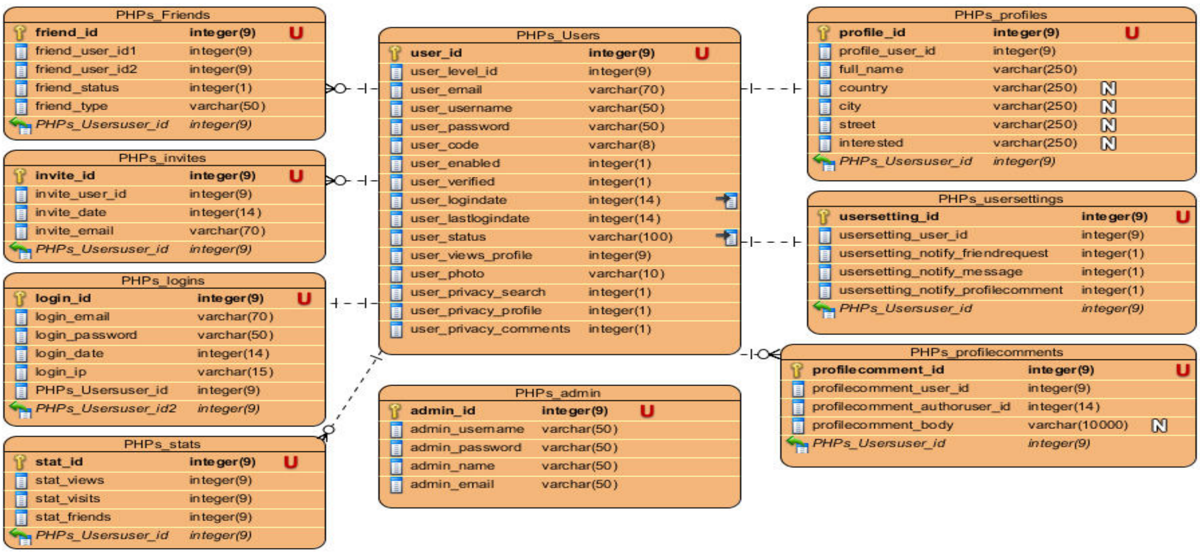

Fig. 9. Entity Relationship Diagram

- **EXPERIMENTS & RESULTS**

4.1 Data Source

We create the data samples of real life online social networks to do evaluation. The first dataset contains 60 online users' profile. Each user profile contains the following features: User ID, Name, College School and the relationship to all his/her contacts. In this experiment, we will only study this relationships, the other labeling are ignored. We model it as a network where each node represents an online user, and the edge between a pair of users denotes that they have contacts with each other.

We conduct a series of experiments in order to evaluate the performance. In particular, we try to find out how the number of rounds t in Algorithm 1, the percentage of labeled links and network size scale with the accuracy of our results.

Definition 1: Throughout the experiment results, we define profile as the ratio of the Setting Completion by summation of its value.

Definition 2: Throughout the experiment results, we define activity as the ratio of the action of user activity like comment, sharing and so on by summation of its value.

Definition 3: Throughout the experiment results, we define performance as the ratio of the summation of profile completion and user activity by two.

Definition 4: Throughout the experiment results, we define accuracy as the product of the performance by 0.9.

4.2 Experiment results

(Table 1) show the relationship between profiles and activity with other parameters like performance, accuracy and security. These Equations used to inform the values in the table. Performance equals Profiles plus Activity and Accuracy equals 90 product Performance. (Figure 10, Figure11 and Figure12) show the charts of accuracy, performance and security respectively.

User ID (Node)	Profiles (Link)	Activity (Link)	Performance	Accuracy	Security
101	97%	80%	89%	80%	40%
102	30%	50%	40%	36%	50%
103	90%	30%	60%	54%	60%
104	99%	90%	95%	86%	45%
...	...	...	...	...	...

Table 1. show the relationship between profiles and activity with other parameters like performance, accuracy and security for one student

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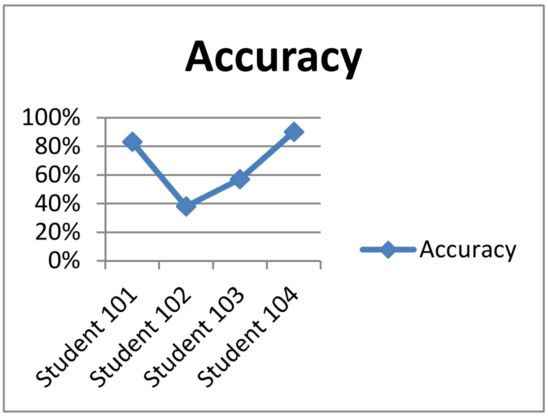

Fig. 10. Accuracy Chart

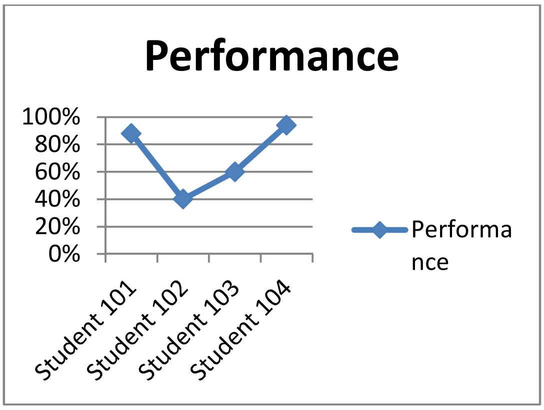

Fig. 11. Performance Chart

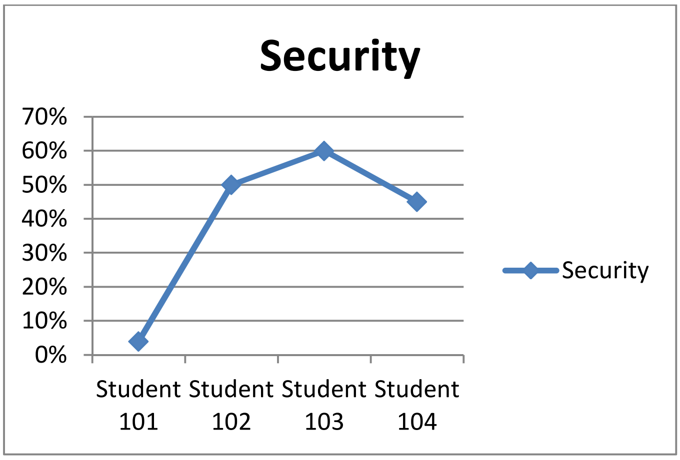

Fig. 12. Security Chart

5. CONCLUSION

In this paper we tried to provide our interpretation of the current social-technical educational system shaped by technologies and practices of the "Knowledge Society" to locate the role of learning and learners in a lifelong perspective. We believe that both users attitudes and available technologies are mature to let us envisage that each network user could easily engage in a lifelong learning personal experience if properly lead by appropriate methodologies and sustained by accordingly designed and developed personal learning environments.

To this extent we provided a model to schematize the knowledge flow occurring during an effective learning experience in a connectivist environment. The purpose of this model is twofold: from one side it can be used by personal learning environment designers as a guideline for checking if all phases and enabling conditions are supported by the integrated tools; on the other side it can be used by instructors or designers to set up learning activities.

In this paper, we proposed efficient and effective framework and algorithm for link classification in online social networks and for maximizing the influence in such networks. We would like to continue to improve the efficiency and efficacy of our methods for link classification and influence maximization problems.

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