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Bridging the Gap between E-Learning and Knowledge Management (KM): An enhancement of Moodle system by applying KM Functions

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ABSTRACT

The world moving towards digitization of knowledge makes E-learning an important issue and prime concern which can be enhanced by combining it with another separate world of knowledge called knowledge management. This research paper introduces E-learning and knowledge management and their relationship. The theoretical aspect illustrates the relationship between Moodle, which is an E-learning system and knowledge management. This part contains analysis of Moodle with respect to knowledge management and categorization of knowledge management into five basic functions provided by Moodle. After the analysis, major knowledge management function- Social Networking Service (SNS) - missing in the Moodle system is identified. The practical part is concerned with the enhancement of the Moodle system by adding SNS in the system; hence to fulfill this objective, Moodle is integrated with Mahara, an open source portfolio system which contains social networking features. After the integration, Moodle has both features of learning management system and user management system. The basic goal behind the integration is to verify the research finding that, "social networking service enhances E-learning system", which helps to further strengthen the relationship between the two systems.

Keywords: *E-learning, Knowledge Management, Moodle, SNS, Mahara, Learning Management System.*

1. INTRODUCTION

Information is collection of data that are processed to be useful. Knowledge is the application of data and information. The way of managing that knowledge is termed as Knowledge Management. Information Technology (IT), education and learning influenced the new term E-learning. The term "E-learning" where E means electronic itself reflects the meaning i.e. learning is done through or delivered or even accessed through electronic technology. Therefore, E-learning comprises all forms of electronically supported learning and teaching activities. Information usually refers to collected data whereas knowledge refers to understanding of that information. So generally it is very difficult to transfer knowledge because to understand the information, we need to understand the meaning of it, which is not an easy task. This is very true since knowledge transfer requires absorption capacity of the brain and as we know that human brain is not same for every individual and it also depends upon their relevant interest. Individual usually catches information far more quickly and efficiently if the subject matter is of his or her interest. The basic goal of E-learning system is to provide information to the desired user. E-learning system can be enhanced by the addition of SNS which contains social networking features.

E-learning system focuses on formal learning. Formal learning is learning that takes place within a teacher-student relationship, such as in a school system. E-

learning system with SNS can contain non-formal learning. Non-formal learning is organized learning outside formal learning system. For example: learning by coming together with people with similar interests and exchanging viewpoints. Non-formal learning supports to collect knowledge via experiences of the users of a certain interest group. "E-learning system provides intercommunication facilities to specific topics whereas KM system provides collaboration with experts and other users on various topics" (Al-Sadi et al. 2008). Large numbers of people simultaneously converge upon the same point of knowledge i.e. group intelligence. Group intelligence emerges from the collaboration and competition of many individuals that helps in consensus decision making or group decision making which is collectively termed as collective intelligence. So more realistic and directly related information can be generated. In E-learning system, information is reluctant to update because of information formality. However, SNS is informal i.e. no hesitation to input or share knowledge which create an active knowledge sharing and store system. For example Moodle, an E-learning system is basically a course management system. In Moodle system, user can create an account, update profile, view course materials and access desired information. Although Moodle is a very popular course management system, it can be enhanced by adding major Knowledge Management (KM) functions like collaboration, identifying experts and knowledge sharing. These functions are achieved by SNS by which user can create a

friends circle, restrict users, create a group on their own, etc. The user plays a major role in E-learning system since it's the user who is benefited by using the system. Therefore different KM functions provided by SNS can be very handy in building and reflecting social networks or social relations among users which is very much essential for effective knowledge sharing.

E-learning system can be integrated with other systems which contains the social networking features. The main focus of the research is to enhance the E-learning system by applying KM function. So, E-learning system can be integrated with the system which has the ability to create a truly collaborative working environment that includes collaboration among different users. So to achieve this, Moodle, an E-learning system is integrated with Mahara, an ePortfolio system. Although Moodle is a very popular Learning Management system (LMS), it still lacks integrating ability to create a truly student-driven ePortfolio system as opposed to class-based assignment submission system. So after the integration truly collaborative working environment can be created as well as Moodle can also enjoy digital portfolios/ePortfolios.

2. BACKGROUND

This section deals about different important areas of this research. The section start with the overall concept of E-learning and Knowledge Management and then the Moodle, an E-learning system in which the KM functions are applied for the enhancement and ends with Mahara, an ePortfolio system which is integrated in Moodle to provide SNS features.

2.1 E-Learning

E-learning can be defined as learning using electronic means: the acquisition of knowledge and skills using electronic technologies such as computer and Internet-based courseware and local and wide area networks. "It encompasses learning accessed via a range of technologies such as internet, WAP (Wireless Application Protocol), SMS (Short Message Service), IP-telephony, multimedia, teleconferencing, videoconferencing and computer-based learning platforms" (Al-Sadi et al. 2008). E-learning is essentially the network-enabled transfer of skills and knowledge. E-learning refers to using electronic applications and processes to learn. E-learning applications and processes include web-based learning, computer-based learning, virtual classrooms and digital collaboration. Content is delivered via internet, intranet/extranet, audio or video tape, satellite TV and CD-ROM. The important common characteristic is that education is delivered through electronic devices or computers. Sammour et al. (2008) has stated some of the main features of E-learning systems. The first feature is the course creation which deals with the creation of the course through the experience of instructors/teachers and excellent knowledge acquired by them. The knowledge

can be pedagogical (i.e. the information gathered from research and experience of expert teachers), psychological (scientific study of human mind) and instructional issues. It can also contain technical questions. The next feature is course management, which is basically related to structuring and sequencing courses. Generally the external information source is addressed. This feature also includes functionality of course or class deployment with reference to the teaching material. Similarly another feature i.e. course administration covers user management, administration of access rights and all aspects of billing. The main purpose of E-learning system is to make the user learn. So in the next feature i.e. learning, practicing and applying, different contents of E-learning is acquired by the user and applied. This phase include methods for the absorption of the contents like communication, interaction and absorption of E-learning contents. It's the student who uses the E-learning contents. Different information posted by the instructor is acquired by the students and that information is converted into knowledge. Therefore another feature which is assessing student performance deals with the evaluation of student done through different means by conducting examination and test. These means help in verifying the potential of the students. In the last feature i.e. feedback, user's responses are taken as a feedback. The user's feedback can be very handy in enhancing the learning process and the E-learning system itself.

Learning process is not a simple process. It can be viewed in different ways. According to Michalca et al. (2008), learning process can be a process for acquiring information or acquiring information and processing experience. It can be further elaborated to acquiring information and processing experience that effect long term change in the consciousness of the learner. It can be the integration process of information and experience and storing into his/her knowledge base. It can be also viewed as the process in which learner selects information and process experience where learner constructs knowledge which may be useful in future. Besides that Michalca et al. (2008) proposed two approaches of E-learning systems i.e. "a technology driven development approach" and "a pedagogical driven development approach". In the former approach, there is a chain starting from learning media to the learner where there are different steps in the middle part of the chain like learning environment, categories of learning and learning objectives, whereas the latter approach is just the reverse of the former one.

2.2 Knowledge Management

According to a dictionary definition, knowledge is "the fact or condition of knowing something with familiarity gained through experience or association; acquaintance with or understanding of a science, art, or technique; the fact or condition of being aware of something" (Merriam-Webster, 2001). There are different levels of refinement to the items related to knowledge, the lowest one being

data, followed by information and knowledge at the highest level. Data consists of discrete, objective facts about events and says nothing about its own importance or relevance. In other words, it can be defined as the collection of unorganized and unprocessed facts. Data is essentially a raw material for the creation of information whereas information can be defined as the aggregated data that is organized in a way that makes it useful for an end-user when making decision (Awad and Ghaziri, 2007). Experience is applied knowledge i.e. “Knowledge develops over time through successful experience and experience leads to expertise” (Awad and Ghaziri, 2007). Knowledge and experience are closely related to each other. Knowledge cannot be stored but we can store information about knowledge. It’s the individual who uses knowledge so human factor is required for processing knowledge and transforming information into knowledge. New knowledge can be created by experiences, observations and drawing rational conclusions.

Knowledge has many features, attributes and dimensions. Knowledge can be documented i.e. captured and stored for further use or undocumented (i.e., personal, group or organizational knowledge that has not been captured). Explicit knowledge, also known as codified knowledge, corresponds to the information and skills that are easily communicated and documented, such as processes,

templates and data that are captured in media. Therefore “explicit knowledge can be retrieved and transmitted more easily than tacit knowledge” (Awad and Ghaziri, 2007) because tacit knowledge is highly personal knowledge that is gained through experience and embedded in the human mind largely influenced by beliefs, individual experiences and jobs. So, it is often difficult to share. Awareness about the existing knowledge is also one of the attributes of knowledge which helps to recognize the importance of existing knowledge. Similarly scope of knowledge refers to an area where the knowledge is applicable, to whom it is accessible and whose activity it supports. Knowledge sharing between different components of the learning system is a critical component of the learning process. Unlike other goods, knowledge is enriched when shared and is not diminished through use. In order for knowledge to be transferred between individuals, it must first be transformed into information (externalized) and then converted from information back to knowledge (internalized) as shown in Figure 1. For example in Moodle, course materials posted by instructors are accessed by students. The tacit knowledge of the instructor is transferred to explicit knowledge i.e. course materials can be information to the students. The accessed information can act as knowledge to students after it is acquired by them.

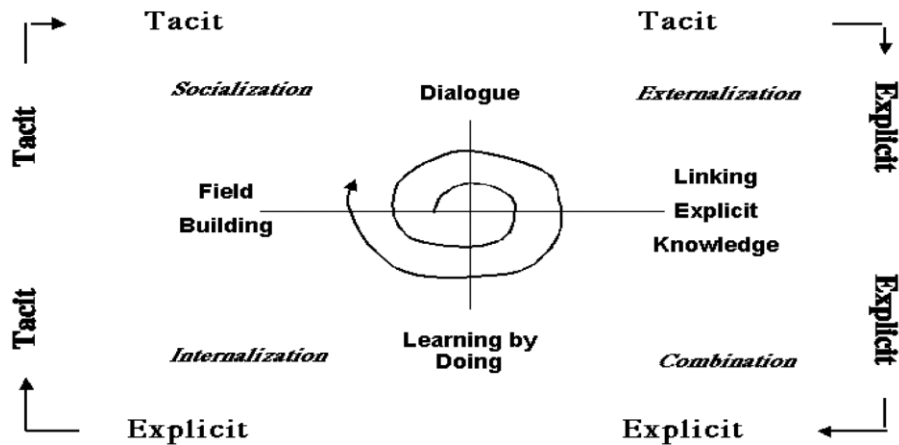


Figure 1: The Knowledge Spiral (Nonaka and Takeuchi, 1995)

Nonaka and Takeuchi define these transformations (Nonaka and Takeuchi, 1995). Socialization helps in knowledge sharing. So interaction is the key in this phase. Externalization captures the information about knowledge. Combination creates a new knowledge on the basis of previous existing knowledge and Internalization deals with converting information into knowledge. The “knowledge spiral” in Figure 1 shows how knowledge is transformed from tacit to explicit and then again to tacit during various phases of knowledge sharing. Knowledge sharing between individuals can be ad hoc or organized (systematic). Transfer of knowledge from one person to another can happen on an ad hoc basis within a project or an organization. Knowledge sharing occurs after the

initiation of an individual, for example, when they need to solve a problem and ask for help from other individual who are known to have the appropriate expertise. If this communication and sharing is systematic and there is a process in place to document it, exchanged knowledge will be captured and organized into a group memory. Thus, the next time this piece of knowledge is needed, it will be retrieved from the group’s knowledge repository rather than solicited from an individual. This will lead to time-savings both for solicitor of the information and for provider.

Implementing a KM system is not an easy task. It involves both challenges and obstacles. Lawton (2001)

has mentioned some of the major issues on implementation of KM. They are technological issue, lack of standards, organizational issue and individual issue. Technological issue deals with the software technology and inadequate security. Sometime integration of sub-systems is required for efficient knowledge sharing. The integration of subsystems is not always easy and simple. Similarly inadequate security concerns with the probability of sharing the information with the wrong audience. The wrong audiences are the undesirable persons for example: competitors or it can be former employees too. Similarly lack of standards includes the ways of using terms and concepts in different ways that may create an obstacle during knowledge sharing. Organizational issue concerns with the methodology followed in an organization. So while implementing KM system, methodology with respect to organization should be considered. Individual issue is related to the willingness of an individual to share knowledge. Individuals are different from one another due to their different natures. Some are always willing to share knowledge and even enjoy while sharing knowledge but some are reserved type, not willing to share knowledge. Some individual although are willing to share knowledge but are unable due to their busy schedule.

2.3 Moodle

Moodle is a Course Management System (CMS), also known as LMS or a Virtual Learning Environment (VLE). It is a free web application that educators can use to create effective online learning sites (<http://Moodle.org/>). Besides the basic goal of Moodle to promote learning, there are several other ways to use Moodle such as applications of Moodle in school due to its ability of large deployments. It can be used for blended learning (face-face courses) or conducting full online courses. Many users use for activity modules such as forums and wikis and some use just to deliver contents to students and assess learning using assignments or quizzes.

2.4 Mahara

Mahara is an open source ePortfolio system with a flexible display framework. The ePortfolio system is a collection of electronic evidence assembled and managed by a user, usually on the web. It is generally “user-centric” i.e. students control what goes into their ePortfolio and who sees it. So Mahara is a user centric environment with a permissions framework that enables different views of an ePortfolio to be easily managed. Mahara also features a web log, resume builder and social networking system, connecting users and creating online learner communities (<http://mahara.org/>). Mahara provides a social networking facility where users can create and maintain a list of friends within the system. In an ePortfolio system, an ePortfolio owner chooses whether other users can add them to their friends list automatically or by request and approval. An ePortfolio

owner's can restrict friends from viewing his/her profile. The main feature of an ePortfolio system is the ability of the students to control their own environment.

3. RELATIONSHIP BETWEEN E-LEARNING AND KNOWLEDGE MANAGEMENT

E-learning system and KM system are two different approaches. According to Al-Sadi et al. (2008), the most important difference is that “E-learning system and Knowledge Management systems are focused on two totally different goals”. The first goal is related to communication and collaboration. The former system provides structure learning content and intercommunication facilities among users on specific topics whereas the latter system use CMS and provide collaboration with the users on different topics. The other difference can be the learner’s information collected by E-learning system where evaluation is done through tests and examinations. This collected information can be used for skill management and career planning. Skill management and career planning both are components of KM. Al-Sadi et al. (2008) has also mentioned some of the similarities between E-learning and Knowledge Management such as: “E-learning and Knowledge Management systems provide knowledge in different forms to the users”. These similarities match with the common features stated by Denning (2000) in his paper. Both the systems have almost similar architecture with more complexity in the server part. Communications and co-operation facilities are the key in both the systems. Different forms of communication and co-operation include e-mail, chat rooms and forums, to other forms of co-operation. Personalization is also the key in both approaches that includes adaptation of working environment according to the user’s needs and characteristics. The content of KM system can act or can be considered as the repository of E-learning content. In both systems, users have to register i.e. they need to be identified by the system to access relevant information.

Communication and co-operation is the key issue in both the systems i.e. E-learning and Knowledge Management. One of the main objectives of E-learning is effective knowledge sharing and to achieve this, interdependencies between users are very important. So, “integrating Knowledge Management and E-learning have come into focus and key element for investigation in various disciplines” (Al-Sadi et al. 2008) but “E-learning technology has been evolving separately from Knowledge Management technology” (Woelk and Agarwal, 2002). Knowledge is shared between multiple users and the role of trust between individual is the key for knowledge sharing since knowledge sharing always depend upon level of trust. To develop a trust, SNS is the key. Different functions of SNS helps in collaboration and intercommunication between multiple users. The three

main functions of KM i.e. collaboration, knowledge sharing and identifying experts can be achieved by SNS. SNS i.e. social networking service deals with the social collaboration which includes different user functionalities. Social networking service represents the user and his/her social links. So, it generally focuses on building and reflecting social relations among different individuals. Therefore two main characteristics of SNS are ‘keeping in touch’ and ‘identity management’ (Richter and Koch, 2008). Keeping in touch deals with maintaining the social relations that can be achieved through direct communication (direct exchange with someone) or indirect communication (via artifacts). We can send message directly in direct communication but we need to have access control to control friends in case of indirect communication. Access control helps to select only the desired user who can send and view the information. Similarly identity management is the identification of individual and managing the user contacts through access restriction. Besides the two main characteristics of SNS, Richter and Koch (2008) have proposed six basic functionalities of SNS. They are identity management, expert finding, context awareness, contact management, network awareness and exchange. Identity management is managing the viewer’s who view your profile i.e. selecting the users who can see your profile. Expert finding is concerned with searching appropriate expert in a certain area. Context awareness is related to common interests and common contacts i.e. common context with other users. So it further support to create a common trust which is a very essential component for successful collaboration. Contact management is managing friends i.e. friends control that include access restriction and maintaining personal network. Network awareness is creating awareness through different activities/notifications (e.g. birthday notification). Exchange is the interchange of information between users. It can be direct or indirect. Direct exchange includes sending message and indirect exchange includes sharing photos or communicating through bulletin board.

4. AREAS OF IMPROVEMENT

Moodle system contains many KM functions. However, Moodle system needs SNS function to overcome the major research problem i.e. “collaboration between multiple users” since SNS provide social networking features. Moodle with SNS enable greater communication and collaboration between multiple users. For example “creating specific group” and “restricting users”. Effective knowledge sharing can be done by creating a particular interest group since people are always willing to share knowledge if it is of his/her interest. Similarly security can be achieved by restricting users i.e. by blocking undesired users from sharing information. Although Moodle system contains some social networking features like tagging, creation of blog and search friend and message, it still needs to be improved to overcome the major research problem. During blog creation we can upload file and also insert tag in the tag section. We can also view the different interest area in the tag section under participant (Participant-> tag section). Student can view the profile of teacher which also contains the tag of interests. One can view other user profile by clicking on tag which can be very useful technique in identifying expert. Moodle can be seen as a tool for capturing teacher’s tacit and explicit knowledge for knowledge sharing especially when deployed collaboratively, which is not possible without SNS functions.

5. INTEGRATION OF MOODLE AND MAHARA

Integration is bringing together of Moodle with other system so they function together as a single system. Table 1 provides the general comparison between LMS and ePortfolio system. The comparison table helps in understanding the differences between LMS and ePortfolio system.

Table 1: Generalized comparison between LMS and ePortfolio

LMS	ePortfolio
Courses are the central hubs	Users are the central hubs
Teachers make the rules	Users define their rules
Courses provide structure	Unstructured and organic
Grades are given and managed	Grades not given
Content is available to all on a course	Others can only see what users let them see
Social networking revolves around courses	Users determine their own social networking
Formal classroom	Informal playground/pub

The integrated system is the enhancement of Moodle with SNS functions. Different features are associated with SNS. For example, intercommunication and collaboration between multiple users on various topics is also possible. The user can send friend request, send message, group invitation, create a friends circle and restrict friends from

viewing own’s profile. The user can also create an “interest group” to share information of his/her interest which can be further developed into knowledge. E-learning knowledge contents are formal knowledge related to the subject. However after creating an interest group, more and more informal information will be

gathered and transformed into knowledge. Besides the addition of different functionalities, availability of two features i.e. “single sign in” and “automatic account creation” helps user to login to Moodle and enjoy features of Mahara with same username and password. Whenever user creates an account in Moodle, the user account is automatically created in Mahara too. So the integrated system is the enhancement of Moodle retaining existing features. Therefore Moodle is now also a user management system with the addition of one of the major feature i.e. “user privileges”. Now the users can create a social networking environment among them. These added features address some of the issues on implementation of KM. For example technological issue, this concerns with not sharing the information with the wrong user. This issue can be resolved with the available feature of friends control and selection of members in an interest group. The other issue i.e. individual issue which deals with the user willingness to share the knowledge can be addressed to some extent with the creation of social networking environment and especially the possibility to create interest group which can increase eagerness among the users to use the system and share their knowledge. More

informal information is gathered which can create a new knowledge. There is no hesitation and limitation on sharing information which make the system “active” in terms of knowledge sharing.

6. RESEARCH VERIFICATION

The Moodle system is integrated with Mahara for the enhancement i.e. addition of SNS functions. The integration is done to verify the research finding i.e. “SNS in E-learning system for the enhancement”.

6.1 Features of an Integrated System

6.1.1 Single Sign in

The Moodle user can login to Mahara account with same username and password i.e. whenever user login to Moodle, the link to Mahara appears in the interface of Moodle. Then the user can login and use Mahara features by entering through the link to Mahara.

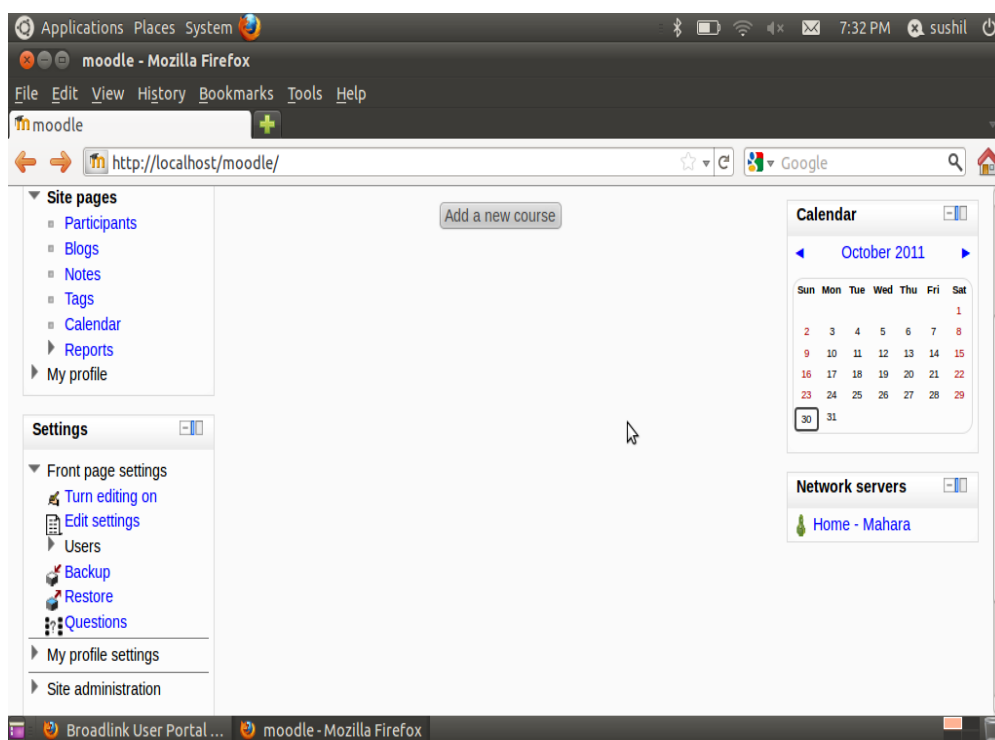


Figure 2: Link to Mahara after login to Moodle system

6.2 Groups

Different groups can be created and managed through the group section. We can create a group and invite existing users to join that particular group. Groups can be of

different types i.e. open membership or invitee only. For example in Figure 3, there are two groups E-learning and football, where E-learning is an open membership group and football is the group consisting of only the invitees.

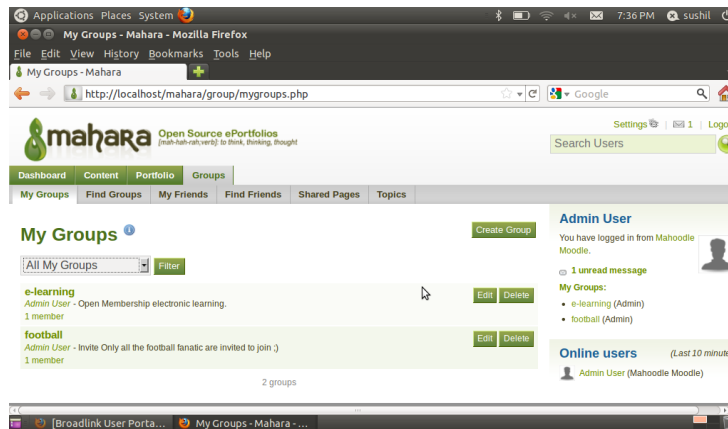


Figure 3: Creating and managing group

6.3 Friends Control

We can search friends through the search box. In Figure 4, there are two users' admin and Lionel Messi. Admin user can find other users by searching through the search

box and after the user's name is displayed, admin can view his/her profile, send friend request, send message, and edit group membership. Besides that, the user can also restrict undesired users through "friend's control" section.

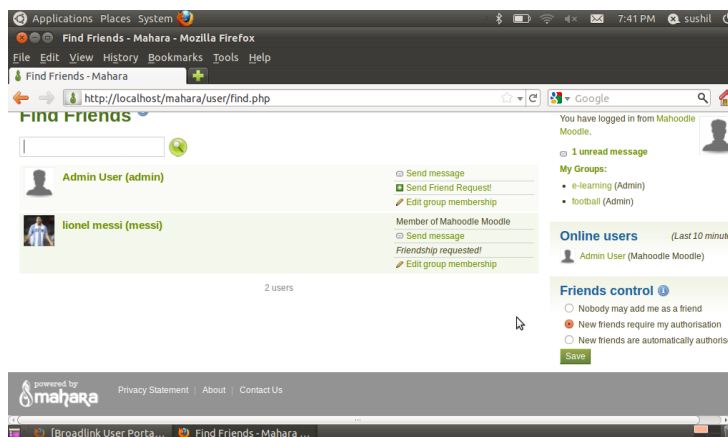


Figure 4: Friends control

7. CONCLUSION AND DISCUSSION

Knowledge management plays a major role in the enhancement of E-learning system and vice versa. Moodle, an E-learning system, and KM are very much co-related. The close relationship between Moodle and KM is visualized by the nature of Moodle with the phases of knowledge spiral model proposed by Nonaka and Takeuchi (1995). For example, existing Moodle system covers internalization and externalization phase. This research concentrates on socialization phase of the knowledge spiral model. New knowledge can be generated from active knowledge sharing system which is possible only after the system is non-formal. So to make the system non-formal, there must be collaboration between multiple users. In this way Moodle system satisfies all the four phases of knowledge management.

Although Moodle contains many KM functions, it needs SNS function to enable greater collaboration and communication between multiple users. The main reason behind the enhancement of Moodle is collaboration between multiple users for effective knowledge sharing. Collaboration between multiple users leads to "group intelligence" which is the bigger contribution of SNS function. Group intelligence leads to "collective intelligence" after rational decision making, which is a very important mechanism to create a new knowledge. Moodle is augmented towards user management system by the addition of user's privileges that makes the system "user centric". The major focus of the research is that enhancement of E-learning system by the application of KM function further strengthens the relationship between the two systems.

This research is restricted to the study of relationship between E-learning and KM, analysis of the relationship between KM and Moodle and enhancing the Moodle system by applying KM functions. However, the research can concentrate in future on the study of "trust system" since "trust" plays a key role in social collaboration, which is very much essential for effective knowledge sharing. The more amount of trust, the better quality of information is delivered. Therefore, the study can concentrate on increasing and maintaining the trust among individuals. Other future work can be the empirical analysis of the system. The analysis can be done to find out the feasibility and usability of the enhanced Moodle system (that is integration of Moodle and Mahara).

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