

# Student Learning Management Based on Collaborative and Interactive Information System

Muhammad Pasha, Syed Akhter Hossain, Md. Kabirul Islam

**Abstract**— Student Learning Management (SLM) practices with information systems are common and widely used in the Higher Educational Institutions (HEI) for managing and organizing different levels of learning of students in order to ensure qualitative aspects of learning. At present, SLM practices are based on interactive Information System and through the Virtual Learning Management System (VLMS), this role of delivering the learning contents for different levels of learning of the university students can be very effective. But this VLMS by no means provides learning assessment of the students. University teachers are using online based smart tools such as Blogs, Wiki, etc., consisting of questionnaires or comments to manage the Interactive and Collaborative Learning (ICL) today. Although the proposed system consists of all these components of VLMS, this work is based on research and a focus on Collaborative and Interactive Information System (CIIS). The intended research is based on initial investigations of practical problems that exist in the class room and several other interactions with the pedagogy and with other learning factors. The designed system supports effective learning environment for the students of HEI to share their problems regarding class lectures/lessons and related questions for the suggestions, not only from the mentors but also from other students at the same time which encourages peer learning. This also shares individual learning experience with the similar problems. A case study based on the methodology was designed to describe how individual teachers may use the proposed system for SLM in their own personal settings. The evaluation used an interpretive methodology to investigate three research areas: Anchored Discussion, Teacher-Students' Self Inventiveness and Professional Peer Design Review. Experimental observations of student and teacher blogs illustrate how the designed system encourages students and teachers to look beyond classroom learnings.

**Keywords**—Student Learning Management (SLM), Higher Educational Institutions (HEI), Virtual Learning Management System (VLMS), Interactive and Collaborative Learning (ICL), Collaborative and Interactive Information System (CIIS), pedagogy.

## 1 INTRODUCTION

The rapid increase of Internet use enables the educational institutions to add new ideas on their education system by adding new features like content based Course Management System (also known as Learning Management System or LMS) like Moodle [1], Blackboard [2], WebCT [3] etc for last ten years [4]. With the help of these LMSs, educational institutions are moving away from the traditional in-class environment to the new digital phenomenon where teaching is also assisted by computers [5].

An LMS ensures the students' access to have their learning materials, particularly lecture notes and assessment tasks. Some other information e.g. up-to-date announcements, assignments and discussions are also checked which are given by the faculties [6].

These popular LMSs facilitates the educational institutions for managing both the faculty and the students by providing services to ensure consistency, track, report, evaluations, continuous service proficiency etc [7], rather than Collaborative Learning, whereas collaborative learning can play a major role in proper learning at the higher level.

As HEIs are committed to make the students good learners, which is impossible without interactions between students, this brings commitment to make the students' collaborative learning as a simple interactional processes or ICL, but in a setting parallel with the current or existing system of education. This is necessary to have small-episodes of synchronous interaction, and apply the mixture of different learning methods to the students so that they can grasp it easily. In this paper, we investigated on a collaborative LMS, which was developed with the hope that adopting by others may increase use of modern learning system. The system is based on the concept of collaborating through LMS facilitate by the course teachers.

- *Muhammad Pasha is with the Technological and Implementation Team of Khan Academy Project 2012. E-mail: muhammadpasha027@gmail.com*
- *Syed Akhter Hossain is with the Department of Computer Science and Engineering of Daffodil International University, Dhaka, Bangladesh. E-mail: aktarhossain@daffodilvarsity.edu.bd*
- *Md.Kabirul Islam is with the Department of Computer Science and Engineering of Daffodil International University, Dhaka, Bangladesh. E-mail: kislam@daffodilvarsity.edu.bd*

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The primary purpose of the customized LMS was to provide immediate feedback after the end of face-to-face class on the basis of questions, comments, etc. posted by the students to find out their levels of understanding. An online Teacher Student Classroom Feedback System (TSCFS) is designed and developed considering the users e.g. teachers as well as students to make use of personal reflections, and feedback (both formal via comments on course blog and informal via email or chat) once a topic is discussed in the class. The paper concludes by making a number of recommendations based on some of the successes which have been resulted from observations on technology use and effective delivery and pedagogy.

The proposed system which is named TSCFS is developed in the year 2009 by customizing an open source social networking engine named Elgg [8] targeting a web based interactive system that can be used for monitoring the teaching and learning as well as content analysis. Elgg is an open source social networking framework that facilitates individuals and organizations to create an online social environment. It offers blogging, microblogging, file sharing, networking, groups and a number of other features.

## 2 RELATED WORKS

A Learning Management System (LMS) is aimed at managing an e-learning environment, establishing the organization and delivery of content, administrating resources and tracking learning activities and results [9] and [10]. The popular LMS that are in use today are either commercial products (e.g. WebCT, Blackboard, TopClass), or free open source products (e.g. ILIAS, Manhattan Virtual Classroom). Another pattern of LMS exists, which are customized software systems that serve the instructional purposes of particular organizations. LMS that belong to the third category are exponentially increasing, as most education and training institutions are building or planning to build their own LMS. This is due to the fact that a customized LMS will fit better their specific educational/learning purposes i.e. Collaborative Learning, and proves to give a good return of investment over the years. However, the design and implementation of such systems that enables Collaborative Learning is not an easy task, since they are complex systems that incorporate a variety of organizational, administrative, instructional and technological components [11] and [12].

Learning in collaboration with others is the foundation of Collaborative Learning. A Collaborative Learning means inter subjective meaning-making [13] and [14] with the interactions of a group of people, from which group cognition [15] comes out. Moreover, a Collaborative Learning refers to the environments as well as methodologies, in which students or learners directly or indirectly take part in a common activity. During the activity, each individual not only depends on but also is responsible to each other. In recent years, Collaborative Learning has created a field of research on supporting ICL with the help of information system [16].

A number of researchers edited their collections earlier

specifically focusing online collaborative learning researches. Hiltz [17] emphasized online collaborative learning by implementing her virtual classroom that enabled participation and interaction of the users, Dillenbourg [18] noted the cognitive and computational approaches and [19] expanded the term online collaborative learning as an established technique for teaching and learning in which the learners in a group have their learning responsibilities for each other and for themselves. However, Curtis and Lawson [20] explored the term. In another work, Lindblom-Ylänne and Pihlajamäki [21] noted the online collaboration as a written environment through an online collaborative network. Macdonald [22] pointed the online collaborative learning as a product that helps the educators to process easy assessments. On the other hand, Wilcox et al. [23] identified the use of collaborative approaches to student learning, and a range of factors which impact the student experience including learning, teaching and assessment strategies as well as the quality of staff student relationships.

All the above researchers pointed online collaborative learning in their respective research that supports and facilitates group processes and group dynamics in a setting that is not possible with face-to-face interactions or in-class direct participations. This type of learning is typically tailored for use by a group of learners, working either synchronously or asynchronously, through online or at the same work station or across with networked computers.

Considering the above major roles of an online collaborative learning system, the proposed LMS is referred to as the Teacher Student Classroom Feedback System (TSCFS).

A comprehensive literature review of semi-automated, collaborative assessment and feedback is beyond the scope of this paper, however a review of the development of online assessment and feedback systems is also available by Shortis and Burrows [24]. Hepplestone et al. [25] provides a ten-year catalogue of the literature associated with assessment feedback. Less recent publications provide further background, for example Valenti et al. [26] provides a review of ten systems and Heinrich et al. [27] provides a comprehensive review of a wide variety of tools to support essay-type assessment. However, both the technology and the practice continue to advance, and there are many examples of recent thinking around the effectiveness and utility of assessment feedback [28] and [29].

## 3 Method

A LMS, is a software system specifically designed and marketed to educational institutions. It supports teaching and learning, and provides an electronic platform for upload of learning materials such as various formatted files, lecture notes etc. along with presentation of study materials and organization of student activities. These systems are also commonly referred to as Virtual Learning Environments (VLE) and Course Management Systems (CMS) [30].

Heirdsfield et al. [31] pointed the current LMSs those

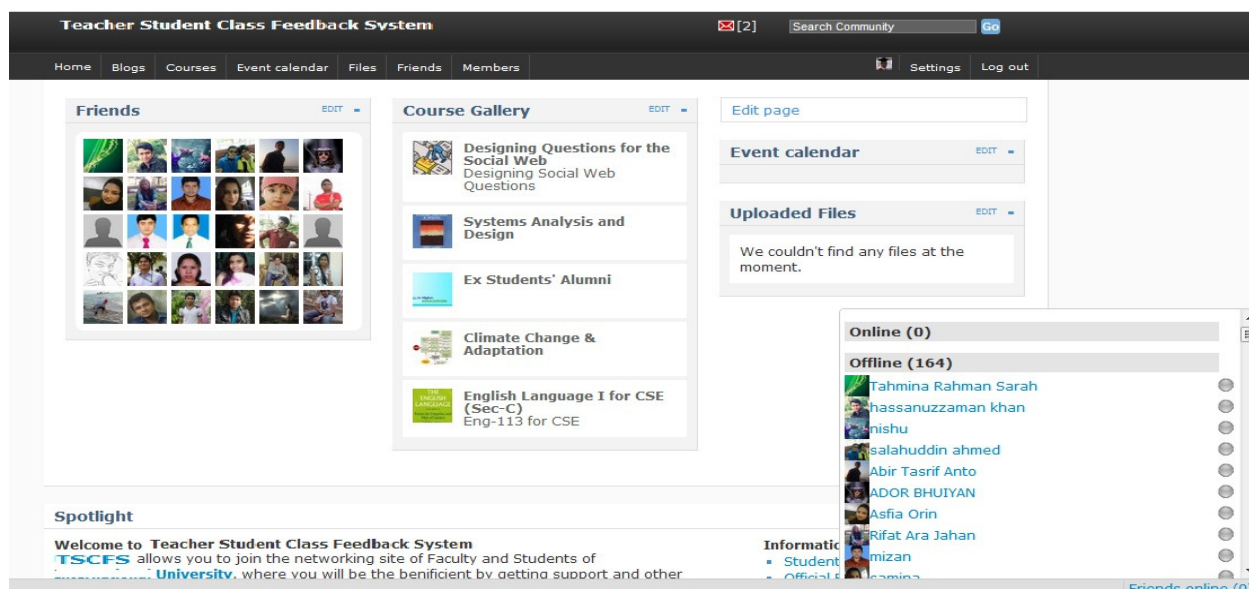


Figure 1: User's home page in TSCFS.

are popular worldwide and used as a tool that enables learning facilities such as discussion forums, chat, blogs and announcements to enhance the learning experience, because it ensures "human interaction, social learning, and possibilities for collaboration and ways for keeping in touch with students". An educator appears to value over chat as well as blogs because it could be used for a range of activities including discussion and collaboration

On the other hand, most of the students of higher education, are already keen users of digital technologies these days, those are often well integrated into their everyday lives [32], the use of online social networking sites and new media in education can be very motivating. At the same time, while students may be adept at using new technologies for social and entertainment purposes, they may not always know how to use them appropriately for educational purposes [33] and [34] or indeed professional purposes such as, in this case, an explanation of lectures, notes or other critical angles.

Teaching the subject material in a context suitable for all of the students is always difficult [35]. Incorporating the new techniques such as online LMS that enables collaborative learning, the system allows educators to gain on students' pre-existing enthusiasm for digital technologies, as well as guiding them in the appropriate educational and professional applications of those technologies. As the requisite software is easy to use, and online storage (and syndication) is straightforward.

Considering the major and important roles played by the LMS, the system also developed a social community pattern for learning that ensured "the power of the network and to exploit social interactions and connectivity" [36]. This article focuses on the authors' experiences with a TSCFS over a two year period 2010-2011, as the first author worked for design, develop and implement the LMS on different departments, however the other authors taught into a range of university courses using the LMS,

in their first and second year undergraduate courses at a university in Bangladesh. The objectives of this study are:

1. To identify the LMS with required features
2. To find out the Teaching-Learning activities of the TSCFS.

#### 4 THE TSCFS

The web-based Classroom Feedback System (CFS) e.g. TSCFS as shown in Figure 1; is a student LMS or CMS through which students can provide their feedback asked by the course teacher through web on a specific lecture immediately after the end of that lecture. In addition, the system also provides some services which are closely related with the group of students along with their instructor of a course, such as various types of File Sharing, Message Services through personal Email account, Personal Notifications for a Course Feedback or Update or Notice, and a Chat Box for quick conversation.

A TSCFS helps a teacher to track the learning progress of a group of students as well as completion of tasks assigned to them. However, the system also provides help to a teacher to identify an area, where the students need help. The proposed system first introduced to the teachers and then to a specific group of students for educating a group of Computer Science and Engineering (CSE) students as a pilot project. After that, it was introduced to other seven departments for facilitating the teachers as well as students to share their asking, which promotes online interactions as well as CIIS especially after the end of a class where face-to-face sessions are unavailable.

Moreover, providing the facilities specified for collaborative learning, the system also facilitates to notify a user for even every single update i.e. blog posts, feedback, file upload and any announcement or notice or event, regarding his/her courses. A notification is not only sent to his/her mail box of the system, it is also sent to his/her

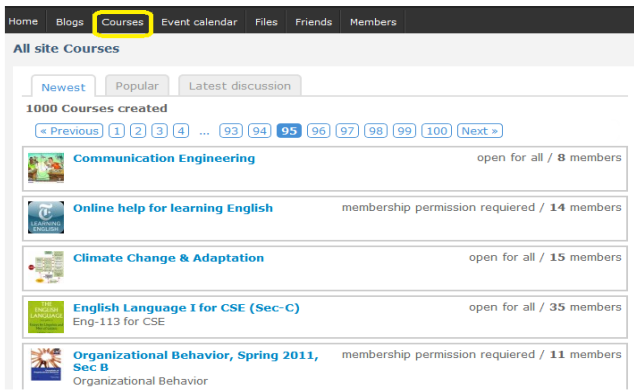


Figure 2: List of courses.

email address (once the option is set by the user). Clicking the notification, the user can check the latest update or a feedback or even a feedback on his/her earlier asking in a course blog.

## 5 APPLYING PROPOSED TSCFS

The online TSCFS consists of Course Gallery, Event Calendar, Personal Blogs, Personal File Management and Sharing System along with Personal Notifications for Course Feedbacks or Updates or Notices through Personal Message Services as well as user's email account and a quick conversation service like a Chat Box.



Figure 3: A course in TSCFS.

### 5.1 Course

A teacher can create one or more courses by providing three or four basic information i.e. Full name of the course, Course Code, Course Description, etc. She/he also can define the method of permission for membership. If she/he selects 'Closed Membership', then a student needs to get permission from the instructor, to join the course blog, otherwise, if the course membership is selected as

'Open Membership', then any user can be a member of a course by clicking 'Join Course Blog' shown in Figure 2: List of Courses. When a course is successfully created, it is added to the database of the TSCFS and shows in the list of courses. So that any user can easily find the list of newly or previously created courses by clicking the 'Course' tab, as it shown in Figure 2: List of Courses.

A Course consisting of three things: 1) Course Blog, 2) Course Blog Files and 3) Course Calendar, which is appears left menu of a course page as shown in Figure 3: A Course in TSCFS.

#### 5.1.1. Course Blog

After selecting a course from his/her Course Gallery, when one student clicks on the 'Course Blog' button, a list of written blogs appears on the screen with an order of the latest 'Blog Post' stands on the top and the older posts just under the latest one and so on. A user can check the latest 'Blog Post' consisting questioners, writings etc. by seeing the title or headline of the post. The proposed system confirm to show the name and image of the writer e.g. the teacher, and the posting date along with posting time, just below the Blog's headline.

Clicking on the headline, a writing panel appears where a student can place his/her comment or feedback, as per the teacher's asking.

#### 5.1.2. Course Blog Files

When a course member wants to get a file i.e. lecture notes, presentations, audio/video files etc. which has already been shared commonly by the course teacher or students for others, the blog member clicks on the 'Course Blog Files'. A list of files appears on the screen for that specific course, with an order of the last shared file on the top and the older files just one by one, under the latest one. A user can check the latest files by seeing the title. The proposed system shows the Name and Picture who uploads a file i.e. the Teacher or the student, along with the date and time of uploading the file, below the File's headline.

#### 5.1.3. Course Calendar

A student can get all announcements or dates of upcoming events i.e. quiz, assignment, class presentation, exam etc. through the course calendar.

### 5.2 Course Gallery

After the creation of a course successfully by the teacher, the course instructor becomes the admin of that particular course. Therefore, the course appears on the 'Course Gallery' of the teacher, as it is shown in Figure 1: User's Home Page in TSCFS. When a student successfully becomes a member of a course, the course is also added to his/her 'Course Gallery'. A 'Course Gallery' is always shown on the 'Home' and 'Profile' page for both teachers and students

### 5.3 Event Calendar

When a teacher adds any event on the course calendar, the event or announcement is shown not only in the

course calendar but an event is also appeared on the 'Event Calendar' section of the dashboard or home page as well as profile page of the users as it is shown in Figure 1: User's Home Page in TSCFS. At the same time, a personal notification is immediately sent to the message box of the course members as well as their email addresses.

### 5.4 Personal Blogs

Members have been given the privilege to write any personal blog regarding a matter which might not be his/her class but seemed useful or interesting to him/her. A comment section is also available to in a personal blog, where the readers can comment or suggest to a blog writer. A personal blog is not regarding with regular classes, enables a group discussion on a specific topic with similar minded students who are interested on that topic. Therefore a learning environment has been developed.

### 5.5 Personal Files Management and Sharing

A file sharing privilege is also given to all members to upload not only document formatted files but also pictorial formatted files can be shared, at the same time, multimedia files i.e. audio and Video can also be shared to all or a group of users. An uploaded file can be set private or shared to a group of users, i.e. students of a same course. Moreover it can also be set accessible for personal friends or login users or public. And through the comment section anybody can get feedback on his/her uploaded files.

### 5.6 Message Services and Quick Conversation

The system enables a personal message service. Any user can write a personal message to other. When a message comes in a user's inbox, a red message box appeared on the top of the pages of a user as it is shown in Figure 1: User's Home Page in TSCFS. Moreover, the system automatically forwards the message to his/her email account.

A quick conversation box or chat box is available for the users to enable easy communication or live chat so that any user can see who (from his/her friend list) are available or online at once (as it is shown in Figure 1: User's Home Page in TSCFS), and ask and share his or her personal quires to a teacher or other classmates when s/he has a query and others are available on online.

### 5.7 Notification Services

The red message box is seen (as it is shown in Figure 1: User's Home Page in TSCFS) for any notification or latest updates related to a user's personal blog, courses, event calendar, or etc. At the same time, all the notification messages are sent to the email account of a user. However a user can set his/her criteria of getting notification to his/her email account, e.g. personal or group notification, etc. S/he can disable all of his/her notifications forwarded to email account if s/he wants.

A block diagram of the proposed TSCFS is described in Figure 4: Block Diagram of the TSCFS; shows when a teacher creates a course blog, a student can find the course blog on the 'Course Menu'. A student can access

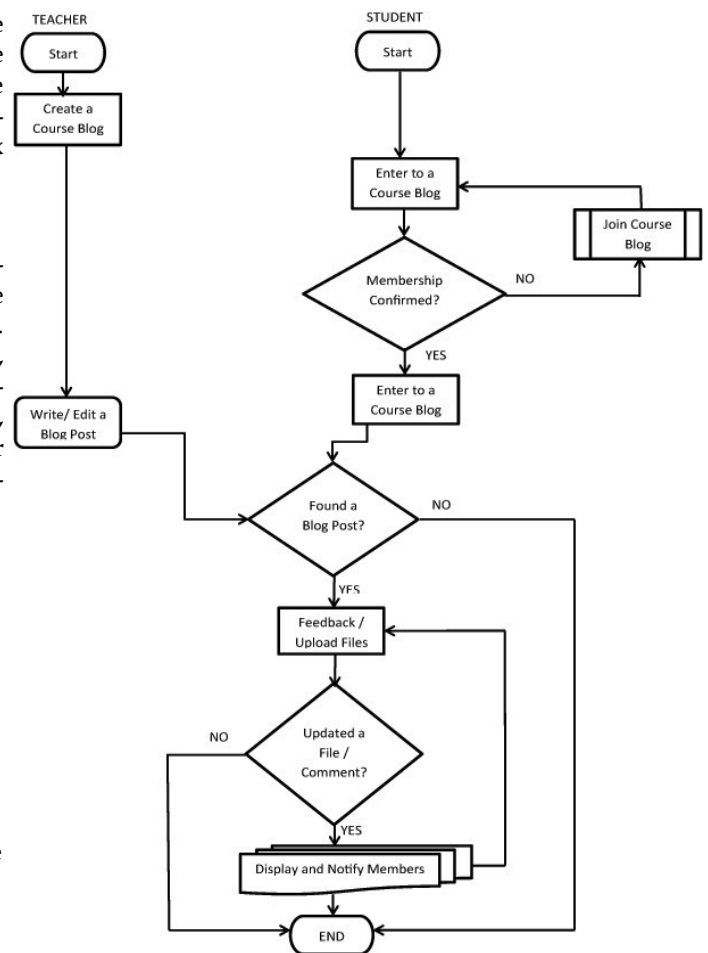


Figure 4: Block diagram of TSCFS.

into a course blog while s/he confirms his/her membership in the course blog by the course teacher. After a teacher writes something, the students can see the blog post. A feedback of the teacher's askings can be given under the teacher's blog post. It can be a comment or other sort of feedback or different types of files as per users' askings.

When a feedback is given or any file is uploaded or any other updates are done, a notification is sent to all the course blog members including the course teacher as it also shown in Figure 4: Block Diagram of the TSCFS. The system archives the date and time of the update and shows it to the members including updating date, time as well as the name of the member by whom the feedback, post or file uploading has been done. If a user fails to post or for improper ways of giving feedback, no posts or update notification is sent to the members of the course blog as there is shown no update in the course blog.

## 6 EXPERIMENTAL OBSERVATIONS AND FINDINGS

### 6.1 Anchored Discussion

One of common uses for a TSCFS is anchored discussion. An anchored collaboration is a good structure to use for review activities at the end of a certain time period, how-

### MidTerm Exam, Syllabus and Discussion

July 12, 2010 by [Dr. Yousuf M Islam](#) Comments (21)

Dear Students,

As you know, the exam syllabus for the Mid-Term exam is as follows:

1. Computer Applications, including input, processing, output, benefits, implementation and problems.
2. Explaining Excel program lines and finding program errors.
3. Application of Wiki.

Pls use the blog to design your own questions on the THREE areas and discuss with your class mates.

-Yousuf

[Edit](#) [Delete](#)

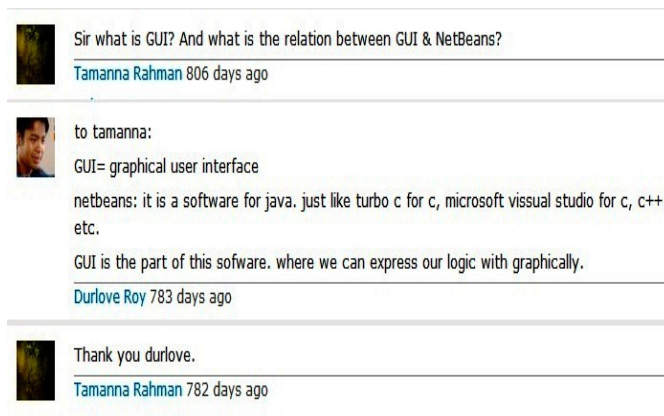
Figure 5: Anchored discussion on exam questions.

ever, is also useful for supporting focused discussions in between the educator and the students as well. Common examples of an anchored discussion are students studying for a midterm or a final exam by posting and critiquing answers to sample questions, or asking students about exam questions or an (anchor) assignment, presentation or quizzes as it is shown in Figure 5: Anchored Discussion on Exam Questions.

It was simple to implement anchored collaboration particularly in a web based CFS, because the space for collaboration can literally be the same space as the anchor. Anchored collaborations have been used in Architecture for debates [37], in CS to discuss papers [38], and in several disciplines to discuss homework. It is described in Figure 5: Anchored Discussion on Exam Questions. The anchor is the faculty member who asked four questions to his students regarding the exam questions after the exam.

## 6.2 Teacher-Students' Self Inventiveness

It is observed that users of specific course did use an online CFS for anchored and focused discussions. A mechanism was used by the students to writing their comments at the end of an anchor's comment. Although there was no explicit support for tracking "threads" of comments (e.g., when one note comments on another note, which comments on another note; [39]), a variety of mechanisms were invented by users (teacher or students) for marking threads or answering a specific user's question as it is shown in Figure 6: Student's comment on



Sir what is GUI? And what is the relation between GUI & NetBeans?  
[Tamanna Rahman](#) 806 days ago

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to tamanna:  
 GUI= graphical user interface  
 netbeans: it is a software for java. just like turbo c for c, microsoft visual studio for c, c++ etc.  
 GUI is the part of this software. where we can express our logic with graphically.  
[Durlove Roy](#) 783 days ago

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Thank you durlove.  
[Tamanna Rahman](#) 782 days ago

Figure 6: Students' comment on a classmate's asking.

## Classmate's Asking.

An example of two Students' self inventiveness is seen in Figure 6: Student's comment on Classmate's Asking, where a student asked the teacher about something and another student responded and replied to his classmate's asking as he knew the answer.

## 6.3 Professional and Peer Design Review

Starting in a course of Human Resource Management, but later being copied in several classes (e.g., English, Economics, Business Communication and Bangladesh Studies), students were asked to post their work for others to

### Topic 3: Job Description

July 9, 2010 by [Siddiquir Rahman](#) Comments (15)

Write a job Description: A junior Executive at Human Resource Department

A job description is a written statement of what the jobholder does how it is done, and why it is done. It should accurately portray job content, environment, and conditions of employment.

A job description includes the job title, the duties to be performed, the distinguishing characteristics of the job, and the authority and responsibilities of the jobholder.

[Md. Al-Mamun](#) 738 days ago

Job Description of a Junior Human Resource Manager. ( 09171-11-1011)

**Job Title:** Junior Human Resource Manager. **Job NO.02**

**Reports to:** Executive Human resource manager **Grade level-18**

**Supervises:** new employees and labor union. **Date:10/07/2010.**

Functions: Manage the Supervisory Training, deal with labor/union relations, and must be able to modify orientation programs.

Duties and Responsibilities: (1) Must be able to control thrift/Savings plan administration, Modify career planning development.

(2) Develop retirement preparation programs and manage labor/union on request.

(3) Must maintain personnel records/reports and information system.

Job Characteristics: Maintain administrative services and deal with community relations is not necessarily a requirement of this job.

[Iftekhhar Ahmed](#) 737 days ago

Figure 7: Students' writing by seeing classmate's writings.

review—sometimes peers, but sometimes experts from the outside. This kind of review can perform several roles. It can be a motivating activity that helps students, view their work from a new perspective. It can be an activity that highlights a particular aspect of the students' work (e.g., when the teacher sets the ground rules about what's to be critiqued). It can also be an activity that allows a large class to see what others are doing, in order to benchmark their own work.

We highlight one of these uses to provide more details as it is shown in Figure 7: Students' Writing by Seeing Classmate's Writings. In one Human Resource Management class, students were asked to write their job description as a junior executive at Human Resource Department for each of their projects on the course blog page as it is described in Figure 7: Students' Writing by Seeing Classmate's Writings. Students were asked to go through different resources i.e. books, internet, etc. to develop their projects. The goal of this structure was to provide stu-

dents with an opportunity to review each others' projects and to help one another in answering their research questions.

This activity was judged to be fairly successful. The course supervisor observed and gave instructions when the students were updating their writing by seeing others, at the same time taking the supervisor's instructions seriously. The students enjoyed the experience, particularly reading one another's postings and seeing. Moreover, the course instructor enjoyed how the peers responded to the students' work that ensures the peer design pointed by Zimring et al [40].

## 7 DISCUSSIONS

A LMS or CMS like TSCFS is only one of several web-based CSCL tools that have been created for learners. It is justifiable to looking at the bargains that were chosen between others and the proposed LMS, and to see how those bargains impact the kinds of applications that can be authored with these tools. In general, the TSCFS does not frame the process of students tests, quizzes, results or etc. as other LMS or CMS tools do, which makes it desirable in some settings (e.g., with adult learners) and less desirable in others.

Moodle, WebCT and Sakai [41], have all been used successfully in educational contexts. They aim at supporting teachers in creating furthermore managing online courses. All the same, with respect to providing teachers with information about their students, they mainly show students' track reports or of how the overall class is resulting by using the system rather than focusing on peer teaching or collaborative learning which can only be possible with a CIIS.

A web based CIIS like TSCFS is a multi-representation tool where students are asked to make a statement about a discussion question, and then appoint in a progressed discussion assisted by the educator, about the question. The online CFS offers ease threaded discussions, but it supports anchored collaboration together with a setting so that threads of discussion can be accessed from any page on that website. The system opens the doors to grease the wheels to a sort of discussion where users are propelled to identify the kind of note that they are posting, as a way of encouraging deliberation about the collaboration process ensuring not only the Anchored Discussion, but also the Teacher-Students' Self Inventiveness at the same time Professional Peer Design Review.

Despite the other collaboration spaces such as CoNote [42], SpeakEasy/MFK [43] & [44], and CaMILE [45], [46] & [47] are perhaps better conformed where the users need a more spotlighted and more confined activity, such as elementary school or middle school students. But at the tertiary level of education, the TSCFS can be a collar as it focuses CSCL more compared with those. Novice students who are less familiar with Uniform Resource Locators (URLs), page editing versus page viewing, or Hyper Text Markup Language (HTML), do not need to know anything about those. Usage of TSCFS as like as these other tools, is also controlled. Users sign in, so that their

identity is known and each user's contribution can be tracked. Users cannot delete or modify other users' postings. The CIIS offers these features: It is easy to use, individual contributions can be identified with date and time, and it is not possible for one user to modify or delete another user's posting but seeing only.

Authorized users such as course instructors or administrators will be able to create and manage their courses whereas students can join and participate to give their feedback from anywhere in the world through web. At the same time, any member e.g. a teacher or a student can start writing and sharing personal blogs on a topic of his/her interest that ensures getting feedback from others, which enables a chance of - the more students practice and get feedback on their writing, analyzing, or problem solving, the more adept they should become [48].

Originally, outsiders who do not have their account in the system may also make their registration through their email addresses, and send join requests to the system for the available courses. However, the University ruled to registrar an account via University email addresses only to adapting the learning portal system as the university wanted only authorized individual and facilitators to use the system.

## 8 CONCLUSION

The TSCFS is a flexible SLM tool based on CIIS, but that very flexibility may limit some of its applicability, as described earlier. The points of the above sections were to show that the SLM tool seems well-suited to the characteristics of higher education. Activities using the TSCFS have been invented time to time and costumed on demand by a fairly large number of teachers as well as students. We have only started to gather data suggesting that some of these activities have been effective in supporting student learning. We believe that the system can be effective, when sufficiently integrated with classrooms, as described in the final section where we consider why the TSCFS has been successful in encouraging invention by its users.

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**Muhammad Pasha** received B.Sc. in Computer Science and Engineering in 2010 and M.Sc. in Computer Science and Engineering from Daffodil International University of Dhaka, Bangladesh. He started his research career as a Research Associate in Human Resource Development Institute (HRDI) of Daffodil International University from 2010 to 2011. Later he joined Agami Education Foundation, Bangladesh. Currently, he is working with the Khan Academy Project 2012.

**Syed Akhter Hossain** was born in Khulna, Bangladesh in 1965. He received his B.Sc. (Hons.) and M.Sc. in Applied Physics and Electronics from Rajshahi University and Ph.D. in Computer Science and Engineering from the University of Dhaka, Bangladesh. He started his teaching career at the Institute Technology Pekerja-Pekerja, Malaysia as a Lecturer in 1993. He worked as a Faculty member at Rajshahi University, East West University and ULAB. He did post-doctoral research at IUT Lumiere Lyon 2, France. He is currently serving Daffodil International University as a Professor and Head of the Department of Computer Science and Engineering.

**Md Kabirul Islam** is an Associate Professor of the Department of Computer Science and Engineering, Daffodil International University, Dhaka. He obtained his PhD in Technology Supported Education from an Australian University. He has several projects and publications related to the different areas of ICT for Development (ICT4D) such as eEducation, mLearning, eHealth, and eCommerce.