

# Enhancing Online University Class Management System with Instant Email Feedback Alert

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**Abstract** — It is important to enhance learning support systems in line with current instant culture. This article presents the development of a more user oriented system which interacts with users in various instances with specific emphasis on the provision of instant email alert that notifies users when assignments are posted and when students' academic records are updated. This avoids the need for students to directly contact the lecturers to see their test or predicate marks. It also reduces the amount of errors that usually have to be corrected at the end of the semester. The study further conducts a usability testing of the developed Online Class Management System to confirm acceptability of the system by lecturers and undergraduate students in a University.

**Index Terms** — Online Learning management systems, Instant services, Alert systems, Email feedback technologies

## I. INTRODUCTION AND BACKGROUND

This article presents the results of a research done to improve some important aspects of e-learning system in the form of an Online University Class Management System developed and implemented at the Tshwane University of Technology, South Africa. The focus is not on learning online, but on enhancing aspects that would make it easy for lecturers to be able to manage their class academic records online and also enable students to have electronic updates on the modules that they registered for. This is in the form of an alert that makes them aware that an assignment has been posted, and that marks have been entered on one of the modules they are enrolled for.

### A. Research problems addressed

Online class management is becoming increasingly prominent in tertiary education, with universities increasing and more students signing up for different learning systems. In developing a learning management system, it is very important to develop it in a way that suits three groups of users which are namely students, faculty staff, and the institution's management. For this study however, emphasis has been put on technical features that would suit the students and lecturers. The internet has made the process of sharing information a lot easier than in the days where physical contact was required to share information. The current global-wide adoption of systems such as social

networking systems providing instant information suggests that it would be difficult to get people to use system not providing similar instant feedback and facilities. Students are not likely to be satisfied with systems where they simply type their essays on computers using learning management systems and then constantly check to know when professors would upload or send their marks and feedback. For some reasons most of the students would only notice their predicate marks shortly before examination day. This could be too late for some students because should they have known it earlier, they would have put more efforts to get a better mark. To add to the need for better system than ones used currently, many mistakes are made during the mark entering process which in turn leads to students crowding lecturers' offices to check and correct their marks, thereby disturbing most of the daily operations carried out by lecturers in their offices.

Interestingly, even in the light of the above, most lecturers usually find it very hard to move from using the old traditional method of managing class records using Microsoft Excel for example to a more portable method using a web based Learning Management System (LMS). The LMS would usually make the job a little bit easier than using Excel because the Excel system requires self-compilation of formulae for calculating sums, averages, percentages etc. Such tasks can be automatically carried out by a system. With such features added to the instant feedback feature, lecturers and students could be more encouraged to use online class management systems.

### B. Research questions

Towards enhancing the feedback and communication between lecturers and students with regard to the provision of learning support in line with the current instant services inventions using technologies like web 2.0 and others, the research question for this study is therefore: How can we develop a system to improve on the current features of LMS by providing a form of email alert that instantly makes students aware that an assignment has been posted, and that marks have been entered or changed on one of the modules they are enrolled for?

### C. Research objectives

The objectives for this study are therefore:

- 1) To develop a system called Online University Class Management System
- 2) To design and incorporate a communication tool into the system that could notify or update students on regular basis via an automated instant email as their academic records are updated.

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## II. LITERATURE REVIEW

As we progress into the information era, the amount of information has become greater, access is much faster, the information has become global, and information is more accessible with different search parameters that can be used to alter information view. Also, dynamic information replacing static information on the web increasingly provides the electronic nervous system for many organizations through the use of mobile technologies such as smart phones and Internet usage [11].

Some authors have argued that interactivity of Computer Mediated Learning can boost the speed and level of student learning [6] and helps to improve students' productivity by motivating them [8]. As much as there is a vast need for an improved learning system, there are several challenges such as adapting to the cultural behavior of the people who would use the system (e.g. the current instant services culture). This is important because it is not useful to design a system that no one will use. It will be a waste of time if the problem that the system was aimed at solving remains unsolved due to non-alignment with the users' way of doing things. Therefore, designing an effective learning system requires looking at several variables and considerations, including interactivity and interaction design [4].

From time immemorial, the traditional modes of training and assessment include oral, written (paper based) and recently the computer off-line written forms. The major limitation of these modes was and still is that lecturers and students need to have physical contact for example in a lab or class for training to run. This lacks the flexibility in time (attending classes, writing tests, or submission of assessments) and also requires a facilitator to be more involved in a student's work which promotes less self-management from students. Attempts to solve this problem involve using common online course management systems in the higher education, including but not limited to WebCT, Blackboard, Desire2Learn, Angel, eCollege etc. E-learning has a well-developed approach to the creation of content-based, single learner; self-paced learning objects [7].

These all fit under virtual learning environment (VLE) which can be defined as an education system based on the Web that models conventional real-world education by integrating a set of equivalent virtual concepts for tests, homework, classes, classrooms, and other external academic resources. They normally use Web 2.0 tools for 2-way interaction, and include a content management system. Virtual learning environments are the basic components of contemporary distance learning, but can also be integrated with a physical learning environment in Blended Learning. All in all, LMSs seems to be utilitarian to most stakeholders involved in the teaching and learning process especially in tertiary institutions in many countries. The phenomenal in the use of internet and the World Wide Web has contributed to this increased adoption of LMSs.

Today, most course management systems include tools for course content organizations and presentations, communication tools, student assessment tools, grade books and functions that manage class materials and activities. This study is however unique in the provision of an Online University Class Management System (OUCMS) which is developed to overcome certain limitation of LMSs with

advanced features providing instant email alert in line with current instant services culture of the students.

## III. RESEARCH METHODOLOGY AND DESIGN

The main aim of this study is to improve mostly on the communication offered by the available systems towards being able to make the systems a little interesting to students. A system which will notify the student of their academic records update and any future amendments would be better for the students who could be able to rectify any mistakes in time because they will know instantly.

### A. Functional requirements

This system is not aimed to replace existing systems as it is not having full functionalities of a Learning Management System. It is aimed at portraying few features found missing in the other LMSs:

- 1) Should send a notification to the student should their record be updated. The notice should tell the student of their previous mark, the new mark and how it affects their predicate mark.
- 2) Display the predicate as you login. This would relief students struggle towards the end of the semester to know their predicate before the predicate day when it is published, so as enact adequate preparations towards the examinations.

### B. System Development

The system was developed using PHP, HTML and Asynchronous JavaScript with XML (AJAX). The server is hosted on an Apache Server and the system can run on any computer with at least 500MB memory. The Web application system can be accessed with any browser from an Internet accessible client computer.

### C. System Output and Functional Testing

The following is a step by step process with screen capture of how the new system works:

Users can go to [ocms.bonganiweb.co.za](http://ocms.bonganiweb.co.za) which is the URL used to test the system. On top of the page is the menu system and on the left side are the update gadgets.



Figure 1. Registration page

User register on the page in figure 1 and click “Register” to register the details entered. All fields are mandatory except the “other details” field which expects information about anything e.g. address, cell phone, other emails etc. After pressing the Registration button, the system will tell the user to check their emails for the confirmation link and click on it to confirm their emails. Why the confirmation link? This system is highly dependent on emails for communication and so, to make sure that the user has supplied valid email address, the system sends a confirmation link to the given email address. So, if the user was able to receive the email then they will be able to click on the link to activate their account, login and start using the system.



Figure 2. Add module

After logging into the system, the first thing that a lecturer does is to add a module that they offer, as shown in figure 2. The system displays the previous, current or all modules that the user/lecturer ever added in the system, below the “add new module fields panel”.



Figure 3. Add task/assessments per module.

The second thing would be adding tasks/assessments to each module so the system would be able to calculate the predicate using the weights provided per task/assessment. This is shown in figure 3.

Lecturers/Instructors then have to inform students about a subject/module added so the students could then go to the system and be able to add the subject/module. Students are then able to see how the assessments are laid per subject and also the due dates per assessments.

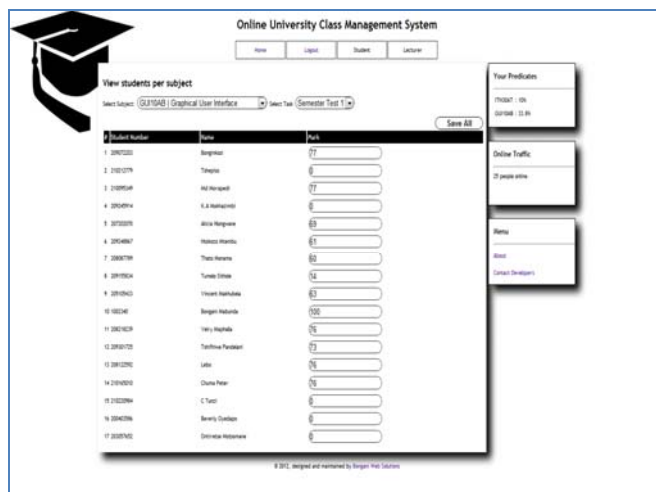


Figure 4. Add marks per module’s assessment.

As soon as a subject has students, the lecturer will then be able to add their marks per assessment in a module/subject. This is done as shown in figure 4 above. When the lecturer enters the subject mark and press “save all”, the systems sends an email to the users whose mark has been updated and notifies them of the changed mark and the resulting predicate mark. An example of such email is given in figure 5 below.

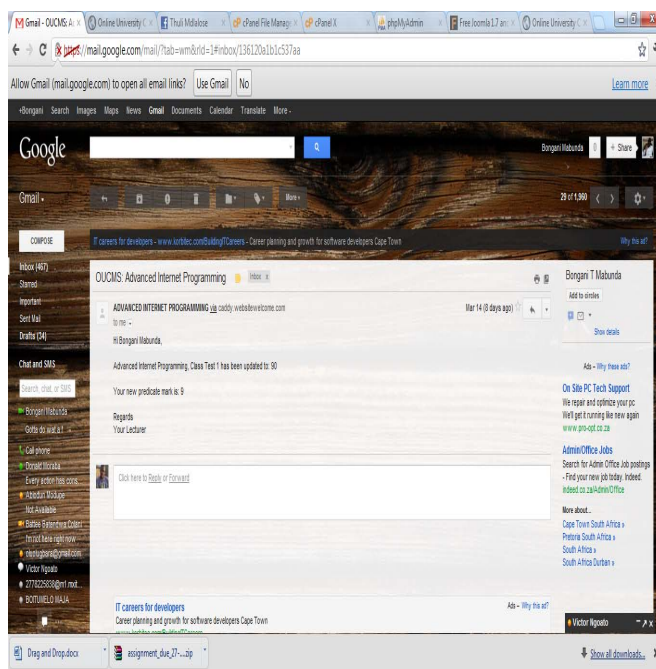


Figure 5. Email sent to notify the students of an updated mark and changed predicate.

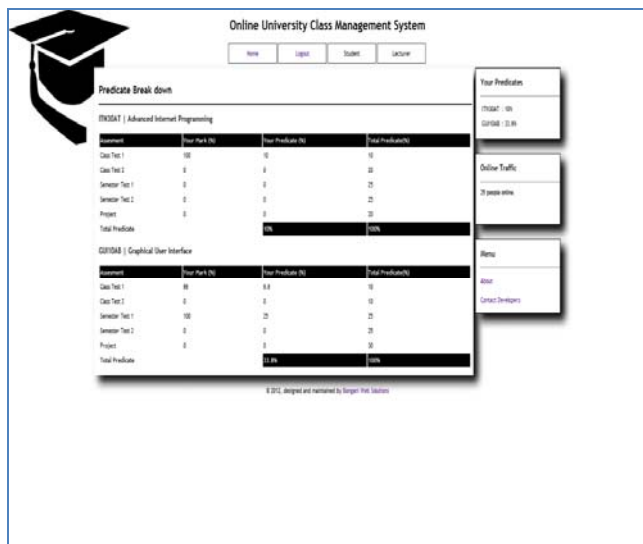


Figure 6. Viewing predicate break-down

Students are then able to check their results as to how their predicate was built, and the marks per assessment in a subject that the user is enrolled for. This is shown in figure 6 above.

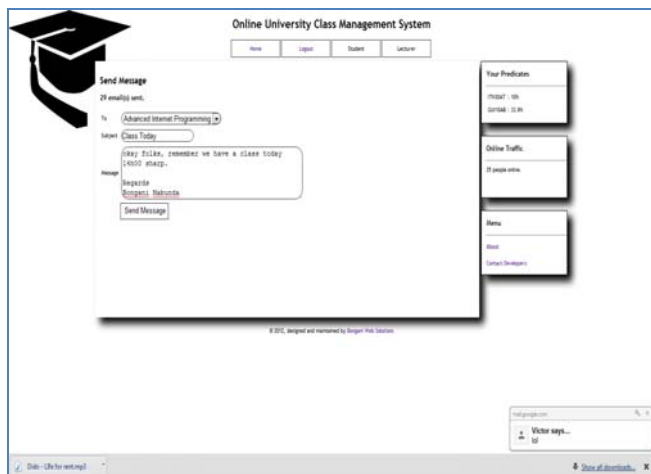


Figure 7. Sending message to students.

Specific messages can be sent via email to all students who have enrolled for the selected subject. This could be done as shown in figure 7.

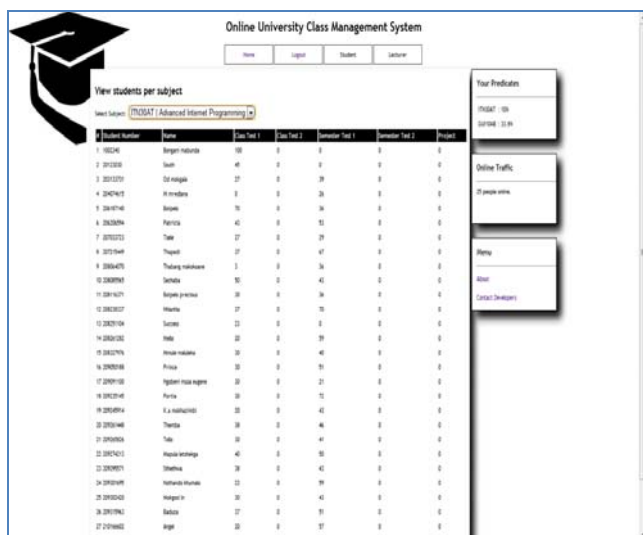


Figure 8. View students mark per subject.

Lecturers can then check student marks per subject using the above page shown in figure 8.

### Other features

- 1) Updates per subject e.g. displays latest subject content like assignments, study guides etc.
- 2) Pop in panel pops in on mouse over the logout link to notify the users of their login status.
- 3) “Your Predicates” panel shows the predicates per subject to the person who is logged in.
- 4) “Online Traffic” shows how many people have logged into the system.
- 5) “Other Menu” provides extra information about the system and other useful information. It has links like, “about us” and “contact developers”.
- 6) “Lecturer” appears only when a lecturer is logged in and shows the lecturer menus when a mouse moves over it.
- 7) “Student” appears only when a student is logged in and shows the student menus when a mouse moves over it.

Overall, the various features of the system are aimed at enhancing the usability of LMSs. The best impression from the students was that they are now able to get updates about their predicates and they don’t have to calculate it (sometimes wrongly) on their own like before.

### D. Usability Testing

After a system has been built, it has to be tested and evaluated by developers first and then the relevant users of the system. Human perception about technologies determines their attitudes towards them. The choice of educational technologies should not be guided by a technologically deterministic approach, but rather according to the contextual requirements related to a broad range of social, cultural, political and economic factors.

Usually most system fails as the result of the people’s failure to adapt to the new system and leave the old or usually called traditional way of doing their daily operations. Our experience at the Tshwane University of Technology in South Africa shows that even after the implementation of the online self-registration system for example, people still prefer queuing up on very long lines for a registration officer to capture their details on the system so they can be registered. Some ICT education systems have been reported to be less effective not because it is too technical but because of not complying to the local context. Therefore, users have to be comfortable with the system otherwise they are not going to use it if they do not like the look and feel or if they don’t find it interactive or informational.

### E. System-user interactivity as a usability factor

It has become generally accepted by computer system users that interactivity had a positive impact on attitude toward using computer systems and websites. Since the uniqueness of the Web system lies in its interactivity, it might be interesting to investigate so we can find out how interactivity affects attitude towards a Website or a web system. This is because interactivity is capable of enabling

real-time, two-way or easy interactions [12] between web or software system and users.

Steuer [13] defines interactivity as “the extent to which users can participate in modifying the form and content of a mediated environment in real time” (p.84). It is an assumed attribute of interpersonal communication. This definition takes into consideration the important role of users in conceptualizing interactivity [12]. Steuer [13] proposes speed of interaction, range and mapping as three major factors affecting interactivity. Speed of interaction is also referred to as response time. The more instantaneous a user perceives their actions in a mediated environment, the higher he or she perceives interactivity. Range is concerned with how many options a user has in making changes in the mediated environment. Mapping deals with “the way in which human actions are connected to actions within a mediated environment” (p.86).

In simple terms, we can define perceived interactivity as a two-component construct consisting of navigation and responsiveness which enhances the users’ attitude towards the web system. This depends on how easy your users can navigate to their desired pages and how fast they get to receive a response from the system and also how easy do they are able to post information onto the web system.

#### F. Types of interaction

Before the explosion of online teaching and learning, a well-recognized classification of interactions in distance education was offered [9]. His three-part interaction scheme included Learner-instructor, Learner-learner, and Learner-content interaction. Learner-instructor interactions establish an environment that encourages learners to understand the content better. This type of interaction is “regarded as essential by many educators and highly desirable by many learners” [9]. Learner-learner interactions take place “between one learner and other learners, alone or in group settings, with or without the real-time presence of an instructor” [9]. This type of interaction is a valuable experience and learning resource.

Empirical evidence shows that students actually desire learner-learner interactions, regardless of the delivery method. Learner - content interaction is defined as “the process of intellectually interacting with content that results in changes in the learner’s understanding, the learner’s perspective, or the cognitive structures of the learner’s mind” [10]. Although learner-content interaction is well recognized as a type of interaction, there is not much discussion about learner-content interaction in the current literature. This is probably because different contents may require different interaction patterns, and, thus, it is difficult to have a generalized discussion about such interactions.

Given the technology-mediated nature of online education, learner-interface interaction is considered to be another important type of interaction. Hillman *et al.* [5] point out that this type of interaction occurs between the learner and the technology used for online education.

## IV. USABILITY EVALUATION

A number of approaches have been developed so as to improve and achieve productive design by researchers. User Centered Design (UCD) is touted in the literature as one of the most effective [1]. Employing usability

testing as part of a UCD framework in the design of online courses provides opportunities for developers to identify and eliminate potential problems encountered by students early in the design process and prior to course delivery [1]. One benefit is enhanced student satisfaction, potentially increasing student retention [2]. Another benefit is the opportunity to set standards for design that can be replicated by development of other online courses saving time and lowering costs.

UCD was employed for usability testing of the developed system which was said to be the approach that could be used for the developer to know what to do as the system is still under development. A feedback page was incorporated to ask users (students and lecturers) to leave their comments and developers would grab them and act upon them. A total of 50 comments were received and analyzed.

### A. Usability Testing Results

The following issues were raised and discussed

#### 1) Menu readability:

Most of the students raised a concern that the font in the left menu is too low and the background seems to be making it hard to read because it is almost like that of the menu itself. It was then decided that colors should be changed and menu font be enlarged to a much bigger font and readable one.

#### 2) Menu relevancy:

It was discovered that most of the users find it not being a good idea that a user has to specify his/her user type each time they login. The expectation was that the system is supposed to recognize the user role when the user logs in. As a result of the above concern, developers had to combine the accounts because it makes sense that lecturers can also be students and students can also be lecturers. So a user should be logged in once and be able to access menu in both user role/types.

#### 3) Overall design:

Most of the users appreciated the design as being nice and simple, being aided by the AJAX technology which allows you to hide what you do not want to see. This simplifies the interface.

#### 4) Information/Notifications:

Many students are impressed with the notification feature but they felt it should not only notify users about tests only. Users feel something else should be added, as portrayed by the statement: “the system should notify us about everything” echoed by one of the students in his or her comment. Lecturers liked the part of adding marks into the system, since it is also enhanced with AJAX and JQuery technology so that it doesn’t have to always reload the student list but only changes the part you want to change which increase flexibility when capturing marks.

#### 5) Response time/speed:

Many concerns were received from users complaining about overall time the system takes to respond to people when they chat, participate in a

forum, save changes etc. We concluded that we would look at the problem at a later stage since it somehow did not seem as a matter of coding. By later expanding the scope and duration of the study, this could also be one of the things to be done in the next study.

The overall impression from the users was not bad. This could be as a result of the fact that most of the 3<sup>rd</sup> year students that were used or that were more involved have learnt about web design in their second year and understand the intricacies of system design.

#### B. Communication

As the most critical part of this system, the notification system was found to be the most interesting part of the system. Lecturers were impressed with the fact that they are able to just send one email which the system would format and send to all the students enrolled for a particular subject. Lecturers can issue an assignment and students would collect it through the system which then generates notification about each assignment deadline as it approaches. Students were mostly impressed with seeing how their predicate was built up and they are able to see how each test impacts their final predicate mark without them looking at the physical study guide and calculating their predicate manually. They get real time notifications about their updated test marks.

#### V. CHALLENGES FACED THROUGH THE STUDY

One of the challenges faced involved training users and getting them to admit to using the system, as most of the people still find it hard to switch onto the automated way of doing things. Lecturers complained that the system was not connected to the Integrated Tertiary Software (ITS) system that the institution uses, making them having to enter the marks on both systems. Another challenge was the private hosting of the system because no one was available to provide hosting permissions within the Corporate Affairs of the Institution.

#### VI. CONCLUSIONS

Many universities and colleges have students with considerable differences in age, past experience, gender, culture, language, level of attendance, and needs. These varying levels have some impact on the adoption and use of LMSs by both students and lecturers. The underutilization of LMSs results in terrible waste of resources and may result in the use of tools in a manner entirely contrary to pedagogical principles and teaching practices which could in turn hamper learning [3].

This study considers the importance of the interactivity of a system, and also the importance of users' satisfaction through improving the communication part of learning management systems. This is implemented using a feature through which lecturers via the system pass instant message to a desired group of registered students upon certain update transactions. Just as banks do these days, students also get real time feedbacks with the notification feature where the

system notifies users about their results and predicate as well as deadlines for assessments each time they login and when their records are updated. With this system, a lot of bridges would be electronically crossed. For example, students would no longer have to wait for the predicate date to know their predicate mark or to correct mark errors. With usability test conducted for the system, improvement in the enthusiasm of the student is reported.

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