

# How Active are Students in Online Discussion Forums?

Dip Nandi, Margaret Hamilton, James Harland and Geoff Warburton

School of Computer Science and Information Technology

RMIT University

Melbourne 3000, Australia

[dip.nandi, Margaret.hamilton, james.harland]@rmit.edu.au

geoffw@cs.rmit.edu.au

## Abstract

The role of discussion forums is an essential part of online courses in tertiary education. Activities in discussion forums help learners to share and gain knowledge from each other. In fully online courses, discussion forums are often the only medium of interaction. However, merely setting up discussion forums does not ensure that learners interact with each other actively and investigation into the type of participation is required to ensure quality participation. This paper provides a general overview of how fully online students participate in discussion forums and the correlation between their activity online and achievement in terms of grades. The main benefit of this research is that it provides a benchmark for the trend of participation expected of the fully online introductory information technology and programming students. Investigating the participation and the factors behind online behaviour can provide guidelines for continual development of online learning systems.

The results of the data analysis reveal that a high number of students are not accessing or posting in the discussion board. Results also show that there is a correlation between activity of students' in online forums and the grades they achieve. Discussion about the findings of data analysis and the lessons learned from this research are presented in this paper.

*Keywords:* Online learning system, online activity, assessment, diversity, asynchronous discussion forums.

## 1 Introduction

Since the introduction of internet enabled online learning, discussion forums have been used to ensure interaction between learners and instructors (Sharples, 2000; Farmer 2004). Currently, a major focus has been put onto the better use of the technology to support online learning in particular with the introduction of Web 2.0 technologies (Thompson, 2007). But the way in which online interaction/participation can be designed has yet to be adequately investigated.

Our overall research aim is to investigate the factors that lead to effective online interaction in fully online introductory Computer Science and Information Technology (IT) courses and propose a framework with

design principles for online interaction. The first step to achieve this is to measure how active students are in online discussion forums and the correlation between this activity and the overall marks obtained in the subject if there are any. This is the first step in a longer process to determine the appropriate pedagogical issues and design parameters for fully online courses.

This paper draws from existing literature and presents the findings of quantitative data analysis regarding the activity of online students in two fully online introductory Information Technology (IT) and Programming courses and the correlation between online activity and marks achieved. The data for this research was collected throughout a study period in 2009.

In particular this paper draws from existing literature about online learning and use of discussion forums, presents and discusses the finding of data analysis to answer the following questions;

- (1) *“How active are students in online discussion forums?”*
- (2) *“Does the online discussion forum activity have an effect on the marks obtained?”*

## 2 Literature Review

The “learning” context has changed significantly over the years and the emphasis is nowadays on learner-centeredness and peer-based activities. The advancement of technology and learners' advanced computer skills has made it possible for online learning to develop quickly. Interactions between teachers and learners are now more often happening online (Sheard, Ceddia, Hurst and Tuovinen, 2003). Online learning increases the opportunities for learner participation and enhances the participation of learners who may feel more inhibited to engage in discussions in a traditional classroom setting (Dengler, 2008). This has prompted an increase in the amount of research being performed on online learning environments.

### 2.1 Online Learning and Interactivity

Online learning systems have been described as web based learning environments consisting of digitally formatted content resources via the use of the World Wide Web (Zhu and McKnight, 2001). The online learning system is regarded as a communication device to provide communication link between the instructor and students where they can actively interact (Chang and Fisher, 2001; Piguet and Peraya, 2000).

“Interaction” has been recognized as the most significant attribute in any online system or course (Maor and Volet, 2007; Al-Mahmood and McLoughlin, 2004;

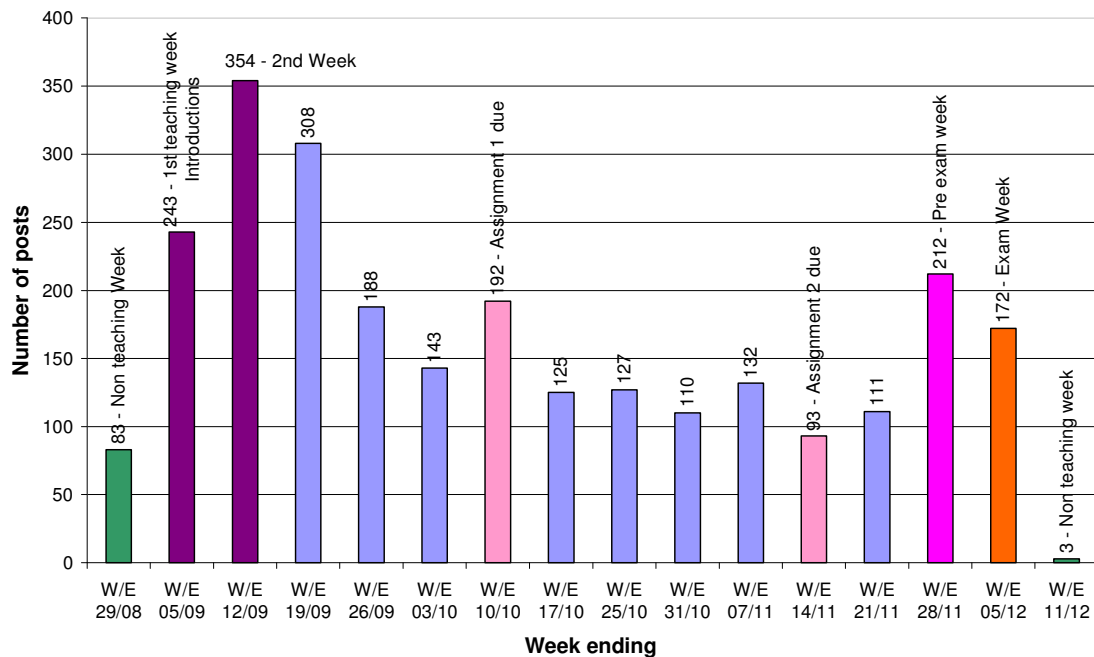


Figure 1: Posts by week (Intro to IT)

Sharples, 2000). Both the conversation theory of learning (Pask, 1975) and social constructive learning theory of learning with technology (Brown and Campione, 1996) emphasize the fact that learning, to be successful, requires continuous conversation and interaction, not just between teacher and learner, but also amongst the learners. Also learners need time to act and reflect. Consequently, educators should consider interactivity when designing online learning strategies (Maor and Volet, 2007).

The challenge of teaching with technology is to create a learning environment that allows and supports the full range of learning strategies. Al-Mahmood and McLoughlin (2004) state that teaching is a sort of conversation and the importance should be on effective interaction with students through technology. Online teaching is not about broadcasting but two-way communications are required to make it blended within a classroom learning environment.

To ensure that a classroom type interaction between students and teachers takes place in online learning environment, asynchronous and synchronous discussion forums can be used. Discussion forums are an effective way of exchanging ideas and sharing knowledge among learners and instructors. The asynchronous discussion forums are preferred over synchronous discussion forums because of the nature of communication. Synchronous discussions can be arranged in online courses through the use of tools like “Blackboard Chat”, “Elluminate”, “Skype” etc. However in synchronous discussion forums, the communication is instant and it is not always possible for all students to participate in the forum because of time commitments. Hence synchronous discussions in online courses attract low student participation.

The asynchronous nature of discussion in a web-based course incorporates interactive communication that is unique and different from the face-to-face classroom type instruction. It also eliminates the constraints of time and space. This type of system facilitates the requirements of

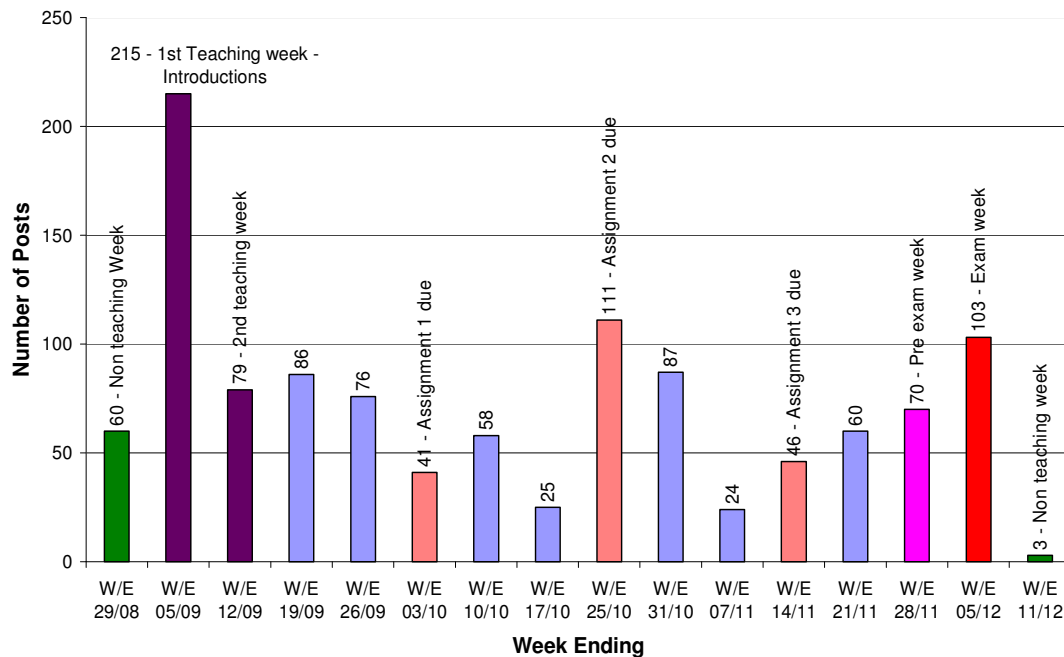
people with family and work responsibilities, transport problems, physical disabilities etc to have quality education online (Sher, 2009).

## 2.2 Discussion Forums and Participation

The discussion forum is the ubiquitous communication tool within online learning environments and hence significantly shapes the kind of communication that takes place. The asynchronous nature of discussion in a web-based course incorporates interactive communication that is unique and different from face-to-face classroom type instruction and also eliminates the constraints of time and space.

Discussion forums have frequently been used successfully as communication tools in online learning environments to facilitate interaction between students to share knowledge (Rovai, 2002) (Bradshaw and Hinton, 2004; Berner, 2003). Discussion forums also provide an effective opportunity to exchange ideas and share knowledge amongst learners and instructors (Tallent-Runnels et al., 2006; Levine, 2007). Because of their potential benefit, online discussion forums are becoming a common feature even in face-to-face courses as they allow students and instructors to communicate with each other regardless of time and space.

In online courses, students are encouraged to participate in discussion forums to demonstrate their capability to carry on a discussion by sharing their knowledge of the topic. The use and benefits of these forums vary immensely, covering topics as diverse as learner or teacher-led discussions, debates, collaboration around set tasks or projects, or set activities (Berner, 2003; Rovai, 2002; Rovai and Jordan, 2004; Bradshaw and Hinton, 2004; Gerbic, 2006). Forums are also used for posting comments on readings, prior to submitting a formal review of the reading, as a memory trigger (looking back at old discussions), to find role models, to get some form of immediate peer review, or for making



**Figure 2: Posts by week (Intro to Programming)**

connections with each other. These activities allow learners to think critically, discuss the topic intimately and learn from others.

Broadly speaking, the above mentioned benefits can be termed as quality online engagement, but on the other hand, research has shown that participation in online discussion forums is not always equal (Poole, 2000; Guzdial and Carroll, 2002; Leh, 2002; Russo and Benson, 2005; Salmon, 2003). There are three main levels of participation (Salmon, 2003):

- Firstly, some are “lurkers” i.e. who just read the messages and do not participate. They may learn by reading the posts and incorporating the ideas into their assignments (Guzdial and Carroll, 2002);
- Secondly, some learners read the messages and treat them as a notice board posting their own position having limited interactivity;
- Thirdly, the participation is interactive and to its full potential (Ho, 2002).

The above mentioned models of students’ participation in online discussion forums provide an outlook for the expected behaviour of online students and they need to be investigated with fully online introductory Computer Science/IT students.

### 2.3 Research Questions

From the above discussion we can summarize that there is a definite need to investigate the current activity of students in online forums. This leads us to our first research question which is

(1) “How active are students in online discussion forums?”

The above mentioned research question also draws us to investigate whether there is a correlation between the level of activity in online forums and the grades they achieve in that course. So our second research question is

(2) “How does the level of activity in online forums affect the grades students achieve in the online course?”

Investigating the above mentioned research questions will provide us with a clear picture of the diverse styles of leaning of online students. It will identify who the “lurkers” are and who are interacting actively whether the particular behaviour has any impact on grades or not. This investigation will enable us to fulfil our overall research aim of identifying the factors that lead to effective interaction in fully online courses.

### 3 Methodology

We have mentioned previously that our overall research aim is to investigate the factors that lead to effective online interaction in fully online introductory Computer Science/IT courses. A step towards achieving that research goal is to find out the distribution of activity of online students throughout a study period and the correlation between this activity and grades achieved.

Hence to conduct the research we have chosen two fully online introductory Computer Science/IT courses. One of them is an Introduction to Programming course and the other is an Introduction to IT course.

The Introduction to IT course covers general IT concepts e.g. computer fundamentals, operating systems and applications, internet, spreadsheets etc. This course has students from various degrees including Bachelor of Technology, Bachelor of Business IT, Bachelor of Indigenous Studies, and Bachelor of Accountancy.

The Introduction to Programming course covers introductory concepts of programming through the use of two programming languages; Alice and Java. Students enrolled in this course are only from the Bachelor of Technology degree.

Both the courses are conducted in a fully online environment and there are absolutely no face-to-face

classes. We collected data from Blackboard, the University's Learning Management System.

We collected data throughout the study period which began in September 2009 and ended in November 2009. Both the courses have online discussion forums where students are encouraged to participate and interact with each other.

To determine the distribution of student activity we recorded the number of accesses and posts by the students throughout the study period. At the end of the study period, assignment and final examination results for each student were recorded. Using these assessment results we investigated if there is a correlation between the level of student activity in discussion forums and the grades they achieved.

#### 4 Data Analysis and Findings

The introductory IT course had 299 students enrolled whereas there were 346 enrolments in the introductory programming course. The students were located in many parts of Australia and also different parts of the world while studying the courses. The age of the students ranged in between 20 to 70 which represent diversity in maturity and motivations of the students.

The introduction to IT course had two extra tutors apart from the instructor and the discussion board participation in the course was assessed where 10 percent of the total mark was allocated for participation. Whereas the introduction to programming course was conducted by the instructor only with no tutor support and the participation was not assessed.

Figure 1 provides a broad-spectrum overview of the number of posts each week by the students in the introduction to IT course. It indicates that there are a high number of posts by students during the first couple of teaching weeks where students may have tried to get accustomed of the course details. The number of posts gradually decreased after the initial teaching weeks and again rises during weeks when assignments and examinations are due.

Figure 2 provides an overview for the number of posts each week by the students in the introduction to programming course. It initially provides a similar scenario like figure 1 where there are soaring numbers of posts in the first couple of weeks. However the number of posts gradually declined and was quite low before the first assignment was due, unlike the trends in the introductory IT course. The trend remained same throughout the study period as assignment weeks failed to attract high number of posts as seen in the introductory IT course.

Figures 3 and 4 provide the number of posts by the students in the two courses respectively. Both the figures reveal there are a high number of students who have zero posts (174 in Introduction to IT and 218 in Introduction to Programming) that is; they did not post at all during the study period. Although the graphs were prepared with different distributions of number of students, the trend of posts is very similar.

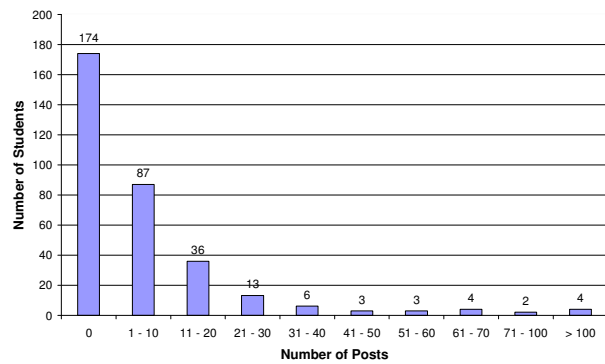


Figure 3: Posts by students (Intro to IT)

When ascertaining the activity of the students in discussion boards, using only the actual number of posts may not provide the overall picture.

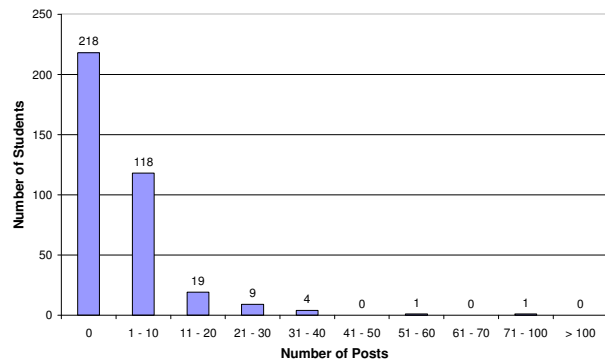


Figure 4: Posts by students (Intro to Programming)

As well as students that have posted in the forum, there may also be a significant number of "lurkers" present (Salmon, 2003; Guzdial and Carroll, 2002) in both the courses. Hence we have graphed the number of accesses by students in discussion forums against the number of students in figures 5 and 6 for Introduction to IT and Introduction to Programming courses respectively.

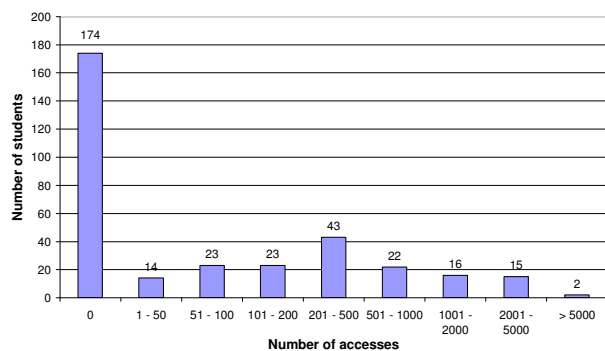
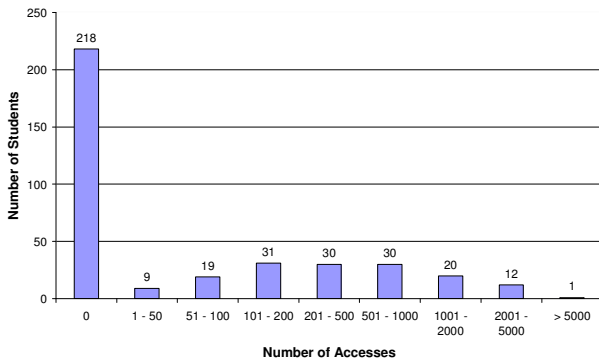


Figure 5: Accesses by students (Intro to IT)

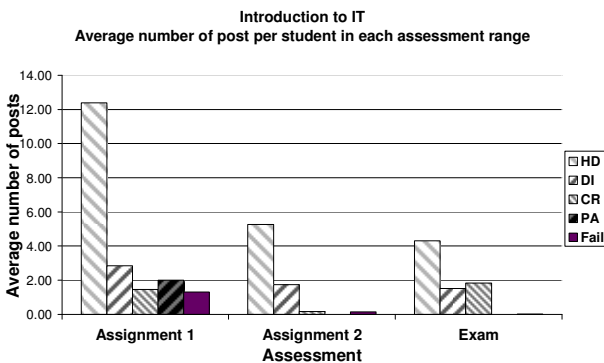
Comparing figures 5 and 6 indicates that there is a similarity between the trends of student accesses in both subjects; also there are a high number of students who did not access the discussion board. Not accessing and not posting might be a bit surprising for the introductory IT course as the participation in the discussion board was assessed and ten marks were allocated for posting on the discussion board.



**Figure 6: Accesses by students (Intro to Programming)**

Comparing the posts and access data in the same course reveals a coincidence. Almost 58 percent (174/299\*100) of students did not access and post in the Introduction to IT subject. This rate of “0” accessing and posting is around 63 percent (218/346\*100) in the Introduction to Programming subject. Consequently only around 40 percent of the total students in both the subjects accessed and posted in the online discussion forum.

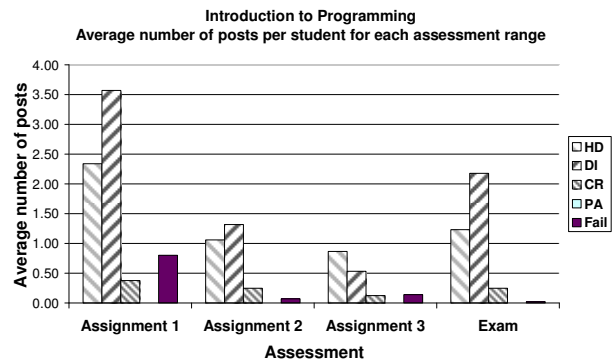
Further investigating the data closely demonstrated that students who accessed at least once also posted in the discussion forum.



**Figure 7: Grades achieved (Intro to IT)**

Figure 7 and 8 provides a general overview of the average number of student postings in the discussion board against their performance in each of the assessments in the study period. This allowed us to investigate the second research question for this paper. With this question we investigated if there is a trend between the level of activity in online forums and the grades students achieve in each course. In general, most of the students with higher number of posts achieved Distinction or High Distinction in the assignments and final assessment. The grades of High Distinction (HD) refers to marks which are in between 80-100, whereas Distinction (DI) refers to 70-79, Credit refers to 60-69, Pass (PA) refers to 50-59 and Fail refers to the of 0-49.

There is a definite correlation as most of the students who posted for a few number of times either failed or just passed the course. This establishes the fact that high achieving students participated in the online discussion forum more actively than other students did.



**Figure 8: Grades achieved (Intro to Programming)**

## 5 Discussion

The data analysis and findings section has provided a general overview of the activity of the students in the two online courses. It also shows the number of students posting and accessing the forums over the study period. There are differences in the number of accesses and posts between the two courses and we consider various possibilities below, in terms of the content, the students themselves, the instructors and assessment.

### 5.1 Impact of Content

There is a difference in the overall number of posts by students throughout the semester in the two courses which we now consider. Although the Introduction to Programming course had more enrolments (346) than the Introduction to IT course (299), the overall rate of posting was higher in the introduction to IT course with around 41 percent. This rate was around 36 percent in the Introduction to Programming course. This disparity could be explained by the dissimilarity in the content of the courses plus the assessment given for participating.

The content for the programming course is more prescriptive. As the course content is algorithmic and more narrowly focused, the opportunity for direct discussion and asking questions is limited. It was noticeable from the observation that, often a single solution by a student to a problem raised by another student or the instructor had ended the discussion at that point. The same situation applied to assignments also. Once the solution is obtained, there was very little discussion to follow which may explain the reason for generally low number of posts during the weeks when assignments are due.

On the contrary, the introduction to IT course covers the basic topics from general information technology covering a vast area from both hardware and software. Often there was a lot to discuss about these topics from different angles. While discussing online, students pointed towards examples and real world situations from the past and current use of information technology in their personal and work life which broadens the discussion. This can cause a jump in the number of posts. The identical situation applies for assignment weeks also where students discuss different solutions for the problems in the assignments causing a sharp rise in the number of posts. This situation points towards the fact that the content of the course has a bearing on the overall

number of posts and direction of discussion. In the course like programming, it is often difficult for instructors or tutors also to extend discussions to attract more participation from students.

## 5.2 Diversity of Students

The diversity in participation can be defined by the research carried out by Sheard, Ramakrishna and Miller, (2003) who pointed out that the background, maturity and motivations of learners have an impact on the online participation. As mentioned previously, students from different degrees e.g. Bachelor of Technology, Bachelor of Business IT, Bachelor of Indigenous Studies and Bachelor of Accountancy were all enrolled in the IT course. Many of them were not pursuing direct Information Technology related studies. Hence those students needed to participate more in the discussion forum to get used to the basic IT- related topics taught in the course.

The Introduction to Programming course only had students from Bachelor of Technology degree. Individually there might have been a bit of diversity in the area of previous study or experience in programming; however they all were pursuing the same degree which was typically technology or programming. As a result they were more accustomed to handle the concepts of the programming course and needed less attention and interaction with others.

## 5.3 Difference in Tutor Support

As discussed in section 4 the Introductory IT course had tutor support which was not the case in the introductory programming course. Hence the students had more tutors to ask questions of and receive more feedback from tutors which resulted in higher levels of participation in terms of number. This is one of factors that Gerbic (2006) and Weaver (2005) identified as motivators of online participation of learners. This phenomenon explains that although online learning is more learners centred, there is still the typical traditional glimpse of instructor dependency in the discussion forum. The more feedback students get from the instructors, the more they interact with the instructors and other students and are inspired by the presence of the instructors.

## 5.4 Impact of Assessment

Research suggests that the strongest motivator for participation is to add some form of incentive as learners generally perceive that what is valued is what is assessed (Burkett, Leard and Spector, 2004; Laurillard, 2002; Leh, 2002; Ramsden 2003; Sheard, Ramakrishna and Miller, 2003; Seo, 2007). The phenomenon of lurkers is also most evident in online discussion forums where participation and engagement is not compulsory (Sheard et al., 2003; Sheard, Ramakrishna and Miller, 2003).

Participation in the discussion forum in the introductory IT course was mandatory as it was assessed and worth 10 percent of the final mark. That could be one of reasons for the higher number of posts. Students had to post to get the marks and so it was highly valued by the students. The lower rate of participation in the introductory programming course could be explained by

the fact that the forum participation was not assessed and students only posted when they were really in need of some assistance in solving problems.

## 5.5 Level of Activity and Achievement

It is important to ascertain the trend between activity and achievement to decide whether or not the online learning environment is totally student-centred and whether this isolated environment provides a barrier in achieving good results in online courses. We found there is a trend between student activity in online discussion forums and the grades they achieved in each assessment. This is clearly evident from figures 7 and 8. All the assessment marks of high achieving students were quite consistent with their participation throughout the semester. Generally the number of posts dropped as the study period progressed, but the trend remained the same. The students, who posted more, got higher marks in each assignment and in the exam than others, with this trend being same for both the courses. However, looking at this trend, it can not be concluded that active participation is the only reason behind higher marks in assessments. There may be other factors that may influence the marks of the students and will be further investigated in future research.

## 6 Lessons Learned

Several lessons are learned from this research regarding the general behaviour of the online students and its impact. Some of the lessons learned from this research are discussed in the following sections.

### 6.1 Managing the Content Sequentially

The way course content is managed has an impact on how students' participate in the discussion board. For example, if all the assignments are released during the first weeks of the course, then most of the students may start discussing all the assignments well before the due date of the first assignment. One of the reasons for that can be a "scare" factor regarding the assignments; this factor works in the minds of the students, being online and isolated makes this factor more prominent. They start to consider the assignments as a hurdle and attempt to complete them as soon as possible. In this way, the focus of the students will be on the assignments rather than learning the basic concepts of the subjects. For these courses, all the assignments were released together at the beginning of the study period and this could explain why a lot of postings occur during the first few weeks and once all the assignment problems are clarified, the participation rate decreases. As a result of our study and observation, we believe that it is better to release the assignments periodically. By releasing the assignments periodically, the focus of the students can be diverted towards learning the subject matter sequentially which can provide them with a strong background on the subject material.

### 6.2 Managing the Expectation

Managing the expectation is another lesson that we learned from this research. This expectation can be of two types: The expectations of the instructors and the

expectations of the students. As we discussed earlier, the expectations of the instructors on how the students participate online has to be dependent on the content of the subject. In a course like Introduction to Information technology, where there is a vast opportunity for discussion, the expectation can be around 5-6 posts per week by the students. This number can be a bit too high for courses like Introduction to Programming where there might be fewer prospects for the discussion to broaden.

From the above discussion we can see that the rate of “lurking” could be different for various subjects depending on the number of possibilities to answer, time of posting and release of content. In this research, we found there were no students who accessed but did not post over the study period. However there were students who accessed more, but posted less, at different times, as shown in Figures 3, 4, 5 and 6. In a subject like Introduction to Programming, there might be a lot of “lurkers”, because the solution of a problem might already be there and lot of students might just view it and not post. Hence the expected participation needs to vary depending on the content of the subject.

The expectations of the students are another aspect to consider. There is a tendency that students want the instructors only to answer their questions and get regular feedback. These factors might have been a reason for higher number of posts in the IT course than the programming course. However instructors do need to consider their way of providing feedback and responses to the students’ questions. This role of the instructor contributes towards the ultimate learning i.e. deep learning or surface learning.

### **6.3 Role of the Instructor**

The role of the instructor is one aspect that needs to be taken into consideration while looking at the participation of the students. The way instructors moderate discussion forums has an impact on how the students’ participate. The type of moderation has a major impact on the direction and number of student participation. If the instructor directly answers the questions from the students, then the discussion ends there on the spot. Whereas broadening the discussion through hints, clues and directions makes the students participate consistently in a higher rate.

### **6.4 Preference of Students**

Students prefer to build a learning community early on in first few weeks. They introduce themselves and sometimes post their personal email addresses so that they can chat about the subject matter informally. Research shows that strong sense of community not only increases persistence of students in online programmes, but also enhances information flow, learning support, group commitment, collaboration, and learning satisfaction (Dede, 1996; Wellman, 1999). Hence students need to be encouraged to follow this practice of building online communities which ultimately leads to effective collaborative learning.

The preference of the students regarding the use of tools for online participation can have an impact on their posting online. This fact came up from close

observation of the course that some students may prefer to use direct synchronous chat or audio tools to ask questions of the instructor and get an instant answer rather than posting on the discussion board and waiting for someone to answer. On the contrary, most students prefer to use the asynchronous discussion board where they can post questions and comments anonymously. Hence student preferences need to be taken into consideration while investigating online activity and participation. This trend of student preference will be further investigated during the qualitative analysis phase of our research and will be reported in future publications.

## **7 Conclusion**

This paper has provided a general overview of the activity of students in the online discussion forums in two introductory courses in a fully online learning environment. By acknowledging the importance of interactivity in online discussion forums, this paper has presented the findings from data analysis carried out with the students of two fully online courses. In addition, the possible reasons for the sort of findings and some of the lesson learned through this research have also been discussed. There are certain factors that contribute towards student participation online and this research has contributed towards identifying those factors.

Our overall research goal is to identify the factors that lead to effective online participation in introductory IT/Programming courses. The first part of that process was to investigate the trend of activity of students in these fully online courses and find out if there is a correlation between activity and grades achieved or not. Hence the major focus of this paper was to present the “big picture” showing the general activity of students in online forums.

Results of our data analysis show a high percentage of students do not access the discussion forums or post at all throughout the semester. However the results also show that it is essential to participate consistently to achieve a high grade. As we have seen from this paper, there are many factors that contribute towards students’ active participation online.

The key lessons learned from this research are that managing the course content and expectations have a large impact on how students participate on online discussion forums. This research has presented the expected behaviour of fully online students in discussion forums. The type of moderations carried out by the instructors and the preference of the students also shape the online discussion.

We will take the findings of this research into our next step and carry out a qualitative analysis of the participation of the students and instructors to investigate the type of participation. Qualitative analysis is required to explore student’s and instructor’s perceptions to capture the views and go deep into the thoughts (Lechner, 2001). By combining the findings of the qualitative analysis and the quantitative analysis from this research, we will attempt to develop a comprehensive framework for effective online interaction.

For active and effective discussion forum participation, there needs to be a comprehensively defined framework that can assist the instructors and

students. We intend to develop a comprehensive framework with design principles for online interaction that can act as guidelines to help and encourage them to participate online; and guidelines for instructors on how to set up the online discussion forums for effective learning. The clearer the criteria for interaction in online forums, the more effectively academics will be able to make use of online interactions and discussions as an educational tool.

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