Articulation of Group Dynamics of Undergraduate Students in Social Media

Abstract

The main aim of this study is to investigate the students' group dynamics during their online activities within the framework of Zone of Proximal Development (ZPD) theory of Vygotsky and the potential of more capable peers for knowledge construction in an undergraduate course. A social media environment was used as a support tool in a blended approach. The students were given a task set on computer programming in the social media and asked to support each other for solving problems with no teacher intervention. Pre and post tests were conducted and t-test of the scores (out of 15 marks) obtained by the students was done to discern any improvement of learning as a result of students' engagement in problem solving in the social media. The results of the t-test indicated an improvement of acquisition of knowledge in the topic of basic programming. The conversation of the students in the form of textual messages showed that the students who experienced a problem in order to solve the set task were in the ZPD and ultimately did it successfully with a little assistance and scaffolding from a more capable peer. In fact, the members of the peer groups provided support to bridge the gap between the existing skills and abilities of programming and their intended goal, that is, completing the tasks given by the course teacher. Additionally, the students felt that peer interaction improved their understanding of the computer programming and problem solving competency.

Keywords: Zone of Proximal Development (ZPD), Collaborative Learning, Group Dynamics, and Social Media

Introduction

Students learn through interaction with their peers. This concept of Vygotsky (1978) has a great impact on collaborative knowledge building. The essence of this student centered learning is: Knowledge is constructed through active engagement of students enrolled in the same course of study, called peers. According to Vygotsky's theory of Zone of Proximal Development (ZPD), the group members provide scaffolding where a more skilled learner assists a less skilled member of the group to upgrade his/her level of competencies. Group Dynamics is the process and a technique ensuring effectiveness in the framework of collaborative learning (Jaimini, 2014). However, students' cognitive level, motivation, size of the group, gender etc may influence the learning at individual level.

Nowadays, E-learning and social media platforms are used by the teachers worldwide because of its interaction facilities. The social media and *Web 2.0* tools are the enablers that bring the learning community together (Wheeler, 2011). Whether learning is regarded as occurring through social media, bulletin boards, or in traditional face-to-face settings, statures from Plato through Vygotsky have located – either in their theory or practice – the role of dialogue and social interchange as central to learning and development (Friesen & Lowe 2012).

Naturally, the students in most universities in the developing countries are not quite familiar with peer group interaction and reluctant to interact with each other (Islam, 2003). We have created an environment

for student interaction using a social media in a blended approach where the course teacher taught basic programming techniques as a topic of Computer Fundamental course in a face to face class. In the next stage, students were given problem-solving tasks in a social media blog and asked to initiate individual problems and simultaneously, involve solving each other's problems within a given period of time. The course teacher adopted a strategy to monitor the interaction but not appear in the blog with a textual posting.

We have investigated the pattern of student interaction in solving each other's problems and the extent to which students' exhibit group dynamics as a whole and utilize their joint intelligence. Relevant literature on group dynamics, and its scope and appearance in social media are presented in the following section.

Literature Review

Collaborative Learning and Group Dynamics
'Group Dynamics' plays a crucial role in effective implementation of cognitive, social and emotional practice and teachers often have to struggle with the issues relating to composition and working aspects of the groups (Jaimini, 2014). Jaimini also added, the teachers in the situations of organizing collaborative learning, therefore, need to plan, monitor and assess the group interactions. However, group size, basis of group formation, i.e. homogenous or heterogeneous group in terms of ability, age, gender, experience, background etc may impact on the performance of the group (Forsyth, 2009). Moreover, the group composition and cohesion, task structure, student and teacher roles, nature of facilitation, discourse styles, group processing and learning environment are also important for group performance (Kegan, 1994; Jones & Carter, 1998). Forsyth (2009) defines group dynamics as the leading actions, process, and changes that may occur between and within groups. According to Forsyth, "*a group is two or more individuals who are connected by and within social relationships*".

Jaimini mentions that small group interaction increases higher-order thinking skills and a higher ability to reason. Peer interaction stimulates cognitive development when students really assist in problem solving while working for achievement of a common goal (Berk & Winsler, 1995). Vygotsky's ZPD supports this assertion of Berk and Winsler where he talked about a more skilled peer who can provide scaffolding to another less skilled peer. Johnson and Johnson (1987) believe that more frequent giving and receiving explanation, and greater perspective taking in discussing material seem to occur in heterogeneous groups, all of which increases the depth of understanding. In a collaborative learning situation, if a member is more knowledgeable than the other, the latter may learn from the former. Vygotsky (1978) writes,

> "*the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers*"

When the task is accomplished the more competent or skillful peer provide appropriate assistance or scaffolding for solving problems. With this benefit of scaffolding, the less competent peer is then able to complete the task on his/her own. This is the beauty of this peer interaction. Rosenshine, & Meister (1992), and Harland (2003) acknowledge the effectiveness of scaffolding and group dynamics under the approach of collaborative learning.

Adoption of Social Media in Learning
Despite the relative novelty of the '2.0' versions of learning associated with personal learning environments and social media, aspects of the underlying conception of learning are not necessarily new (Friesen & Lowe 2012). Researchers like Menéndez Echavarría, Sánchez, Claudia (2013) and Raths (2013) found Social media as an interactive communication platform related to web 2.0 (social web).

Participation in online forums can support and build students' skills in online interaction, face-to-face academic debate and academic writing (University of Michigan, 2014).

Huffman (2013) in the light of the approach and method collaborative learning and group dynamics gave a technology planning model which outlines six components for the use of technology in the classroom. The six components are 1) student/staff assessment, 2) inventory, 3) measurement, 4) planning, 5) leadership, and 6) evaluation. Appropriate planning and use helps the teachers and educators maintain focus on the major issues, thus maximizing the benefits while minimizing in pitfalls (Islam & Vale, 2012; and Greenhow, 2009).

Adopting virtual ethnography, and utilizing observation techniques supported by a diary to detect problems and propose solutions Feliz, Ricoy, & Feliz (2013) analyzed students' participation in Twitter in a masters course and found that the students actively participated in training activities posting 3026 tweets but had problems integrating interaction mechanisms. Consequently, they needed to be given guidance, insisting on re-tweets, as well as on improving horizontal interaction. The students (20 male and 19 female) were found to take full advantage of the maximum length allowed by this tool. Social media helps education institutes for improving their brand images. Conducting exploratory content analysis of 36 universities and colleges in the USA, Peruta, Ryan, & Engelsman (2013) commented that these universities have been able to extend their brand using their social media channels. The study of Raths (2013) found that teachers are building learning communities that have helped with resource discovery, knowledge acquisition, feedback on ideas, innovative strategies, connections to experts and practitioners, and the ability to track conferences.

Social media use has several positive effects on student's learning outcomes for example, knowledge and skills, participate and contribute more and their satisfaction (Cao, Ajjan, & Hong, 2013). Indeed, students perceive it as beneficial and positive and helpful for promotion of an understanding of the importance of teamwork and the uses of technology (Alon, & Herath, 2014). Moreover, this communication tool enhances student learning, satisfaction, and sense of connectedness (Barczyk, & Duncan, 2012). A study of University of Michigan (2014) also concludes, the more the participation in social media the better the results of the students.

Conversely, social media use can be destructive to learning if it is not used properly (Andersson, Hatakka, Gronlund, & Wiklund 2014). However, teachers and school leaders jointly may find the coping strategies to reclaim the students from this situation.

Objectives

The objectives of this study are to:
1. explore the problem solving ability of the students in social media in absence of course teacher's intervention
2. find out the cognitive development and improvement of learning as a result of peer interactions during problem solving in social media.

Methodology

The present study was conducted in a university in Dhaka, Bangladesh. The university created an environment for student interaction using a social media tool called 'Learning Feedback System (LFS)'in a blended approach to provide students an extra support for broader understanding of the topic taught in face to face classes. A computer fundamental course was considered for this study where the course teacher taught basic programming techniques as a topic of the course in a face to face class. 79 students in three sections participated in this study. Section A, B and C comprised 28, 23, and 28 students respectively. The students were freshmen, having little or no familiarity with collaborative learning. As per

research design, all the students went through a systematic teaching and learning process throughout one semester. The sequences and data analysis techniques were:

1. **Teaching (delivery of lecture for a period of six weeks)**
The four course teachers delivered two lectures per week for a period of six weeks on computer programming and a lab work per week.

2. **A pre-test**
At the end of six weeks, a pre-test was taken with a set of five questions to assess students' ability to fix a trivial faulty program. Each of the students was awarded marks out of 15 for this pre-test based on a structured marking scheme. The questions given to the students were validated by a panel of experts and analyzed according to the Bloom's cognitive levels.

3. **Social media interaction and problem solving**
After pre-test, each student of all the three sections was asked to participate separately in a social media discussion blog for sharing two problems with reference to the pre-test and in the next stage help solve each other's problems in a collaborative manner. This social media engagement continued for two weeks. Quantitative and qualitative analysis of these interactions were done to discern patterns of problem solving and group dynamics.

4. **A post-test**
A post-test was applied with minor modifications of the pre-test tasks (*i.e.,* they were given a different faulty program) to find out improvement of the scores of the three sections as a result of social media intervention. Each individual was awarded marks for this post test as per a structured marking scheme.

A statistical t-test of the pre-test and post-test was done using SPSS (version 20) to show any improvement of cognitive development as a result of peer support in the social media.

A questionnaire was administered to understand students' perceptions of learning with the peer group and benefit of interactions and group discussions.

Results

Nature of Peer Scaffolding

As mentioned earlier that the students of each section posted their problems and engaged in problem solving in three different blogs. Quantitative data of their engagement are presented in table 1.

Table 1. Students engagement in problem solving

Section	No of students	No of students provided support for problem solving	No of messages posted by these students
A	28	17	33
B	23	10	23
C	28	11	25
Total	79	38	71

All the students came up with at least one problem but not all students engaged in problem solving sought by the individual peers. The results revealed that students formed different cluster group during mutual support for problem solving. An example is given from section B (figure 1).
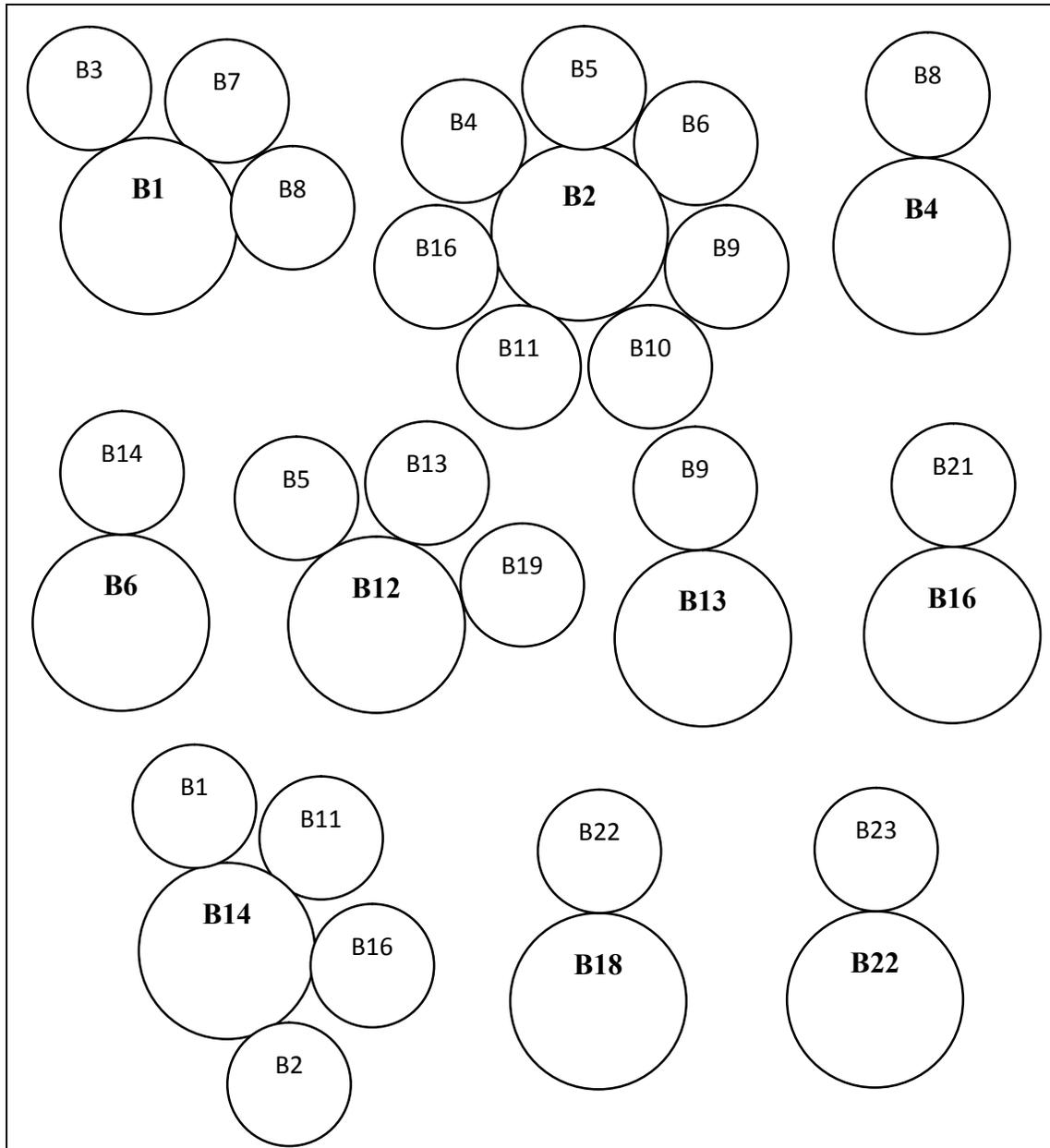
Figure1. Pattern of peer support for problem solving in social media

Figure 1 shows:

- About half of the students answered to the questions of the others

- A number of students responded to small groups of students seemed to more competent. For example, student B2 assisted in problem solving to another seven students for achievement of their common goals. Student B2 seems to be a highly skilled peer
- Few students received help from skilled peers and conversely provided help to another peer for solving problems. For example, student B4 received help from student B2 and provided help to another peer B8.

The data also revealed that several common questions were asked by the students and were addressed naturally by the competent students who responded. An example of a problem posted by *student B2* was answered by *student B14* is given below.

Student B2

(transcript) Problem 2:We use data 8,5 but in the trace table why don't we get output 13?

Student B14

(transcript) Solution: After using data 8,5 we can't get output 13,coz it was a wrong program.

In the quiz, the program was:

READ M1 M2

WHILE M1<>-1

READ M1 M2

PRINT M3

WEND(Back to while)

DATA 8 5

DATA 7 16

DATA 13 19

DATA -1 -1

According to the program- 1stly,we input data 8,5. 2ndly,it cheack the condition WHILE M1<>-1. if it in the condition then it will be yes. 3rdly,we again input data 7,16 and follow the statement M3=M1+M2. 4thly,we follow the statement PRINT M3 and get the output 23. 5thly,we follow WEND(back to while) and cheack the condition.WHILE M1<>-1 again in pairs of data (13,19)thus,continue we get outputs (23,32,-2) but not get the output 13.

Here, *student B14* presented the answer step by step with confidence and provided justification so that student B2 can understand the given task easily and finally may become competent to solve his/her own problem and play the same roll in the group . This is an example of peer scaffolding.

Improvement of Learning due to Peer Group Support

The students were awarded marks out of 15 in both the pre-test and post-test . Mean marks and standard deviations are given in table 2.

Table 2. Mean and standard deviations of the pre-test and post-test

Test	Mean marks	Std. deviation	Gain
Pretest	6.92	2.652	3.82
Posttest	10.74	2.762	

The table indicates an improvement in mean marks (3.82) obtained by the students in post-tests which took place after social media intervention. However, the standard deviation increased slightly due to maximum scores (15). One sample t-test of individual scores of the students in pre-test and post-test was done using SPSS (version 20) which was found significant. This result indicates an improvement of capacity of problem solving and skills acquired as a result of peer group support in the social media blog.

Additionally, the five questions of the test were analyzed as per the Bloom's cognitive levels (1956). The questions and corresponding cognitive levels are given in table 3.

Table 3. Cognitive levels of the questions

Test question	Bloom's cognitive levels	State of Bloom's Taxonomy
Q.1	Analysis	4th Level (HOT)
Q.2	Knowledge & Comprehension	1st and 2nd Level (LOT)
Q.3	Understanding & Application	2nd and 3rd Level (LOT)
Q.4	Evaluation	5th Level (HOT)
Q.5	Synthesis	5th Level (HOT)

Discussion

Group Dynamics in Social Media

The data shows that all the students in each section came up with at least one problem in the first instance which indicates their strong ability to identify own problems (Jaimini, 2014). However, there were two supporting reasons. The "set" of questions in the test followed the steps necessary to diagnose and fix errors in a program. Immediately, the students started to support each other by their second and third attempts for solving problems and having peers solve their own problems. This is a kind of peer scaffolding (Rosenshine, & Meister, 1992; Berk & Winsler, 1995). This scaffolding happened in two stages: (i) problem of a single student was clarified or solved or hinted (Harland, 2003) by a single or a

small group of 2/3 students, (ii) overall group interaction among the students. This pattern of interaction was consistent for all the three sections of students who participated in the social media blog intervention.

The peer scaffolding that happened in the social media can be explained with Vygotsky 's Zone of Proximal Development (ZPD). In the present study, the students who experienced a problem in order to solve the teacher's task were in the Zone of Proximal Development and ultimately they did it successfully with a little assistance and scaffolding from a more competent peer. Moreover, in most cases the scaffolding was provided by a small group of 2/3 expert peers that ultimately formed a cluster. It is interesting to note that, once a student, with the benefit of scaffolding completed the task that is, achieved the goal, and later on he/she took on the role of an expert peer by providing scaffolding to another peer in the large group. Vygotsky's ZPD also supports this pattern. Furthermore, small group interaction increases higher-order thinking skills and a higher ability to reason (Jaimini, 2014) and this peer interaction stimulates cognitive development since the students really assisted in problem solving while working for achievement of a common goal (Berk & Winsler, 1995). The leading actions, process, and changes that occurred between and within groups are group dynamics (Forsyth, 2009).

Students perceived that peer interaction reduced the gap between weak and strong students which is aligned with the Vygotsky's ZPD. Social media interaction helped them improve confidence in the subject matter, motivation for study and skills in programming.

Impact of Social Media Interaction on Learning

The quantitative data indicates that the mean marks obtained by the students increased in the successive tests. More clearly, the mean marks obtained by 79 students in post-test increased by 3.82 than the pre-test. So, the results indicate an improvement of acquisition of knowledge of the topic (programming) that is, accumulation of prior and post knowledge happened through peer interaction (Hunt, 1997; Powell & Kalina, 2009). It would seem that effective learning happened during peer interaction as it had a positive impact on students' grades (Laird et al. 2014). Further, the result of the t-test of the marks obtained by individual students (79) is significant that is, there is improvement in their performances in the successive tests. Again, this result supports the above claim of improvement of learning as a result of group interaction.

Further to our above claim, we tried to understand how this improvement of learning happened by doing an analysis of the five questions as per Bloom's cognitive levels. Each of the five questions matched with corresponding cognitive levels (table 3). Since students stated their problems and provided solutions to others' problems, they utilized higher order thinking skills (Polly & Ausband, 2009) during social media interaction and problem solving. Obviously, attaining these skills by the students is an achievement of the course goals (Islam & Vale, 2012).

Conclusion
This study has illustrated a few interesting findings regarding group dynamics of the students in the social media during their engagement in problem solving of a task set of five questions on basic programming and improvement of the competencies of the students reflected from the pre and post tests. The results undoubtedly show an step by step scaffolding provided by a few more capable peers for solving problems posted by a few less capable peers which is aligned with the Vygotky's theory of ZPD. Indeed, improvement of learning happened due to peer interaction based on different cognitive levels. The extent to which such improvement occurs in presence of teachers' support is left for further research.

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