

AN ONLINE DISCUSSION FOR SUPPORTING STUDENTS IN PREPARATION FOR A TEST

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ABSTRACT

This research examines classroom-based student participation in online discussion groups while preparing for a test, as well as the relation between the type of participation and student achievement. The online discussion groups were set up towards particular tests in a large-scale course, Introduction to Ecology, during the academic years of 2004 (N=99) and 2005 (N=72). They were intended to be a virtual meeting place for students to exchange information related to a question pool, when no face-to-face meetings with the teachers take place. The results indicate that a high percentage of the students who take the test (85%) participate in the discussion groups. Mixed results were found regarding the relations between the participation in the discussion and achievements. Based on the quantitative data and interviews with students we outline recommendations with regard to the effective use of discussion groups for supporting students in their preparation for tests.

KEYWORDS

Participation, Test Preparation, Discussion Groups, Question Pool, Achievement

I. INTRODUCTION

The use of online discussion groups, which allow for interaction among students as part of academic courses, is increasing constantly. Therefore questions pertaining to the influence of such discussion groups on teaching and learning processes are of great interest. This research joins a series of studies [[1](#), [2](#)] dealing with issues related to the various uses of online discussion groups in academic courses, and focuses on a unique discussion group that aims at supporting students in preparing for tests.

During the preparation period for a test, when no face-to-face meetings occur between the students and the teacher, the student is expected to demonstrate a high degree of self-direction, which involves meta-cognitive, cognitive and emotional processes. An online discussion group can serve as a learning environment that promotes self-direction. It provides an opportunity to focus on the difficulties that arise during the learning process and to formulate them in a way that enables the student to receive relevant and focused feedback from other students and from the teacher. In addition, it exposes the student to difficulties of colleagues and thus allows self-examination and deeper learning processes.

This research examines the extent of student participation in a discussion group aimed to help them prepare for a test, as well as the relation between the type of participation and student achievements in the test. The research focused on a discussion group set up to help students prepare for a particular test in a large-scale course, Introduction to Ecology, taken by first-year students in the Faculty of Life Sciences at

Tel Aviv University during the academic years of 2003–2004 and 2004–2005. The course was conducted face-to-face and was accompanied by a website during the semester. When the semester was over, 1300 true/false questions, encompassing the entire course material, were presented on the course website. The students were informed that 90 of those questions would comprise the test. The discussion group was intended to be a virtual meeting place for students to exchange information related to the question pool, to raise difficulties that came up as they were preparing for the test, and to receive feedback from colleagues and from the teacher. The teacher followed the discussion group and intervened when he deemed necessary. Following the tests, data regarding the number of messages, the number of entries to the discussion group and the grades of 99 students in 2004 and 72 students in 2005 who took the test were collected. To complete the picture, interviews were conducted by telephone with seven students.

II. THEORETICAL FRAMEWORK

As the use of the Internet for the enrichment of the study environment in academic courses increases, questions are being asked regarding the possible ways in which integrating Internet tools may affect teaching and learning processes in general, and student achievement in particular. One of the relatively widespread tools intended for creating asynchronous interaction among the students and between them and the teacher is the online discussion group. The literature reports on various kinds of online discussion groups varying in goals, subject matter, nature of the instruction, roles of the participants and duration [1, 2]. This study examines a unique discussion group intended to assist students in the process of preparation for a test following a face-to-face course.

In the period of preparation for the test, when no face-to-face meetings are held, students should demonstrate a high degree of self-direction. They must assess the gap between their knowledge and the required level, focus on their difficulties and select ways of handling the situation, while using their time and resources efficiently [3, 4, 5, 6, 7]. Learning processes which involve self-direction require integration of the following components: meta-cognitive activity (reflection on the knowledge and the learning processes); cognitive activity to focus the knowledge and skills; and operative strategies to select action paths. Studies show that students possessing a high level of self-direction reach higher academic achievements in comparison to students with a low level of self-direction [4, 8, 9].

A learning environment that encourages self-direction has unique characteristics. Boekaerts lists some of the central ones, e.g., flexibility, choice, opportunity for self-appraisal, encouragement of internal motivation and creation of varied opportunities for learning [3]. Lin et al. identify four components of instruction that promote self-direction in the period of preparation for the test: evaluation of processes and outcomes, continuous guiding of the student, use of experts' modeling, and change of point-of-view during discussion with experts and other students. Without appropriate support, students have difficulties reflecting on knowledge and reflecting on learning processes, as well as focusing on difficulties and on selecting ways of acting [5].

The pre-test discussion group can serve as a learning environment with the characteristics that support self-direction. The activity in the pre-test discussion group is characterized by flexibility and choice regarding extent and type of participation. The very participation in a pre-test discussion group requires that students focus on difficulties, formulate and explain themselves in a way that will provide them with effective support from other participants. The exposure to difficulties brought up by others, the handling of various viewpoints and criticism all constitute a basis for further inquiry and self-examination [10, 11, 12, 13]. The teacher's regular presence and steady participation in the discussion group facilitates the structuring of the discussion, ensures the reliability of the information, and provides feedback and personal guidance for the students [11, 12, 13, 14, 15]. Discussion groups of this type might manifest

elements of teaching that Lin et al. identified as supportive of self-direction towards a test: The ongoing array of interactions among the students and the teacher allows students to assess their knowledge in comparison to that of others (evaluation of processes and products), to be exposed to difficulties, responses and mistakes of fellow students and experts (change of positions and modeling), and to receive personal feedback and guidance (modeling and guidance) [5]. Participation in the discussion can help in structuring personal and group knowledge in which each of the participants shares responsibility for the created knowledge. The individual and group's need to find the correct answers creates joint responsibility for the contents and their formulation [8, 11, 16, 17, 18].

Despite these clear advantages of an online discussion group, previous studies have found that many students do not participate due to the new challenges that such a group might generate. This environment, rich in nonlinearly arranged material, requires that the students be focused and consistent. They must be proficient in searching for information, distinguishing between important and irrelevant information and between correct and incorrect information, and sorting and organizing that information. The need to express oneself in writing and the exposure to the responses of peers might pose a threat to some of the students. Writing as the sole means of communication with others requires high awareness of the quality of writing [19, 20, 21]. Additional factors which can hinder student participation in the discussion group are: technological limitations, lack of computer skills or skills in functioning in a discussion group, the characteristics of the group and the course, and the student's learning style [22].

The studies that focus on student activities in discussion groups variously define “participation in a discussion group”. Some of the studies include those who have viewed the discussion as well as those who wrote messages [23, 24], whereas others regard participation only as writing messages [2, 22]. The methods of measuring participation vary as well: in some cases the number of messages written is counted, while others count the number of words written in the discussion group. In our research we have distinguished among three types of participation: those who write messages, those who merely read the content and those who are not active at all. The general picture that arises from studies that inspect the extent of participation in various types of discussion groups is that the percentage of participants as both writers and viewers is about half of the enrolled students, and that the percentage of message writers is around 20%–30% of the participants in the discussion group [2, 22, 23, 24].

Many studies compared achievement among students who used e-learning in asynchronous learning environments to those of students who studied in face-to-face learning environments [25, 26, 27, 28, 29]. Only in a few of these studies was there an attempt to focus on the potential relation between the type and extent of activity in a discussion group intended for a specific purpose, and student achievements. These revealed inconsistent results. For example, Beaudoin examined the differences between the achievements of students who wrote a large number of messages, those who wrote a small number of messages and those who wrote none. He found that those who wrote many messages achieved higher scores compared to students in the other groups. But he also found that those who wrote nothing at all had better achievements than those who were fairly active [30]. Picciano reported positive relations between the level of participation in a discussion group and the grade in a test and in a final assignment [31]. Following these studies, we have chosen to focus on the role of a discussion group as a support in preparation for a test and the relations between student participation and their scores.

The research questions are as follows:

What is the type and extent of student participation in the online discussion group that supports test preparation?

Is there a relationship between the type and extent of the activity in the discussion group and the

achievements in the test?

III. METHOD

A. The Field of Research

Most of the courses in Tel Aviv University are taught face-to-face. A significant percentage of these courses are accompanied with an Internet site that the teachers build using a designated Internet interface for academic courses on the web called HighLearn, a Web-based learning content management system. A site was built using this interface for the course “Introduction to Ecology,” a first-year, large-scale course given by the Faculty of Life Sciences. To help prepare for the test, the teacher presented 1300 true/false questions in the course site two weeks before the test. A sample of such questions is shown below. He informed the students that they would be tested on 90 of these questions, and opened a discussion group in the course site intended to assist in preparation for the test. He followed the activity in the discussion group on a daily basis. The data in this paper refer to all the students who took the test: 99 students in Summer 2004 and 72 students in Summer 2005.

A sample of the questions presented to the students:

The student has to determine whether the sentence is true or false

- a. Only living organisms take part in the interactions within the ecosystem.
- b. In a study of interspecific competition it was found that $K_2 > N_2 + N_1 \alpha_{21}$, therefore, population no. 2 will decrease.
- c. Small desert rodents feed at night because this is the time their predators are asleep.
- d. The intensity of intraspecific competition is determined by the population density and by the availability of the limiting factors.
- e. The fact that in the wild polar bears hibernate every winter means that this process is governed by an internal body clock.

B. Data Collection

The participation extent was defined on the basis of two measures—the number of messages and the number of viewings in the discussion group. The data were automatically recorded in computer logs by a data mining program. Relevant reports were produced based on this data.

The students were divided into three groups according to their type of participation: message writers, viewers only, and non-participants. The grade in the test served as the measure of success. In addition to these measures, we selected 15 students, who took the test in 2004, and sent them an e-mail asking them to be interviewed either by phone or e-mail—5 students from each group. 10 students responded to our e-mail: 4 message writers, 3 viewers, and 3 non participants.

Those students were asked about their motives for entering the discussion group, the reasons for their activity or inactivity, the instructor's role, their feeling about the helpfulness of the discussion group in the process of studying for the test and its influence on their achievements.

C. Results

We shall present the results according to the two research questions:

1. Type and Extent of Participation in the Discussion Groups

Table 1 presents the type and extent of student participation in the discussion groups according to the three types of participation defined above.

In 2004 30% of the students wrote messages (921 messages overall) and in 2005 about 40% of students wrote messages (580 messages overall). The average number of messages per student in 2004 was 29.7 and the distribution was relatively high (standard deviation 46.8). The average number of messages per student in 2005 was 21.5 and the distribution was relatively low (standard deviation 5.4).

In 2004 about 50% of the writing students sent a few messages in a one week period (up to 10 messages) and 30% were more active (over 20 messages). Half of the messages were sent by the three most active students who sent more than 100 messages each. In 2005 the results were similar. Some 40% of the writing students sent less than 10 messages; 30% sent more than 20 messages. The two most active students were responsible for 40% of the total 580 messages sent to the discussion group.

In 2005 the viewers became more active. The average number of viewings per viewer was four times that of 2004. In 2004 the average number of viewings per viewer was 6.9 and the distribution was relatively high (standard deviation 10.4). The average number of viewings per viewer in 2005 was 27.1 but the distribution was relatively low (standard deviation 5.9).

| | 2004 | 2005 |
|------------------------|--------------|-------------|
| N of Students | | |
| | 99 | 72 |
| Percentage of students | | |
| Message writers | 31.3 | 37.5 |
| Viewers only | 51.5 | 44.4 |
| Non-active | 17.2 | 18.1 |
| Number of messages | | |
| | 921 | 580 |
| Number of viewings | | |
| | 2145 | 2244 |
| Messages per writer | 29.7 ± 46.8 | 21.5 ± 5.4 |
| Viewings per writer | 69.2 ± 110.0 | 83.1 ± 15.7 |
| Viewings per viewer | 6.9 ± 10.4 | 27.1 ± 5.9 |

Table 1: Number of Messages and Number of Entries According to the Type of Activity in the Discussion Group in 2004 and 2005

The interviews with the students provided a dimension explaining their motives to participate in the discussion group. The interviews also suggested that there was a particularly active group of students who initiated the discussion and kept it going.

As one of the students said “There has to be an ignition—an initial spark, other people didn't really know that there is something going on but they slowly realized this”. Another student said “I entered by chance and then I saw that there were a few people who sent lot of messages that really helped me. So I started entering and I really got carried away with the whole thing and became dependent on certain people’s answers”.

In both discussion groups the teacher contributed about 7% of all the messages (64 messages in 2004 and 38 messages in 2005). His role in the discussion did not come up as a central question in this research, but it received an important place in the student response in the interviews. We shall quote several statements students made on this issue. One student remarked that the teacher's presence at the right time and extent is very important for the development of the discussion. "He has to enter at least once a day, and before the test even more often, or else the discussion is ineffective. It turns into a heap of rubbish." Another student remarked that the intervention of the instructor at the right time helped achieve the goal. "We argued about the answer... he waited and let us argue... his intervention was smart." The instructor's attitude and the high appreciation he received from the students were also emphasized "His willingness to help and his caring charmed many of us. His way of helping by not giving us the final answer but making us understand also... helped me at least not to learn the answers by heart like a parrot, but to understand and internalize the material... so thanks!!!."

2. The Relation Between Participation in the Discussion Groups and Test Achievements

The second research question pertained to the relation between the type of participation (writers, viewers, non-participants) in the discussion groups and success in the test. Table 2 presents the average grades in the test for the three groups. Scheffe's test was conducted to compare the contrasts among the grades in the three activity groups. We found that the message writing group of 2004 term could be distinguished from the two other groups and that its achievements in the test were significantly higher ($F(98.2)=7.68, p<0.01$) than the achievements among the two other groups. On the other hand, in 2005 the message writers did not achieve significantly higher grades than the two other groups.

| | 2004 | 2005 |
|------------|---------------|--------------|
| Writers | 89.2 ± 8.6 a* | 87.3 ± 1.6 a |
| Viewers | 78.5 ± 14.6 b | 83.1 ± 1.7 a |
| Non-active | 73.6 ± 22.1 b | 84.2 ± 2.8 a |

Table 2: Relations Between the Type of Activity in the Discussion Group and the Grade in the Test
Data are Averages ± S.D.

*Within each column, numbers followed by different letters differ significantly ($p<0.01$)

We also examined the relation between the number of messages written and the grade in the test among the writers group. In 2004 a significant correlation ($p<0.05, r=0.40$) was found between the number of messages written and the grade in the test. A significant correlation was found in both terms between number of viewing of all the students and grades (2004 $p<0.01, r=0.26$; 2005 $p<0.05, r=0.23$).

An obvious explanation for the positive relationships that were found in 2004 between the extent of message writing and achievements in the test was that the active writers were generally better students. In order to test this possibility we compared the annual average grades of the various student groups.

| | 2004 | | 2005 | |
|----------------------|--------------------------|--------------------|--------------------------|--------------------|
| | Average of annual grades | Grade in this test | Average of annual grades | Grade in this test |
| All students | 79.4 ± 12.4 | 81.5 ± 15.5 | 85.0 ± 9.3 | 76.2 ± 10.5 |
| Message writers | 81.4 ± 17.3 | 89.2 ± 8.6 | 77.2 ± 10.5 | 87.3 ± 1.6 |
| Most active students | 87.6 ± 6.6 | 94.0 ± 5.4 | 74.3 ± 13.06 | 91.4 ± 4.2 |

Table 3: Relations Between the Extent of Activity, Annual Average Grades, and Achievements in this Test
Data are Averages ± S.D.

In 2004 significant correlations were found between the number of written messages and the annual average grades ($p < 0.05$ $r=0.22$) and between achievements in this test and the annual average grades ($p < 0.01$ $r=0.37$). Namely, the active students in the discussion had better grades in this test and were also better students in general.

In 2005 the picture was different. The students who were most active in the discussion group (wrote more than 20 messages, $N=10$) were those who had lower annual average grades than the others. On the other hand, their achievements in this test were significantly higher ($t(70)=3.12$, $p < 0.01$) in comparison with the other students ($N=72$).

Several important issues emerged in the interviews with the students who were active writers, pertaining to the contribution of the discussion group to success in the test. The students' comments mainly suggested that participation in the discussion group contributed to their understanding of the learned material and to strengthening their self-confidence.

“The forum really helped me!!! Things I thought I understood turned out to be inaccurate...I'm sure that this also improved my grade.”

“The discussion group really helped. I don't know what I would have done without it... Especially the contact with the teacher, it does not exist in any other course. But also the friends' responses. I often changed my opinion about questions which I thought I understood.”

“If I didn't understand the final answer I read the discussion... and this really helped me understand several topics.”

“I was asked a lot, and I answered and people agreed with me, and I understood I'm in the right direction. It gives you a very good feeling.”

“It helped my feeling and maybe influenced the grade. I think that if I would have participated more in the discussion it would have helped me more.”

“...not just the presence of the instructor, but the presence of the students too is very important. It really boosted my confidence. It's not just what the instructor will say but also friends' responses.”

IV. DISCUSSION

One aim of this study was to check student participation type and extent in an online discussion group intended to support them in preparation for a particular test. The hypothesis was that during this period, when no face-to-face meetings are held, the students would have a special interest in active participation in the discussion group that would assist them. In the discussion groups that were examined, 30–40% of all the students enrolled for the test wrote messages, and 45–50% of them viewed the discussion. Overall, about 80% of the students made use of the discussion group. Previous studies that examined different manners of using various types of discussion groups found that about 50% of the students enter a discussion group [22, 23, 24]. In our case, among the participants, the majority (60%) were message writers unlike in previous studies, in which only 15%–20% were message writers [23, 24].

Based on the message distribution among the writers we concluded that most of the activity in the discussion group was carried out by a small core of active, interested participants. They were the initiators

of the discussions and the ones who answered questions of the others. The success of the discussion was dependent on their interest and determination. Most of the participants in the group were casual users who came in for clarifying a few specific questions and disappeared once they were satisfied or discouraged by the responses they received. A possible explanation for this pattern of activity can be related to the fact that the students were guided by a pool of review questions presented by the teacher. Focusing questions are known to serve as a basis for creating a relevant discussion and leading the students towards a clear goal [30]. Another explanation for this pattern had to do with the teacher's roles, as was reflected in the interviews. His frequent entries enabled the students to develop a relevant discussion, knowing that he was responsible for the credibility of the contents. The teacher's timing of his intervention left the students enough time to respond to one another and discuss issues among themselves. His manner of writing encouraged thinking and created a pleasant atmosphere. Other studies also emphasize the important role of the teacher as a discourse facilitator, whose cognitive, social and teaching presence is essential for confidence building and increase the motivation for knowledge sharing [8, 26, 32, 33, 34, 35]. The example set by the few most active students also encouraged the other students to participate in the discussion, to contribute their knowledge, receive information from peers, and feel that this activity was valuable even when under pressure towards the test. Student comments indicate that the involvement of the teacher and the message writers was important in supporting reflective processes, which are at the basis of the student's self-direction.

Question arises as to why around 17% of the students in both terms did not participate at all and 50% of the students only viewed the discussion and did not write anything. In the interviews, some reasons for the lack of participation were brought up. The first reason was related to the learning habits of first-year students who are, in general, less accustomed to using the various knowledge resources and to collaborative work. This supported findings of another study, which showed that graduate students made greater use of discussion groups than undergraduates [22]. The second explanation is related to students' former experiences with discussion groups where much irrelevant and unfocused material accumulated. Students with such negative experiences regarded the discussion group as a waste of time which they could not afford in the period just prior to the test. The third explanation, which provided further support for what was already known from the literature, was the students lack of self confidence in expressing themselves in writing or in using web-based technology in general [30]. Students seem to need an adjustment process in order to effectively use this medium. It is also possible that the congestion created in the discussion group, the large number of messages, and the lack of internal organization discouraged students from entering the discussion group. This argument was strengthened when we examined the messages in the discussion group where some students expressed frustration regarding the information load.

In order to support the use of discussion groups for test preparation, they should be used as an integral part of the learning process in the course and not just towards the test. The opportunity for gaining such an experience throughout the learning period might reinforce the confidence of hesitant students, allow students to discover the power of the group as a source of information, and turn participation in discussion into a regular part of the learning process.

The second research question dealt with the relation between the type of activity in the discussion group and achievements in the test. It appears that only the group of students who actively participated by writing messages received higher grades in the test in compared to the other two groups. This finding reinforces the hypothesis that the more active student has more opportunities for reflection, further inquiry, criticism and direction [11, 33].

Among the message writers of 2004 a positive correlation was found between the number of written messages and the student grade in the test, but since the active message writers had a higher average annual grade we can not suggest any causal relationships between activity in the discussion and the higher achievements in the test. On the other hand, in 2005 the active message writers had lower annual average grades than the rest of the class, while in this test their grades were significantly higher. It is therefore plausible that in 2005 the activity in the pre-test discussion group helped those students whose achievements are usually not high. Additional research is needed to better understand this result.

Based on the general trend in 2004, the teacher encouraged students in 2005 course to take part in the discussion group assuming that it might improve their achievements. This may have caused more students of generally lower standing to take part in the discussions. Indeed they seem to have benefited from this activity. The teacher's recommendation in 2005 may have also been the reason for the higher activity level of those who were classified as viewers only. I may also account for the lower standard deviation among the active participants in 2005.

Two central arguments that were raised by the students might explain the active message writers' success in the test. The first has to do with the level of understanding of the material, whereas the second one concerns the strengthening of students' self confidence regarding their knowledge of the material as a result of their participation in the discussion group. According to the interviews, active participation helped the ones engaged in it focus on the difficulties, formulate questions, raise arguments, and be exposed to criticism and feedback from peers and the instructor. In addition, it came up in the interviews that participation in the discussion supported habits of group learning and the sharing of knowledge among active participants. These processes, which occur during the discussion, reinforce cognitive, motivational and operative factors, which are significant in processes of self-direction.

The findings indicate a large gap in the average number of viewings between the viewers and the message writers in 2004. We assume that in 2004 the viewers were similar to the non- active students in terms of their involvement in the discussion. In 2005 there was not such a large gap in the average number of viewings between viewers and the message writers. In 2005 the viewers were more involved in the discussion. We can assume that those students who viewed the discussion more intensively were similar to those students who posted only few messages, in terms of their involvement in the discussion. However, in both terms the viewers did not achieve significantly better grades than their peers who didn't enter the discussion group at all, and this might indicate a lack of actual involvement. The viewers did not receive an informal evaluation of their activity and personally focused direction from their fellow students and the teacher, nor did they explicitly take a position. We can assume that the contribution of the discussion to their knowledge level and to their confidence towards the test was marginal. Nevertheless, a study conducted by Garrison et al. reported that participants who are viewers only (latent) feel that they do derive some benefit merely by reading the messages in the discussion group [33].

Based on the data we have, we can formulate several recommendations as to an efficient management of a discussion group aimed at helping students during the period before the test. Of paramount importance is the consistent presence of the teacher, with intervention timing and style that are thought-provoking and encourage the students to express their opinions. It is also important to focus the discussion around a pool of questions, some of which will compose the test. Aligning the online discussion with assessment of student learning is key. It is also necessary to insist on relevant and clear writing, and on the creation and maintenance of a positive and encouraging environment both by the teacher and the other participants. Too big a load of information and repetition of questions hinder the activity in the discussion, and therefore it is recommended to set rules of writing in advance.

This research demonstrates the potential of a discussion group focused around a set of review questions in helping students at the time of preparation for a test. The asynchronous nature of the activity enables a large group of students, who wish to do so, to carry out collaborative learning and consultations without the need to actually convene at one place. The teacher too can respond, at her or his convenience, to the needs of students personally as well as collectively. These are key factors at times in which the students are under a great deal of stress and no regular study sessions take place.

In order to strengthen our findings and deepen our understanding of the effect of a discussion group from this type we recommend that this also be tried in other fields and among wider groups of students. We also think that a qualitative study of the factors that cause students of different levels and characteristics to take part in such a discussion group will help form a basis for constructing various models for management of the discussion groups.

Another topic that should be further investigated is the effect of such discussion groups on the viewers only. Why do they refrain from contributing and what benefits do they perceive?

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