Using Discussion Groups in a Hybrid Course with D2L

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Abstract

There still seems to be an ongoing debate over the usefulness and effectiveness of various forms of on-line technologies in the teaching activity. Much progress has been made both on the supporting technology side as well as on the side of the appropriate pedagogical approaches to be used. In spite of this, many people are skeptical relative to the added value of the online technology to the teaching activity. We share the experience of a converted skeptic who found himself in the unexpected situation of observing how on-line techniques based on Desire2Learn (D2L) brought, to an already existing traditional Database course, much more value than one would have anticipated. The better than expected results, measurable by the frequency of correct solutions and increased level of student participation, culminated with students literally (re)inventing query techniques other than those taught in the classroom for query types as difficult as division queries.

1 Introduction

Terms like "distance learning", "distance education", "online teaching", "virtual university" are more and more common in our vocabulary as today one can hardly find a university that would not offer, in one form or other, some sort of distance education option as an alternative or in completion to the face to face traditional programs. There is a large variety of approaches, tools and technologies for distance learning, but all share some basic characteristics like: separation of teacher and learner in space and/or time, control of learning by the student's will rather than the distant instructor and the noncontiguous communication between student and teacher, mediated by some form of technology.[9]

Historically, distance education can be traced backed to the correspondence courses used in Europe until the middle of the last century, when instructional radio and television took over. Today we witness the development and growth of web based technologies characterized by a dominant component of interactive online activity using an electronic computer, which takes us into the era of "online education" or "e-learning". These technologies will very likely replace other forms of distance education as high speed connections will make it easier to effectively transmit live video streams through the Internet in addition to text, images and voice. Web-based technologies enrich distance education with new dimensions, the most important of which is interaction. Interaction is not limited to student-instructor interaction, but extends to student-student interaction which is the basis for building a sense of community. Most Web based educational platforms like: WebCT, WebTycho and Desire2Learn, to name only a few, focus on this aspect of multi-way interactivity aimed to place participants into an integrating comprehensive environment best described by a term like "virtual university".

Despite the widespread expansion of distance education programs, there still seems to be an ongoing debate over the usefulness and effectiveness of various forms of on-line technologies in the teaching activity. Much progress has been made both on the supporting technology side as well as on the side of the appropriate pedagogical approaches to be used. In spite of this, many people are skeptical relative to the added value of the on-line technology to the teaching activity. In this paper we share the experience of a converted skeptic who found himself in the unexpected situation of observing how on-line techniques based on Desire2Learn (D2L) brought, to an already existing traditional Database course, much more value than one would have anticipated. As opposed to some disciplines that are more prone of benefiting from the use of images, sound, multi-media or Internet surfing, there seems to be little to expect from on-line technologies in case of a topic as dry as SQL syntax. At least this was the author's initial impression, which had to change once discussion groups in D2L have been put to work.

2 The Desire2Learn Learning Platform

Desire2Learn (D2L) is a web-based suite of enterprise software products used by over 3 million people worldwide. The D2L Learning Platform is an easy-to-use teaching and

learning tool for course development, delivery and management, which provides flexible functions to help facilitate communication, collaboration and community building. It provides the learners with a user-friendly, flexible and collaborative environment that matches each individual's way of learning and offers access to the best available resources, programs and facilities for instructor and peer collaboration. To instructors the D2L Learning Platform provides easy-to-use, but robust tools to help the development and deployment of online courses, build community and create an environment that reflects the concept of "virtual university". D2L's user-centric system offers learners easy-to-use tools, intuitive navigation and context-sensitive help, motivating progress tools, and feature-rich collaboration and communication tools [2].

3 Context and Background

There is a sustained effort at University of Wisconsin Stevens Point to promote various forms of distance learning. In this context there is a growing interest in the development of on-line and hybrid classes based on D2L. As part of this effort the author of this paper benefited of a UWSP grant provided through the Summer Curricular Redesign Program during the summer of 2005. This 4 weeks seminar provided a good opportunity to learn the technicalities of D2L as well as a formation framework to address the multiple challenges of on-line teaching.

Our known and declared objective was to convert a traditional face to face database course into a hybrid version supported by D2L. It seemed a too bold of a attempt to move directly to 100% on-line in the case of a class like this and even the move to the hybrid version was considered with a great deal of skepticism. There are good reasons for being so cautious and this is due to the nature of the domain. The CIS 219 Databases course is dominantly a SQL syntax class. So, how do you teach dry syntax at distance? In the face to face version the classes are seasoned with a large number of examples, live demos and instant hands-on exercises so that the students' interest is kept up at all times. This is a whole lot of interaction. So, how do we compensate for this in an on-line environment? Fortunately on-line education has a secret of its own when compared to other form of distance learning: it brings in and it promotes interaction. The Web based on-line tools like D2L are equipped to support various forms of interaction: between teacher and students, between students and the learning environment, and among students themselves. Clever use of these capabilities may be the key for a successful distance education experience. Given this, we identified organized student to student interaction supported by discussion forums and discussion groups as the piece that could be a real add when compared with face to face education where student to student interaction is only sporadic if not accidental.

The hybrid version of CIS 219 was offered in the fall of 2005 and in spite of the initial skepticism the use of D2L based on-line technique, especially discussion forums proved to be a valuable add the our initial face to face course. The better than expected results, measurable by the frequency of correct solutions and increased level of student participation, culminated with students literally (re)inventing query techniques other than

those taught in the classroom for query types as difficult as division queries. In our attempt to understand what happened we analyze the activity of the discussion groups by focusing on a couple of key aspects: (1) basic/inherent advantages of on-line activities like: lack of student inhibition, virtually unlimited time to prepare the responses to various challenges, (2) stimulation of student to student interaction – students where encouraged to ask for help from their peers or instructor when faced difficulties as well as to comment on their peers solutions, (3) assigning multiple roles to students – students where asked to evaluate and grade their peers' work and provide justifications for their grading, (4) delegating roles and responsibilities to students – students where delegated the role of moderator in the discussion group, by allowing students to answer other students' questions which normally would have been answered by the instructor; only unanswered questions where taken over by the instructor. Gradual introduction of the above aspects across several discussion group assignments showed a visible increase in students' participation and their interest towards the topics of the course, clearly measurable by the number of posted messages and quality of the solutions provided for several assignments.

4 D2L Discussion Forums: Facilitate versus Moderate

Interaction in on-line teaching is a topic largely addressed in the literature [3][4][5][6][8] [9][10].

As Cox and others [4] acknowledge, "discussion between students (…) can be a powerful tool for learning when it moves from simple question-and-answer format to deeper exploration of issues, challenging each others' ideas and generating productive interaction and synthesis. This level of discussion has traditionally been hard to achieve through distance learning, and is becoming rarer at conventional universities too, due to reductions in teaching contact hours. Now, through conferencing, the technology to allow higher-level discussion is available, but the facilitation skills to encourage and stimulate such discussion via the online medium are less well known."

Discussion forums are most successful when skillfully led and this is a serious challenge for the instructor who is expected to work very hard and to fill in the role of the facilitator, the gentle "social host" as a discrete presence welcoming and ready to help all "guests", or that of the moderator, the "meeting chairperson" from which everyone expects leadership and control.

There are ten important functions a facilitator/moderator has to fulfill as identified in the literature [5][6]:

1. Opening Discussions - provide an opening comment that states the theme of the discussion and establishes a communication model.

2. Setting the norms - establish the conference norms and agenda, with clear rules and expectations.

3. Setting the agenda - managing the forum over time, specifying a road map of the discussion.

4. Referring – specify relevant information sources: textbooks, articles or Internet resources.

5. Recognition - explicitly reassuring participants that their performance valued and welcome.

6. Prompting – specific request of actions from individual participants or from the group as a whole.

7. Assessing - tests, review sessions, or other formal procedures to evaluate participants' performance.

8. Meta-commenting - communication about communication, remarks directed at such things as the context, norms or agenda of the forum.

9. Weaving - summarizing the state of the discussion and finding threads of unity in the comments of participants.

10. Delegating – assign moderating functions to individual participants to perform for a shorter or longer period.

In the next section we will show how these functions have been used in our discussion groups and what their outcome was.

5 Discussion Forums at Work

During the fall semester of 2005 we've set up several discussion forums for CIS 219 Databases course. With the above mentioned ten facilitator/moderator functions in mind we gradually shifted from a moderator's position to that of a facilitator. As our presence in the discussion groups was more and more "discrete" more and more responsibility was delegated to the participant students. In the following subsections we give the chronology of the events as well as the outcome of each step we took in our use of discussion groups.

5.1 "Let's get to know each other"

The first forum was intended to create a sense of community as well as to set the basic topic of the discussion for the rest of the semester. The forum had two parts:
"**About you and your experience with databases...**
Briefly describe any of your previous experiences with databases. If you never used a database directly, describe a real life experience in which you think a database may have been involved.
Databases, are they of any use?
Give at least 3 examples of businesses where databases are used. Give one example where databases are not used, nor are likely to be used."

The first part gave the students an opportunity to introduce themselves from the perspective that was of interest for this course that is, their past experience with databases. The second part included a small challenge since, as expected, most of them could easily give 3 examples of businesses where databases are used, while it is much harder to come up with an example where databases are or would not be used today. This allowed us to make a point about the utility and opportunity of taking this class.

5.2 Entity/Relationship (E/R) Design

The second forum gave was when we first use delegation. Again the forum consisted of two parts:
"**E/R Design**
Post your E/R design and justify your choices i.e. design decisions (3-5 phrases).
Comment E/R Design
Pick one of your classmates E/R design and comment on its strengths and weaknesses (3-5 phrases)."

In the first part the students where required to develop a relational database schema by using the E/R model, and since any kind of design can be debatable, they also had to justify in a couple of phrases their main design decisions. The second part had many objectives: (1) have the students check and compare several designs for the same model, (2) make a choice of preferred model posted by a peer, (3) critically analyze and evaluate their peer's model.
The above setting was intended to trigger fruitful debate and controversy. And it did! A number of 14 students produced a total of 46 messages. Even if not explicitly specified, students where encouraged to defend their point of view when criticized, and respond accordingly. The instructor posted only a few messages in order to make this happen. Several negotiation threads where generated as students argued about their design decisions.

5.3 Solving SQL Queries

The next four forums where spread during the rest of the semester and had a main part consisting of a set of queries for which the students where required to provide and post SQL solutions. Each of these forums had a second part in which we proceeded to a gradual shift of roles and responsibilities to be delegated to the students. In this way the functions exercised by the instructor changed their nature as they moved from referring/recognition/prompting/assessing towards meta-commenting/weaving/delegating. See it illustrated bellow:

"Post any of your questions concerning the SQL topics studied so far.
Check questions and answers in the forum to find responses to your questions or to bring your contribution to the already existing responses.

Post your solutions. Pick one of your classmate's posting and grade it. Justify…

Post your questions concerning the topics…
Try to provide answers to questions posted in this forum."

In the above sequence we distinguish 3 distinct phases in delegating responsibilities and assigning roles:

- students take over part of the moderator's function – they are required to provide answers to questions posted by their peers;
- students take over the some of the instructor's functions by grading their peer's work;
- students get the responsibility to provide answers to questions from their peers concerning grading or correct solutions to queries.

As students where taking over more and more roles and responsibilities through delegation, we experienced an increased level of participation among students. The number of posted messages grew steadily amounting to 83 messages in the last forum. As number of messages increased we could observe more frequently the development of distinct negotiation threads where two or more students where engaged in constructive argumentative debates. This is just the right environment for cross-fertilization of ideas and for the development of new and innovative concepts.

6 Unanticipated Effects – Inventing New Techniques for Division Queries

One of the most surprising outcomes of students negotiating their solutions was in the discussion forum related to sub-queries. Use of sub-queries in SQL is a powerful, but tricky problem solving techniques, and requires a good understanding of the workings of SQL doubled by skill and experience. We used plentiful examples, both in the classrooms and in the discussion forums, in order to get students to understand the techniques and get to minimal level of skill required for applying these techniques. Even so there is a special category of sub-queries that is of a particular difficulty: division queries. Division queries typically refer to the retrieval of entities related in some way with each and every entity of some other type. Such queries are easy to identify since they are most often phrased in

terms of keywords like "each", "every", "all" and similar. In terms of logic these queries are expressed by the use of a universal quantifier.

The standard approach to solve division queries is to use double negation.
For example the query:

```
"Suppliers having offers for every product?"
```

Would be solved as:

```
SELECT Name
FROM Tb_Supplier S
WHERE NOT EXISTS(SELECT *
                FROM Tb_Product P
                WHERE NOT EXISTS (SELECT *
                                  FROM Tb_Offers
                                  WHERE S.Supp_ID=Tb_Offers.Supp_ID
                                     AND Prod_ID=P.Prod_ID))
```

Which reads like: "name of each supplier such that there is no product that would not be offered by that supplier". Such mind-twister statements are hard to comprehend at any time and the corresponding SQL statement is even harder to understand because it requires use of multiples correlations among the tables involved in the queries. However, this is the universally accepted standard approach resulting in a typical pattern of SQL statements. It is used in most textbooks and represents a challenge both for students to understand and instructors to teach. This is the technique we discussed in our lectures and requested the students to use when solving their assignments.

Some students do not come very often to classes and what is worst they sometimes don't even care to read from their textbooks or the instructor's lecture notes. We had one such student in our class; let's call him Absent. This student started to work on his assignment without having any clue of the techniques discussed during the lecture. Being a smart fellow, he was so far fairly successful in getting along with his own logic and intuition. So, with a healthy dose of confidence he tried to do his job with the division queries, and came up with an interesting idea: "The suppliers offering each and every product satisfy the condition that the number of products they offer is equal to the total number of products listed in the database. So, all we have to do is to find the two counts and compare them: if the counts are the same the supplier qualifies, otherwise not." This is a perfectly valid logic, and arguably, to many easier to understand than the double negation approach.
Putting it into practice requires knowledge of grouping techniques to which the students where exposed in some previous chapters. As result Absent tried his luck and used his limited logic to put his idea in practice and posted a first version of the solution for our division query. It was wrong due his limited skill in SQL… At this point a second student we call Genius came into play. He picked up his peer's idea and started working on it. First by giving an advice to Absent… It did not work. However, they continued to exchange messages and after a couple iterations of negotiating their ideas they came up with the following solution:

```
--alternative solution
```

```
SELECT Name
FROM Tb_Supplier S,Tb_Offers O
WHERE S.Supp_ID=O.Supp_ID
GROUP BY S.Supp_ID,Name
HAVING COUNT(Prod_ID)=(SELECT COUNT(*) FROM Tb_Product)
```

This is a perfectly valid solution and the approach itself, the key of which is using the COUNT operator, can actually be found in some of the textbooks like [7].

At this point is hard to say who should take credit for "inventing" a query technique that was certainly unknown to them: Absent or Genius. The best guess is that this was an outcome of a cooperative activity inside a D2L discussion forum.

7 Conclusions and Evaluation

Gradual diversification of students' roles and increase of their responsibilities by use of delegation across several discussion group assignments showed a visible increase in students' participation and their interest towards the topics of the course. This was clearly measurable by the number of posted messages and quality of the solutions provided for several assignments. One interesting outcome of this activity was the fact that students ended up (re)invent sophisticated query techniques through cooperative work in D2L discussion forums. On Bloom's taxonomy [1], this is the equivalent of jumping to level 3, which refers to creative application of concepts, a form of cognition that is above simple knowledge and recollection of facts and above simple comprehension or understanding of the meaning of acquired information or skills. In conclusion, on-line discussion groups proved to be a stimulating experience both for students and the instructor.

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