

Learning Through Discussions in Blended Environments

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ABSTRACT

This paper reports research into the student experience of learning through discussions in a blended environment. Third year engineering students studying e-commerce engaged in both face-to-face discussions and online asynchronous discussions as key aspects of their learning experience. Adopting a quantitative methodology, questionnaires based on what students thought they were learning through discussions, and how they went about engaging in face-to-face and online discussions were developed. These questionnaires, and another based on the Course Experience Questionnaire redeveloped for the subject, were issued to students at the end of their learning experience. The results suggest qualitatively different experiences of learning through discussions. The results show that students' views of discussing both online and face-to-face are related to their experience of learning as a whole. It shows that the way they approach discussions is related to aspects of their experience such as what they think they are supposed to be learning from the discussions, how they perceive the teaching of the subject, and how they relate the goals and standards of the subject to the discussions. The results also show that students who have a deep understanding of how the discussions are related to their learning outcomes, tend to approach the discussions in more meaningful ways. In the face-to-face context, their approach emphasises learning through the experience of others, and in the online environment, their approach emphasises reflecting on the problems discussed from a variety of perspectives.

INTRODUCTION

Learning through discussions is a key aspect of the student learning experience in higher education. It is an important strategy for good teaching (Ramsden, 1992:168), it is closely associated with quality approaches to teaching (Trigwell and Prosser, 1996), and it is an appropriate activity for quality learning in tutorials (Biggs, 1999:86).

The student experience of learning through discussions is undergoing a transformation. This is largely being driven by the adoption of new communication technologies for purposes of learning. For traditionally campus-based institutions, the adoption of learning technologies for discussions and other activities often results in a blended learning experience, made up of both face-to-face and on-line aspects. This creates complexities for the learning experience. One of the complexities the new communication technologies bring to the student campus-based experience is that the discussions are no longer

restricted to the seminar or tutorial. They have the potential to start on a topic before the students meet face-to-face about it, and to continue long after the topic-related tutorial has ended. Another complexity is that the contribution of on-line discussions to the quality of the learning experience is not well understood. Is there evidence of qualitatively different contributions of on-line discussions to the learning experience? This is one of the key research questions of this study. To answer this question, the supporting research questions involve investigating what students think they are learning through discussions, how they approach both face-to-face discussions and on-line discussions, and what are the students' perceptions of their learning context. It will be argued that only by situating the student experience of the online technologies in the learning experience as a whole can a useful understanding of the relationship of the new technologies to learning be understood.

To address the research questions of this study, the student experience of learning through discussions in a blended context is investigated. Approximately 250 third-year engineering students were enrolled in an e-commerce subject, whose main learning outcome was the development of a written proposal for an e-commerce venture project. In the course of the semester, the students engaged in face-to-face and online discussions to identify the business they were considering as a venture, they provided user case-descriptions, they evaluated the proposals of their colleagues and they prepared a final report on their own e-commerce venture project. The on-line discussions were used by the students to post their proposals and user case-descriptions so that evaluation of their work could continue publicly, well after the topic-related tutorials had finished. The public nature of the on-line discussions also provided a chance for students to survey a wider selection of their colleagues work than could be managed in the classroom. The lecturers felt that by publishing their work on the subject's website, the students were likely to be exposed to a wide variety of perspectives on the problems discussed. The face-to-face discussions were used to help students brainstorm and work on issues related to their tasks that they came across in their tutorials.

THEORETICAL BACKGROUND AND PREVIOUS RESEARCH

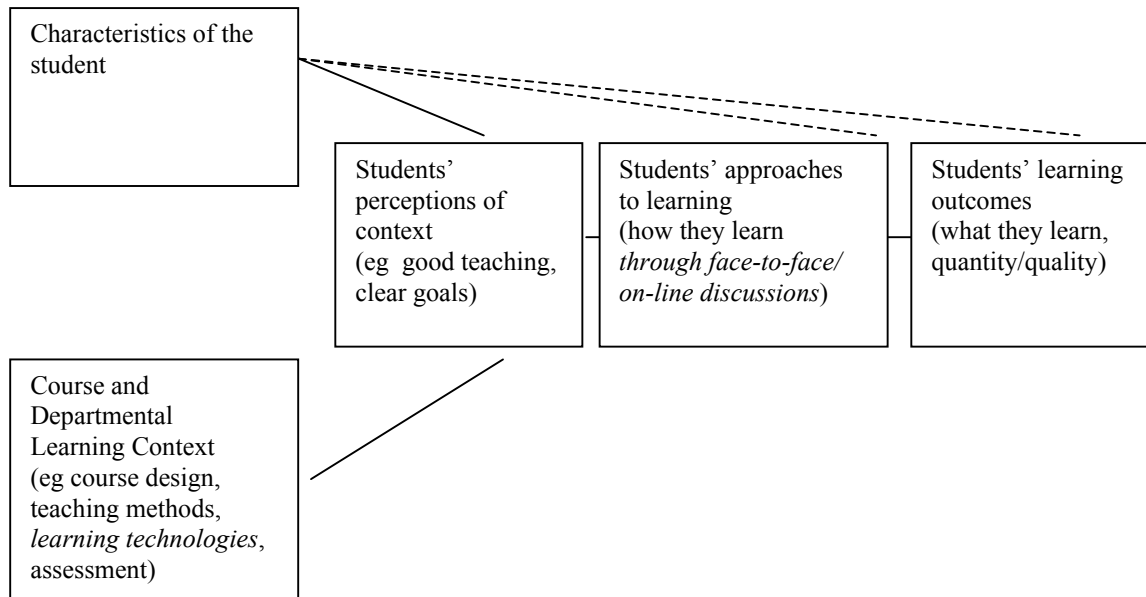
Previous research and theory suggests that the student experience of learning in higher education is a relational phenomenon, that is, that the parts of the learning experience, such as student concepts, their approaches, assessment, the learning context and the learning outcomes are not constituted as separate parts, but rather are closely related to each other (Marton and Saljo, 1976a; 1986b; Entwistle and Ramsden, 1983; Ramsden, 1992; Marton and Booth, 1997; Prosser and Trigwell, 1999). Consequently, when investigating the relationship of a new aspect of the students learning experience, such as the introduction of learning technologies, it is important to situate it within the other parts of the student experience and understand its relationship to them.

In this body of research, known as Student Learning research, the quality of student conceptions of learning have been shown to be closely related to key elements of the learning experience such as approaches (Marton and Saljo, 1976b; Hounsell, 1984; 1987; Prosser and Millar, 1989; Crawford et. al., 1998; Cope 2001). Investigating conceptions of physics, Prosser and Millar (1989) found evidence that students who adopted a surface approach to learning are less likely to hold holistic conceptions of the subject matter.

They also found evidence that suggested that development in conceptions as the course proceeded was related to the approach adopted by students. Students who adopted a deep approach were more likely to develop holistic conceptions of the subject matter than students who adopted a surface approach (Prosser and Millar, 1989:526). Similarly, research into student conceptions of essay writing have identified variation in how students conceive of essays and how they relate to approaches (Hounsell, 1984; 1997). Comparing the conceptions held by 17 second-year history undergraduates and 16 second-year Psychology undergraduates, this study used two sets of semi-structured interviews inviting students to discuss how they went about preparing for recent essays, and what they believed essays were and what essay writing involved (Hounsell, 1997:109). Hounsell identified three categories of conceptions of history essays: the essay as argument, the essay as viewpoint and the essay as arrangement (1997:111-113). Hounsell then looked at the approaches adopted by the students in their essay writing procedures (1997:114). Beginning with writing preparation, students holding *argument* as their conception of an essay tended to reveal an awareness of preparation that included both argument and evidence. Students reporting this type of experience viewed the essay emerging from the combination of both the argument and the evidence. Students holding *viewpoint* as their conception of an essay did not foreground the importance of evidence in their preparation. Where essays were conceived as an *arrangement*, the students reported assembling the material in relation to the topic rather than an argument provided by the student (Hounsell, 1997:116). This study reinforced the important relationship between the quality of conceptions held by students and the quality of the approach to writing they were likely to adopt. From this study, a quality writing experience would be one in which students experienced essay writing as an experience of making meaning through an engagement and understanding of the content.

In this study we extend previous research by situating discursive learning technologies (Laurillard, 2002) in the 3P model of learning as shown in Figure 1 and investigate the quality of the outcomes of learning through discussions. In order to evaluate their contribution to the learning experience properly, it is argued that they can not be evaluated independently, but rather should be evaluated in relation to key elements of the student experience, such as conceptions and approaches, as well as aspects of the learning context, such as assessment and workload, and learning outcomes.

Figure 1
The 3P Model of Learning – situating discursive learning technologies



(after Trigwell and Prosser, 1997)

The 3P model of learning has been named so because its parts can be divided into *Presage* (student characteristics and the course, departmental and learning context), *Process* (perceptions and approaches) and *Product* (learning outcomes). In Figure 1, the labels in italics have been added to indicate the focus of this study in relation to the model. Learning technologies are increasingly part of the course and departmental learning context, and in this study, student approaches to learning through discussions are investigated.

This is not the first time that learning through discussions has been investigated in relation to this model. A previous qualitative study into learning through discussions (Ellis et. al.,; in press), identified different conceptions of what students thought they were learning through discussions.

Categories of Conceptions of learning through discussions

- Conception A:* To understand the ideas that are closely related to the subject's goals from a number of perspectives.
- Conception B* To understand the ideas that are closely related to the subject's goals.
- Conception C* To exchange ideas to find the answers
- Conception D* To develop communication skills

In that study, four categories of conceptions were identified. Categories A and B were conceptions that were closely associated with understanding. Students holding conceptions consistent with these categories revealed an awareness that discussions in

their subject were not just about finding answers or developing their communication skills, but were purposefully related to the subject's goals and allowed them to understand important ideas from a variety of perspectives held by their colleagues. In contrast, students holding conceptions consistent with categories C and D did not show an awareness of a close association between their discussions and their learning outcomes. They thought that discussions were simply about getting the right answer or developing communication skills in a general way that was not really related to the goals of the subject.

The previous study (Ellis et. al.,; in press) also identified different approaches to learning through discussions, both in face-to-face and on-line discussions.

Categories of Face-to-face approaches to learning through discussions

- Approach A:* To engage in face-to-face discussions to learn about the project from the experience of others
- Approach B:* To engage in face-to-face discussions to understand how to solve problems related to the project.
- Approach C:* To engage in face-to-face discussions to finish tasks
- Approach D:* To engage in face-to-face discussions to develop communication skills
- Approach E:* To not engage in face-to-face discussions.

Categories of online approaches to learning through discussions

- Approach A* To reflect on the problems discussed from different perspectives to deepen understanding
- Approach B* To reflect on the problems discussed from different perspectives to improve understanding
- Approach C* To engage in online discussions by waiting and seeing what others do
- Approach D* To engage in online discussions to fulfill subject requirements

While the categories of approaches A-E in both face-to-face and on-line discussions are qualitatively different from each other, it is possible to group them into two . In both sets of categories, those labeled A-B emphasise understanding; in face-to-face discussions, the approaches involved a focus on problem solving and learning through others; in the on-line discussions, reflection was emphasised most by students. In contrast, categories C-E were qualitatively different. They did not emphasise understanding, but other concerns; in face-to-face discussions, approaches C-E involved using discussions to finish tasks, to develop communication skills without linking those skills to the point of the discussions, while some approaches involved trying to avoid engaging in face-to-face discussions at all; in on-line discussions, approaches C-D involved waiting and seeing what other students posted before making their own posting, or posting simply to fulfill subject requirements. It is interesting to note that in the university subject investigated in that study, a percentage of assessment was explicitly given to online discussions and not to the face-to-face discussions. This may explain the lack of an approach E in on-line discussions, similar to that found in the face-to-face discussions.

The variation in the student approaches to learning through discussions is consistent to previous research on student approaches to learning mentioned above.

It should be noted, when interpreting the approaches identified above, that the descriptions of the categories are those aspects of approaches that students emphasised. It does not suggest that students are not able to reflect while discussing in face-to-face contexts, or that students do not try to understand how to solve problems through on-line discussions. Rather, the descriptive categories represent the students' awareness of what is happening in these learning situations.

QUESTIONNAIRES USED IN THE STUDY

To investigate the student experience of learning through discussions in the third year engineering subject, three closed-ended likert scale questionnaires were used: the 'Approaches to Learning through Discussions' questionnaire and the 'Conceptions of Learning Through Discussions' questionnaire were developed from the descriptive categories of students approaches and conceptions in the previous qualitative study into learning through discussions (Ellis et. al, in press) and the third questionnaire was modified from the Course Experience Questionnaire (Ramsden, 1991) and is call the 'Subject Experience Questionnaire (SEQ)'.

The 'Approaches to Learning through Discussions' questionnaire was designed with four scales: deep approach to face-to-face discussions, surface approach to face-to-face discussions, deep approach to online discussions, surface approach to online discussions. Table 1 shows examples of items used in this questionnaire.

Table 1 *Representative Items from the Approaches to Learning through Discussions Questionnaire*

Face-to-face		Item
deep motive, deep strategy 8 items $\alpha = .89,$	1	I find that at times the discussions in class help me to understand the topic from the experience of others
	5	I engage in the discussions in class to learn about the ideas of my colleagues on the topic discussed
surface motive, surface strategy 6 items, $\alpha = .71,$	2	I only discuss issues in class that help me to solve assignments.
	14	I engage in discussions in class only in order to finish a task.
Online		Item
deep motive, deep strategy 4 items $\alpha = .72,$	27	I find that the on-line discussions encourage me to think about what I write before I post it.
	23	I generally read the postings of my colleagues in class to improve my understanding of the topic before making my own posting
surface motive, surface strategy 6 items, $\alpha = .78,$	4	When I make a posting on-line, I am worried that I might appear ignorant
	24	I usually make on-line postings at the last moment possible

The ‘Conceptions of Learning through Discussions’ questionnaire was designed with two subscales; the Cohesive Conceptions subscale and the Fragmented Conceptions subscale. Each scale had 8 items. Examples of items in this instrument are shown in Table 2

Table 2 *Representative Items from the Conceptions of Learning through Discussions Questionnaire*

Conceptions		Item
cohesive conceptions 7 items $\alpha = .87,$	14	Discussing in this subject allows me to understand something in a more complex and deeper way
	16	Discussing in this subject is a powerful method of learning about something in a deep and reflective way
fragmented conceptions 3 items, $\alpha = .63,$	2	Discussing in this subject is just about finding the right answer
	12	Discussing in this subject is just a quick way to find the solution to a problem

The Subject Experience Questionnaire contained six subscales, similar to scales used in the CEQ. Examples of items modified from the CEQ are shown in Table 3

Table 3 *Representative Items from the Subject Experience Questionnaire*

CEQ sub scale		Original Item	Revised Items for SEQ	
Appropriate Assessment Scale (4 items, $\alpha = .54$)	8	To do well in this course all you really needed was a good memory.	2	To do well in this subject all you really needed was a good memory.
Appropriate Workload Scale (3 items, $\alpha = .37$)	4	The workload was too heavy.	3	The workload in this subject was too heavy.
Clear Goals and Standards Scale (3 items, $\alpha = .62$)	24	The staff made it clear right from the start what they expected from students.	22	The lecturers in this subject made it clear right from the start what they expected from students.
Emphasising Student Independence Scale (3 items, $\alpha = .55$)	27	Students here are given a lot of choice in the work they have to do	27	Students in this subject are given a lot of choice in the work they have to do
Generic Skills Scale (6 items, $\alpha = .77$)	5	The course sharpened my analytic skills.	12	The subject sharpened my analytic skills.
Good Teaching Scale (4 items, $\alpha = .72$)	15	The staff made a real effort to understand difficulties I might be having with my work.	21	The lecturers in this subject made a real effort to understand difficulties I might be having with my work.
Overall Satisfaction Item	25	Overall, I was satisfied with the quality of this course.	39	Overall, I was satisfied with the quality of this subject.

Column 1 in Tables 1 and 2 show the Cronbach Alphas for the subscales of the questionnaires. The Cronbach Alphas of the subscales of both questionnaires provided an acceptable range of values ($.63 < \alpha < .89$) compared with the range of alphas used in previous studies ($.60 < \alpha < .72$) (Ramsden, Martin and Bowden, 1989).

The alpha scores for all subscales in the SEQ are shown in the first column of Table 3. The alphas for three of the subscales fell within an acceptable range ($.62 < \alpha < .77$). Since the alphas of the other 3 subscales were low, they were not included in further analyses.

METHOD

The sample of 155 students for this study was taken at random from the cohort of approximately 250 students. All students in the sample were enrolled in, and completed, the third year e-commerce course at a major Australian metropolitan university. All students completed the questionnaires used in the study at the end of the semester.

In analysing the data in this study, the main aim was to identify the relationships amongst how students approached their discussions both in face-to-face and online situations, what they thought the discussions were for, how they perceived their learning context and how they performed in the subject. The analysis was conducted in three phases, a process consistent with similar previous studies (Prosser and Trigwell, 1997):

1. A correlational analysis to look at relationships between pairs of variables
2. A principal component factor analysis, followed by varimax rotation to look at the structural relationship amongst all of the variables
3. A cluster analysis, to look at subgroups of students within the sample (Seifert, 1995).

In this study, Pearson Correlation coefficients are used to look at the strength of the relationship between the variables designed to provide scores for student approaches, conceptions and perceptions of the writing to learn experience. Table 4 shows the correlations.

Table 4 *Correlations Between Parts of the Student Learning Experience and Performance Outcomes.*

<i>Variables</i>		<i>Variables</i>										
		2	3	4	5	6	7	8	9	10	11	12
		<i>sa</i>	<i>daol</i>	<i>saol</i>	<i>cc</i>	<i>fc</i>	<i>cgs</i>	<i>gss</i>	<i>gts</i>	<i>exam</i>	<i>final</i>	<i>osi</i>
<i>Approaches</i>												
1	<i>Deep approach face-to-face</i>	-.15	.51**	-.19	.68**	-.01	.31**	.47**	.25**	.05	.05	.28
2	<i>Surface approach face-to-face</i>		-.18	.60**	-.23**	.33**	-.10	-.22**	-.10	-.13	-.15	-.08
3	<i>Deep approach online</i>			-.23	.56**	.13	.23**	.40**	.12	.01	.05	.32**
4	<i>Surface approach online</i>				-.31**	.28**	-.33**	-.37**	-.27**	-.09	-.07	-.23**
<i>Conceptions</i>												
5	<i>Cohesive conception</i>					-.12	.32**	.56**	.31**	.05	.08	.43**
6	<i>Fragmented conception</i>						-.09	-.01	-.12	.12	.09	-.01
<i>Perceptions of Teaching Context</i>												
7	<i>Clear Goals and Standards</i>							.48**	.50**	.05	-.02	.40**
8	<i>Generic Skills</i>								.55**	-.01	-.01	.62**
9	<i>Good Teaching</i>									.05	.02	.60**
<i>Performance Outcomes</i>												
10	<i>Exam Mark</i>										.86**	.03
11	<i>Final Mark</i>											.05
<i>Overall Satisfaction</i>												
12	<i>Overall Satisfaction Item</i>											

**p<0.01, n=155

The results in Table 4 shed some light on the strength of the relationship between pairs of variables associated with the student experience of learning through discussions. In general, whether the scores are statistically significant or not, they indicate associations that are by and large, in the right direction according to the relationships suggested by the qualitative shifts in the categories of conceptions and approaches. More precisely, the Deep Approach face-to-face variable shows a large positive association with the Deep Approach online variable ($r=.54$, $p<.00$), the Cohesive Conception variable ($r=.68$, $p<.00$), the Generic Skills variable ($r=.47$, $p<.01$), and a medium positive association with the Clear Goals and Standards variable ($r=.31$, $p<.00$) and the Good Teaching variable ($r=.25$, $p<.00$). Similarly, the Deep Approach Online variable shows a large positive association with the Cohesive Conception variable ($r=.56$, $p<.00$), the Generic Skills variable ($r=.40$) and a medium positive association with the Clear Goals variable ($r=.23$, $p<.00$), and the Overall Satisfaction Item ($r=.32$, $p<.00$).

The Surface Approach face-to-face variable shows a large positive correlation with the Surface Approach online variable ($r=.60$, $p<.00$), a medium positive correlation with the Fragmented Conception variable ($r=.33$, $p<.00$), and a medium negative correlation with

the Generic Skills variable ($r = -.22, p < .00$). Similarly, the Surface Approach Online variable shows a medium positive association with the Fragmented Conception variable ($r = .28, p < .00$), and medium negative correlations with the Cohesive Conception variable ($r = -.32, p < .00$), the Clear Goals and Standards variable ($r = -.33, p < .00$), the Generic Skills variable ($r = -.37, p < .00$), the Good Teaching variable ($r = -.27, p < .00$) and the Overall Satisfaction Item ($r = -.23, p < .00$). There are also a number of other significant correlations in Table 4 which are consistent with the trends reported here.

While the correlation analysis looks at relationships between pairs of variables, a factor analysis looks at relationships between groups of variables. Factor analyses investigate the structural relationships amongst a number of variables. Factor analyses group variables together that seem to be related to each other and identify those variables that are not part of the group. In this study the factor analysis was used to investigate the structural relationships between the variables investigated in the correlation analyses.

Since the sample size is small ($n = 155$), it was preferable to have a low number of variables for the factor analyses. To reduce the number of variables, only one Performance Indicator was used, the Final Mark. The results of the Factor Analysis are shown in the Table 5.

Table 5 *Principal Components Factor Analyses of Approaches, Conceptions, Perceptions and Final Mark Variables*

Variables	Factors	
	1	2
<u>Approaches</u>		
Deep Approaches face-to-face	.82	
Surface Approaches face-to-face		.76
Deep Approaches online	.76	
Surface Approaches online		.76
<u>Conceptions</u>		
Cohesive Conception	.85	
Fragmented Conception		.71
<u>Perceptions of the Learning Context</u>		
Clear Goals and Standards	.54	
Good Teaching	.46	-.30
<u>Performance Outcome</u>		
Final Mark		

Loadings of magnitude less than .3 omitted
 Varimax Rotation, KMO=.70
 Eigen-value 2.9 & 1.6 , 50% variance explained, $n = 155$

In Table 5, Factor 1 shows that a higher score on the Deep Approach face-to-face variable (.82), is positively related to the Deep Approach online variable (.76), the Cohesive Conception variable (.85), the Clear Goals and Standards variable (.54) and the Good Teaching variable (.46). Factor 2 clearly shows that a higher score on the Surface Approach variable (.76) is positively related to the Surface Approach Online variable

(.76), the Fragmented Conceptions variable (.71), and negatively related to the Good Teaching variable (-.30). The factor analysis suggests that a deep approach to face-to-face conversations is strongly linked to a deep approach to online discussions, a cohesive conception of discussions as a way of learning and positive perceptions of the learning context. Likewise a surface approach to face-to-face discussions is linked to a surface approach to online discussions, a fragmented conception of discussions and negative perceptions of the learning context.

The correlation and factor analyses investigated the data at the level of the variables. To investigate the data at the level of the individual, a cluster analysis was used. The following methodology draws on a modified version of the methodology reported in Prosser (2000).

Cluster analyses can be used to identify subgroups within a sample on the basis of similarities of the variables being investigated. Standardised scores were used for the subscales of approaches to learning through discussions (deep and surface), conceptions of learning through discussions (fragmented and cohesive), the experience of the subject in which the students wrote (Clear Goals, Good Teaching), the exam mark and the final mark students received. All scores were reduced to a mean of 0 and a standard deviation of 1 as a way of comparing the student scores.

The hierarchical cluster analysis using Ward's technique (Seifert, 1995) revealed two clusters of students, based on the increasing value of the Squared Euclidean Distance between the clusters (Crawford et.al, 1998a:464; Prosser et. al., 2000:68). The results of these two clusters are shown in Table 6.

Table 6 Cluster Analysis of Parts of the Student Learning Experience and Performance Outcomes

Variable	Cluster (Standardised Mean)		Stat sig if p<0.05
	1, n=102 Reproducing	2, n=53 Understanding	
<i>Approaches and Conceptions</i>			
Deep approach face-to-face	-0.31	0.58	0.00
Surface approach face-to-face	0.23	-0.44	0.00
Deep approach online	-0.30	0.57	0.00
Surface approach online	0.27	-0.53	0.00
Cohesive conception	-0.40	0.76	0.00
Fragmented conception	0.12	-0.24	0.03
<i>Perceptions of Context</i>			
Clear Goals and Standards	-0.39	0.74	0.00
Good Teaching	-0.37	0.71	0.00
<i>Student Marks (performance outcomes)</i>			
Exam Mark	-0.13	0.26	0.02
Final Mark	-0.14	0.26	0.02

N=155

The results from the cluster analysis identified two groups of students in the population investigated: one cluster (53 students) engaged in discussions with an underlying intention to understand the subject, and another cluster (102 students) who engaged in discussions in a superficial way.

In Table 6, students who engaged in discussions in a deep way judged by a large positive score on the Deep Approach face-to-face variable (.58, p<.00), had large positive scores on the Deep Approach Online variable (.57, p<.00), the Cohesive Conception variable (.76, p<.00) the Clear Goals and Standards variable (.74, p<.00) and the Good Teaching variable (.71, p<.00). In addition, they did well in the subject judged by the exam mark score (.26, p<.00) and their final mark score (.26, p<.00).

Students who engaged in discussions in a surface way judged by a medium negative score on the Deep Approach face-to-face variable (-.31, p<.00), had medium negative scores on the Deep Approach Online variable (-.30, p<.01), the Cohesive Conception variable (-0.40, p<.00), the Clear Goals and Standards variable (-.39, p<.00), and the Good Teaching variable (-.37, p<.00). In addition, they performed comparatively poorly in the subject judged by their exam mark score (-0.13, p<.05) and final mark score (-.14, p<.05).

DISCUSSION

This section discusses some of the implications of the results of this study for research and practice.

Before discussing the results in detail, it is worth noting some of the limitations of this study....

The results of this study confirm the relational phenomenon of learning in higher education. There are close relationships between the way students approach their learning, what they think they are doing when they learn, how they perceive the learning context and the level of their performance. It therefore should come with little surprise that with the introduction of a learning technology such as an asynchronous discussion tool, that the contribution of the technology is dependent upon how the students use it which appears to be closely related to other parts of their learning experience. Students who conceive of discussions as a useful way of learning more about the subject tend to engage in online discussions in a reflective and meaningful way. They also tend to engage in face-to-face discussions with a similar intent.

The results suggest that the quality of the approach students adopt towards discussing both online and face-to-face is consistent with the way they perceive their environment. Students who approach discussions meaningfully tend to hold positive perceptions of their learning context while students who do not display an awareness of the link between their discussions and learning outcomes, tend to hold a negative perception of the learning context. It seems logical that students who have a poor perception of the teaching would also not be able to understand the teacher's intent behind learning activities such as online discussions. It also follows that students who did not display an awareness of the purpose of the discussions would tend to perform at a lower level than those students who did, and this was born out by the results.

The implications of this research for practice are clear. At the level of the whole learning experience, a lot of preparation would seem to be necessary if we are to help students learn through discussions. It is not enough to simply provide opportunities for meaningful discussions closely linked to the learning outcomes of the subject to the students. If students are not aware of the purpose of the discussions, or they have negative perceptions of the learning context, then they are not likely to benefit from the discussions or perform well in the subject. Consequently, more preparation is needed in helping the students to understand how to learn from the experience of others, how to use the postings of others to reflect on their own answers, how to stop worrying about appearing ignorant in their postings and focus on the relationship between the discussions and the learning outcomes of the subject. Improving the clarity of the goals and standards of the subject would seem to be important in addressing the students' perceptions of their learning context, as does making a greater effort to understand the students' difficulties as they engage in their discussions.

In terms of the contribution of online discussions to the quality of the learning experience, there are qualitatively different contributions that the online discussions bring to the learning experience. It has been shown that the contribution of the tool is dependent on the students' use of it. The way students approach the online discussions meaningfully brings reflection more to the fore. This insight can be used to help students who are surface learners to modify their approach. Teachers could pair them up with

those who are using the discussions more strategically. Teachers could also model the habits of the good students to the whole class. Most importantly, this study has shown that we should not treat the online discussions as separate from the whole experience. Rather if we are to help the students use them most meaningfully, improving their relationship with other parts of the experience, such as working to improve the students' perceptions of the learning context and their approach to discussions in general, must be addressed.

REFERENCES

- Biggs, J. B. (1999). *Teaching for Quality Learning at University*. Buckingham: Society for Research into Higher Education & Open University Press.
- Cope, C. (2000). *Educationally Critical Aspects of the Experience of Learning About the Concept of an Information System*. Unpublished thesis, La Trobe University, Melbourne.
- Crawford, K., Gordon, S., Nicholas, J., & Prosser, M. (1998b). University mathematics students conception of Mathematics. *Studies in Higher Education*, 23, 87-94.
- Ellis, R.A., Calvo, R.A., Levy, D., Tan, K. (in press). Learning through discussions. *Higher Education Research and Development*. Vol 23, 1
- Entwistle, N., & Ramsden, P. (1983). *Understanding Student Learning*. London: Croom Helm.
- Hounsell, D. (1984). Essay planning and essay writing. *Higher Education & Research*. 3(1), 13-31.
- Hounsell, D. (1987). Essay writing and the quality of feedback. In J. Richardson, M. Eysenck & W. Piper (Eds.), *Student Learning: Research in Education & Cognitive Psychology* (pp.109-119). Milton Keynes: Society for Research Into Higher Education & Open University Press.
- Hounsell, D. (1997). Contrasting conceptions of essay writing. In F. Marton, D. Hounsell & N. J. Entwistle (Eds.), *The Experience Of Learning: Implications For Teaching & Studying In Higher Education* (2nd. ed.), (pp. 106-125). Edinburgh: Scottish Academic Press.
- Laurillard, D. (2002). *Rethinking University Teaching: A framework for the effective use of educational technology* (2nd ed.). London: Routledge.
- Marton, F., & Booth, S. (1997). *Learning and Awareness*. New Jersey: Lawrence Erlbaum Assoc, Publishers.
- Marton, F., & Säljö, R. (1976a). On qualitative differences in learning. I. Outcome and process. *British Journal of Educational Psychology*, 46, 4-11.

Marton, F., & Säljö, R. (1976b). On qualitative differences in learning. II. Outcome as a function of the learner's conception of the task. *British Journal of Educational Psychology*, 46, 115-127.

Prosser, M. (2000). Evaluating the new technologies: A student learning focused perspective. *Uniserve Science May Workshop*, unpublished.

Prosser, M., & Millar, R. (1989). The 'how' and 'what' of learning physics. *European Journal of Psychology of Education*, 4, 513-528.

Prosser, M., & Trigwell, K. (1997). Perceptions of the teaching environment and its relationship to approaches to teaching. *British Journal of Educational Psychology*, 67, 25-35.

Prosser, M., & Trigwell, K. (1999). *Understanding Learning & Teaching: The Experience In Higher Education*. Buckingham: Society for Research into Higher Education & Open University Press.

Ramsden, P. (1991). A Performance Indicator of Teaching Quality in Higher Education: The Course Experience Questionnaire. *Studies in Higher Education*, 16, 129-150.

Ramsden, P. (1992). *Learning to Teach in Higher Education*. London: Routledge.

Ramsden, P., Martin, E., & Bowden, J. (1989). School environment and sixth form pupils' approaches to learning. *British Journal of Educational Psychology*, 59, 129-142.

Seifert, T. (1995). Characteristics of ego- and task-orientated students: A comparison of two methodologies. *British Journal of Educational Psychology*, 65, 125-138.

Trigwell, K., & Prosser, M. (1996). Congruence between intention and strategy in science teachers' approach to teaching, *Higher Education*, 32, 77-87.