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# The Use of Discussion Boards by First Year Business Information Systems 100 Students

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## Abstract

*Business Information Systems 100 (BIS100) is a common core business unit at Curtin Business School in Western Australia. The unit is offered to first year Bachelor of Commerce students in face-to-face, distance or online modes; over 1166 students were enrolled in BIS100 in Semester 1 2009. In all modes of learning students were given access to a learning management system (LMS) and encouraged to communicate through the discussion board. The use of such technology is expected to enhance access, quality, interaction and flexibility (Eastman & Owens Swift, 2002; Eaton, 2003; Freedman, 2008). Moreover, Krentler and Willis-Flurry (2005) found in their research with university business school students that the use of technologies such as discussion boards and the Internet enhanced student learning. Similarly, learning management systems are used at Curtin Business School to enhance access, quality, interaction, engagement and learning. Curtin Business School students are introduced to the FLECS-Blackboard learning management system and encouraged to use the discussion board functionality through first year common core units such as Business Information Systems 100. Local Western Australian students attend lectures and tutorials and also have access to the FLECS-Blackboard learning management system; access to the BIS 100 unit is online for all distance education students. The same weekly content is delivered for both groups. Quantitative data were collected; students' use of discussion boards was monitored and comparisons made between usage at the beginning and end of a semester. Also, the numbers of students who contributed and posted to individual threads was monitored. Additionally, qualitative data were collected; key informants were asked for their opinion on how best to enhance students' learning experiences through the use of learning management systems. In this paper, the researchers present their findings about the relationship between students' different levels of engagement with discussion boards and their learning outcomes. Also, consideration is given concerning how best to enhance students' learning through the use of discussion boards. In the future, this research could be extended to consider the quality of student interactions on discussion boards and usage by different age groups. In addition to this consideration could be given to the differences in student interactions on FLECS-Blackboard in voluntary participation, as in this research, and compulsory participation in discussion boards for assessment purposes.*

## Introduction

As new technologies have emerged they have been adopted by educators to engage students more effectively in their learning and increase the effectiveness of their own teaching. Even so, this adoption of new technologies has created challenges for traditional pedagogical approaches to learning and teaching. The advent of the Internet has facilitated the development of learning management systems and changed the way distance education is delivered, but what kind of impact has it had on face-to-face instructional methodologies?

In 2009, the authors sought to deepen their understanding of the pedagogical impact of the use of learning management systems in higher education; in particular, they investigated the use of discussion boards within a first year business education unit, Business Information Systems (BIS) 100, at Curtin Business School (CBS) in Perth, Western Australia. Quantitative data were collected by

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interrogating the learning management system used at Curtin University, FLECS-Blackboard. Qualitative data were collected by interviewing key stakeholders in relation to the use of discussion boards. In this paper, background information is provided which contextualises BIS100 within the Bachelor of Commerce (B.Com) offered by Curtin Business School. Also, the different ways academics use FLECS-Blackboard to enhance students learning within Curtin University and its largest faculty, CBS, is discussed. Additionally, a review of the literature was conducted; hence, an overview of current thinking about blended learning is included in this paper. It was evident from the review of the literature that until recently minimal research had been done in relation to blended learning and the relationship between students' learning and the use of technology; there is scope for further research into the pedagogical implications of the use of learning technologies, particularly the use of discussion boards (Krentler & Willis-Flurry, 2005; Vaughan & Garrison, 2005).

### ***What is Blended Learning?***

Blended learning is the combination of multiple approaches to learning; it is used both in higher education and in workplace professional learning contexts. According to Driscoll (1998, in Baldwin-Evans, 2006) blended learning is a combination of different technology based learning opportunities and pedagogical approaches, as well as different instructional technology integrated into workplace activities. Instructional technology can be face-to-face, via the Internet or CD-ROM. Blended learning combines and maximizes the benefits of face-to-face and virtual educational and workplace learning environments (Mackay & Stockport, 2006; Mitchell & Honore, 2007). Even so, getting the blend of learning opportunities just right is important (Hoffman & Miner, 2008; Mitchell & Honore, 2007).

According to Vaughan and Garrison (2005, p.2) *blended learning is on the cusp of transforming higher education*. However, the transformation of higher education via blended learning is dependent upon a clear understanding about the quality and nature of blended learning. In the earlier days, e-learning in higher education referred to web-based learning and teaching materials and online activities. More recently, effective blended learning is understood to be the integration of quality online learning experiences with the best of face-to-face instruction in a planned, pedagogically valuable manner which also reduces traditional class contact time (Vaughan & Garrison, 2005). It is cautioned that mere substitution and enrichment of face-to-face for electronic learning is unlikely to be successful in higher education. Importantly, Vaughan and Garrison (2005) asserted that this thoughtful integration is neither an add-on to a classroom lecture nor an online course. It is the fundamental redesign and an optimal (re)design approach to enhance and extend learning by rethinking and restructuring teaching and learning. The interpretation of Vaughan and Garrison (2005) is notable simply because it addresses and expands Laurillard's (2002) idea on refining the learning and teaching in higher education by embedding educational technology. Curtin University has adopted an approach consistent with refining the learning and teaching process by embedding technology and is investigating strategies for the provision of quality blended learning across the institution. The need for continuing investigation into how best to thoughtfully integrate technology to enhance students' learning in higher education is reiterated in the literature.

### ***What Type of Pedagogy Facilitates Blended Learning?***

The advent of emerging technologies has generated a need for new pedagogies to enhance students' learning (Eaton, 2003). A survey conducted at the end of a three year action research study into the blended learning delivery of an MBA program at Ashridge Business School in Hertfordshire in the United Kingdom showed the majority of participants agreed that implementation of e-learning strategies demanded new attitudes and skills from lecturers and students alike (Mitchell & Honore, 2007). Lecturers' ability to actively engage students in the learning process was an important pedagogical factor in the facilitation of effective blended learning environments (Arbaugh et. al., 2009; Chickering & Gamson, 1987; Chickering & Ehrmann, 1996; Paetzold & Melby, 2008). Active

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learning did not just happen and was not synonymous with online learning even though it could be enhanced through the use of technology. Hence, it was necessary for lecturers to plan for active learning to occur (Arbaugh et. al., 2009; Paetzold & Melby, 2008). Additionally, Wan, Fang and Neufeld (2007, in Arbaugh et. al., 2009) noted that blended learning was influenced by the interaction of students' and lecturers' personal traits, technology and instructional design. The use of communication technologies could enhance contact between lecturers and students (Chickering & Ehrmann, 1996). In this paper the impact of the use discussion boards in blended learning environments is considered.

One of the problems associated with blended learning is that lecturers could be unsure about how to use emerging technologies in their classrooms if they are unaware of the associated advantages and disadvantages or if they have insufficient knowledge of appropriate pedagogies. In recent research Bolt and Dickie (2009) found the use of discussion boards was perceived to be advantageous in distance education but lecturers doubted its usefulness for face-to-face learning situations. In many cases lecturers were familiar with managing in-class discussions, but less familiar with facilitating asynchronous online discussions made up of a series of posts and responses linked together as a threaded discussion. To determine the respective advantages and disadvantages of the two modes of discussion, Meyer (2003) compared the benefits of face-to-face versus threaded discussions by investigating the roles of time and thinking. Not surprisingly, Meyer (2003) found that face-to-face discussions produced energy because of the speed at which the discussion occurred; whereas, threaded discussions took more time. Moreover, an energetic discussion commenced in a face-to-face learning situation could be extended and deepened outside of class time through the use of discussion board forums. Although higher-order thinking was evident in both forms of discussion, brainstorming activities were better suited to face-to-face discussions and thinking that required time for students to reflect was better suited to threaded discussions (Meyer, 2003). Additionally, Salmon (2000, in Arbaugh et. al., 2009), noted that compared with face-to-face learning opportunities online courses were more likely to promote reflective learning.

Sometimes it was difficult for academics to spark 'an energetic discussion' amongst some groups of students, particularly in undergraduate units. Nunn (1996, in Sloffer, Dueber, & Duffy, 1999, p.11) found that "student discussion averaged only about 2% of class time". Students, also, noted that face-to-face discussions could be superficial compared to the more reflective types of comments generated by threaded discussions. In class, lecturers could employ cooperative learning strategies to spark discussion (Bennett, Rolheiser, & Stevahn, 1991; Kagan, 1994). Even so, perhaps, because of language difficulties or lack of experience students, still, may be reluctant to participate. Hence, the provision of opportunities for students to engage in threaded discussion as well as face-to-face discussion could broaden the opportunities for students with different learning styles and abilities to engage more effectively in discussions.

### ***Does Participation in Discussion Boards Enhance Student Learning?***

In early studies that compared student learning outcomes as a result of either online or face-to-face delivery, there appeared to be no difference in students' final exam results (Arbaugh et. al., 2009). Sankaran and Bui (2001, in Arbaugh et. al., 2009) attributed differences in students' performance to their learning strategies and motivation levels rather than the course delivery method. In their study, Clouse and Evans (2003, in Arbaugh et. al., 2009, p.75) found that "the combination of asynchronous content delivery and synchronous chat sessions produced the poorest results on exam questions, but that the combination of face-to-face content delivery and asynchronous discussion produced significant improvement on open-ended exam questions". Krentler and Willis-Flurry (2005) found that when business school students did not choose to use discussion boards, students majoring in Marketing or Information Systems outperformed their peers. However, when students chose to use discussion boards the performances of students from across all business majors were comparable. Thus, the use of discussion boards *appeared to equalize student performance* (Krentler &

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Willis-Flurry, 2005, p.320). As a result of this research, Krentler and Willis-Flurry (2005) suggested that students who were less intrinsically motivated by their field of study or less experienced with the use of technology could enhance their learning through utilising technology such as discussion boards.

In this paper, the outcomes of preliminary research into the use of discussion boards by business education lecturers and students are presented. The methodology is discussed in the following section and the results of the study are presented later in the paper.

### ***Methodology***

The authors conducted the case study research presented in this paper in 2009 in a Western Australian Business School. The case in question was the Business Information Systems 100 unit which was located in the context of Curtin University's Bachelor of Commerce degree as one of the seven first year common core units. The focus of the research was on the use of discussion boards by students enrolled in BIS100 in various locations and modes of study. BIS100 was an interesting case because it provided access to three different learning contexts; that is, a large first year unit, a small Year 12 experience unit and distance classes. The purpose of the study was to determine the frequency of students' discussion forum usage in a range of situations, consider its impact on student learning outcomes and provide advice about pedagogical considerations for enhancing students' learning through the use of discussion boards.

Mark Graber coordinated and taught BIS100 in face-to-face and online learning situations for 10 years. As the Unit Coordinator of BIS100 and a lecturer within the School of Information Systems, Mark had extensive knowledge and understanding of the unit and how to effectively engage students through the use of discussion board forums. Notably, the authors conducted related research into the flexible delivery of BIS100 through a partnership agreement between Curtin University and the African Virtual University (Graber & Bolt, 2009). Susan Bolt, as CBS Coordinator of Teaching and Learning, also, had extensive knowledge in relation to this case and pedagogical approaches that enhanced student learning. In relation to her professional duties and associated research activities, Susan observed the delivery of BIS100 to students enrolled at the Curtin Bentley Campus in both the large unit and the Year 12 experience unit on several occasions throughout Semester 1, 2009 and, subsequently, provided feedback to lecturers in relation to her observations.

To overcome any bias that may have existed because of their close association with BIS100, the authors conducted semi-structured interviews with three key informants about the use of discussion boards. The number of key informants was low because only a few key people had access to the type of information required in this research. Moreover, investigations of this nature were not typically conducted and data were only available for a brief period of time. Initially, the authors explained the purpose of this research to the key informants and discussed how the data could be obtained through an interrogation of Curtin FLEC-Blackboard databases. After an interrogation of the databases the findings were reported back to the authors. The key informants, also, provided advice on the effective use of discussion boards to enhance students' learning. Numerical data from databases were analysed quantitatively and reported in this paper as percentages, graphs and tables. Qualitative data were reflected upon by the researchers and reported descriptively in the paper. Further to this, the authors investigated relevant Curtin University websites and reviewed literature pertaining to blended learning.

Although most data were collected through the interrogation of Curtin University databases ethical issues concerning research with humans were considered. Participants were informed about the purposes of the research and given the opportunity to volunteer their participation. No participants were coerced and all participants had the right to withdraw at any time without penalty. Anonymity and confidentiality were ensured and participants' names have not been used. At the conclusion of

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the research the findings were shared with key informants and disseminated more widely to the academic community through conference presentations and scholarly publications.

### ***Context in which BIS100 is Situated***

At Curtin University lecturers are encouraged to provide flexible learning opportunities that enhance students' access to information, each other, and learning spaces. The FLECS-Blackboard learning management system has been adopted by Curtin University to provide learning spaces, manage classes, provide information and engage learners. Even so there are different levels of usage of the FLECS-Blackboard learning management system (LMS). Some units have no online component. If there is an online component it may be informational, supplemental, essential, or fully online. At the informational level, an online unit site would contain information such as a unit outline and details about the unit assessment items. The LMS is recognised as an optional source of information for students. At the supplemental level, the online unit site is used to enhance face-to-face instruction and may contain lecture notes and additional resources. At the essential level, the unit is designed so that students engage with a significant proportion of the learning activities via the website. If a unit is fully online there is no face-to-face component; all learning activities are delivered online (Office of Teaching and Learning, 2009).

Curtin Business School (CBS) has an international reputation as an innovative business school that has consistently produced industry-ready graduates for the global business community. With over 15,000 students from 70 countries, CBS is a comprehensive teaching and research facility with a multi-national reach. Its online MBA is ranked in the top 100 internationally. The CBS undergraduate Bachelor of Commerce (B.Com) course is comprised of 8 common core units and 16 specialist units that constitute studies in single or double major discipline areas. The Business Information Systems (BIS) 100 unit is one of the seven common core first year units; the eighth common core unit is the Business Capstone unit which students take in their third year of study. The first year B.Com units are delivered across 10 campuses in local, national and international locations. The majority of CBS students study internally through a face-to-face study mode. Western Australian rural and remote students study through a partially online study mode; this is a form of blended learning whereby students have some face-to-face interaction with lecturers but, also, download pre-packaged material via the internet. Similarly, 'offshore' students participate in partially online blended learning as a result of partnership agreements between the Curtin Business School and its international partner institutions. The Bentley-based Distance Education Area offers online learning options for external students (Curtin Business School, 2009). The various locations and study modes are summarised in Table 1.

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**Table 1: Locations and Study Modes for BIS100 Semester 1 2009**

Location	Study Mode	Online Component
Curtin Bentley Campus	Face-to-face	Essential
Bentley-based Distance Education Area	External	Fully online
Esperance Community College	Partially online	Essential
Kalgoorlie Campus	Partially online	Essential
Pilbara TAFE Karratha	Partially online	Essential
Pilbara TAFE South Hedland	Partially online	Essential
Curtin Sydney Campus	Face-to-face	Essential
INTI International College Penang	Face-to-face	Essential
Metropolitan College Malaysia	Face-to-face	Essential
Curtin Miri Sarawak Campus	Face-to-face	Essential
University Economics Ho Chi Minh Vietnam	Face-to-face	Not essential
Curtin Singapore Campus	Partially online	Essential
Charles Telfer Institute Mauritius	Partially online	Essential

### ***Frequency of CBS Students' Discussion Forum Usage***

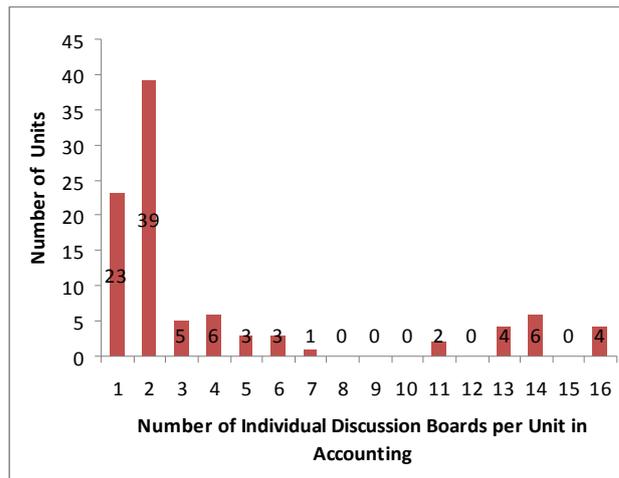
Curtin Business School lecturers are encouraged to provide flexible learning opportunities that enhance students' access to information, each other, and learning spaces. As a result of this research it was found that across CBS, in Semester 1 2009, 807 units had a presence on the FLECS-Blackboard learning management system, as shown in Table 2.

**Table 2: Number of unique unit instances on FLECS-Blackboard in CBS in Semester 1 2009**

Areas within the Curtin Business School	Number of unique units on FLECS-Blackboard
Accounting	152
Business Law	126
Economics and Finance	118
Graduate School of Business	94
Information Systems	124
Marketing	98
Management	87
CBS (Divisional unit)	8
<b>Total across all CBS areas</b>	<b>807</b>

Of these 807 units there were 522 units that used the discussion board function within the LMS; thus, across CBS discussion boards were used in 65% of the units with a presence on FLECS-Blackboard. One of the limitations of this research was that the number of discussion boards in use

within each of the CBS areas was not identified. However, the research did identify that in the largest School, Accounting, there were a total of 416 discussion forums in 96 of its 152 units with a FLECS-Blackboard presence; that is, 63% of the Accounting units on FLECS-Blackboard had a discussion board component. Thus the percentage of Accounting units on FLECS-Blackboard that had a discussion board component (63%) was consistent with the overall percentage of CBS units on FLECS-Blackboard that had a discussion board component (65%). Further analysis of the Accounting units showed a trend towards providing one or two discussion forums for each unit; 65% of Accounting units with a discussion board component had either one or two discussion forums. This trend is shown in Figure 1.



**Figure 1: Frequency of Discussion Forums in Accounting Units in Semester 1 2009**

The School of Accounting offers Accounting 100 for first year Bachelor of Commerce students as one of the common core units. This research identified there were three discussion forums, in Accounting 100 - *unit feedback*, *welcome to Accounting 100*, and *help us to help you*. As well as the use of discussion boards, the Accounting 100 unit coordinator delivered the content through mass face-to-face lectures with the assistance of sessional mentors. This structure created a highly interactive learning environment whereby there was significantly more interaction between the lecturer and students even though there were large classes.

Typically, lectures in higher education are less interactive and the dilemma of engaging students to enhance their learning persists. In Business Information Systems 100 (BIS100), the lecturers sought to increase the interaction between the teaching staff and students by team teaching and increasing students' opportunities to engage in course related online discussion forums.

Students without experience of online learning and the use of discussion forums could be disadvantaged in distance learning or web enhanced courses. Anecdotal reports taken from the University's unit evaluation tool indicated students found using FLECS-Blackboard to be initially intimidating. Many students felt frustrated and some gave up because of expectations of completing online assessment using a time constraint, posting discussion responses by set dates and the weekly review of online course content. So, some of the web functionality of BIS100 was designed to decrease student anxiety, for example, by providing immediate feedback and results via online assessment and build students' capacity to enhance their learning through the use of designated topical BIS100 discussion board forums. The same discussion board topics were used in five of the six BIS100 locations. The discussion board usage for Bentley Campus BIS100 students is shown in Figure 2 and the number of responses per individual thread for Bentley Campus BIS100 students for

the Assignment 1 discussion board forum is shown in Figure 3. The implications of these results are discussed in the following paragraph.

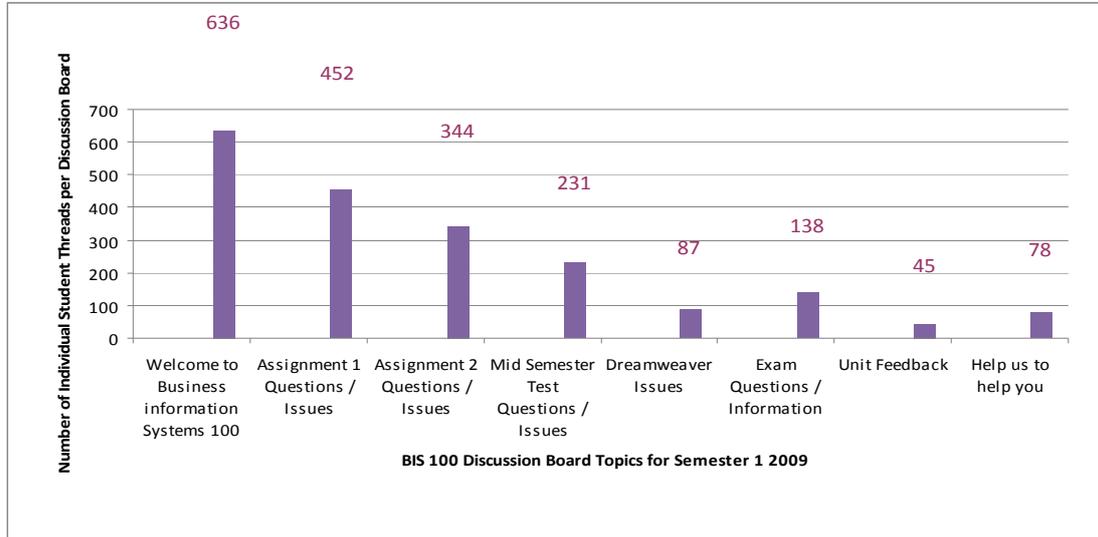


Figure 2: Discussion Board Usage by Bentley Campus BIS100 Students in Semester 1, 2009

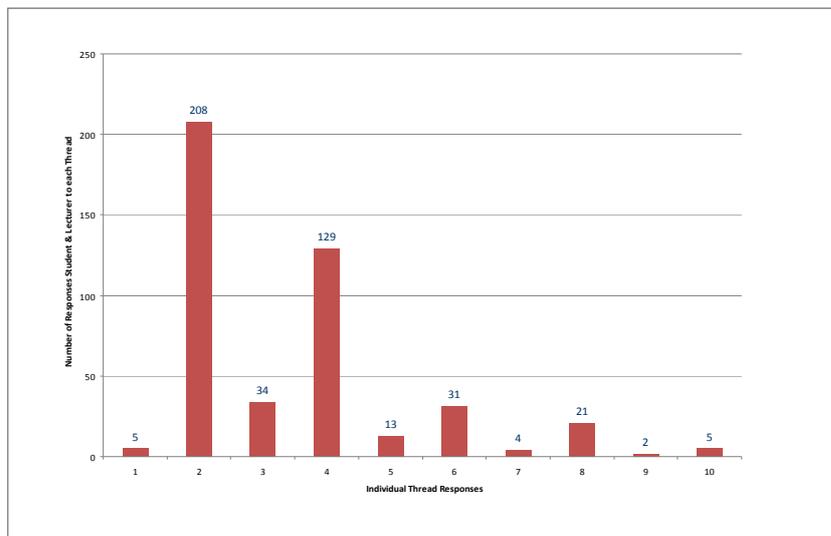


Figure 3: Number of Responses per Individual Thread for Bentley Campus BIS100 Assignment 1 Discussion Board Forum

In Figure 2 it is evident that 87% (636 of the 733 enrolled students) participated in the initial discussion board forum to introduce themselves to each other and the lecturers. It is important to note that students' participation in the BIS100 discussion board forums was entirely voluntary; there was no assessment attached to their participation in the discussion board forum nor were there any stimulus questions posted to elicit required responses from students. Students were welcomed to the

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unit and asked to introduce themselves to the class in the first discussion board forum. In subsequent forums students could post any queries or comments they had in regard to the four assessment items, the software, the unit or any general concerns they had. The unit coordinator's observations and reflections on the decreasing frequency of students' discussion board usage indicated students' increasing confidence with the work associated with the unit. The unit coordinator held this opinion because he read the student posts and interacted with the students in class. Predictably, students were more concerned about completing their first assignment than subsequent assessment items. In Figure 3 the number of responses per student thread in relation to the first assignment is shown. Thus it shows that 46% of threads (208 of the 452 responses) had two responses given for that thread; that is, the student posted a question and their question was answered. The next highest category showed that 29% of threads had four responses associated with them (129 of the 452 responses). In these cases the students asked an initial question that was answered and then they asked a second question that was also answered. In cases where there were an odd number of responses it indicated that students asked a question which was answered and then they made a further comment, for example, they thanked the lecturer for the assistance. Over time, it was evident to the unit coordinator that students' confidence increased and that their participation in the discussion forums had contributed to their increased confidence. However, the impact of discussion board usage extended beyond the affective domain and was also evident in student results.

### ***Impact of Use of Discussion Board Forums on Student Learning Outcomes***

In this research the usage of discussion boards in the BIS100 unit, internationally, was investigated. In Semester 1, 2009, there were 733 students enrolled internally in BIS100 at the Bentley Campus; 686 independent student identification numbers were recorded in the discussion board data. This was the largest group of BIS100 students, as shown in Table 3 below. An overview of BIS100 students' participation in the discussion board forums and the students' average final grades are shown in Table 3. Data relating to the BIS100 Year 12 Experience BIS100 students is not included in either Table 3 or Figure 2. There were 26 students in the Year 12 Experience BIS100 group and two discussion boards were established for this program; most students participated in both discussion board forums. There was no need for a large number of discussion boards because it was a smaller cohort of students and team teaching was used to deliver the lectures and computer labs; hence, students had a lot of opportunity to interact with the lecturers face-to-face.

**Table 3: Overview of BIS100 students of Participation on Discussion Boards and Final Grades**

Location	Number of students using discussion board	Number of discussion boards	Total number of student contributions to discussions	Average number of contributions per student (ranking)	The average final grade of students (ranking)
Metropolitan College Malaysia	119	8	374	3.1 (1)	66% (1)
Charles Telfer Institute Mauritius	118	8	256	2.17 (4)	57% (4)
<i>Curtin Miri Sarawak Campus</i>	<i>154</i>	<i>4</i>	<i>104</i>	<i>0.67</i>	<i>63%</i>
INTI International College Penang	24	8	65	2.7 (3)	65% (2)
Curtin Sydney Campus	65	8	48	0.74 (5)	46% (5)
Curtin Bentley Campus	686	8	2011	2.9 (2)	59% (3)
Overall number of students using discussion board across all locations and their average final grade score	<b>1166</b>				<b>59%</b>

In Table 3 the results for the Curtin Miri Sarawak Campus are shown in italics because there were a different number of discussion board forums in this location and there were issues in relation to moderation of assessment items. Therefore, in the comparative ranking, shown in brackets in the final two columns in Table 3, the results for Miri were not compared with those of the remaining five BIS100 locations. Interestingly, there seemed to be a correlation between the number of student contributions to discussion board forums and students results. In locations where the total number of contributions per student to discussion board forums was higher the students' average final grade scores were also higher. Further scrutiny of the average final scores of Bentley Campus students supported this claim. A random sample of students was taken from across five categories of the number of contributions the students had made to the discussion board forums and their final scores were considered. In this research, five students from each category were selected so the total sample size was 25 students. In future research the sample size could be increased. The number of Bentley Campus BIS100 student contributions to discussion board forums compared with their average final scores is shown in Table 4. These results clearly show that students who participated more in the discussion board forums also achieved higher scores. At this stage it is not known what other factors contributed to students' participation in the discussion board forums or their learning outcomes.

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**Table 4: Number of Bentley Campus BIS100 Student Contributions to Discussion Board Forums Compared with Students Average Final Scores**

<b>Category Number of Independent Contributions</b>	<b>Average Final Score</b>
50 +	73.4%
30-49	71.4%
15-29	61.8%
5-14	54.2%
0	38.8%

### ***Pedagogical Considerations for Using Discussion Board Forums***

The use of online learning technologies such as the discussion board feature of some learning management systems has been beneficial in the context of open and distance education but there has been doubt about its usefulness in face-to-face teaching and learning situations. Clouse and Evans (2003, in Arbaugh et. al., 2009) found that the use of face-to-face content delivery combined with asynchronous discussion improved student learning outcomes. In the BIS100 research, evidence has been provided in relation to the use of discussion board forums in distance (partially online) and local face-to-face learning situations. The results of this research indicated that higher frequencies of students' usage of asynchronous discussion board forums correlated with higher average final scores in both distance and face-to-face learning situations. So, the provision of blended learning through the combination of face-to-face and asynchronous discussion is an important pedagogical consideration.

In the context of BIS100, students' participation in the asynchronous discussion was voluntary, not linked to assessment and decreased throughout the semester. In all of the BIS100 locations students also had the opportunity to speak with lecturers and fellow-students face-to-face; asynchronous discussion provided timely and flexible support for student learning. A key feature of the BIS100 use of the learning management system was the provision of multiple asynchronous discussion forums about critical assessment and learning issues that students could engage with at their point of need. Thus, unit coordinators need to consider the nature of students' participation - will it be voluntary or assessable? Also, unit coordinators should determine the frequency and number of forums, and the type of topics to include for discussion. Needless to say, all forums require monitoring and input from the lecturers/unit coordinator. So, the level and nature of input from academics will also need to be decided and communicated with participants. In any situation where there is public discussion there are rules of engagement, so the etiquette for communications will also need to be decided and communicated to students.

Another important pedagogical consideration identified by Vaughan and Garrison (2005) was the possibility of reducing the amount of time spent in class as a result of using a blended learning approach. In the BIS100 case there was no reduction of class time because of the use of discussion board in terms of how many contact hours lecturers and students had for the unit. However, many of the students' questions were being answered outside of this contact time; hence, it was likely that more of the contact time could be devoted to other aspects of learning and teaching. In future research, for example, the impact of reducing class time to facilitate the use of discussion board forums to enhance student engagement with required readings could be explored.

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## **Conclusion**

In this paper the results of the BIS100 case study have been presented along with a review of the literature in relation to blended learning. Consequently, the conclusion is drawn that the provision of blended learning in higher education, distance and face-to-face learning situations through the use of discussion board forums is worthwhile and enhances student learning outcomes. To use this technology effectively pedagogical consideration must be given to the nature of student participation and instructional design issues. Although the outcomes of the BIS100 are indicative of enhanced student learning further research is necessary. Further consideration should be given to the impact of students' and lecturers personal traits, technology and instructional design (Wan, Fang, & Neufeld, 2007, in Arbaugh et. al., 2009). Also, future research could investigate the use of blended learning, particularly, in relation to how discussion board forums could be used to enhance student learning in face-to-face classes.

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