Performance in e-learning: online participation and student grades

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Abstract

The beneficial effects of learners interacting in online programmes have been widely reported. Indeed, online discussion is argued to promote student-centred learning. It is therefore reasonable to suggest that the benefits of online discussion should translate into improved student performance. The current study examined the frequency of online interaction of 122 undergraduates and compared this with their grades at the end of the year. The findings revealed that greater online interaction did not lead to significantly higher performance for students achieving passing grades; however, students who failed in their courses tended to interact less frequently. Other factors that may be salient in online interactions are discussed.

Introduction

It has been suggested that interaction in online learning programmes promotes student-centred learning, encourages wider student participation, and produces more in-depth and reasoned discussions than traditional face-to-face programmes (eg, Karayan & Crowe, 1997; Smith & Hardaker, 2000).

Further studies also provide evidence to support the benefits of online collaborative environments. For example, online discussions encourage more reticent individuals to participate to a greater extent (Citera, 1988). Furthermore, Warschauer (1997) advocates interaction in online environments; as here, there is less opportunity for intimidation between individuals and also less time pressure on them than in face-to-face settings.

Conversely, lack of close interaction between learners may have adverse consequences, possibly because learners experience feelings of isolation. Indeed, such a finding was

reported by Haythornthwaite, Kazmer, Robbins and Shoemaker (2000), who suggested that the participants in their study who failed to make online connections with other learners in their group reported feeling isolated and more stressed than those who made such connections.

One reason for the importance of online interaction is because learners experience a 'sense of community' (Rovai, 2002), enjoying mutual interdependence and a sense of trust and interaction among community members, which means that the members of the community have shared goals and values.

There is therefore much research that reports on the beneficial effects of online participation in terms of widening student involvement, improving the quality of discussions compared with traditional face-to-face interactions, as well as research on the beneficial effects of online interaction in terms of fostering an online community.

However, what needs to be investigated is whether online interaction has any tangible benefits in terms of improving student learning as measured by final grades on a course. The current study, therefore, examines the level of online participation of 122 undergraduates during their 1st year of a business degree, comparing the level of interaction with their grades at the end of the year.

Method
Participants
The performance and online engagement of 122 students (70 male, 52 female) were examined for each module taken during their 1st year of study. All students were enrolled in a business degree course. Ninety-seven students were studying full-time taking six modules, and 25 students were studying part-time taking three modules.

Procedure
The participants used the 'blackboard' environment for a period of 12 months, and their usage of this was compared with their level-one grades.

The 'blackboard' statistics was recorded for each student in four main areas of the 'blackboard' environment: communication, main content, student, and group areas.

Data analysis
There are two routes through which the virtual classroom and discussion boards may be accessed, either through the group or the communication areas. Therefore, for the purpose of this analysis, the students' access to the group area and their access to the communication areas were combined and used to represent the degree of participation in online discussion. Access to the main content area and access to the student area were also combined and used to represent the 'blackboard' activity without participating in group discussions.

Table 1: High/medium/low/fail group size per module

Grade group	EB1SO1: entrepreneur and the environment	EB1SO2: entrepreneurship and opportunity recognition	EB1SO3: small enterprise resourcing	EB1SO4: entrepreneurship competencies	EB1SO5: management of e-business	EB1SO6: graduate enterprise project
High (>65%)	22	37	31	30	20	12
Medium (54–65%)	31	27	22	26	20	20
Low (40–53%)	21	15	10	27	14	17
Failed (<40%)	24	22	22	16	16	31

Table 2: Mean ranks for total 'blackboard' usage per grade grouping

Grade group	EB1SO1	EB1SO2	EB1SO3	EB1SO4	EB1SO5	EB1SO6
High	57.64	61.78	56.21	62.10	50.90	50.29
Medium	67.52	62.96	52.27	60.19	41.65	49.47
Low	43.57	40.93	45.05	43.15	32.07	42.82
Failed	23.96	25.05	14.18	22.31	11.56	29.65
	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p = 0.007$

The proportion of the total 'blackboard' hits, which relates to communication/group access, was calculated for each student for each module. This proportion was compared with the year-1 module grade. If online participation in discussion forums is an effective learning aid, then it is expected that those students who proportionately spend more time in communication/group areas should achieve better module grades.

To aid analysis, the students were allocated to groups based on the grades achieved per module. The number of students in each group by module is shown in Table 1.

Results
A Kruskal–Wallis test was performed on the differences in overall 'blackboard' usage, for each grade grouping. Differences in the mean rank scores are shown in Table 2.

Intuitively, it makes sense that the more active a student is, the better he or she will perform, and this is born out by the consistent and significant pattern of results obtained. In general, the mean ranks increased across the grade bands with people in the high-pass and medium-pass bands showing greater activity in terms of the number of times they accessed 'blackboard' than students with low passing grades. Not surprisingly, the students who failed also consistently ranked lowest in terms of 'blackboard' activity. This suggests that greater activity, as measured by 'blackboard' usage, is likely to lead to a better performance in terms of module grade.

Table 3: Mean proportion of total 'blackboard' usage in interactive areas

Module	High passing grade (%)	Medium passing grade (%)	Low passing grade (%)	Failed (%)
EB1S01	90.39	91.23	90.04	75.07
EB1S02	86.75	82.11	75.57	65.49
EB1S03	68.66	63.52	59.07	31.42
EB1S04	78.63	80.53	78.09	67.72
EB1S05	70.55	66.29	65.80	57.48
EB1S06	51.68	53.87	45.26	35.57

There were no consistent or significant differences between the mean ranks of students with high passing grades and those with medium passing grades, which suggest that mere activity levels do not distinguish between the students with high passing grades and those with medium passing grades.

However, the main question here is whether the nature of the activity improves performance, that is, do group discussion and interaction lead to better grades? The proportion of student time spent in interaction areas as opposed to task areas was calculated as a percentage of the total number of 'blackboard' hits. The average proportion of 'blackboard' usage, which relates to interactive areas, is shown below in Table 3.

Table 3 shows that the mean proportion of 'blackboard' usage in interactive areas was consistently highest for students with high and medium passing grades and consistently lowest for those who failed in the modules. There was very little mean difference in the percentage proportion of interactive use between students who received a high or medium passing grade.

A clearer pattern emerges when the students' average 1st-year grade is compared with the mean proportional use across all the modules taken. Figure 1 shows that for students achieving A and B grades, approximately 80% of their 'blackboard' usage is in interactive areas. The figure is approximately 77% for students achieving C and D grades, and 69% for students who failed.

A Kruskal–Wallis test was performed on the differences in proportional use of interaction areas per module for each grade grouping. Differences in the mean rank scores are shown in Table 4.

For module EB1S03 (Small Enterprise Resourcing), there was a significant difference between those who received an F grade and those who passed ($X^2 = 12.325$, $p = 0.006$). Similarly, differences were observed between those who failed and those who passed which approached significance for module EB1S04 (Entrepreneurial Competencies) ($X^2 = 7.104$, $p = 0.069$) and module EB1S05 (Management of e-business) ($X^2 = 7.52$, $p = 0.057$). Individuals who failed in the modules spent a significantly lower
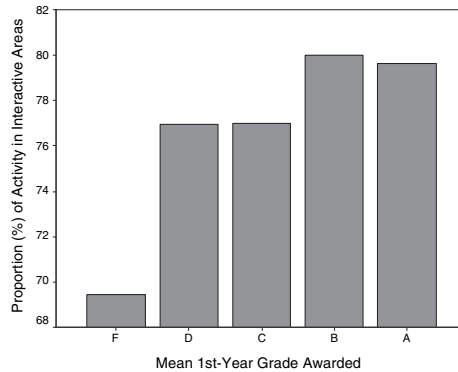
Figure 1: Proportional interactive usage compared to mean first year performance

Table 4: Mean ranks of proportion of total 'blackboard' hits that reflect group and communication area access

Grade group	EB1SO1	EB1SO2	EB1SO3	EB1SO4	EB1SO5	EB1SO6
High	17.60	44.06	41.23	19.46	31.11	35.36
Medium	24.50	41.60	39.98	22.10	33.07	35.00
Low	21.70	39.18	32.56	25.82	31.18	26.03
Failed	23.00	33.00	16.95	10.33	16.05	35.03
	$p = 0.591$	$p = 0.567$	$p = 0.006$	$p = 0.069$	$p = 0.057$	$p = 0.449$

proportion of their active 'blackboard' time in group and communication areas. No significant differences were found between the groups that passed in any module.

Discussion

This study sets out to investigate whether online interaction could produce any tangible benefits in terms of improving student learning, as measured by final grades on a series of different courses.

The findings revealed that students achieving high or medium passing grades engaged more actively with the course, as measured by 'blackboard' access, than students achieving low passing grades. Students achieving low passing grades were, in turn, significantly more active than students who failed in their modules. Initially then, it seems likely that this increased activity is a factor in higher achievement but it is of less importance when distinguishing between students achieving high or medium passing grades. This supports the implicit assumption that hard work translates to better grades, but is the amount of interaction and discussion also a factor in higher achievement?

There is moderate support to suggest that the proportion of active interaction in discussion groups is a significant factor in distinguishing between individuals who pass or fail

in the modules. Amongst those who achieved passing grades, students achieving low passing grades tended to proportionately engage in less online interaction than students achieving high and medium passing grades. However, this observed difference was not statistically significant.

Despite the wealth of research exposing the benefits of online interaction (eg, Karayan & Crowe, 1997; Smith & Hardaker, 2000), students who interacted and participated more in online discussions in this study did not necessarily achieve higher grades. Therefore, by simply encouraging students to get more involved in online discussions is unlikely to automatically improve their performance. Indeed, Swan (2002) has argued that the mere provision of a discussion forum does not aid in learning, and the current study supports this view.

Lessons to be learned
Therefore, given the current findings, the next step would be to try to focus on the factors that might be salient in this regard, that is, what factors in online interaction might enhance learning.

First, the methodology in this study sought to measure interaction in terms of quantity (the number of 'blackboard' hits) rather than the quality of interaction and group discussion, and it is possible that the quality of online participation in terms of the types of interaction would be most important. This notion of quality over quantity of online interaction has been suggested by Chong (1998).

Furthermore, we may need to analyse more carefully the dynamics of online interaction. A study by Weisskirch and Milburn (2003) examined the characteristics of 3125 student postings on a bulletin board and found that when these postings were optional, the students produced more questions and comments directed to their online tutor in comparison to a situation when student postings were mandatory. Furthermore, tutor-directed postings were associated with higher course grades with the same effect not occurring when postings were made from peer to peer. This finding suggests that it is not necessarily the number of postings or degree of interaction per se, which are related to course grades, but rather whether online interaction is carried out on a voluntary or compulsory basis, and with whom the online interaction occurs.

Finally, in a recent 'Web-based learning' evaluation study (Connolly *et al*, 2003), focus group discussions suggested that a number of factors might encourage students to participate to a greater extent in online discussions. These were greater moderator involvement, provision of leadership that encouraged effective discussion, increased reliability and stability of the technology to provide an effective discussion forum facility, and practical issues such as time management and coordination of group member involvement.

However, Connolly *et al* (2003) also provided evidence to suggest that students who failed in their modules interacted with others on their course less than students who

achieved passing grades. It is possible, therefore, that for students who are close to failing the course, the online participation may provide support or a sense of community (Rovai, 2002), which could make the difference to them between continuing with the course and giving up.

Conclusion

It may be concluded then that the reported beneficial effects of online participation and interaction do not necessarily translate into higher grades at the end of the year, with students who participated more frequently not being significantly awarded with higher grades. However, students who failed in one or more modules did interact less frequently than students who achieved passing grades.

Participation in online discussion forums serves a dual purpose: to improve learning and to provide support. It may, therefore, be the case that factors such as the frequency of the interactions are likely to be more important in providing support, whereas quality and dynamics of the interactions may be the more important influencing factors in learning and performance.

Acknowledgement

References

Chong, S. (1998). Models of asynchronous computer conferencing for collaborative learning in large college classes. In C. J. Bonk & K. S. King (Eds), *Electronic collaborators: learner-centred technologies for literacy, apprenticeship and discourse* (pp. 157–182). Mahwah, NJ: Lawrence Erlbaum Associates.

Citera, M. (1988). Distributed teamwork: the impact of communication media on influence and decision quality. *Journal of the American Society for Information Science*, *49*, 9, 792–800.

Connolly, M., Hodson, P., James, C., Graff, M. G., Jones, C., Davies, J. & et al (2003). *E-College Wales evaluation report*. Glamorgan: University of Glamorgan.

Haythornthwaite, C., Kazmer, M. M., Robbins, J. & Shoemaker, S. (2000). Community development among distance learners: temporal and technological dimensions. *Journal of Computer Mediated Communication*, *6*, 1, 1–24.

Karayan, S. & Crowe, J. (1997). Student perspectives of electronic discussion groups. *THE Journal: Technological Horizons in Education*, *24*, 9, 69–71.

Rovai, A. P. (2002). Sense of community, perceived cognitive learning, and persistence in asynchronous learning networks. *Internet and Higher Education*, *5*, 319–332.

Smith, D. & Hardaker, G. (2000). e-Learning innovation through the implementation of an Internet supported learning environment. *Educational Technology and Society*, *3*, 1–16.

Swan, K. (2002). Building learning communities in online courses: the importance of interaction. *Education, Communication and Information*, *2*, 23–49.

Warschauer, M. (1997). Computer-mediated collaborative learning: theory and practice. *Modern Language Journal*, *8*, 4, 470–481.

Weisskirch, R. S. & Milburn, S. S. (2003). Virtual discussion: understanding college students' electronic bulletin board use. *The Internet and Higher Education*, *6*, 3, 215–225.