Asynchronous and Synchronous Online Discussion:

Real and Perceived Achievement Differences

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Abstract

Students in an introductory educational psychology course used two WebCT communication tools (synchronous chat and asynchronous discussion) to discuss four case studies. In response to the item, *I learned the case studies best when using*, 39 students selected synchronous chat and 51 students selected asynchronous discussion. Students who selected synchronous chat correctly answered fewer synchronously-discussed case study examination items than students who selected asynchronous discussion. Student perception of learning advantage may reflect personality characteristics such as sociability. If given free choice of online discussion tools, highly social students are likely to choose synchronous formats. Such a choice may result in decreased academic achievement.

Asynchronous and Synchronous Online Discussion: Real and Perceived Achievement Differences

There are two distinct modes of online discussion (OD) -- asynchronous and synchronous. Asynchronous OD occurs in delayed-time (e.g., bulletin boards) and does not require the simultaneous participation of discussants; synchronous OD (e.g., chat rooms) occurs in real-time and requires the simultaneous participation of discussants (Thurlow, Lengel, & Tomic, 2004). Widely implemented in higher education (Sabau, 2005), asynchronous OD is reportedly useful for "encouraging in-depth, more thoughtful discussion; communicating with temporally diverse students; holding ongoing discussions where archiving is required; and allowing all students to respond to a topic" (Branon & Essex, 2001, p. 36). Although typically an optional course feature (Burnett, 2003), synchronous OD is recommended as an appropriate discussion format in higher education (National Center for Accessible Media, 2005).

Research on the relative learning benefits of asynchronous and synchronous OD has been contradictory and thus inconclusive (Johnson, in press). Pérez (2003), for example, required first-year university students to engage in both synchronous chat and asynchronous email to facilitate Spanish language learning. While more text was produced in chat rooms, there was no significant difference in new vocabulary across the two groups. In contrast, Schwienhorst (2003) described a learning network in which students gave and received foreign language support using asynchronous email or synchronous chat. Reportedly, students in asynchronous learning networks were more likely to complete tasks than students in synchronous networks. Volet and Wosnitza (2004) analyzed transcriptions of synchronous and asynchronous student OD and found that both interactive mediums "showed a substantial amount of social interchange and meaningful learning" (p. 5).

Asynchronous and Synchronous Online Discussion: An ABAB Research Design

Johnson and Howell (2006) acknowledged that “investigation of Internet learning technology requires creative re-interpretation of research methods as researchers attempt to unravel the complex interplay of learner, curricular, and instructional forces that unfold in the context of web-based technology for educational purposes” (p. 282). The interrupted time-series design is one "involving repeated measurement on an individual or small group, over time, with the introduction of some intervention(s) into the data series, and with subsequent monitoring of the series to examine the effect(s)" (Rush & Kratochwill, 1981, p. 58). Choi, Land, and Turgeon (2001) utilized an interrupted time-series design to compare students prior to and following web-based training in generating counter-arguments. Student achievement was measured with a series of in-class examinations. Relative to achievement prior to web-based training, students evidenced an increase in the generation of counter-arguments in discussions. A control condition did not show such an increase across the same repeated measurements (i.e., in-class examinations).

The interrupted time-series design assumes several forms including ABA and ABAB (Barlow & Hersen, 1984). In the ABA design, baseline measures (the initial A phase) establish the steady state of the target behavior. This is followed by implementation of a treatment or intervention (the B phase) while behavioral measurement continues. Finally, the treatment or intervention is discontinued while the target behavior continues to be measured (the final A phase). A variation of the ABA design is the ABAB design, in which the treatment variable is implemented on a second occasion. Threats to internal validity (i.e., maturation, history, testing) are ruled-out as competing reasons for change in behavior and permit inference that the behavioral change is attributable to the imposition of the intervention (Johnson & Howell, 2006).

The current investigation used a modified ABAB research design in order to determine the real and perceived learning benefits of asynchronous versus synchronous OD. College students used two WebCT communication tools (synchronous chat and asynchronous discussion) to discuss four case studies. Comprehension and retention of the four case studies were assessed with multiple-choice items on four in-class examinations. To discuss the four case studies, students were randomly assigned to Discussion-Chat-Discussion-Chat (Figure 1) or Chat-Discussion-Chat-Discussion (the reverse of Figure 1). Alternating OD mode resulted in half of the students in chat and half of the students in discussion for each case study. This alleviated some of the challenges of scheduling real-time chat as well as providing students with equivalent learning experiences across the academic term (ie, two asynchronous and two synchronous online case study discussions).

-- Insert Figure 1 here --

Methods

Subjects

Ninety-three students in an introductory educational psychology course participated in the study. Students ranged in age from 17 to 42 years (mean 21.4 years). Approximately 73% of the sample was female which is characteristic of the student population in the participating college. Students reported an average of 15 college credits complete (range 0 to 56).

Student Achievement: Real and Perceived

Two outcome variables were assessed, -- real student achievement and perceived student achievement. Real student achievement was defined in terms of proctored in-class examination performance and included:

1. *Overall Achievement*, defined as final course grade, was determined by summing student percentage marks on eight required course elements -- four examinations and four online case study discussions. One examination and one case study corresponded with each unit of course content. Overall achievement ranged from 52% to 94% with a mean of 74.6% (*SD* = 8.5) for the group of participating college students.
2. *Examination Achievement* referred to the number of case study multiple-choice items answered correctly on each of the four in-class examinations. Three multiple-choice items on each examination assessed student understanding and retention of the case study discussed online during that unit of course content. The average number of case study items answered correctly on each of the four examinations was 2.7, 2.6, 0.9, and 2.3, respectively.
3. *Asynchronous-Supported Achievement* referred to the number of case study multiple-choice items answered correctly when the cases were discussed in delayed-time. For half of the students this involved summation of the case study multiple-choice items answered correctly on the first and third examinations; for the other half of the students this involved summation of the case study multiple-choice items answered correctly on the second and fourth examinations. Asynchronous-supported achievement for the sample of college students ranged from 2 to 6, mean 4.2 (*SD* = 1.4).
4. *Synchronous-Supported Achievement* referred to the number of case study multiple-choice items answered correctly when the cases were discussed in real-time. For half of the students this involved summation of the case study multiple-choice items answered correctly on the second and fourth examinations; for the other half of the students this involved summation of the case study multiple-choice items answered correctly on the

first and third examinations. Synchronous-supported achievement for the sample of participants ranged from 0 to 6, mean 4.3 (*SD* = 1.2).

Perceived Student Achievement was assessed with a forced-choice item (i.e., I learned the case studies best when using) that required students to selected one of two response-options (i.e., synchronous chat or asynchronous discussion). Thirty-nine students selected synchronous chat and 51 students selected asynchronous discussion (3 students did not select either response-option). Having selected one response-option, students provided written reasons for their perception of OD mode learning advantage.

Results and Discussion

Significant differences in examination achievement (i.e., number of case study multiple-choice items answered correctly on each examination) were not related to mode of discussions. As presented in Figure 2, regardless of the nature of online discussion (real-time or delayed-time), student understanding and retention of the case studies as measured by objective test items, on average, was equivalent. The conspicuously low mean on the third examination was likely an artefact of specific unit content and corresponding case study examination items. The third unit of course content was highly theoretical.

-- Insert Figure 2 here --

There was no significant difference in the overall achievement between the 39 students who selected synchronous chat and the 51 students who selected asynchronous discussion in response to the forced-choice item. When asked the reason for the learning advantage of chat or discussion, most students provided brief written comments. Such comments were thematically organized into seven categories. As presented in Figure 3, student justification for perception of

learning advantage was not unique to OD mode; students provided the same reason for their perception of the learning advantage of both modes.

-- Insert Figure 3 here --

Seven students reported that they learned best when discussing the cases synchronously because that mode forced them to be prepared for the OD; the same reason was provided by 15 students who reported that they learned best when discussing the cases asynchronously. While students should be prepared for all course assignments, perception of the need and opportunity for preparation may have differed across students. Further, the interactive nature of the OD mode was the reason provided by 15% of students expressed the perception that they learned the case studies best when using synchronous chat and 18% of those who expressed the reverse perception. While real-time OD is often assumed to be more interactive than delayed-time OD, students may have interpreted interaction differently. Some students may have assumed that effective discussion occurs in real-time; others may have appreciated the advantage of asynchronous text-based OD where students review, revise, and edit postings, “allowing them to ensure that the phrasing and other message characteristics are consistent with the message they desire to send, without the ‘costs’ associated with delay that would be present in synchronous interaction” (Nowak, Watt, & Walther, 2005, p. 3). It is also possible that students responded to the forced-choice item in terms of the OD mode that they most enjoyed. Enjoyment of one mode over the other may reflect student personality characteristics.

There was no significant difference in overall achievement, examination achievement or asynchronous-supported achievement between students who reported that they learned the cases studies best when using asynchronous discussion and those who reported that they learned the case studies best when using synchronous chat. However, there was a significant difference in

Asynchronous-Supported Achievement between students who made different selections in response to the forced-choice item. As illustrated in Figure 4, students who indicated that they learned the case studies best when using synchronous chat scored, on average, 3.9 on the six examination items that assessed mastery of case studies discussed synchronously; students who reported that they learned the case studies best when using asynchronous discussion scored, on average, 4.5 on the six examination items that assessed mastery of case studies discussed synchronously. Such a difference did not occur by chance (t = -2.24, df = 88, p = .027).

-- Insert Figure 4 here --

The achievement discrepancy presented in Figure 4 may be interpreted as supporting the contention that perception of learning benefits reflects student personal preference which is often based on personality characteristics. Students who preferred synchronous over asynchronous OD may have been more social than students who expressed the reverse preference. “Since evaluation in higher education is largely cognitive as opposed to social, it is not surprising that highly social students are often at an achievement disadvantage. This may be equally true in both traditional and online learning environments” (Johnson, 2006, p. 11). Synchronous chat, while compatible with individual sociability characteristics, may not have facilitated the learning of highly sociable students.

Implications for Educational Practice: Asynchronous and Synchronous Online Discussion

While the combined use of asynchronous and synchronous online discussion is frequently recommended in higher education (Davidson-Shivers, Muilenburg, & Tanner, 2001; Ligorio, 2001), the results of the current investigation suggest that such combination should be judiciously implemented. If given free choice of OD mode, highly social students are likely to choose synchronous chat. Such a choice may result in decreased academic achievement.

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Figure 1: ABAB Research Design: Asynchronous Discussion contrasted with Synchronous Chat

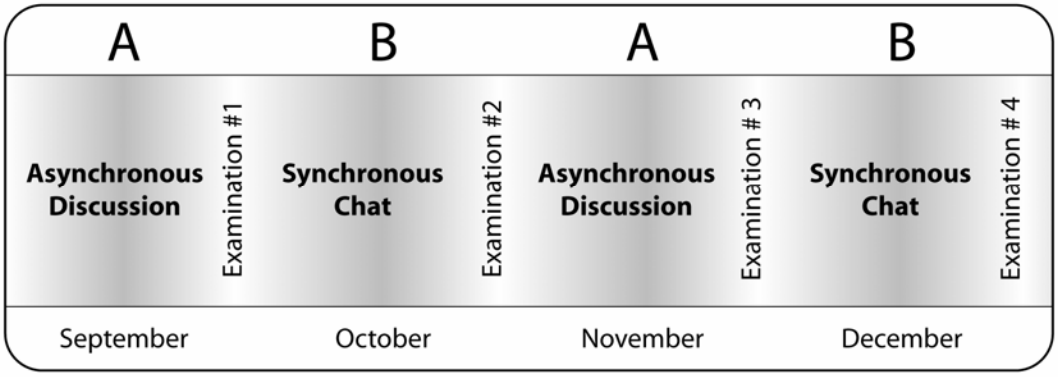

Figure 2: Student Achievement across Four Examinations under Two Experimental Conditions

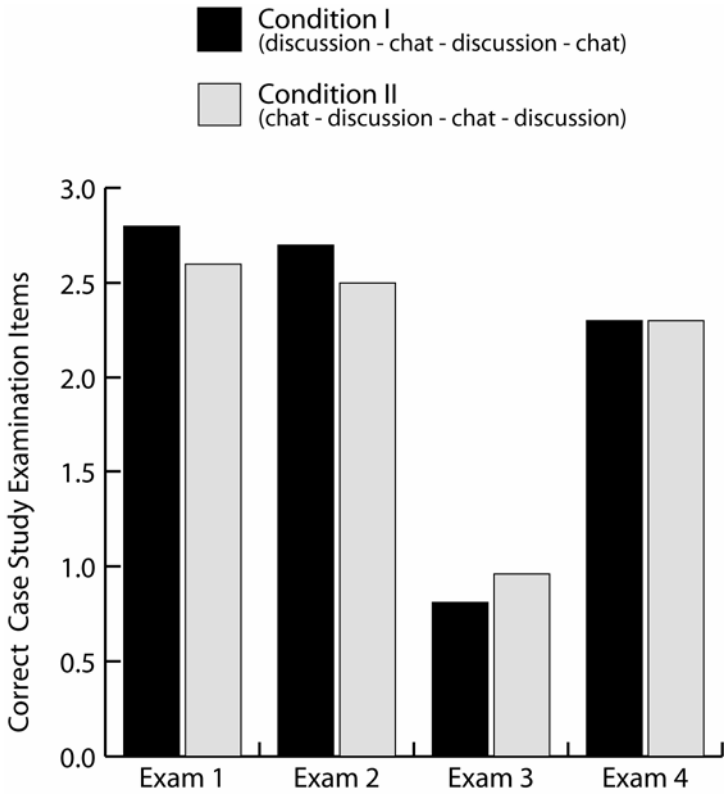

Figure 3: Student Reasons for Perceived Learning Advantage of Online Discussion Mode

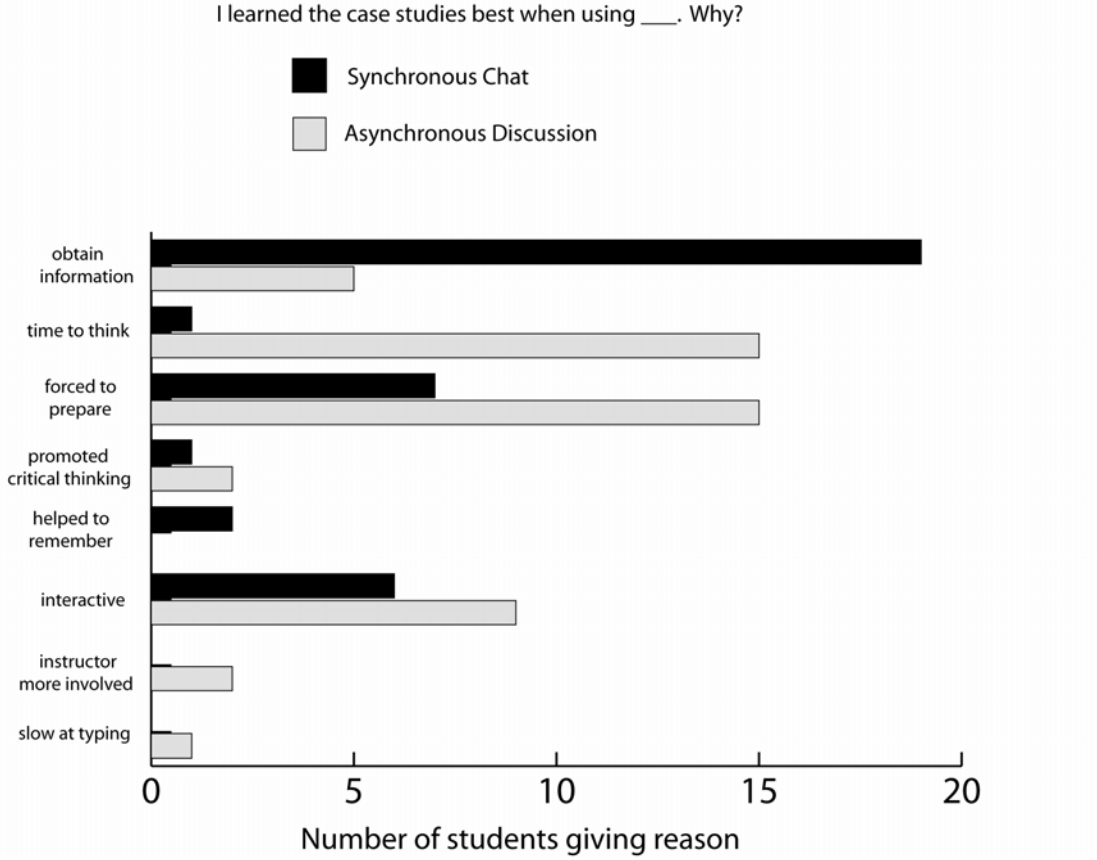

Figure 4: Real Achievement in Relation to Perceived Achievement