

Monitoring Participation in Online Courses

Ian Douglas¹ and Nicole D. Alemagne²

¹Learning Systems Institute, University Center C4620, Florida State University, Tallahassee, Florida, USA, idouglas@lsi.fsu.edu.

²Learning Systems Institute, University Center C4620, Florida State University, Tallahassee, Florida, USA, nda06c@fsu.edu.

ABSTRACT

Previous studies have shown a strong link between attendance and success in education. However, most of this work relates to traditional face-to-face classes; there have been few studies on attendance in online learning environments. This paper will consider the concept of online attendance and how it may be measured. It will also present data that suggests attendance in online courses has a similar relationship to success as it does in conventional courses. The implications for the future development of tracking and reporting tools and for student advising will be discussed.

INTRODUCTION

A number of studies have found that class attendance positively affects performance in traditional settings. Romer [26], studying undergraduate economics students, found that the performance of students who attended all lectures was a full letter grade better (from a C- to a B+) than those who attended a quarter of the lectures. Devadoss and Foltz [10] reported a similar relationship (e.g., B+ vs. C+) for students who attended all classes over those who attended half the classes in an agricultural economics program. Stanca [27] correlated missing classes with declines in exam scores and reported that an hour spent attending class had a greater return than an hour spent studying (from a panel data set for introductory economics).

Park and Kerr [21] found that attendance positively affected performance in a money and banking class, although less so than adjusted cumulative GPA and percentile rank on a college exam. Durden and Ellis [12] found that the problem in a principles of economics class was excessive absenteeism; the authors speculated that the reason might be that it is not harmful to grades to miss a certain number of classes, or that better students simply miss fewer classes.

Cohn and Johnson [8] studied five years of principles of economics classes and found strong evidence that class attendance positively affects grades, although when they instituted controls for SAT and GPA the relationship became weaker. They confirmed Durden and Ellis' finding that excessive

absenteeism plays a large part in a student's grade. Marburger [19] also studied absenteeism; he found that it reduced the mean scores on final exams by 2.3 percent overall in undergraduate economics courses at three medium-sized state institutions. In an expansion of the study [20] students who missed a class were 9 to 14 percent more likely to incorrectly answer an exam question covering that material than were students who attended the class. Brocato [4] analyzed grades and absences over a four-year period in principles of macroeconomics and intermediate economics classes; he reported that good grades correlated with attendance and that the relationship may be stronger for younger students.

The positive impact of attendance has been reported in subjects other than economics. Rodgers [24] [25] visited the topic twice, looking at Australian business students in introductory statistics classes. In the first study she reported that attendance had a small effect on performance, but speculated that the impact may be greater as students take further classes. She then studied a scheme meant to increase attendance, in which students' grades were reduced for absenteeism; she found a positive association between attendance and performance in the 'trial' and 'control' years, although there was no difference in performance between the years.

In the area of psychology, Launius [18] reported a significant positive correlation between attendance and performance on exams and assignments. Studying students in a first-year psychology course, Gunn [14] found a positive directional relationship between attendance and grades, with greater attendance yielding higher grades. Van Blerkom [28] determined that there was a significant correlation between class attendance and final grades in adolescent development and introduction to educational psychology classes. Jones [15] reported that absences and grades have a "direct causal relationship."

Day [9] looked at the effects of journal writing and attendance on performance in sociology classes. She found that fewer absences were correlated with higher examination scores. In the United Kingdom Gatherer and Manning [13] found a particularly strong correlation between lecture attendance and performance for UK ethnic and non-Anglophone minorities in first-year biological sciences.

Not all studies have found that class attendance is an important factor in performance. For example, Buckles and McMahon [5] determined that lectures did not improve test scores in an introductory economics course. Douglas and Sulock [11] found that homework was the most important factor in success, "but that attending class faithfully reduced the marginal product of doing homework, and vice versa." Krohn and O'Connor [17] found a positive relationship between attendance and overall performance in three intermediate macroeconomics courses. However, they did not find a relationship between attendance and individual test scores. It must be noted that the attendance variable was self-reported by students, and therefore may not have been accurate.

On balance these studies provide evidence for requiring, or at least strongly encouraging, class attendance for students in conventional face-to-face courses. However, the question of attendance is not as clear for online and distance courses, in which the absence of the need to attend at a particular place, at a particular time is seen as a specific benefit of the mode of instruction.

CONCEPT OF ONLINE ATTENDANCE

The relationship between class attendance and performance in online learning has not yet been studied extensively. The concept of attendance is not straightforward given that students are more often given flexibility and options in how they participate in the courses learning activities. Pure online courses allow asynchronous participation and hybrid courses include regular synchronous online classes.

Two studies that have been done were on hybrid courses that required synchronous class attendance in addition to asynchronous learning. Cheung and Kan [7] reported on 168 students who were enrolled in a business course at the Open University of Hong Kong; they found a relationship between tutorial attendance and performance. Interestingly, however, they reported that the relationship existed for attendance at up to five of eight tutorials, with a slight negative association for attendance at more sessions. Their speculation was that tutorial attendance provided support (emotional and academic) and that students did not need to attend all tutorials to experience that support.

Riffell and Sibley [23] evaluated the effectiveness of the online portion of a hybrid course in an introductory environmental biology course for non-science majors and found no relationship between lecture attendance and post-test scores. However, to be included in the study students had to give permission and had to be present for all assessment tests. Therefore most of the students who were not included in their dataset had low attendance rates and the authors suggest that their results should not be used to evaluate this area.

In a third study, Picciano [22] conducted a descriptive analysis of students in a totally asynchronous online graduate education administration course. Among other research questions, he analyzed how participation related to course performance. Participation was measured by counting the number of postings to a discussion board. The students were divided into high, medium, and low participation groups, with mean examination and written assignment scores calculated for each group. Picciano found no difference in exam performance among the groups; however, the high participation group scored significantly better on the written assignment than the other two groups.

This highlights a crucial issue in studies of attendance—the definition of the term. It is commonly taken to mean the physical presence of a person in a scheduled learning experience. An important distinction here is between physical and cognitive attendance, in that students can be counted as physically present even when they do not cognitively engage in the learning experience. The idea of cognitive attendance incorporates active class participation and attention during non active periods.

It is possible for a student to sit through an entire class daydreaming and not listening to the instruction. In the modern classroom, where laptops are allowed and often encouraged, students may be more engaged in instant messaging or web browsing than class participation [1]. This issue has recently become more controversial, with some professors and schools moving to ban or at least control the use of laptops in class, due to their potential as a distraction [29].

In an online course the potential for cognitive non-attendance is higher. Unless video is used it is not possible to see how attentive students are. In face-to-face interactions an instructor can monitor cognitive attendance by observing a student's gaze, facial expression, and general demeanour. However, a student could easily log on to an online class and spend his time watching television.

Cognitive attendance is more difficult to measure than physical attendance. Thus, most studies focus on physical attendance and make the assumption that it equates with some form of cognitive attendance. It is possible to either mandate physical attendance, or to provide an incentive by including a participation grade based on attendance. It is more difficult to mandate or create incentives for active participation in learning.

Most literature on participation focuses on the reasons that students do or do not participate. In distance courses much or all of the interaction is asymmetric, and participation can be defined by activities such as logging in to symmetric class sessions, participation in discussion boards and forums, and reading class materials. One study found that students in a distance course went online most often to read course materials (far more often than for

other reasons such as communication with other group members or composing comments) [3].

Another study grouped factors facilitating or hindering online participation into three categories. The most frequently cited reasons were related to the attributes of the technology. For example, "time-independence" was considered both helpful (the ability to log in at any time and to post thoughtful opinions) and not (some students did not consider the asynchronous postings to be conversation, and all suggested that synchronous meetings would be beneficial). Other factors were related to course design. For example, a totally asynchronous course does not provide natural pacing opportunities, such as class meetings, which can increase participation. The solution in this course was to have regular online discussion threads with starting and ending dates; however most students posted toward the end of the discussion schedule, which reduced the ability to create a conversation.

Finally, several factors related to the students' learning styles. Some students found the online environment more conducive to participation than a face-to-face one, while others had the opposite reaction. Students who needed substantial direction from the instructor had problems with the asynchronous environment, which demands a certain level of self-discipline [6]. A study comparing online and face-to-face sections of an MBA course found more participation by females in the online class than in the traditional setting. The author found this in line with studies proving that women see the Internet as a collaborative medium [2].

Cognitive attendance at online courses is in one sense more difficult to determine, as the instructor cannot see the students. In another sense, it may be easier to determine in asynchronous modes as a digital trace can be made of student activity. Tools already exist to help with this, and research on the concept of online attendance may help inform the development of better tools.

TOOLS FOR MONITORING STUDENT ACTIVITY

In online learning there are tools which may assist research in developing a concept of online attendance. They take the form of tracking facilities built into learning management systems (see figure 1).

These tools provide data on individual user activities during the run of a distance learning course. They allow an instructor to track how often a student visited a course web site and what he did when he got there. They identify when a student did not attend to certain class material (e.g., did not listen to an online lecture or follow a recommended link). The data can be presented for individual students or for the whole class. Figure 1 illustrates the click count for a user over a period of nineteen days.

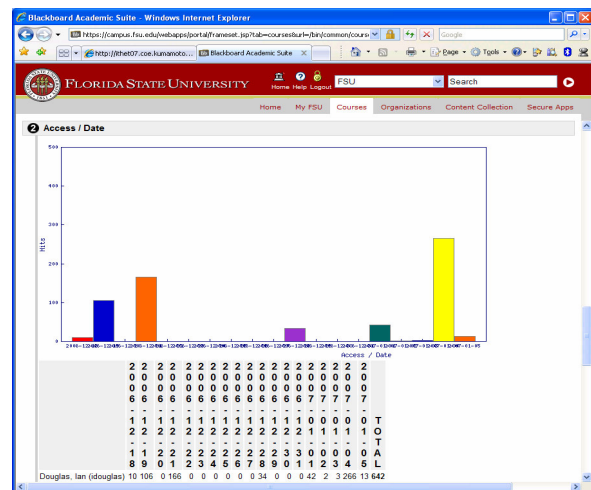


Figure 1. A screen from the Blackboard course statistics tracking tool.

A CASE STUDY IN ONLINE ATTENDANCE

In order to investigate the concept of online attendance and its effect on performance, data from an online course was analysed to determine the effect of various attendance measures. The course, part of an online Masters program in Library and Information Science, ran in the spring of 2006 and initially had 44 students enrolled. At various stages in the course four students withdrew, leaving 40 who completed.

The students were given flexibility in terms of how they participated in the course. There was a choice between a predominantly asynchronous mode, attending synchronous class meetings, or a hybrid of both. The synchronous class meetings took place on 12 consecutive Monday evenings and lasted for two hours. If students chose not to attend the synchronous class meeting, they were asked to participate in threaded discussion boards for the week they missed.

In each week of the class a number of research papers were covered, together with one or more chapters from the course text. Students were encouraged to discuss issues arising from these readings in both the class and discussion forums available for each week of the course. In addition, every student was paired with another student and assigned one of the papers covered. The pairs were required to be present on the relevant week to collaborate in leading discussion about their paper both on the board and in the weekly class.

Measures were taken for weekly class attendance and for the number of posts on the weekly discussion boards. Only substantial posts in which students made a significant point were counted; one line comments (e.g., writing to agree or commend someone else's post) were not counted. In addition, the total click rate for each individual on the course web site was calculated using the tracking features of the course learning management system (Blackboard).

Table 1. Measures of course participation.

	Highest	Lowest	Average
Discussion posts	108	2	26
Class attendance	12	2	7
Web clicks	6500	523	2993

Table 1 shows the overall data for the students who completed the course; there was a significant spread between the lowest and highest participation rates.

RESULTS

Statistical analysis was carried out using three measures of participation: class attendance, discussion posts, and the web click rate on the site. The performance measure was not the overall grade on the course, given that this was partially determined by participation. Rather it was based on the scores for two major assessments, which consisted of individual papers requiring the students to display their knowledge of the material covered in the course. One of these assessments was due in the middle of the course and the other at the end.

Two groups were compared for their level of attendance. Those scoring above the mean for the performance measure (score on assessments) (group 1, $n=24$) were compared with those scoring below the mean (group 2, $n=16$).

Table 2. Statistical comparison of participation.

	Average Group 1	Average Group 2	T value
Discussion posts	33	15	0.01
Class attendance	7.54	6.3	0.035
Web clicks	3804	1775	0.0002

From table 2 it can be seen that those who scored above the mean for the major assessments had significantly higher levels on all three measures of "attending" the online course. Attending more of the synchronous class meetings, posting in more discussion threads, and registering more clicks on the course web site all resulted in better performance.

DISCUSSION

The measures available are relatively crude in that they are quantitative rather than qualitative measures. The click count is particularly crude, yet in this case it is a seemingly important predictor of success.

The click count can be distorted given that new users of the learning management system will increment their click count through mistakes while navigating through the site. It also could be easily manipulated by students who employ random clicking because they know the instructors are monitoring and the click rate. On the other hand, it is also reasonable to expect motivated students who put a lot of effort into reading threaded discussion posts, accessing all materials, and contributing many posts to accumulate a higher click count.

There is scope for those who develop learning management tools to greatly improve the data collection and reporting features for online attendance and participation. Of the three measures used in this study only one (click count) was collected automatically. The attendance and discussion posts per person had to be counted manually.

For online class attendance, mere attendance was counted, rather than active participation. It is intended in future studies to measure the number of times students speak in class as opposed to their attendance; again this will have to be done manually. The number of times a microphone is active could be tracked within collaborative classroom tools.

The tracking of discussion posts is also fairly crude, given these can vary greatly in quality and quantity. In the current study tracking had to be done manually, and only substantive posts were counted. Single line "I agree" type posts were ignored. However, even the substantive posts varied significantly in both quality and quantity. This is another area where those designing tools for educational use could greatly improve reporting features. The number and size of reports could be detailed in a way that showed students' relative contribution to the online discussion of course material. One possible measure of quality is the number of responses that occur in reaction to an initial post. High quality posts may engender more responses from others in the class.

It is possible to develop and evaluate more sophisticated text analysis tools that provide some analysis of the actual contributions submitted. Jeong [16], reported on the development and use of such tools, with which he analyzed the language used in threaded discussions in an online class. He found that use of conversational language was an important factor in increasing responses within the dialogue.

Finally, the reporting of web clicks currently provided by some learning management systems could be improved upon by giving more specific reports on what has been clicked on. It should be possible to separate out navigation clicks from clicks on content. In Blackboard it is possible to set up tracking of individual content items. However this must be set up manually and the instructor has to navigate and call up individual reports for each item tracked. There is a need for additional research in making such tools easier to setup and use, and to

identify what specific measures are good predictors of student performance.

IMPLICATIONS FOR STUDENT ADVISING

In the above discussion the focus was on how software tools could be improved to report back to instructors the relevant measures of student participation and attendance. Given that there is some evidence, to suggest that attendance data is important (including the study presented in this paper), there are also important implications for class management and student advising.

In the current study students were informed early in the course that the learning management system had the ability to track students activities and that the instructor would be using this feature. Many students expressed surprise at the existence of this feature, suggesting that it was usual for instructors to use it. The students were informed that they may be contacted if their click count was low.

The instructor contacted a number of students who showed low click counts after three weeks of the course. The contacts were made in a concerned manner, with an offer to assist in any problems. Two of the students reported that the contact helped them realize they had taken on too much work. Both stressed work commitments and one had been overly ambitious in her initial estimation of the amount of courses she could manage in a single semester (taking five, rather than the normal three courses per semester). Both were among the four students who dropped the course before its completion.

The role of academic advisor may be greatly enhanced by allowing the aggregation of attendance data across all courses to be tracked for each student. This would allow quick diagnoses of students with problems and provide an opportunity for both advisors and instructors to be proactive in offering remedial assistance and advice. Low attendance may be due to a variety of reasons. In addition to external pressures (such as work and family commitments), it may be due to the need for enhanced study or communications skills. Students may need specific guidance in adjusting their commitments when transitioning between different levels (high school to college) and modes (face-to-face to online) of learning. Future research should probably address some qualitative analysis of the reasons for low attendance and how they can be addressed.

In addition to providing better tracking and feedback to instructors and advisors, there is a case for reporting the tracking data directly to the students themselves. Students currently get feedback on their scores on assignments through learning management systems, including statistical data on the whole class. Thus, in addition to receiving their own score on an assignment, they can see the average score for the class. It would be interesting to speculate the effect of

students being able to see their own attendance measures on an online course and how these relate to the class averages. This may prompt some self-reflection on the student's relevant effort.

CONCLUSION

There is substantial evidence that attendance, no matter how crudely measured, is an important factor in success in education using traditional forms of instruction. There are relatively few studies considering attendance and its measurement and importance in online courses.

In this paper we have briefly discussed the meaning of attendance in online courses and presented data suggesting that attendance is a very important issue for online courses. Synchronous class attendance, the number of threaded discussion contributions, and click count are all good predictors of success in a course. There is scope for further research to examine the issue of attendance in online courses and to refine the measures such that we may begin to measure cognitive attendance and active participation rather than just physical presence.

The findings have implications for those who build learning management tools, in that there is great scope for them to improve the tools' student tracking features. If student inputs (attendance and participation) can be tracked in the same way as student outputs (assessment scores), it could provide a powerful mechanism for the early identification of students on a track to failure and a means to intervene and prevent this before it is too late.

REFERENCES

- [1] D. Adams, "Wireless laptops in the classroom (and the Sesame Street syndrome)", *Communications of the ACM*, 49, pp. 25-27, September, 2006.
- [2] J.B. Arbaugh, "Virtual classroom versus physical classroom: An exploratory study of class discussion patterns and student learning in an asynchronous Internet-based MBA course", *Journal of Management Education*, 24, pp. 213-233, 2000.
- [3] M.F. Beaudoin, "Learning or lurking? Tracking the "invisible" online student", *Internet and Higher Education*, 5, pp. 147-155, 2002.
- [4] J. Brocato, "How much does coming to class matter? Some evidence of class attendance and grade performance", *Educational Research Quarterly*, 13, pp. 2-6, 1989.
- [5] S.G. Buckles, M.E. McMahon, "Further evidence on the value of lectures in elementary economics", *Journal of Economic Education*, 2, pp. 138-141, Spring, 1971.

- [6] M. Bullen, "Participation and critical thinking in online university distance education", *Journal of Distance Education*, 13, 1998. Retrieved April 26, 2007 from <http://cade.athabasca.ca/vol13.2/bullen.html>
- [7] L.L.W. Cheung, A.C.N. Kan, "Evaluation of factors related to student performance in a distance-learning business communication course", *Journal of Education for Business*, 77, pp. 257-263, May/June, 2002.
- [8] E. Cohn, E. Johnson, "Class attendance and performance in principles of economics", *Education Economics*, 14, 211-233, June, 2006.
- [9] S. Day, "Learning in large sociology classes: Journals and attendance", *Teaching Sociology*, 22, pp. 151-165, April, 1994.
- [10] S. Devadoss, J. Foltz, "Evaluation of factors influencing student class attendance and performance", *American Journal of Agricultural Economics*, 78, pp. 499-507, August, 1996.
- [11] S. Douglas, J. Sulock, "Estimating educational production functions with correction for drops", *Journal of Economic Education*, 26, pp. 101-112, Spring, 1995.
- [12] G.C. Durden, L.V. Ellis, "The effects of attendance on student learning in principles of economics", *The American Economic Review*, 85, pp. 343-346, May, 1995.
- [13] D. Gatherer, F.C.R. Manning, "Correlation of examination performance with lecture attendance: a comparative study of first-year biological sciences undergraduates", *Biochemical Education*, 26, pp. 121-123, 1998.
- [14] K.P. Gunn, "A correlation between attendance and grades in a first-year psychology class", *Canadian Psychology*, 34, pp. 201-202, 1993.
- [15] C.H. Jones, "Interaction of absences and grades in a college course", *The Journal of Psychology*, 116, pp. 133-136, 1984.
- [16] A. Jeong, "The effects of conversational language on group interaction and group performance in computer-supported collaborative argumentation", *Instructional Science*, 34, pp. 367-397, 2006.
- [17] G.A. Krohn, C.M. O'Connor, "Student effort and performance over the semester", *Journal of Economic Education*, 36, pp. 3-28, 2005.
- [18] M.H. Launius, "College student attendance: Attitudes and academic performance", *College Student Journal*, 31, pp. 86-92, March, 1997.
- [19] D.R. Marburger, "Absenteeism and undergraduate exam performance", *Journal of Economic Education*, 32, pp. 99-109, Spring, 2001.
- [20] D.R. Marburger, "Does mandatory attendance improve student performance?", *Journal of Economic Education*, 37, pp. 148-155, Spring, 2006.
- [21] K.H. Park, P.M. Kerr, "Determinants of academic performance: A multinomial logit approach.", *The Journal of Economic Education*, 21, 101-111, 1990.
- [22] A.G. Picciano, "Beyond student perceptions: Issues of interaction, presence, and performance in an online course", *Journal of Asynchronous Learning Networks* 6, pp. 21-40, July, 2002.
- [23] S. Riffell, D. Sibley, "Using web-based instruction to improve large undergraduate biology courses: An evaluation of a hybrid course format", *Computers & Education*, 44, pp. 217-235, April, 2005.
- [24] J.R. Rodgers, "A panel-data study of the effect of student attendance on university performance", *Australian Journal of Education*, 45, pp. 284-295, December, 2001.
- [25] J.R. Rodgers, "Encouraging tutorial attendance at university did not improve performance", *Australian Economic Papers*, 41, pp. 255-266, 2002.
- [26] D. Romer, "Do students go to class? Should they?" *The Journal of Economic Perspectives*, 7, pp. 167-174, Summer, 1993.
- [27] L. Stanca, "The effects of attendance on academic performance: Panel data evidence for introductory microeconomics", *Journal of Economic Education*, 37, 251-266, Summer, 2006.
- [28] M.L. Van Blerkom, "Academic perseverance, class attendance, and performance in the college classroom", Paper presented at the Annual Meeting of the American Psychological Association (104th, Toronto, Ontario, Canada), August 11, 1996. Retrieved March 8, 2007 from http://eric.ed.gov/ERICDocs/data/ericdocs2/content_storage_01/0000000b/80/26/5a/bc.pdf
- [29] J.R. Young, "The fight for classroom attention: Professor vs. laptop", *The Chronicle of Higher Education*, 52, p. A27, June 2, 2006.