Tutorial Attendance and Student Performance

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Abstract: I present data on the correlation between student attendance at optional tutorials and performance as measured by the final grade in the course. Two courses were studied: a large course in Physics for the Life Sciences and a somewhat smaller liberal arts course in Physics without mathematics. For both courses, students who attended all or most tutorials received a mean final mark in the course just over a full letter grade higher than students who attended none or very few tutorials. I discuss the difficulties in untangling cause and effect in the correlation of these two factors.

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1. The Study

At the University of Toronto undergraduate courses typically have two or three hours of classes a week and a weekly one-hour tutorial; tutorials are known as *recitation sections* at some other institutions. Here I present data on the correlation between attendance at tutorials and the final mark that students received in their course.

I studied two courses:

1. A full-year first year Physics course for students in the Life Sciences.[1] The course has nearly 1,000 students, most of whom are intending to apply to a professional faculty such as Medicine. The course is calculus based.

2. A half-year liberal arts Physics course.[2] The course has 160 students, 30% of whom are in their first year. Almost all students are studying the social sciences, the humanities, or commerce, and about one-half are taking the course as a "breadth requirement." The course has no mathematics whatsoever.

Both courses have a similar tutorial structure. About one-half of most tutorial sessions are spent in activity-based small group conceptual activities, and the other half of the session is devoted to more traditional question-answer and problem solving activities. No attendance or participation mark is associated with the tutorials in either course, although I do not explicitly state that attendance is voluntary.

For both courses, the final mark is calculated from:

- A weekly homework assignment.
- A weekly reading quiz on the textbook sections for the coming week.
- Tests and a Final Examination.

[1] A full year course corresponds to roughly two semesters.
[2] A half-year course corresponds to roughly one semester.

The Physics for the Life Sciences course also has a laboratory whose mark in worth 20% of the mark in the course. In addition, the liberal arts course students write two papers.

The tutors ranked their students' attendance on a three-point scale:

0 – The student never or hardly ever attended tutorials
1 – The student attended some tutorials but not most
2 – The student attended most or all tutorials

For the Life Science course, most but not all tutors supplied me with this information for their students; I received data on tutorial attendance for 86% of the students. For the liberal arts course, I received data on all students.

I compared the students' tutorial attendance with their final mark in the course. Table 1 shows the data for the Physics for the Life Sciences course, and Table 2 shows the data for the liberal arts course.[3] For the Life Sciences course the overall final mark mean was 69.8 ± 0.5; for the liberal arts course it was 66.7 ± 1.4. In all cases the uncertainties are the standard error of the mean.

Table 1: The Physics for the Life Sciences Course

Attendance	*Number of Students*	*Final Mark*
0	124	63.1 ± 1.3
1	205	68.1 ± 0.8
2	275	74.4 ± 0.6

Table 2: The Liberal Arts Physics Course

Attendance	*Number of Students*	*Final Mark*
0	47	61 ± 3
1	49	65 ± 2
2	63	72 ± 2

Sydney University in Australia offers workshop tutorials associated with their mainstream first year Physics courses. Attendance at these tutorials is explicitly voluntary. Similar to our results, Sharma et al. found that student performance on examinations correlates strongly with tutorial attendance.

2. Discussion

It is not surprising that tutorials aid student learning: that is why we expend considerable resources to give them. In the future I will show the above data to the students in the respective courses to motivate more of them to attend. However, the magnitude of the difference in outcome based on tutorial attendance is surprising.

[3] At the University of Toronto marks of 60-69 are C's, and marks of 70-79 are B's.

There is probably more than simple cause and effect involved. It is well known that students who are engaged and/or organized and/or motivated will do better in their courses. These student characteristics probably correlate strongly with tutorial attendance. This, in turn, can contribute to improved student performance in ways beyond the straightforward learning that occurs in tutorials.

From the front of the classroom, students in the Physics for the Life Sciences seem to be very serious and goal oriented in their studies. By contrast, although many students in the liberal arts course are enthusiastic and eager to learn, a significant fraction struck me as trying to do the bare minimum necessary to get through the course. These impressions are not born out by the data on students who basically "blew off" their tutorials. The percentages are not that different between the two courses: 21 ± 2% for Physics for the Life Sciences versus 30 ± 4% for liberal arts Physics. I was also surprised that the difference in student grades as a function of tutorial attendance was the same for both courses, just over a full letter grade between the bottom and top categories of tutorial attendance; I thought the spread would be less for the Physics for the Life Sciences course.

Reference

Sharma M, Mendez A and O'Byrne J 2005 The relationship between attendance in student-centred physics tutorials and performance in university examinations *Int. J. Sci. Educ.* **27** 1375–1389.