

David Benjamin

Introduction:

Education is a tricky area of study, like any area of the social sciences. There are many variables and constant changes in the subjects being studied. However, methods have been developed that show promise for helping a majority of people learn. One of these is the Tutorials by McDermont, et. al [1]. While it is difficult to quantify or even qualify good or bad teaching, one can usually determine it when it is seen. In this paper we will examine two tutorial sections that have been studied by their Learning Assistants (LAs), who have collected field notes in these sections. One section has what I identify as a bad teaching assistant (TA) and the other is identified as a good TA. These two sections will then be compared on their grades and any other measures given in the class. We find that the effect of the TA on the tutorial section and the students' understanding as defined by test grades and other measures from the class and is unaffected by the presence of a bad TA.

Background:

There have been some recent papers on the topic of the effect of a teacher and teacher attitudes towards students and student learning. Darling-Hammond looked at teacher quality and student achievement. She found that “while studies as long ago as the 1940s have found positive correlations between teaching performance and measures of

teachers' intelligence (usually measured by IQ) or general academic ability (Hellfritsch, 1945; LaDuke, 1945; Rostker, 1945; Skinner, 1947), most relationships are small and statistically insignificant” [2]. Moreover, Darling-Hammond suggests that “subject matter knowledge is another variable that one might think could be related to teacher effectiveness. While there is some support for this assumption, the findings are not as strong and consistent as one might suppose” [2].

She also notes that “studies have found a somewhat stronger and more consistently positive influence of education coursework on teachers' effectiveness” [2]. She continues to look at other variables of teachers on student learning, where she finds that “other studies of the effects of teacher experience on student learning have found a relationship between teachers' effectiveness and their years of experience (Murnane & Phillips, 1981; Klitgaard & Hall, 1974), but not always a significant one or an entirely linear one” [2]. Darling-Hammond then summarizes these results, stating:

While these studies suggest that there are aspects of teaching effectiveness that may be related to teacher education, certification status, and experience, they do not reveal much about what it is about teachers' behaviors or abilities that makes the difference in how their students perform. Research on teachers' personality traits and behaviors has produced few consistent findings (Schalock, 1979; Druva & Anderson, 1983), with the exception of studies finding a recurring positive relationship between student learning and teachers' "flexibility," "creativity," or "adaptability" (Berliner & Tikunoff, 1976; Schalock, 1979; Walberg & Waxman, 1983). Successful teachers tend to be those who are able to use a range of teaching strategies and who use a range of interaction styles, rather than a single, rigid approach (Hamachek, 1969). This finding is consistent with other research on effective teaching, which suggests that effective teachers adjust their teaching to fit the needs of different students and the demands of different instructional goals, topics, and methods (Doyle, 1985)” [2]

In their study comparing online course with traditional course, Moore et.al found that drawback in online courses were “predictable — for example, students in online courses

are often dissatisfied with their interactions with teachers, students are less satisfied with the online course, and teachers are sometimes disappointed with students' learning in online courses" [3]. They also state that "teachers are the most important part of a student's education — there's nothing better for a student than a good teacher, and there's little worse for a student than a bad teacher. The effectiveness of a particular teacher, however, depends on a variety of factors, one of which involves the instructional choices that the teacher makes — for example, what information the teacher presents, how the teacher presents the information, and what tools the teacher uses (or doesn't use) in the classroom" [3]. While this suggests that teachers are important, whether or not a TA in a tutorial section will have the same impact or importance is a relevant question.

Moore et.al further suggest that "we are social animals; we seek and benefit from interactions with others" [3]. So if we have positive interactions with other people, it is more likely we will learn. Therefore, we have to ask are these positive interactions, do they show that the teachers care about the learners. Moreover, they state that "learning is inseparable from the learning *experience*. Personal attention matters. Personal interactions matter" [3]. Mathias echoes a similar position stating that "everyone knows of an exceptional teacher's caring for students, fine teaching and contributions to the school" [4]. So studies utilizing modern and past research efforts have emphasized the importance of a good teacher on the learning of the student. We will now look at whether a TA that has a positive emotional connection with the students does a better job than a TA with a negative emotional connection.

Data:

Now we turn to look at the TAs in the Tutorial sections. The site was a tutorial section in physics 1120 at the University of Colorado. This was the first time the tutorials were used here. I worked as a Learning Assistant in the 10am Tuesday section. The TA of this section was Mike/Shane (same person went by a nickname). Fieldnotes were collected in this section by the LA. I also used Noah P.'s fieldnotes who did his fieldwork in the 9am section of 1120 whose TA was Kara. These are to compare/contrast with the section of interest. The data were collected in weekly fieldnotes, which were taken in the tutorial sections and recorded afterwards.

I propose that Kara is an example of a good TA and Mike is an example of a bad TA. This is more in the affective sense of the words, good and bad, i.e. they either have a good rapport with their students and seem to care about them or not. There are also examples in the fieldnotes of poor methods of teaching in Mike's case.

The first example of Kara being a good TA comes from the LA in her class, who when asked, said that she was a good TA. Moreover, this excerpt from the fieldnotes is interesting : "Kara explains the lab and how they don't have permanent magnets with N-S labels, so the students will have to use a compass to figure out which end of the magnets in which. She also says that since today is voting day, if anyone needs to leave to go vote they may." This is evidence that she cares about her students and what is going on in their lives. She is making allowances for them and expressing that she understands them. This is thus evidence of a positive connection with the students, what could be called "good" teaching.

Moreover, "Kara starts the recitation by saying that she doesn't have much of an introduction, that the lab is 'self explanatory'. She tells them, however, that they should

‘work hard’ on this activity because flux will be ‘hitting you’ all semester. She is trying to get them to pay attention to what they are learning here, as if it will help them down the road.” This shows her trying to get her students to focus on importance topics in the Tutorial to benefit them later on in the semester.

Another example of positive connection with her students, “Kara hands out white sheets of paper to each group, as usual, and says ‘Have fun with the tutorial.’ She also suggests that the tutorial is long so the students should ‘try to push through it.’” Here she is trying to encourage them in a positive manner, as well as letting them know that it is a challenge they should meet.

In a final example of “good” teaching:

She comes over to demo the circuits. ... Kara has them close all the switches and they see they were right about the brightness. In the parallel branch, the lights do not seem to be lit at all. Kara asks why that might be, and how you could test to see if they are broken. One student suggests disconnecting one of the bulbs – they do and see the other bulb light – concluding the bulbs are not broken. Kara asks if there is current flowing – they say there has to be because the current has to get back to the battery through the parallel bulbs. Kara says that’s right and lets them get back to the tutorial.

Here Kara has given them positive reinforcement by telling them they are correct. But she does it in a good way epistemologically as well, for she does not just give them the answer, but makes them think about it. So we have looked at behaviors of a “good” TA.

Now we turn to look at the other case. In this lengthy excerpt, we see that the students do not like Mike, as well as behavior on Mike’s behalf that shows a distaste for the students. Both of these situations create a negative relationship with the students and are “bad” teaching:

Mike went over to the neighboring section for something. While he was gone I went over to a group and saw them working on a part of the tutorial and asked them a question, and asked them to put the switch in their circuit. The students grumbled something and complied. One student then said 'I like him he's nice.' Another student agreed saying, 'He's way nicer than Mike.' Which was followed up with 'As long as he keeps Mike away I'll do what he asks' (I thought this was interesting that they seemed to be more willing to follow my guidance and didn't like having Mike around).

Later, Mike started handing out the papers during class. He was calling the students' names and tossing the papers towards them. Mike then asked for one student, while handing out papers. And then he turned towards the student. I was discussing the tutorial section with the student and his group and then Mike asked him, aren't you so and so, and the student replied 'yeah.' Mike then said, Well why didn't you respond when I called your name. (In a snotty voice). The student then replied (rightfully so), that he was talking with me about the tutorial.

A little later, while Mike was still handing out the papers, I was at another group. One student in that group said 'Mike's in a mood today.' Another student replied 'He could just hand us the papers.' Instead Mike was tossing the papers in the direction of the students after calling out their names. (Showing he still doesn't know who his students are. Sad.)

So as we can see Mike has a negative relationship with his students. As an example of his negative approach to epistemology, I take an example that was not submitted in fieldnotes but was too useful to pass up. This occurred during the review session on the last day of the Tutorials.

When Mike was trying to explain how to determine the difference in potential in a constant electric field, he began referring to line integrals. He also started talking about Maxwell's equation when trying to explain why a B-field always closes in on itself. I take these two examples as poor examples of teaching students. The material he is referring to is out of the students' league. They have probably never heard of it, let alone dealt with it. As such, I will categorize Mike as a "bad" TA, both pedagogically and affectively. He does not employ useful methods for teaching, and he does not attempt to connect with the students or show any care for them.

So we have established the qualities and shown examples of a “good” TA and a “bad” TA. Now let's look at the effect they have on student learning.

Grade data were received from the instructor for the course, Steve Pollock, for the sections of both TAs. These data included three exam scores, scores for the clickers, scores for Lon-CAPA, Pre-Bema scores, Pretest scores, and Online questions scores. Students that were labeled as having dropped the course, or were missing two or more exams were removed from the data analysis. The exam scores were given in detailed analysis, divided between the multiple choice scores and the individual scores on the long answer parts of the test. However, because we are just interested in the general state of the students' learning, I am going to look solely at the cumulative score on the exams.

In order to give a better picture of the effect of the TA on the students, I am going to look at all of the TA's sections to get better statistics. We can assume that the TA's would be good or bad in general and not in a specific section. Both TA's are first year graduate students in physics at the University of Colorado at Boulder. One difference between the TA's is that Kara is taking a class on Physics Education Research, which implies an interest in the subject, and the betterment of her students. Moreover, it allows her more access to education knowledge, and the chance to apply these techniques to help her students learn. One thing however is that the Tutorial sections do not allow for much teaching, so experience with teaching does not seem to play a very large role in it. The tutorials are pre-packaged scenarios so that the TA's and LA's have a similar job of dealing with student questions and occasionally guiding them. The TA's, however, have more bureaucratic responsibilities, such as grading, proctoring tests, etc. So the real teachers are the professors of the class.

The grade data were computed with standard averages and standard deviations, with the error computed as the standard deviation divided by the square root of the number of data points.

We find that the two groups have similar pre-Bema scores, 24.1 ± 1.0 for Mike's sections and 24.2 ± 1.0 for Kara's sections. We can interpret this as the two groups entering the course with similar knowledge. This is good for it shows that neither group starts with an advantage over the other, causing possible issues.

The two groups also have very similar CAPA scores. Mike's sections have an average score of 82.9 ± 2.1 while Kara's sections have an average score of 82.6 ± 1.9 . The clicker scores are also very similar with Mike's sections have an average score of 71.0 ± 2.2 and Kara's sections have an average score of 69.5 ± 2.1 .

The scores for the online participation are different however. Mike's sections have an average score of 92.9 ± 1.4 . Kara's sections, however, have an average score of 87.7 ± 1.9 . These are interesting for the online participation grade is an easy one to achieve, for Steve will even give points for just putting in your ID number and submitting the form. A student doesn't have to answer the questions. So these numbers imply a difference in the participation in the class. Mike's students seem to be more motivated or willing to participate in the class. This could account for differences in the results. Whether or not the TAs have an effect on this dimension of the students is hard to say however. The TAs have no interaction with the students on this part of the grade. So it would be unlikely to assume that the TAs have an effect on whether the students are more likely to fill out an online question survey once a week.

The pretest scores of the two groups differ as well. The pretests are like quizzes that students take before they start the tutorial. Mike's sections have an average score of 85.3 ± 1.9 . Kara's sections have an average of 80.7 ± 1.9 . The exam scores do not differ significantly. For exam 1 Mike's sections have an average of 71.3 ± 1.9 while Kara's sections have an average of 67.8 ± 1.6 . For exam 2 Mike's sections have an average of 73.5 ± 1.6 while Kara's sections have an average of 70.7 ± 1.6 . For exam 3 Mike's sections have an average of 74.3 ± 1.9 while Kara's sections have an average of 74.2 ± 1.8 .

Analysis/Results/Discussion:

These data imply that the performance of the TA does not affect student learning in a tutorial section. This is likely due to the fact that the tutorial sections have been research and created specifically to enhance student learning. Since the TAs do not have a large amount of interaction or influence on the students, they are likely to have a smaller effect on student learning. In the converse case, where TAs led their own recitations, it is likely that there would be a greater effect on student learning, depending on the performance of the TA.

Another possibility could be the effect of the LA on student learning. Perhaps having a good LA can cancel out the effects of a bad TA. The feedback that the students gave to me was all positive. So this is a possibility.

Another possible explanation is that some students could be motivated by a "bad" TA. The students may be motivated to go out and learn on their own. Also, some people may be more motivated by negative emotions than positive ones.

While this study has downplayed the importance of the TA on student learning, as Noah P. mentions in his fieldnotes “I wonder if they would have gotten the point of the tutorial if there was not a TA or LA to ask them questions”. Aside from these results, more definitive conclusions can’t really be drawn due to the complex nature of human interactions and learning.

Conclusion/ Summary:

So, we have looked at the effect of the TA on the learning of students in a Tutorial section. Examining previous work, we find suggestions that a positive connection with students on an emotional level provides a better learning environment for the students. In this study we looked at two different TAs with different teaching styles and what we categorized as “good” and “bad” teaching styles/student interactions. These categorizations were supported by fieldnotes collected at the sites of interest. We then looked at grades in the class and compared the students of the two TAs. We find in the end that there were no real significant differences. Because of this we are able to assume that Tutorials help to cancel out the effect of the TA on the student’s learning.

Future directions would include an attempt to study what behaviors are good for teachers, perhaps categorize behaviors and beliefs into traditional/modern and see where a teacher lies, and how well their students learn. Also it would be interesting to look at how good the LA was could have an effect as well. Another interesting topic would be to look at how the different students who interacted with the TA vs the LA more did. Although the sample size would be too small to draw any good conclusions. It would

also be of interest to compare tutorial sections to traditional recitation sections under the same professor, although that seems to be an unlikely event.

Appendix:

You have all the fieldnotes that Noah P. and I turned in, which were all that were used. If you want another copy then tell me. Otherwise I won't bother attaching them to either the end of the paper or the email.

References:

[1] McDermont, Lillian C., Shaffer, Peter S., and the Physics Education Group. Tutorials in Introductory Physics. Upper Saddle River: Prentice Hall, 2002.

[2] Darling-Hammond, Linda. "Teacher Quality and Student Achievement: A Review of State Policy Evidence" Education Policy Analysis Archives. Vol. 8 n1, Jan 1, 2000.
<http://epaa.asu.edu/epaa/v8n1/>

[3] Moore, Randy, Jensen, Murray, Hatch, Jay. "Bad Teaching: Its Not Just for the Classroom Anymore" The American Biology Teacher. Vol. 63, n6, Aug. 2001.

[4] Mathias, William. "Linking School Goals and Learning Standards to Teacher Evaluation and Compensation" ERIC Clearinghouse on Teaching and Teacher Education. March 2001.