

Introductory Statistics without Lecture Reactions, Reflections, and Revelations

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- Who do you teach?
- Why did you choose this session?

Teacher-Centered Lecture
vs.
Student-Centered Collaborative Learning

Why change the way the course was being taught?

- MATH 183 – Introductory Statistics
 - General education course
 - Pre-professional, middle grades mathematics education, psychology, others
 - MWF
- Instructor
 - PhD in Statistics
 - History of lecture-based teaching
 - Consistently positive student evaluations

- Guided notes
 - [Example](#)
- Lecture – Example – Practice
- In-class activities
- Weekly homework

- Homework journals
 - [Example](#)
- Individual – Small-group – Whole-class
- In-class journals

- Final exam and course grades
- Student reflections: “What have you learned as a result of being in this class? (Note that this does not necessarily have to be statistics-related.)”
- Final exam: “Tell me something you have learned in this class that you can see being useful for you in the future.”
- SITE course evaluations

Summary Statistics

		Mean	Median	Standard Deviation
Final Exam	Lecture	66.20	80.33	31.76
	Non-Lecture	71.08	78.00	28.77
Final Course Grade	Lecture	73.51	83.27	25.58
	Non-Lecture	80.19	83.99	17.43

Results of Mann-Whitney Tests

	Test Statistic	p-value
Final Exam	784.5	0.6490
Final Course Grade	768.0	0.4634

- No significant difference in median final exam score for the two sections nor in the median final course grade.

- Quantitatively: appears that there is no significant difference between teaching statistics from a student-centered approach versus a traditional lecture-based approach
- Qualitatively: found major differences between the results of students' perceptions of their learning in both classes

- Discomfort and Learning Style
- Superficial vs. Meaningful Knowledge
- Confusing Learning with Doing
- Learner Autonomy

- Lecture

- “I really like the set up of the class, and how lecture & HW & upcomming [sic] tests are very well gone over & I know what is expected of me as a student in this class.”
- “This class is moving very fast for me and I feel really overwhelmed at times. I just wish we could slow down just a little bit so I can really grasp the concepts more fully and in depth.”
- “I have learned that it is hard for me to take what I learn in class & apply it to the homework. I always feel like I understand it during class but when I go home to do it I can’t recall how I did it and even though [I] look to the notes for most of the questions, there are still some I can’t answer. I learn best when you let us do one on our own!!”

- Non-Lecture
 - “Being in groups, trying to help each other learn, is not at all helpful to me. I am not mathematically inclined as is and being in these groups and being expected to know everything without generic structured, lecture style teaching is hard for me.”
 - “[E]ven though the journals are helpful it gives me the impression that I’m teaching myself and I like the traditional math class.”

- Non-Lecture

- “I have learned that while it’s not easy teaching yourself the material it is beneficial. Being in groups is helpful, because most of the time if I didn’t know an answer one of my group members [did]. I’ve learned that being in a class like this, it seems almost as if I don’t have to study as much, because I’ve studied throughout to do the homework journals.”
- “I’ve taken stats before so most of what we have covered has been review for me but I understand it better this time. Before I just memorized the formulas and could get the right answer but I didn’t really know what the answer meant.”

- Lecture
 - “I’ve learned alot [sic] about using statistics to find the mean, median & modes of data.”
 - “I have learned how to make a box plot.”
 - “I’m not great at it, and I really couldn’t tell you when to use anything we’ve been taught, but I get it at least. I understand (I think, anyway!):” followed by a list of statistics topics
 - “... it’s actually more complex than I thought it would be.”

- Non-Lecture

- “So far I have learned how to calculate/interpret data that is useful in my own research.”
- “problem solving from a mental standpoint not just math”
- “Being in this class has taught me that I truly learn best through verbal explanation. I retain more information if I am able to verbally explain a concept to other people. Although I am able to pick up information while working alone, the information ‘sticks’ better if I can talk about it. I find myself doing this in other classes besides statistics now, and it really helps!”

- Non-Lecture

- “This class has given me the opportunity to be open and give my opinion which to be honest I didn’t know I was capable of.”
- “I do enjoy the group work, however I’m not a very good people person...I guess this will help me deal with that.”
- “I have learned how to communicate more effective [sic] with others in the group, so they can understand how I reached my answers. I have also learned to listen better to others in the group to understand their perspective on problems. This has helped me to learn to listen better as a whole, as well as communicating more effectively as a whole.”

- Lecture
 - “How to study (practice problems, practice problems & MORE practice problems)”
 - “This class is hard there is alot of work that goes into just one problem so many steps to remember” [sic]
 - “This class has confirmed that I learn very well from seeing examples worked out and then going from there.”

- Non-Lecture

- “I haven’t learned much of anything in this class because I learn better from lectures and being shown step by step, rather than trying to learn from a group when at least three out five all have different answers.”
- “I know that I learn and remember information much better if the professor lectures and shows me how to correctly solve the problem.”
- “I have learned a lot about statistics in this course but I did not like the group learning environment. I found the class was less boring and more enjoyable, but I believe it would be easier to understand the material in a lecture-based class.”

- Lecture
 - Students gave credit for their successes to the instructor.
 - Students blamed themselves for their shortcomings.
- Non-Lecture
 - Students took ownership of their successes.
 - Students blamed the instructor for their shortcomings.

- Lecture

- “I really liked Dr. Autin’s system of taking notes. I loved the way the notes were laid out and it really helped me to understand and be able to review.”
- “Ms. Autin made it very easy to learn statistics. She had plenty of examples for us to do on each topic so practicing the material made it very easy to learn... Ms. Autin also went over the notes and material thoroughly so that also helped in being prepared for the tests.”
- “Dr. Autin’s style of teaching was very efficient & adequately helped me not only learn statistics, but to also enjoy it. The way she did notes, posting an outline on blackboard but still requiring class time to complete them helped tremendously!”

- Lecture

- “I started slacking after my 2nd test because I knew there was no way to come back from receiving [sic] the grade I did. I didn’t really learn how to study for tests in this class so that made my grades look so horrible. The teachings were great so I wouldn’t have blamed her for anything.”
- “Maybe I should have worked/studied a little harder for my statistics test so that way I wouldn’t have to work as hard to get the final grade I would like. My homework grades are low as well. I didn’t notice until now I’m kind of an procrastinator when it comes to doing the homework and studying.”

- Non-Lecture

- “I have learned to be accountable for my own learning, and how much time management is truly needed. I have also learned how to better work in a group setting.”
- “Actually the idea of learning first without instruction. Doing the packets outside of class before discussing them helped me to develop a better skill of teaching myself. I’m sure this will be very beneficial in pharmacy school.”
- “I have learned how to be more of a leader and how to effectively communicate my thoughts so that others can understand. I have also learned new ways of thinking in statistics – I can deductively find answers on my own as opposed to simply being told or shown answers.”

- Non-Lecture

- “I feel the class structure sucked. To me statistics is a course where group work fails to advance one’s understanding of the material. In my opinion a more structured course is needed where examples & problems are given by the professor and worked through as a class. “
- “I learned less statistics-related material due to the group learning aspect rather than the professor [sic] teaching.”
- “I would have enjoyed the class more, and probably learned more if Dr. Autin would have taught the class normally.”

How would I change things?

- Shorter, more frequent homework journals
- Make sure students do not feel like they are subjects in an experiment
- Find better ways to motivate students to increase preparation for class
- Find better ways to reassure students

- Questions?
- Comments?