

Getting Active in the Large Lecture

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The benefits of active learning are well documented; nonetheless, the implementation of active learning strategies can be challenging in large lecture environments. The project will examine the research supporting active learning, present the implementation of simple active learning techniques in large lecture classes, and provide evidence to test the effectiveness of the techniques on both student learning outcomes and student attitudes. The purpose is to investigate the concern that adding active learning to large lecture classes reduces the amount of time available to teach content in class, resulting in less student learning. The expectation is that incorporating active learning techniques will not harm student learning and will lead to positive student attitudes. The active learning techniques of question-based outlines, discussion-question prompts, small group discussions, and exam preparation will be investigated using exam grade comparisons, pre- and posttest analyses, and student surveys. The findings demonstrate that active learning does not lead to less student learning and instead that it can have a positive impact.

Keywords active learning, large lecture, student learning

A Conversion

“Active learning is a good idea for small classes, but that won’t work in my large lecture class.” Many political scientists have undoubtedly heard a similar comment, or perhaps made a similar comment. The kind of discussion and interaction that is part of active learning may seem great for a small class or perhaps at an elite university, but inappropriate in classes with over 100 students. In that environment, an engaging, well-organized lecture may seem more appropriate.

For many years, I believed that active learning was best for smaller courses, but that it simply would not work in my large lecture courses. There was the risk that with all the class discussions and activities, there would not be enough time for students to learn the course content. Furthermore, active learning techniques seemed time consuming because I would need to change teaching styles and it would involve even more class preparation time.

A colleague challenged my assumption that active learning is inappropriate in large lecture courses. The colleague, an English professor, explained to me how he would teach a large lecture class based entirely on discussion and active learning. I then decided to use my large lecture class for an experiment. I would implement active learning techniques in my large lecture courses, and I would evaluate the transformation to examine if active learning made a difference on student learning and attitudes.

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This article examines the research supporting active learning, presents the implementation of simple active learning techniques in large lecture classes, and provides evidence to test the effectiveness of the techniques on both student learning outcomes and student attitudes. The purpose is not to suggest that active learning is “better.” Rather, the purpose is to investigate the concern that implementing active learning techniques in large classes reduces the amount of time available to teach course content, resulting in less student learning. The expectation is that incorporating active learning techniques will not harm student learning and will lead to positive student attitudes.

Review of the Literature

Active learning has different meanings to different people and it is not a concept unique to political science. Generally, active learning includes techniques that engage students in the learning process by engaging them in meaningful learning activities and reflection (Prince 2004). The key is that students are not passive participants in their learning; rather, they are engaged and active in the learning process. This is important because studies have found that much of what students hear in a lecture class is soon forgotten (Silberman 1996). The basic logic underlying active learning is that students need to be a part of their learning, and that it can be difficult for many of them to understand concepts if they are only receiving information from their professors (Meyers and Jones 2003).

There are numerous articles examining active learning in political science courses. Most of the political science literature on active learning emerges through the use of role-playing and simulations (Ciliotta-Rubery and Levy 2000; Endersby and Webber 1995; Hensley 1993; Josefson and Casey 2000; Kaarbo and Lantis 1997; Kathlene and Choate 1999; Larson 2004; Newmann and Twigg 2000; Shellman 2001).

All the articles provide beneficial examples of active learning in political science courses. However, with the exception of Larson’s article, the role-playing and simulation active learning techniques are geared toward upper-level political science courses. Thus, political scientists, while engaged in active learning, have not examined active learning in large lecture political science courses. As a result, much of the active learning literature is from disciplines outside political science.

Many professors argue that active learning is fine for upper-level and small courses, but that it is inappropriate for large, lower-level lecture courses. Common reasons to object to active learning include: there is too much material to cover without a long lecture; the class is too big for discussion or small groups; and the structure of the room is inadequate for putting students into groups (Frederick 1987; McKeachie 2002).

However, nonpolitical science research suggests there are methods for incorporating active learning techniques in large lecture courses (Carbone 1998; Frederick 1987; McKeachie 2002). The literature on active learning in large lecture courses frequently suggests that it is important to provide a change of pace in the class and not lecture nonstop (McKeachie 2002). These breaks can occur by using active learning techniques such as asking for student comments, having the students break into small discussion groups, role-playing, and having students write down reflections about the class discussion (Angelo and Cross 1993; Carbone 1998; Frederick 1987; McKeachie 2002). Rather than completely replacing lecture with active learning

techniques, active learning can be used to create variety and a change of pace in large lectures. The variety can help keep students focused.

According to the literature, active learning works because it involves the students and they are participants in their learning process. Thus, they should be more engaged in the class, and one would expect that student learning would improve. Prince (2004) reviewed the literature from a variety of disciplines on active learning to assess its effectiveness and found variation in how active learning was defined and in how its effectiveness was measured. Nonetheless, Prince's review of the literature concluded that there is a consistent body of evidence to support active learning. Interestingly, while Prince's research examined works from a broad range of disciplines (including the natural sciences), none of the scholarly evidence was from political science.

Active learning is not without its critics and not all professors can be expected to embrace it. The different interpretations and methods of analysis make it difficult to compare results (Prince 2004). Thus, it can be difficult to determine the effectiveness of active learning. Others object to what they see as a disdain for professors who prefer the traditional lecture (Mattson 2005).

In summary, active learning research in political science has focused primarily on simulations and role-playing in upper-level courses. The benefits of active learning, established in other disciplines, are numerous and there is evidence to support the claims. Many professors are reluctant to incorporate active learning techniques in their large lecture courses. The literature on active learning in large classes challenges these objections and suggests techniques for large classes. Finally, examinations of active learning in large lecture political science courses are scarce.

Implementing Active Learning

The literature is robust that active learning can make a positive difference for students. Implementing active learning in large lecture classes may seem intimidating. Nonetheless, incorporating active learning techniques does not mean that professors must completely abandon lectures. Rather, active learning techniques can be selectively incorporated into lectures to change the pace of the class.

The University

Texas A&M University—Corpus Christi (A&M—Corpus Christi) had an enrollment of 8227 students in fall 2004 with 80% of them undergraduates. Also, according to fall 2004 enrollment, 37% of the students are Hispanic (a Hispanic Serving Institution) and 62% of the students are female. The large lecture class under investigation is the university's general education State and Local Government course. State law in Texas requires all students to take this course and U.S. Government and Politics.

The Active-Learning Class Setting

The active-learning classes are sections of State and Local Government, have 106 to 143 students and are part of the university's First-Year Learning Communities Program (FYLCP).¹ The learning communities are based on large lecture, general education courses. The students in the political sciences classes also enroll in linked, First-Year Seminars. Many of the students are also enrolled in First-Year

Composition classes linked to the seminars. Assignments across the courses in each learning community are linked and discussions occur across the community.

Students use two texts with one focusing on the politics and government of Texas and the other is a general book about state and local government. Students take five multiple-choice exams during the course of the semester and also earn points for written assignments (done in collaboration with composition and seminar). In addition, students earn points from reading quizzes.

The reading quizzes are to encourage students to read their assigned chapters before attending class. If the students are already somewhat familiar with the basic class material, then they can more easily engage in active learning. Students are provided broad learning objectives for each chapter to help identify important concepts from the chapter for the quizzes. The reading quizzes are either short answer or multiple choice, and their purpose is to determine if the students learned the main ideas from the chapters. They are not designed to measure mastery of concepts or detail. In the learning communities, students take quizzes in their seminar classes. However, many professors at A&M—Corpus Christi administer reading quizzes at the beginning of class in their large lecture courses. Thus, reading quizzes can be administered without smaller discussion seminars. The quizzes can also be given online with WebCT or similar packages.

Modifying the Lecture

PowerPoint slideshows are used in class lectures. However, instead of listing topics and supporting information for a long lecture outline, the presentation can be in the form of a question-based outline or discussion question prompts.

Question-Based Outlines

Rather than simply presenting the information, questions are asked to draw the information from the students. In a sense it is lecturing, yet the students are the ones providing the information. A presentation on voting turnout, for example, might simply ask, “Who is more likely to vote?” and then the students provide the answers (this is why it is helpful to compel them to read prior to class with the reading quizzes). Even if they need to look up the answers in the books, it is still active learning because they have to actively research the answer instead of receiving it from the professor. Often they will need prodding and guidance. Nonetheless, simply asking them what the predictors are (and waiting for their responses), rather than simply listing them, is an example of active learning.

Modifying lectures so students provide the information need not be a difficult, time-consuming task. It can be done by simply restructuring lecture outlines into questions. Instead of listing off features of amateurish state legislatures, the lecture outline can ask “what are some features of amateurish state legislatures?” Sometimes, there is a delay before students answer, but eventually they start listing things off. Often they ask questions about the things that are mentioned, or someone requests an explanation. After the students respond, the professor can then reveal a list as they would do with a traditional lecture and there will likely be some terms on the list that the students did not mention.² This change may seem subtle, but it is active learning because they are becoming active participants in their learning rather than simply writing down lists passively from a PowerPoint slide.

Discussion Question Prompts

Another method for modifying the lecture is to replace the outline-based format with broader discussion questions. With this technique, students are provided an outline of the objectives for the chapter. These objectives specify to students what they are expected to understand, and this is typically the basic information from the chapter. The class presentation does not address the chapter basics. Instead, the students focus on broader thematic issues.

The amateurish legislature example can be used again to illustrate the difference between the question-based outline and the discussion question prompt. The discussion question prompt would not ask the students to list the features of an amateurish legislature. Instead, the students would be asked if there are any costs of having an amateurish state legislature. The students may first then grapple with what it means to have an amateurish legislature. Then, the discussion may need to move to a discussion of professional legislatures. That then can lead to comparison of the two systems. Thus, instead of having an outline that lists features, discussion question prompts are used to elicit responses from the students that address amateurish state legislatures.

The discussion question prompts are useful when the professor would rather discuss important topics instead of presenting basic chapter information. Students are expected to learn the basic information on their own (reading quizzes can help) and the professor leads discussions addressing larger issues and topics. The discussion question-prompt technique was used in fall 2004.

Small Group Discussions in Large Lectures

Active learning techniques need to vary or students may get bored. One method to adopt is to use small group discussions. To do this, the students are asked to consider a question, and then they are asked to break up into small groups (3–4 students) to discuss the question. The questions are designed to assist the students in understanding the class content. Students may be asked to consider different viewpoints, to make judgments about an argument, or to question assumptions. The discussion questions offer an opportunity for a deeper understanding of the course material (Brookfield and Preskill 1999). During the small group discussions the professor walks around the room (so do the class assistants, but it can also be done without class assistants) to encourage students, to check up on them, and to answer questions. After a few minutes of small group discussion, the groups are asked to share their discussions with the class. Once the discussion gets going, other students and groups join in the conversation. Ground rules are necessary and comments need to deal with the material, be factually based, and not personal.³ To encourage them to take the exercise seriously, they are notified that they need to write down their group's responses and that the responses may be collected and count for points in the class.

An example of the type of question asked is, "Is it preferable to have a governor with strong powers, or to have one with weaker powers?" The students discussed this in their groups and one group was really struggling. When asked why, they replied (paraphrased), "well, doesn't it depend? After all, there are consequences no matter which we choose." This was a great point because while actively discussing the question, they realized that there was not a "right" answer. Perhaps they would have

understood that listening to a presentation. They did make the realization on their own, in other words they found the answer through active learning.

There was an initial concern that students would not like breaking up into groups and that they would resist sharing their group comments. However, the feedback received about the groups was positive and students reported enjoying the discussions.

Actively Preparing for Exams

Active learning need not be limited to imbedding questions in lectures and small group discussions. It can also be used for exam preparation. The method for doing this can be quite simple. The main task for the professor is provide clear expectations of what is likely going to be on the exam to the students. This can come from class notes or lecture outlines. Students can even be asked to use the organization of their textbook and key terms.

If the professor has discussion sections, the activity can take place during the discussion sections. If not, an alternative is to divide the students in the large lecture class into groups and assign the groups different chapters or sections of chapters. The groups then take their sections or chapters and create a “study guide” for their material. For some topics, a simple definition may be appropriate. For others, they may need to use examples and to offer lengthier explanations. After the groups do their work, either the instructor, a student volunteer, or a class assistant records the feedback from the students (hopefully on a laptop or a computer in the classroom) and distributes it to the class. They can be distributed either through copies or electronically (via a webpage, WebCT, listserv, etc.).

The guides the students create are comprehensive and thorough. If they do not take making the guide seriously, then they are the ones who suffer the consequences. The development of the study guide may take an entire class meeting, nonetheless if the goal is to promote student learning, then providing this active learning opportunity is a worthwhile commitment. If class time is a concern, students could be assigned into groups and the groups could do their work outside of class. The compiling of their responses could also be done outside of class, or perhaps one group could be given the task of compiling. Alternatively, a class assistant could collect the groups’ responses via e-mail and compile them. Having students reflect on the material is a powerful technique to promote student learning. Simply because a professor has lectured over the assigned materials does not mean that they met the objective of helping the students learn. The study guide preparation technique was used only in the fall 2004 semester.

Does Getting Active Work?

According to the literature (outside of political science), active learning should make a positive difference for students. How well do the active learning techniques of question-based outlines, discussion question prompts, small group discussions, and active learning study guide preparation work? The analysis will include a comparison of class exam grades, pre- and postsubject exam scores, and student attitudes.

A key criticism of active learning is that it will take away class time from covering material and students will learn less. Thus, the expectation of the analysis is not to demonstrate that students in active learning sections do better in class, rather the expectation is that students in the active learning sections will perform as well as

students in nonactive sections indicating that incorporating active learning techniques does not lead to a decline in learning. Additionally, because the students in active learning sections are more involved and engaged in class, the students in the active learning sections are expected to have more positive attitudes about the class than the students in the nonactive sections.

Degrees of Active Learning

Active learning was implemented over a three-semester period. Thus, the different semesters provide an opportunity to examine the impact of the degree of active learning in large classes because each subsequent semester reflects an increase in the amount of active learning techniques used by the professor. The active-learning semesters are coded in the following categories:

- *Active 1 fall 2003*: mostly question-based outlines (some traditional) and some small group discussion
- *Active 2 spring 2004*: question-based outlines (very little traditional) and widespread use of small group discussions
- *Active 3 fall 2004*: discussion question prompts, question-based outlines (very little traditional), widespread use of small group discussions, and active study guide creation.

Comparison of Exam Grades

One measure of student learning is exam grades. If a professor is concerned that active learning opportunities take away class time from teaching course content, then demonstrating that exam grades between active and nonactive sections are similar is evidence that there is not a tradeoff between using active learning techniques and the teaching of course content. If the active sections have *worse* exam grades, then the evidence is that active learning hinders student learning. Thus, the expectation is students in the active sections will perform as least as well on exams as the nonactive learning students.

The exam grade comparison will include sections of State and Local Government from nonactive (spring 2003), active 1 (fall 2003), active 2 (spring 2004), and active 3 (fall 2004). The exams are multiple choice and all exams are based on the same textbooks.⁴ Comparing exam grades is not without methodological questions. Professors will vary each semester in how they construct exams and it is unrealistic to expect that each class and exam will be identical. Nonetheless, an examination of exam grades is one method, albeit not perfect, to begin examining the impact of active learning. The mean exam grades from spring 2003 to fall 2004 (all from one professor's classes) are presented in Table 1.

The *t*-tests for the means comparison are based on comparing nonactive spring 2003 to the other active semesters. Thus, the asterisk next to the Exam 3 mean from active 2 spring 2004 row indicates the spring 2004 mean exam 3 grade is significantly higher than the spring 2003 mean exam 3 grade. The evidence from Table 1 demonstrates there are numerous instances where the mean exam grades in the active 1, 2, and 3 semesters are significantly higher than the mean exam grades for the nonactive spring 2003. In both active 1 fall 2003 and active 2 spring 2004, three out of five exams have statistically significant higher exam grades compared to spring 2003.

Table 1. Comparison of nonactive-learning exam means (Spring 2003) to active learning means (Fall 2003 to Fall 2004)

Semester	Exam 1 means	Exam 2 means	Exam 3 means	Exam 4 means	Exam 5 means
Nonactive Spring 2003	75	72	70	77	75
Active 1 Fall 2003	79**	78**	78**	74	74
Active 2 Spring 2004	77	79**	75**	76	78*
Active 3 Fall 2004	77	78**	70	80	76

*= .05 significance in difference of means compared to Spring 2003.

**= .01 significance in difference of means compared to Spring 2003.

In active 3 fall 2004 there was one exam with a statistically significant higher exam grade.

There are no instances where the active learning semesters had significantly lower exam grades. Thus, the evidence from the exam grades comparison indicates students perform as well or better in the active learning classes. Thus, the claim that active learning means there is less time for teaching content is not supported. In fact, the evidence suggests the active learning sections are outperforming the non-active learning sections on exam grades.

Pre- and Postsubject Exam Analysis

Each semester, the political science professors administer pre- and postsubject exams to students in State and Local Government. The exam was authored by the professors and is used to assess student learning of main concepts. The subject exams are multiple choice and are administered early in the semester and the last day of class. The faculty has not collected sufficient identifying information on the subject exams to allow for the compilation of demographic and student information. Some professors inform their students that if they wish to know their scores they need to include their names. When students give their names on both the pre- and postexam, the names can be used to create matched pairs. For many students, there is insufficient identifying information to match pre- and postcases. The available subject exam data is from spring 2003 to fall 2004 (summers excluded). During this time period the pre- and postsubject exams were unchanged. The nonactive sections (taught by several professors) are from spring 2003 and fall 2003, and the active learning sections are from fall 2003, spring 2004, and fall 2004.⁵ Furthermore, the students in the active learning sections are in sections reserved for first-year students.

Using the overall means (unmatched cases) for the pre- and postsubject exam, a simple independent samples *t*-test means analysis of mean pretest score, posttest scores, and the difference in means between the pre- and posttest scores comparing active learning sections with nonactive-learning sections are computed and presented in Table 2.

According to Table 2, all of the sections had a positive and statistically significant increase. The largest gain in posttest scores is from the active 2 spring 2004 section. The smallest gain for pre- to posttest occurred in active 1 fall 2003. All of the posttests have smaller samples than the pretest because attendance is not required and not all students are present on the last day of class when the posttest is administered.

Table 2. Comparison of nonactive-learning pretest and posttest mean scores to active learning means

	Means		Difference of means
	Pretest	Posttest	
Nonactive	35	52	17**
<i>N</i>	(709)	(541)	
Active 1 Fall 2003	37	47	10**
<i>N</i>	(100)	(51)	
Active 2 Spring 2004	36	58	22**
<i>N</i>	(111)	(53)	
Active 3 Fall 2004	34	54	20**
<i>N</i>	(139)	(27)	

**= .01 significance.

Another method for examining the pre- and postscores is with panel data techniques (Markus 1979). The technique for examining the impact of active learning is to use the pretest score as an independent variable in a multiple regression analysis that also includes dichotomous variables to control for the treatment. Subject exam posttest scores serve as the dependent variable.

Including the pretest score as an independent variable controls for how the student performed on the pretest and how much they gained on the posttest. The controls for the active semesters will indicate how much the active learning sections “added” to the posttest. Thus, the technique allows for an examination of how much a student improved on the posttest in relation to their pretest. The expectation is that the active learning sections will *not* have a significant, negative effect on the posttest scores. Only the matched pre- and postcases can be used for this analysis. The regression equation is presented as follows:

$$\text{postsubject exam} = \text{presubject exam} + \text{active 1} + \text{active 2} + \text{active 3}$$

Table 3. Multiple regression analysis of posttest subject exam results Spring 2003 to Fall 2004

Variable	B
Constant	37.15**
Pretest Score	.46**
Active 1 Fall 2003	-1.61
Active 2 Spring 2004	6.91**
Active 3 Fall 2004	1.78
Number of cases	310
Adjusted R ²	.10
SEE	13.93

**= .01 significance.

According to the results of the regression results presented in Table 3, the active learning sections do not have a negative, significant effect on the posttest scores. The findings indicate the active 2 spring 2004 section has a positive and significant impact on the posttest scores (almost a seven-point gain in posttest scores over the nonactive sections). The active 1 fall 2003 and active 3 fall 2004 sections both have statistically insignificant effects. The expectation that none of the active sections would have a negative effect is met. The active learning sections performed as well or better than the nonactive sections.

Thus, the findings are consistent with exam grade analysis that found the active learning sections did better than or as well as the nonactive sections. The variance explained (adjusted r -square of .10) is small. A likely explanation is that other potential explanatory variables (class rank, GPA, etc.) are not examined (because there is insufficient identifying information to obtain the data). The purpose of the model is not to comprehensively explain the gain in posttest scores, rather it is to examine the impact from the active learning sections.

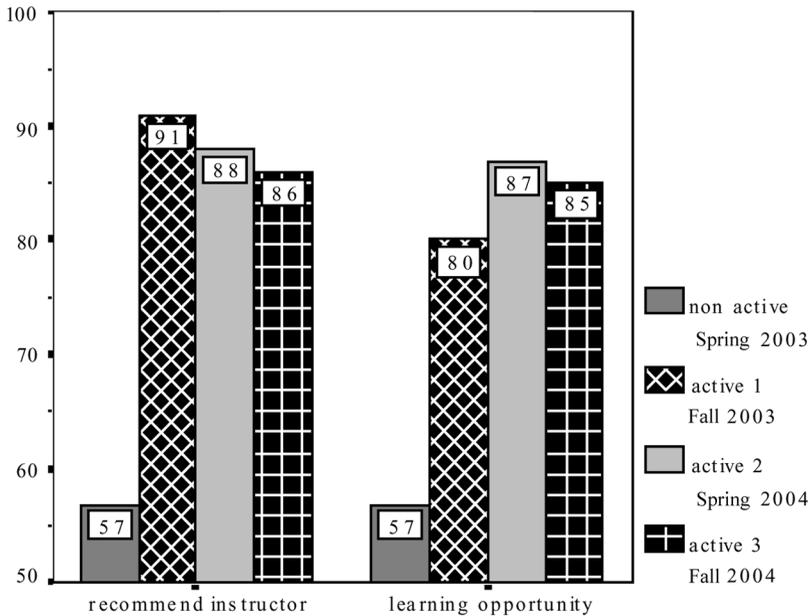
Student Reactions

The evidence gleaned from student opinions is also important. The political science program is part of the College of Liberal Arts and at the end of each semester the college administers an end-of-semester survey for students to share their opinions about the class and instructor. Two questions from the survey can be used to compare the active learning to the non-active learning format. One question asks the students the likelihood of them recommending their instructor to other students.⁶ The other question asks about the learning opportunities in the class.⁷ The response choices are “excellent,” “good,” “satisfactory,” “poor,” “very poor,” and “not applicable.” Responses are from the author’s Spring 2003 (nonactive) and active 1 Fall 2003, active 2 Spring 2004, and active 3 Fall 2004 State and Local Government sections. The response rates for the evaluations are as follows: Spring 2003, 43%; Fall 2003, 43%; Spring 2004, 35%; Fall 2004, 51%. The results of the end-of-semester evaluations are provided confidentially to faculty and comparative data are not provided and, thus, are unavailable.

The percent of students responding “excellent” or “good” is presented in Figure 1.⁸ Over 85% of students in the active sections would recommend the professor versus 57% of students in the nonactive section. Over 79% thought the learning opportunities were “excellent” or “good” in the active sections, while only 57% did in the nonactive section. Overall, the student responses are much more favorable in the active sections than the nonactive section.

Discussion and Implications

The concern that incorporating active learning techniques in large lecture classes will take away time from teaching and hence lead to less learning is not supported by the evidence. At best, active learning has a positive impact on student learning as evidenced by the results of the exam grades and the pre- and postsubject exams. At worst, active learning performs as well as non-active learning sections, indicating that active learning does not take time away from teaching. In addition, student attitudes were clearly more positive in the active learning sections. In summary, active



N: Spring 2003 - 51; Fall 2003 - 45;

Spring 2004 - 41; Fall 2004 - 73

Figure 1. Student ratings of active and nonactive sections State and Local Government.

learning does not lead to less learning and students are more likely to have positive attitudes.

There are differences with the degree of active learning. Active 1 and active 2 outperform active 3 (the most active section) on the exam grade comparison. On the pre- and posttest regression analysis, active 2 has the significant and positive effect on posttest scores. The evidence suggests the introduction of modest amounts of active learning techniques will have the greatest impact on student learning and attitudes. The active techniques used in active 1 and active 2 are question-based lecture outlines and small group discussions. The study guide preparation and discussion question prompt class presentations were used in active 3. While active 3 did not perform as well as active 1 and 2, it still performed as well as the nonactive sections and students in active 3 also had class attitudes that were more positive in comparison to the students from the nonactive section.

To summarize the findings, the combination of question-based outlines and small group discussions has the most positive impact on student learning and attitudes (active 1 and active 2) in relation to the nonactive sections. The discussion question prompts and active study guide preparation (active 3) perform as well as the nonactive sections. A topic for future research is to separate the impact of the study guide preparation and discussion question prompts to more thoroughly investigate the impact of those techniques.

The good news for professors considering adopting active learning techniques is that the techniques supported by the evidence are the simplest to implement. Professors seeking a method to provide a boost for student learning, to develop more

positive student attitudes, and to provide a change of pace for large lecture classes can consider modifying their lecture outlines to the question-based format and incorporating small group discussions. The concern that active learning is inappropriate for large classes because it takes away time from teaching is simply not substantiated by the evidence.

Notes

1. The largest political science classes have 275 students. Unfortunately, the largest classes are not part of this study.
2. PowerPoint has a feature that allows the presenter to reveal items in a list by clicking the mouse.
3. Brookfield and Preskill's (1999) *Discussion as a Way of Teaching* is a valuable resource with numerous examples for using discussion techniques.
4. The only exam with a writing component option is exam 1, spring 2003. During that semester another professor taught the classes for exam 1 and wrote exam 1. The spring 2003 exam 1 included multiple-choice questions and also an optional written component. The textbooks remained the same during the period of study. The edition for the two books did change once.
5. These are the same sections defined as "active" in the exam grade comparison and are the author's sections.
6. The likelihood of my recommending this instructor to other students is . . .
7. The learning opportunities in this class were . . .
8. Not applicable responses are coded as missing and not included in the calculation.

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