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STUDENT PERCEPTIONS OF REASONS FOR LECTURE AND ACTIVE LEARNING

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Abstract

With perceived student resistance to active learning in the classroom, instructors are hesitant to implement such methods into their classroom structure despite how effective they may be. This research seeks to understand student perceptions related to the transition to higher prevalence of active learning techniques. We aimed to find answers to how students perceive the ideal classroom to be structured, what reasons they perceive for lecture and active learning components, and possible explanations to concerns of groupwork during class time. We analyzed 64 interviews with undergraduate biology students at the University of Nebraska-Lincoln, developed coding rubrics from commonly found themes in their answers, and looked into how prevalent each code was among the students. Students preferred that 75% of class time be spent on lecture, which they most commonly perceived as valuable to cover content efficiently, and 25% be spent on active learning, which they most frequently saw as valuable for their own feedback or feedback for their professor. Implications of this study can help instructors to structure their class time and implement active learning methods effectively.

Student Perceptions of Reasons for Lecture and Active Learning

Introduction

National agencies have called upon instructors to implement active learning techniques within the classroom (AAAS, 2011). Active learning engages students in their own learning and produces greater performance than traditional lecture (Freeman, et al., 2014). Educators are then tasked with finding the most effective way to utilize these methods with students in an engaging way. However, some instructors are still hesitant to use these techniques, fearing student resistance (Seidel and Tanner, 2013). Thus, understanding student perceptions of lecture and active learning can help both instructors and students as courses undergo transformation. Students' opinions and advice can be a useful tool for instructors when implementing these techniques to the classroom (Welsh, 2012). This research seeks to understand student perceptions regarding this educational transformation by answering the questions: (1) what ratio do students prefer of traditional instructor lecture to active learning, (2) what reasons do students perceive for instructor lecture, (3) what reasons do students perceive for implementation of active learning, and (4) for what reasons are students hesitant toward in-class group work?

Background

The balance of lecture and active learning may be a contributing factor to student resistance toward active learning. A previous study found that introductory biology students on average prefer approximately a quarter of their class time executing active learning methods with the other three quarters of the time being spent listening to lecture and taking notes (Brown et al., 2017). We expected to find a similar result within this study and hoped to expand on this research by understanding why this balance is important from a student's perspective.

With students' preference for lecture time in the classroom, this project seeks to discover what students perceive to be reasons for lecture. We predicted students would perceive lecture to be more comfortable and familiar to them, thus leading them to desire more time spent on lecture. We also expected to find similar results to a previous study in which students indicated active learning, in contrast to lecture, detracted from the instructor's ability to move through content efficiently, creating a pro perception of lecture (Qualters, 2001).

While most students prefer the majority of class time to be lecture (Brown et al., 2017), students still see the benefit of active learning. Active learning helps students feel connected to what they are learning and improves the environment in which they learn (Qualters, 2001). A previous study found students feel active learning is a way of giving the instructor feedback on how well students are learning and of helping pick out expected information for the students to know (Brazeal et al., 2016). We predicted to find similar results and sought to find student perception on how these active learning methods influence learning as a whole.

The studied pros of active learning are not enough for students to want more than 25% of class time to be spent on these methods (Brown et al., 2017). Previous research has suggested the resistance of students to particular active learning techniques (i.e., clicker questions and in-class group activities) may be due to logistical concerns such as how groups are put together or how much time is allotted to complete respective activities (Brazeal et al., 2016). Other possible explanations for student resistance to active learning are associated with course policies such as grading procedures (Chory-Assad and Paulsel, 2004). This study will build on this prior work by providing insights about what reasons students perceive that active learning serves and will further address sources of resistance.

In regard to resistance toward active learning, group work is specifically resisted by students (Brazeal et al., 2016). Time constraints in a lecture setting are an issue some students worry about when it comes to working in groups and higher-achieving students tend to look at group projects in a less appealing way (Monk-Turner and Payne, 2005). The interviews in this project will give us insight as to what other possible reasons students may be less inclined to want to work in groups with their classroom peers.

Methods

This study took place across several undergraduate biology classrooms at the University of Nebraska-Lincoln during the Spring and Fall semesters of 2015. Our research team consisted of UNL faculty member, Brian Couch, Ph.D., postdoctoral fellow, Kati Brazeal, Ph.D., and myself. Brazeal conducted 64 student interviews with students from eight different biology courses (four to ten students per course). We recruited students to be interviewed via email after completing a course survey which asked if they wanted to participate in an interview. The classes ranged in level, three were introductory courses with 139 to 249 students and the other five were sophomore to senior level courses with 26 to 231 students. The students who completed the interview were offered a \$20 gift card in return for their participation. Demographics for these students are shown in Table 1. Interviews were audio recorded and then transcribed by the University of Nebraska-Lincoln's transcription service.

Table 1. Demographic Information	
GENDER	
Male	38%
Female	62%
CLASS RANK	
First Year	20%
Sophomore	22%
Junior	23%
Senior	34%
MAJOR	
Life Sciences Major	83%
Non-Life Sciences Major	17%
GRADE IN THE COURSE	
A	36%
B	41%
C	19%
D	5%
COURSE LEVEL	
100-level	44%
200-level	27%
300-level	11%
400-level	19%

There was a standard list of questions used to facilitate the interviews. However, the semi-structured protocol allowed the interviewer to ask follow-up questions based on the student's responses. Certain questions in the interview were utilized for a different research study. The questions included for this study are listed in Table 2. The active learning practices referred to in these questions included clicker questions or in-class group activities, depending on which type was used in that respective course.

Table 2. Interview Questions
1. What is the most useful way to spend class time?
2. What percentage of time should be spent on each activity mentioned in #1?
3. Why are the activities mentioned in #1 needed?
4. Why do you think (insert active learning practice) is being used in this course?
5. How does (insert active learning practice) influence your learning in this course?
6. Has this class changed your expectations of how class time should be spent?
7. Would it be useful to have group work?
8. Why is/isn't group work useful?

Interview questions targeted student perceptions of how class time should be spent, what reasons they perceive for lecture and active learning, and how they feel about group work. The open-ended interview questions allowed for students to utilize their own words when describing their perceptions of these concepts and how class time can be most effectively structured to accommodate their learning.

When asked the most useful way to spend class time, the students were not prompted with terms like “lecture” and “active learning.” These categories were later defined based on how the student answered the questions; all of which fell into one of the two categories. In the students’ answers regarding the percentage of class time they would like to spend on each activity they thought should be included in class time, their answers must have combined to total 100%. These were then recorded and averaged to find the general preferred balance of lecture and active learning.

For the more open-ended interview questions, we developed coding rubrics which were used to sort the students’ answers into quantifiable categories. Specifically utilizing questions 3-5 from Table 2, we randomly selected twenty interviews and the three members of the research team individually read through them to identify the common themes that occurred throughout the variety of answers. We discussed the common themes and then created a coding rubric by sorting the common themes into more concise code names and providing a definition and example student answers for each. Separate rubrics were created for students’ perceived reasons for lecture and students’ perceived reasons for active learning. Prior to applying the coding rubrics, we conducted co-coding to obtain reliability. A lead coder and co-coder read the same set of ten interviews and coded them using the rubric. The students’ answers within the interviews had the possibility of being coded with more than one code. Once a 90% similarity of

coding was reached twice between the lead coder and co-coder, the lead coder coded the rest of the interviews alone. We then calculated the percent of interviews coded with each respective code.

All of the students' answers to the questions pertaining to groupwork were read through by both coders. Both analyzed the transcripts to extract reasons students perceived and sorted these answers into overarching categories.

Results

STUDENT PERCEPTION OF CLASS BALANCE

For our first research question about how the students perceived the most effective usage of class time, we found that on average students preferred 75% of class time to be spent with professor lecture and 25% of class time to be spent on active learning. Figure 1 shows the percentage of students who preferred lecture taking up each interval percentage of class time.

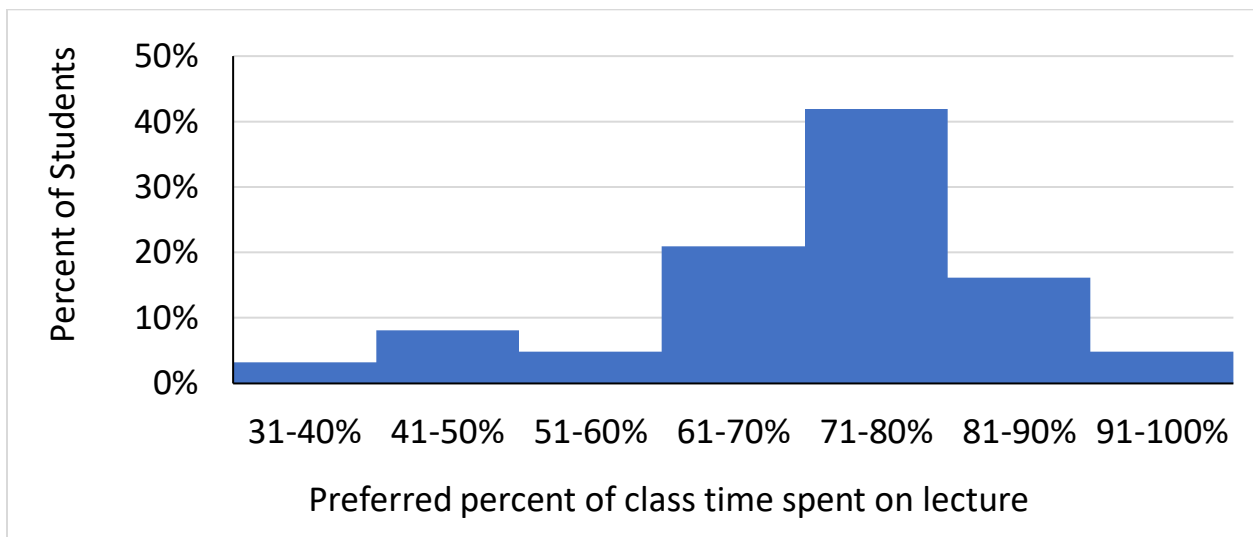


Figure 1: Responses of students and preferred percentage of class time spent on lecture. The x-axis shows percentage of student responses. The y-axis shows intervals of percentage of class time.

STUDENT PERCEPTIONS OF LECTURE

The rubric created based off of reoccurring themes of student perceptions of lecture is shown in Table 3. The six codes generated reflect the vast majority of reasons students perceive lecture to be useful for. If students felt lecture gave them a platform to learn from an expert in the field, we coded Professors as Experts. If the student equated the concept of lecture with learning, we used Lecture Aligns with Learning. Professors as Test/Quiz Authors allowed us to see students who wanted information from those preparing summative assessments. Content Filter emerged when students utilized lecture to narrow down important content. We coded Efficiency of Content Coverage when students saw lecture as a more efficient means to acquire content. Finally, we coded Comfort when students felt more familiar with class time spent on instructor lecture.

We found the most popular codes to be Efficiency of Content Coverage and Professors as Experts, which we coded in 42% and 39% of interviews respectively. We also coded the least popular codes of Comfort (14%) and Professors as Test/Quiz Authors (12%). A complete portrayal of each code displays in Figure 2.

Table 3. Coding rubric for reasons students perceive for lecture

<i>Code Name</i>	<i>Code Definition</i>	<i>Examples</i>
Professors as Experts	The student wants lecture in order to ensure they receive accurate information and guidance from one with knowledge and experience.	<ul style="list-style-type: none">- professors are a source of knowledge- students don't have the information yet- students trust the professor over anyone else
Lecture Aligns with Learning	The student equates learning to listening to a professor lecture and/or interprets lecture as teaching.	<ul style="list-style-type: none">- students believe learning is when professor lectures- student feels lecture is how either they or other students learn best- students feel hearing the information is beneficial to learning
Professors as Test/Quiz Authors	The student wants lecture in order to receive information from those writing the summative assessments.	<ul style="list-style-type: none">- students are able to get an idea of what will be on the test when the professor lectures- students know what to focus on for the test
Content Filter	The student uses lecture as a way to know which information is important for their learning.	<ul style="list-style-type: none">- professors can summarize information from book- lecture is a simplified version of the book- students feel lecture is good for picking out what is important from difficult material
Efficiency of Content Coverage	The student feels lecture is the most efficient way to acquire content.	<ul style="list-style-type: none">- more material can be covered in a lecture- students feel lecture is when new material should be introduced- students feel lecture is the only way to cover content
Comfort	The student prefers lecture because that is what is most comfortable.	<ul style="list-style-type: none">- students are used to lecture- students prefer to sit and listen

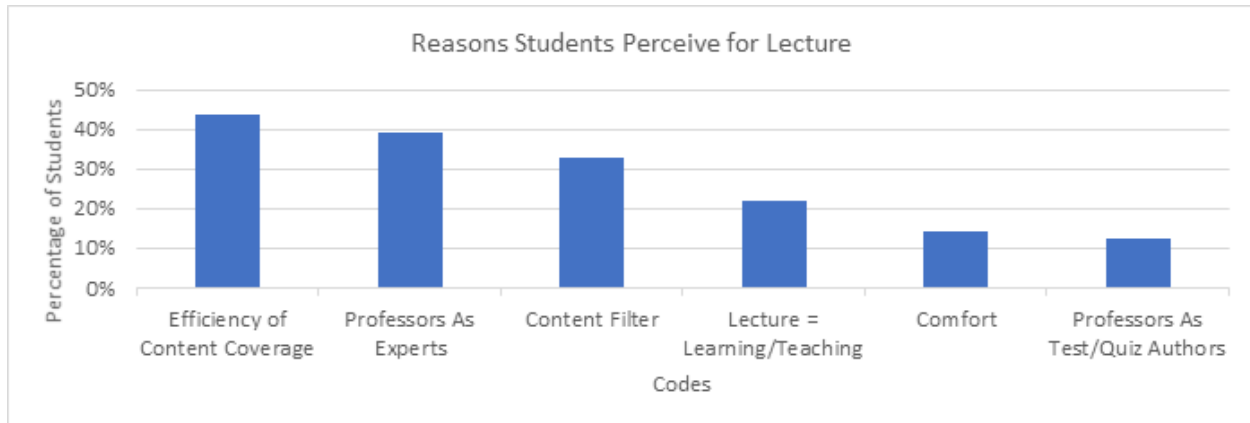


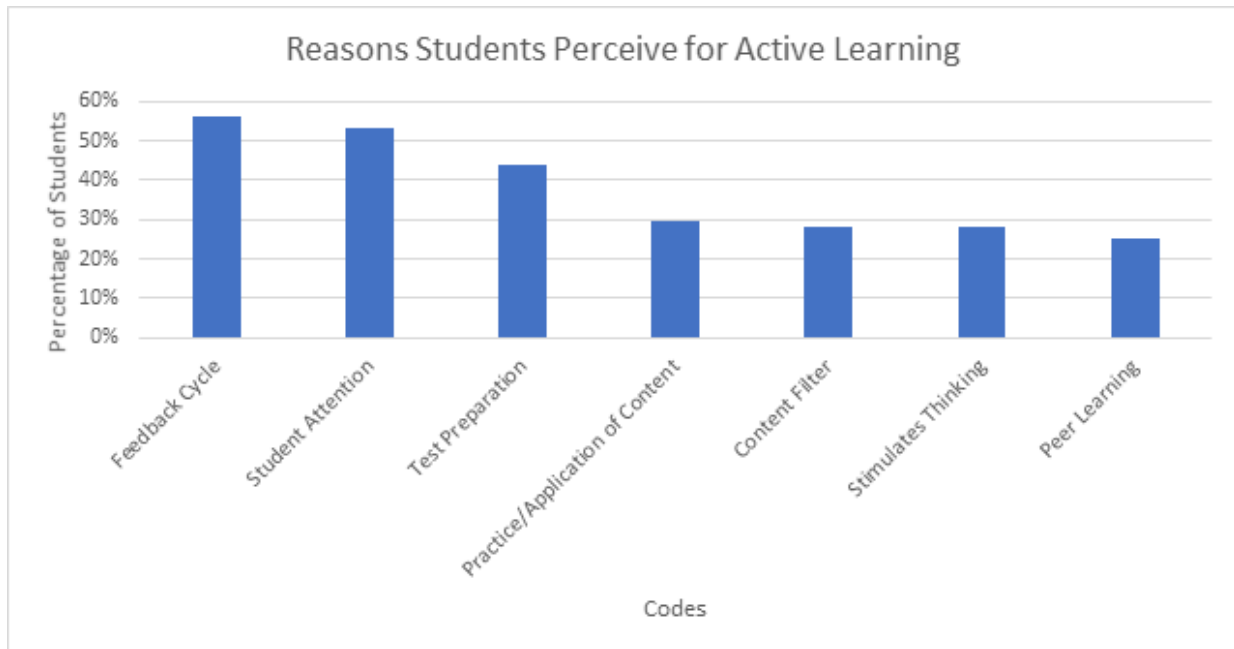
Figure 2: Responses of students' perceived reasons for lecture. The x-axis shows the perceived reason based off of reoccurring themes. The y-axis shows the percentage of students who perceived the respective reason.

STUDENT PERCEPTIONS OF ACTIVE LEARNING

The rubric created based off of common student perceptions of active learning is shown in Table 4. The seven codes created show the vast majority of reasons students perceive active learning to be helpful for. If students felt active learning connected them with their peers, we coded Peer Learning. If the student used the active learning method to narrow down important content, we used Content Filter. Student Attention allowed us to see students who felt the active learning methods kept them alert and paying attention. Practice and Application of Content emerged when students utilized active learning as a way of reinforcing what they have learned already. We coded Test Preparation when students saw active learning as a way to get them ready for a summative assessment. We selected Feedback Cycle when the student felt they or the instructor could measure how well the material was understood. Finally, we coded Stimulates Learning & Thinking when students felt a more active thinking process took place with active learning techniques.

We found the most popular codes to be Feedback Cycle and Student Attention, which we coded in 56% and 43% of interviews respectively. We also coded the least popular codes of Stimulates Thinking & Learning (29%) and Peer Learning (25%). A complete display of each code is shown in Figure 3.

Table 4. Coding rubric for reasons students perceive for active learning		
<i>Code Name</i>	<i>Code Definition</i>	<i>Examples</i>
Peer Learning	The student views AL as a means to facilitate conversation with peers in order to further understand content.	<ul style="list-style-type: none"> - forming groups to study with - AL's allow students to talk to each other encourages you to ask those around you - allows us to teach to others
Content Filter	The student uses AL as a way to know which information is important for their learning.	<ul style="list-style-type: none"> - basic ideas can be sorted out through AL - students feel AL is good for picking out what is important from difficult material - AL shows what material is important
Student Attention	The student sees AL as a way to get involved in class and/or remain focused and alert.	<ul style="list-style-type: none"> - gets the class involved - keep students from falling asleep - encourages students to come to class
Practice and Application of Content	The student uses AL as a way to practice or apply content learned in lecture or in textbook to situations in order to better understand content.	<ul style="list-style-type: none"> - allow students to apply lecture material - synthesizing content - reinforcing what we've already gone over
Test Preparation	The student uses AL as a means of deciphering what will be on a test and/or as a study material.	<ul style="list-style-type: none"> - gets students thinking about and preparing for tests - show us what we need to look at more for the test - AL shows example questions similar to test
Feedback Cycle	The student perceives AL as a way for the instructor or student to gauge how well the content is understood.	<ul style="list-style-type: none"> - allows professor to know how well the students are understanding the content - gives students feedback on their learning - asking instructor questions
Stimulates Thinking & Learning	The student sees the AL method as a way for students to learn material by actively thinking about it.	<ul style="list-style-type: none"> - puts brain to work rather than passively listening - makes you think more than just hearing information - student learns the most through AL



STUDENT RESISTANCE TO GROUPWORK

Six major categories assembled through the responses of groupwork related questions. Logistical Complaints dealt with the sorting and numbers of groupwork. Lack of Alignment with Learning Preferences sorted out those who felt they did not learn well in groups. Group Dynamic Complaints had to do with how well the group worked together. Those with Time Complaints felt groupwork takes up too much time. Content Complaints regarded the specific material at hand. Finally, Grading Policy Complaints had to do with how the groupwork impacted the students' grade in the course. Table 5 shows the categories, followed by a paraphrased example of what a student mentioned that fell into the respective category.

Table 5. Students' Perceived Reasons Against Groupwork	Example
Logistical Complaints	- GW only works in small classroom settings
Lack of Alignment with Learning Preferences	- GW is not my learning style
Group Dynamic Complaints	- One person always ends up doing all the work
Time Complaints	- Too much time is spent explaining the project or assignment
Content Complaints	- GW would work better within a different discipline
Grading Policy Complaints	- My grade should not depend on other people

Conclusion

In this research study, we utilized open-ended interview questions to gauge student perceptions of their ideal class time structure. The purpose of this study was to let student voices be heard in the push to implement active learning within the classroom and allow instructors to implement based off the findings. A broad array of undergraduate biology students were able to explain, from their perspectives, how class time, lecture, active learning techniques, and group work can or cannot be effective.

We found that most students preferred three quarters of their class time to be spent with the professor lecturing to the class and one quarter of class time to be spent doing active learning, which is similar to the finding of a previous study (Brown et al. 2017). This suggests that students may not necessarily be resistant to active learning methods, but rather they are resistant to the idea of active learning methods taking up more of their class time than they would prefer. We also showed the variation in student responses to how class time should be spent. While the

three-quarter lecture/one-quarter active learning appeared most frequently, many students preferred more active learning and many preferred less, suggesting some students may resist differently to the implementation of more active learning.

Students most often perceived the reasons for lecture to be for efficiency of content coverage and utilizing the expertise of the professor. These perceived reasons both may come from students who seek more fiscal value in their education; the students want to cover an effective amount of material from an effective source: their professor, the expert in the content. Students less frequently stated that they preferred lecture due to its comfort or familiarity, which is contrary to what we predicted. Even fewer students saw lecture as a method of obtaining information from those who would be summatively assessing them. However, both of these less frequent codes require a certain level of vulnerability from the student that they may not have felt comfortable sharing with the interviewer which might explain their less frequent appearance. On the other hand, should these reasons truly appear less popularly, students may be more willing to step outside of their comfort zone to acquire the material than originally thought.

Students most often perceived the reasons for active learning to be for acquiring feedback and keeping students' attention. Active learning provides a platform for student to get immediate feedback on how well they understand the material, which can prevail as a selling point for buy-in to the implementation of active learning methods. Similarly, preserving student attention in class can only aid the learning process for students, another upside to active learning. These ideas coincide with the results of previous research (Brazeal et al., 2016). The less popular codes of peer learning and stimulation of thinking may oppose the findings of a prior study in which active learning was perceived to connect students to what they learn and preserve their learning environment (Qualters 2001).

Interestingly, students noted that providing a filter of what content students need to know was a reason for both lecture and active learning. Thus, many students perceived that the material being covered through lecture and active learning was important for the overall content of the course. If instructors utilize active learning methods to help students identify important concepts in the material, buy-in to these techniques could increase.

Students have many concerns with performing in-class groupwork. Perhaps, though, should these concerns be addressed, instructors can achieve higher groupwork buy-in from students. In order to combat logistical and time complaints, instructors should aim to be efficient by possibly prearranging groups before class or only performing groupwork in recitation sections. To address group dynamic, learning style, and content complaints, instructors can be more intentional in explaining how groupwork is the most effective way to grasp the concepts. Finally, professors can aim to hold a better understanding of why students fear groupwork from a grading standpoint and grade more leniently on groupwork or grade the individual in the group setting rather than the group as a whole.

Important limitations to this research that should be acknowledged include the concept that this study on active learning in the classroom was specifically targeting undergraduate biology students. There is a possibility that perceptions of lecture and active learning would look different in different disciplines as well as education level. Future research may look into effective practices of active learning that are able to take all of the student perceptions found in this research into account, making these methods as effective as possible. Despite these limitations, this study made important findings regarding instructors' impending implementation of active learning techniques into the classroom. Keeping the ideal student perception of classroom balance in mind, instructors can intentionally utilize active learning methods to get

students feedback on their learning and keep their attention while keeping a realm of student concerns in mind should the active learning method involve in-class groupwork.

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