

Faculty Academy on Teaching First Year Students

Active Learning Activities vs Weekly Quizzes; Which is more effective in reaching Student Learning Outcomes?

By Debra Conte

The Problem:

Weekly discussion sections are only 50 minutes long.

Taking a weekly quiz takes approximately 15-20 minutes out of the class time.

The students already take nearly *weekly quizzes* as part of their online homework component.

Is there more value in using all of the time engaged in active learning activities versus taking *repetitive* quizzes?

Active learning activities in the context of these classes are primarily group activities involving deeper thinking exercises such as:

- modified think, pair, share
- group analysis of proposed situations.
- group discussion and analysis of chapter content.
- debates with opposing views of concepts.

Prior Research has shown:

Kurt Haberyan, demonstrates in an article in *The American Biology Teacher* that taking weekly quizzes did **not** significantly improve learning outcomes and placed significant additional burdens on the instructor in terms of writing, class time and grading.

In a different article, by Valeh Gholami in *I.J. Modern Education and Computer Science*, 2013, arrived at the opposite conclusion suggesting that frequent testing covers small amounts of materials that can be processed deeper and more meticulously.

The Question Still Remains

There is a fairly large volume of data with results falling on both sides of the question. **“...if viewed collectively, the use of quizzes seem to yield some impressive benefits.”** as reported by Maryellen Weimer, PhD.

However, the prior data ***did not address our specific situation*** where the students were also taking weekly homework quizzes as part of their online homework assignments.

The question remained, did taking additional quizzes on the lecture material in addition to the quizzes given as part of the online home work module benefit students more than using the limited class time in active learning activities?

Project Design:

- Project was conducted over 2 semesters, using 2 courses.
- **Fall 2016 Bio 005 Biology Today:** On line homework, weekly quizzes and group learning activities.
 - Spring 2017 On line homework, weekly quizzes and group learning activities. (No change: control group)
- **Fall 2016 Bio 60 Nutrition:** On line homework, weekly quizzes and discussion. (Treatment group)
 - Spring 2017 On line homework, no weekly quizzes and group learning activities.
- Cumulative final exams were used to measure and compare successful student achievement.

Bio 05 Biology Today, Two-Sample t-Test of Final Exam Scores

Control Group

	Final F16	Final S17
Mean	159.7267081	158.9491525
Variance	813.9248447	336.0030817
Observations	161	177
Hypothesized Mean Difference	0	
df	268	
t Stat	0.294863952	
P(T<=t) one-tail	0.384163048	
t Critical one-tail	1.650559157	
P(T<=t) two-tail	0.768326095	
t Critical two-tail	1.968855173	

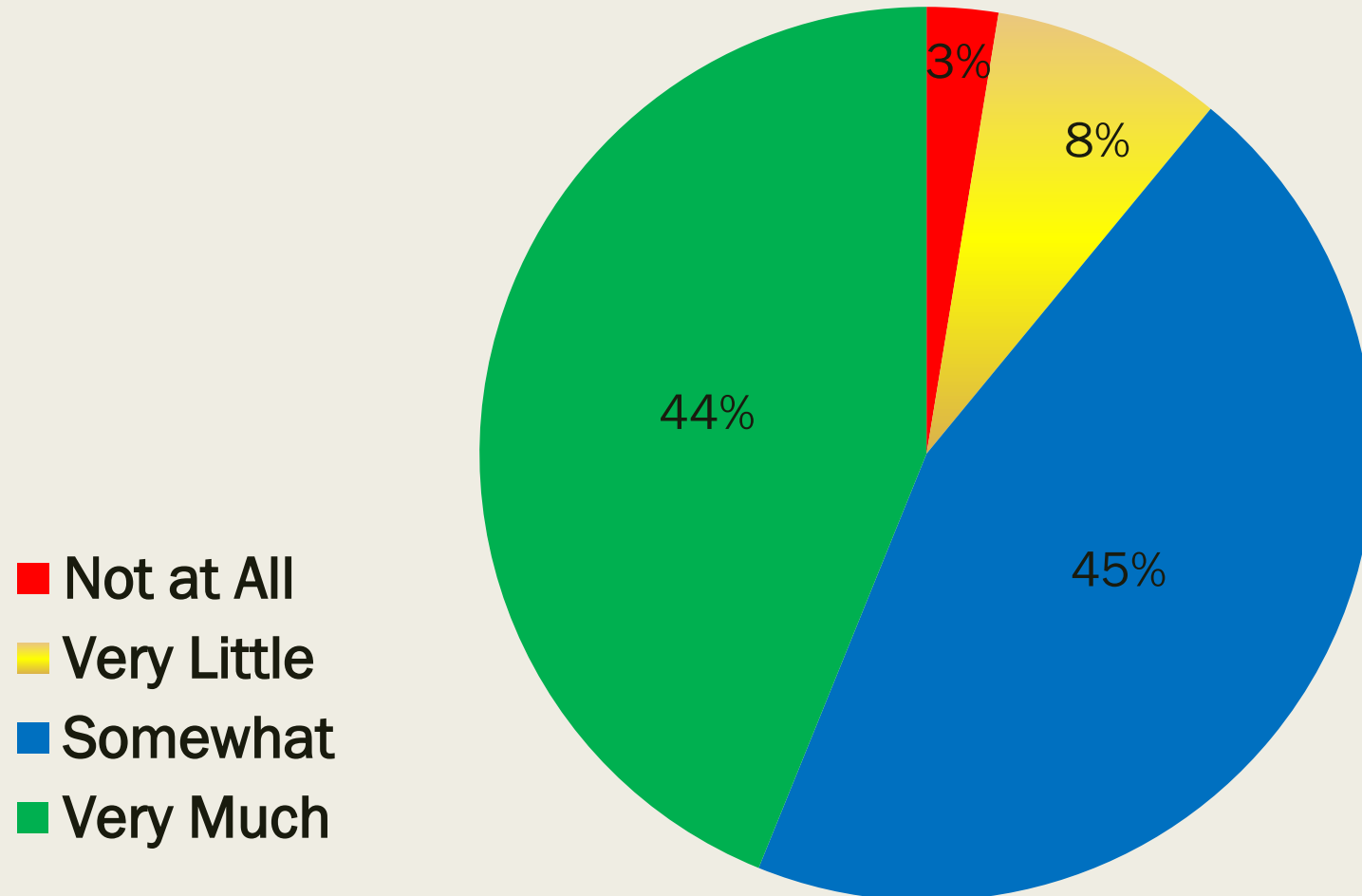
No statistical difference.

Both semesters students had quizzes most weeks.

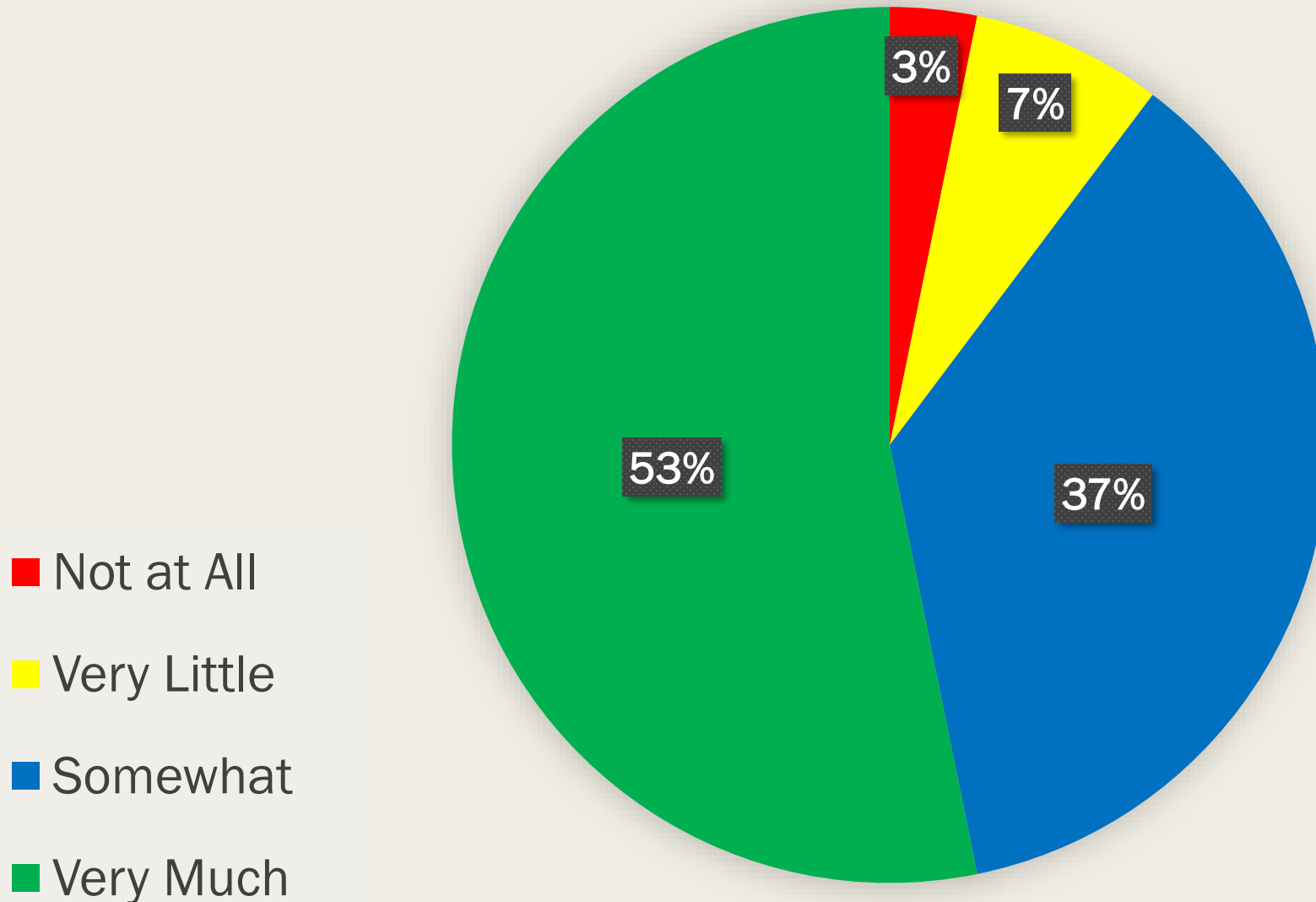
Control Group

Results from Spring Bio 5 Biology Today end of semester survey regarding student perception course structure and learning outcomes.

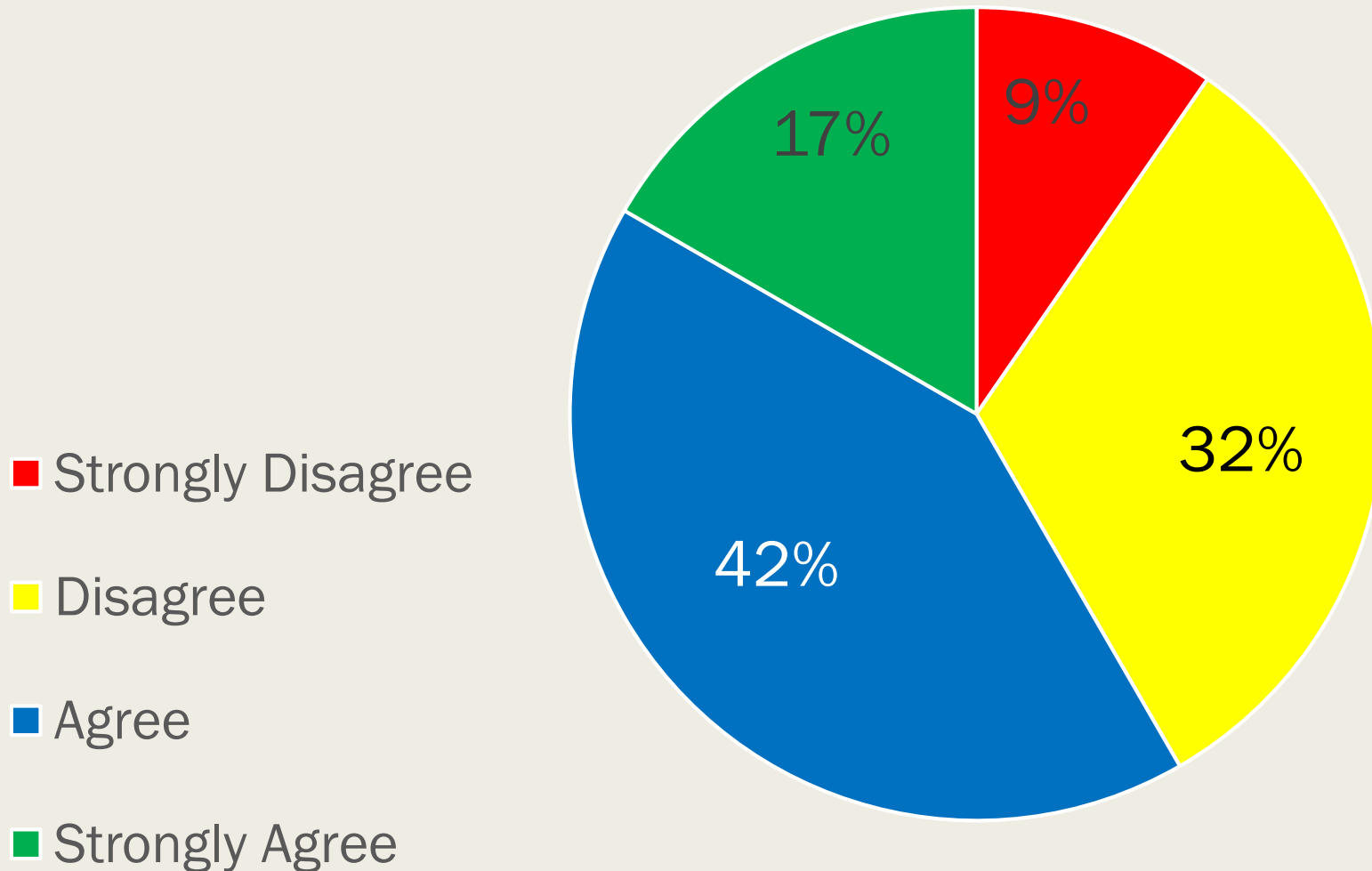
1. How much do you feel your discussion section contributed to your overall understanding of the course material? **Should have been phrased “ How helpful were the class discussions to your overall understanding of the course material?”**



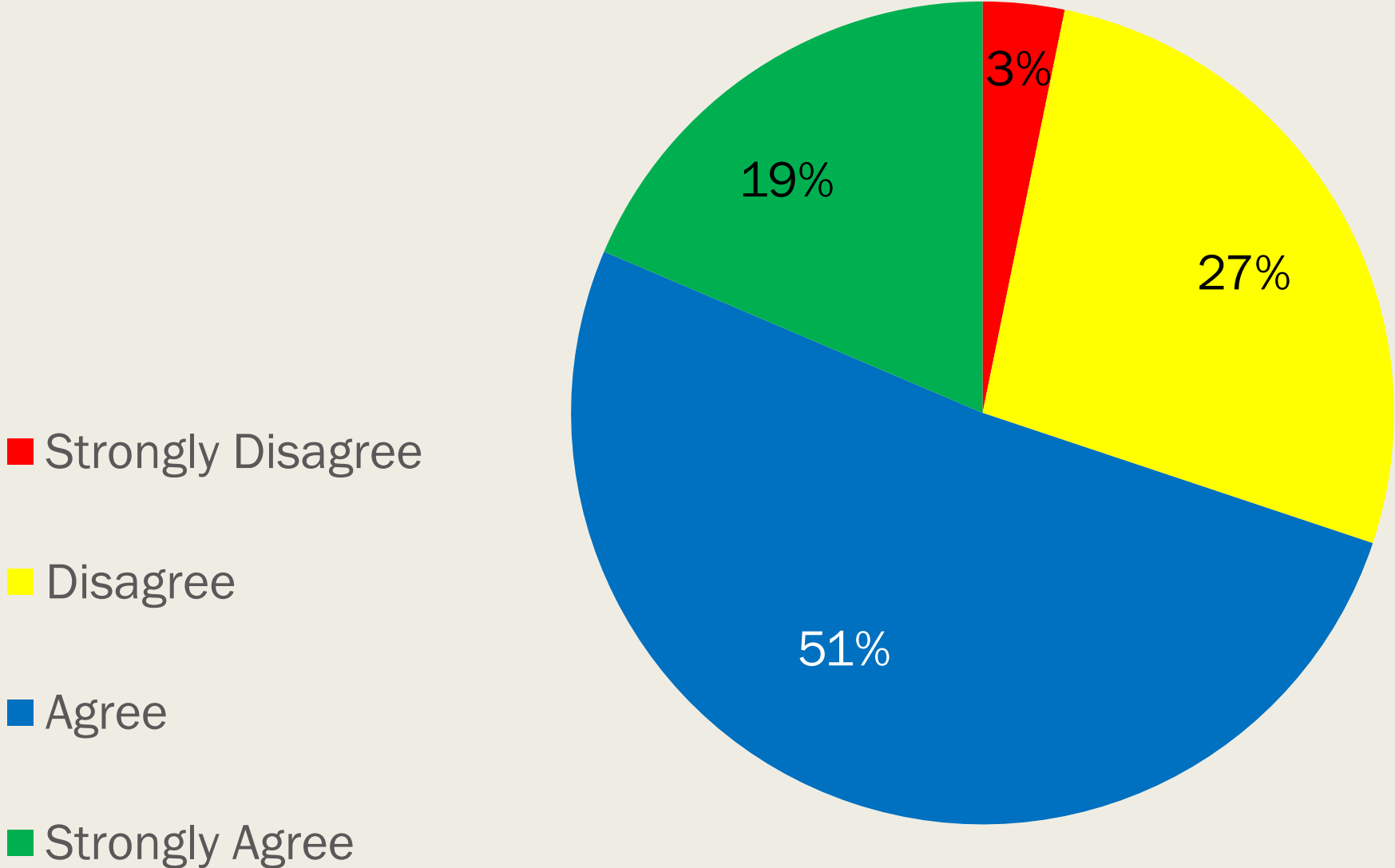
2. How much did the InQuizitive homework contribute to your overall understanding of the course material?



3. Do you feel taking weekly **quizzes** have increased your exam grades?
How helpful were the weekly quizzes in your overall exam success?"



4. The **activities** provided in discussion sections helped to increase my exam scores.



Bio 60 Nutrition, Two-Sample t-Test of Final Exam Scores

Treatment Group

	Fall 2016	Spring 17
Mean	148.9170732	146.4739884
Variance	484.2136777	581.239145
Observations	205	173
Hypothesized Mean Difference	0	
df	352	
t Stat	1.021345981	
P(T<=t) one-tail	0.153895986	
t Critical one-tail	1.649194001	
P(T<=t) two-tail	0.307791973	
t Critical two-tail	1.96672623	

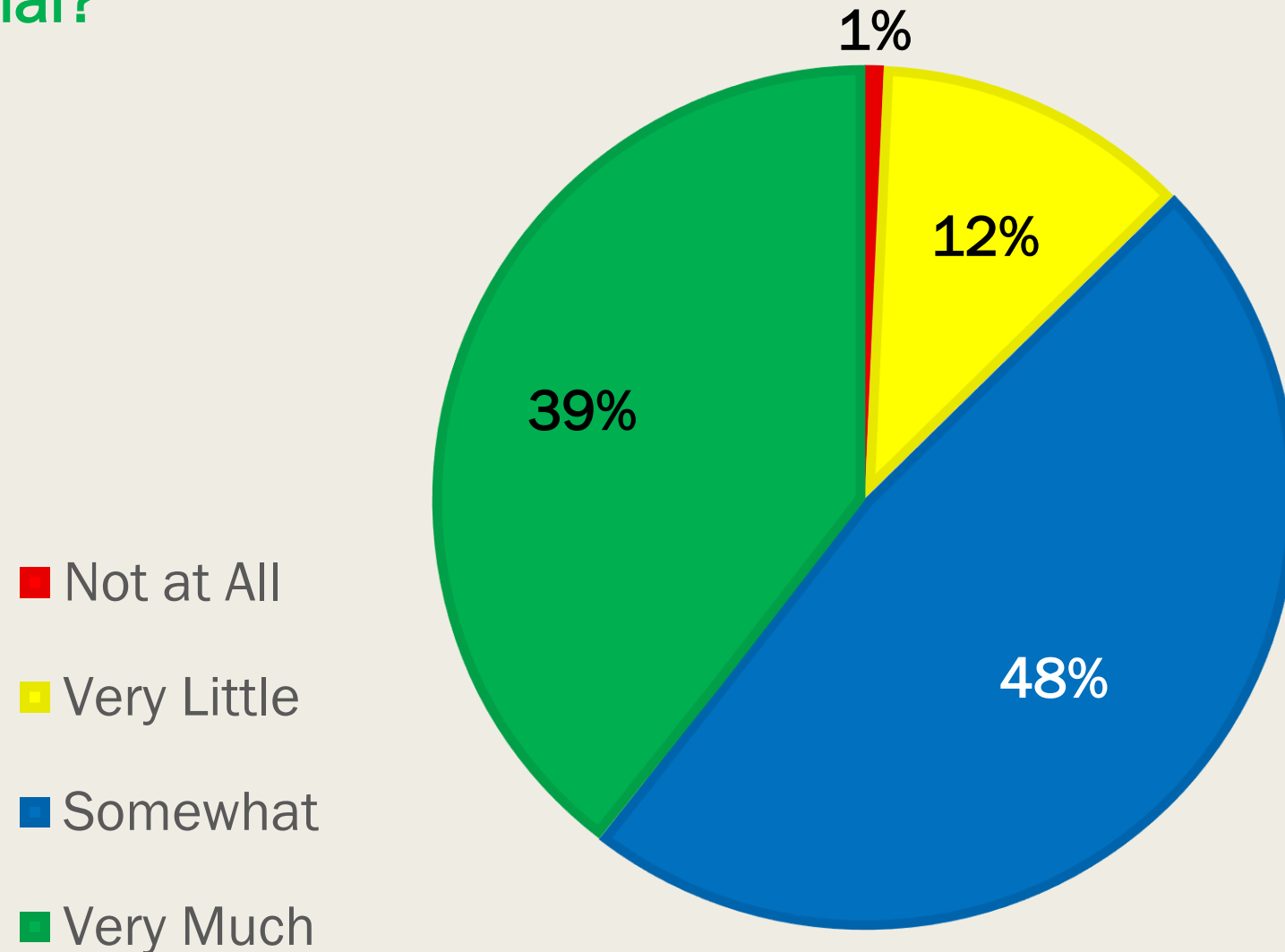
No statistical difference.

Students had quizzes only in the Fall 16 Semester.

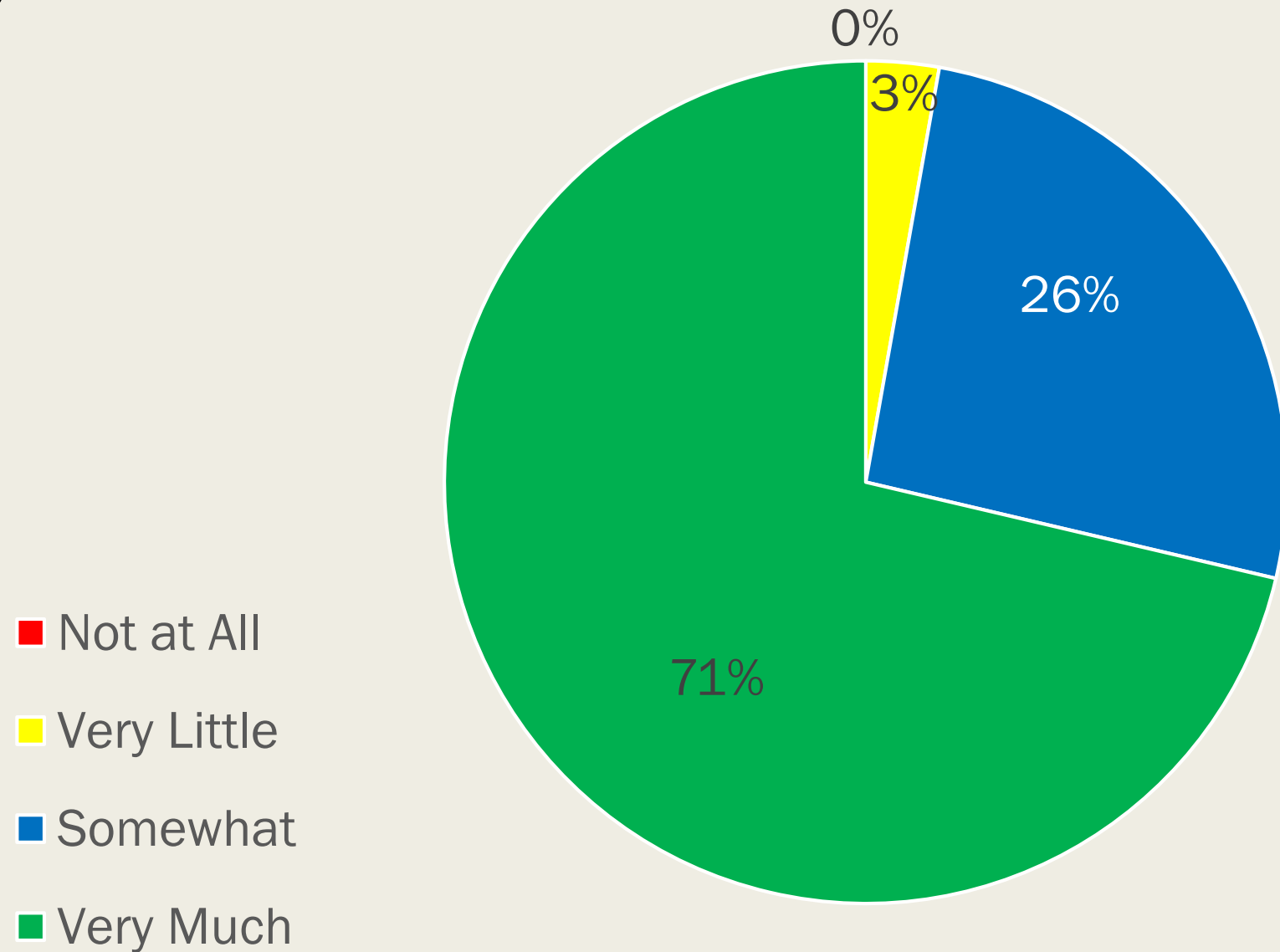
Treatment Group

Results from Spring Bio 60 Nutrition end of semester survey regarding student perception course structure and learning outcomes.

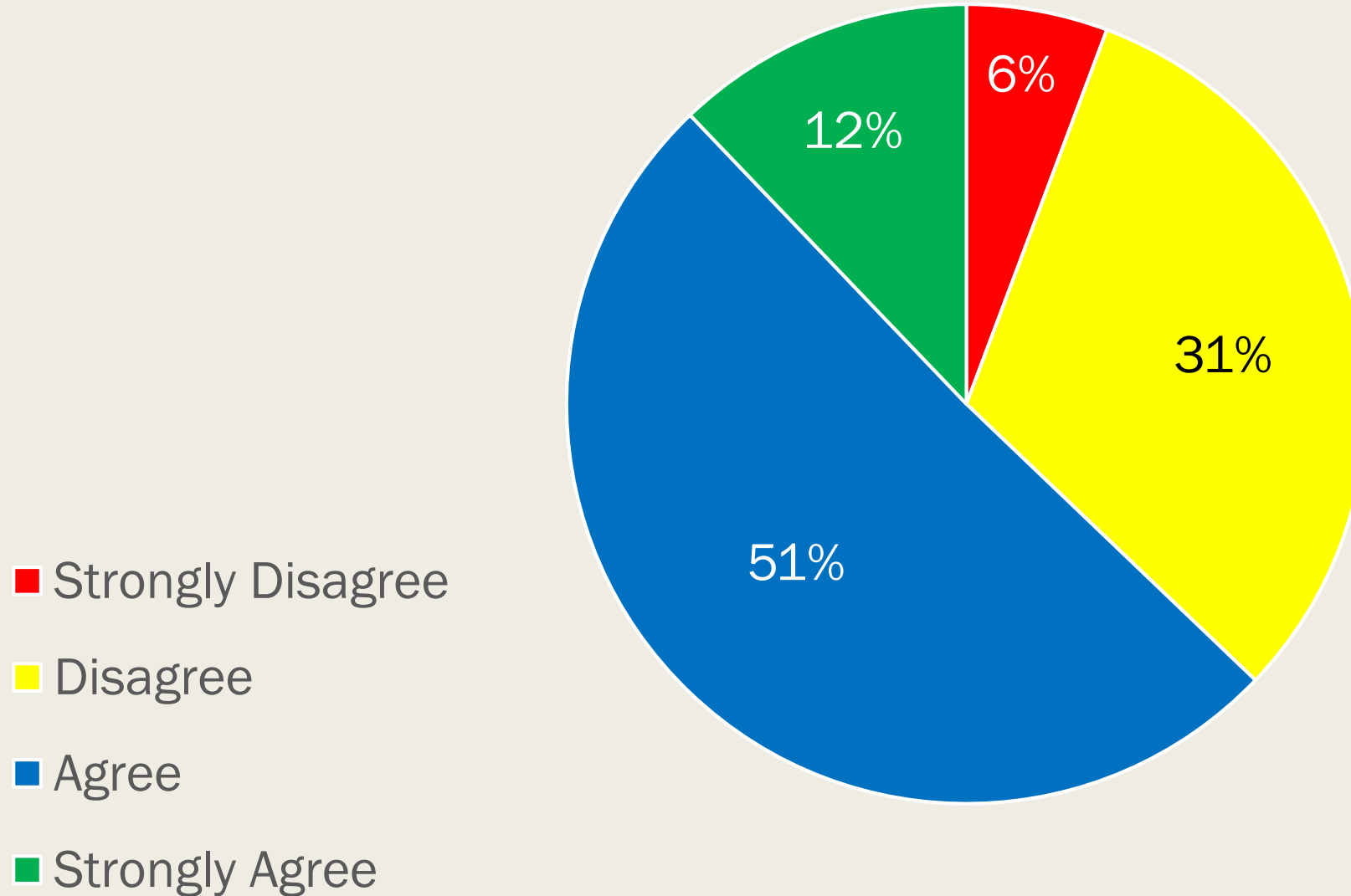
1. How much do you feel your discussion section contributed to your overall understanding of the course material? **Should have been phrased “ How helpful were the class discussions to your overall understanding of the course material?”**



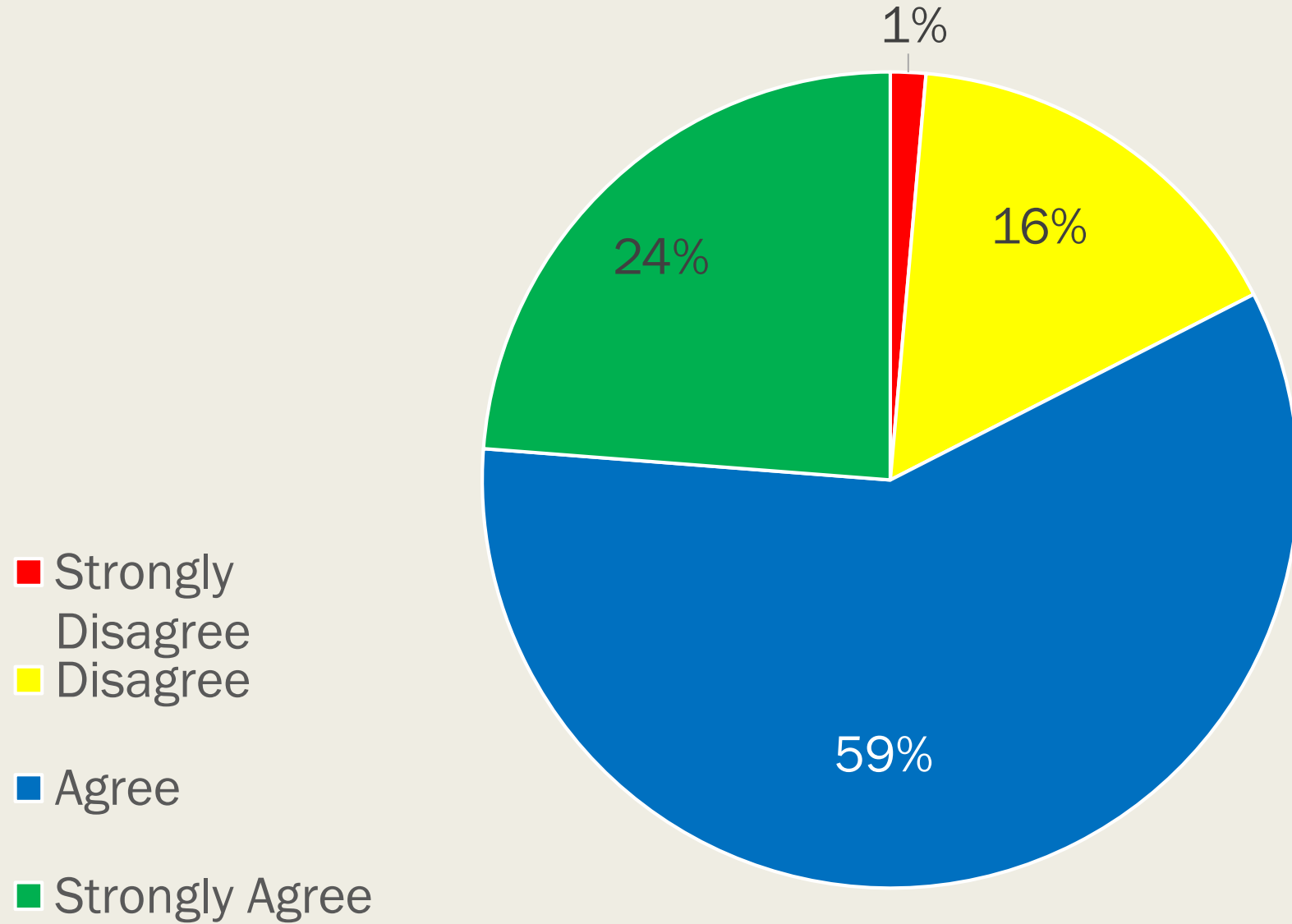
2. How much did the Connect homework contribute to your overall understanding of the course material?



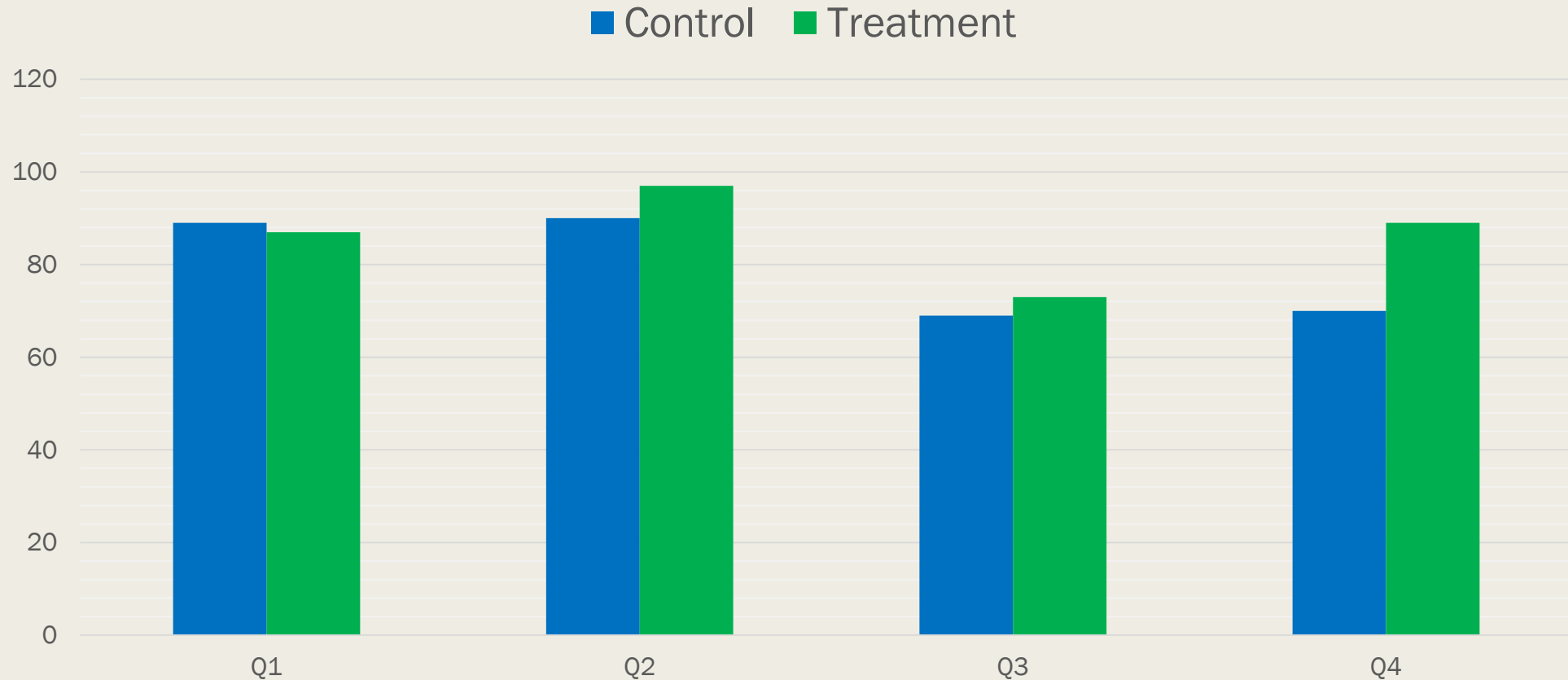
3. Do you feel taking weekly **quizzes** would have increased your exam grades? How helpful would weekly quizzes have improved your overall exam success?”



4. The **activities** provided in discussion sections helped to increase my exam scores.



Comparison of Control and Treatment Group Question Responses



1. How much do you feel your discussion section contributed to your overall understanding of the course material?
2. How much did the InQuizitive homework contribute to your overall understanding of the course material?
3. Do you feel taking weekly **quizzes** have increased your exam grades? Or would have.
4. The **activities** provided in discussion sections helped to increase my exam scores.

Analysis: The data suggests that although there was not a significant difference between the 2 test groups, the Bio 60 class without the weekly quizzes earned slightly lower scores on their final exams.

59% of the Bio 5 students felt that the weekly quizzes helped improve their final exam score, while **63%** of the Bio 60 students felt that weekly quizzes would have improved their scores.

70% of the Bio 5 students felt that the class activities helped increase their final scores while **83%** of the Bio 60 students felt that the class activities helped increase their scores.

It appears that the perception of the students is that weekly quizzes will help assist in their learning process although the test data does not support that perception.

Conclusion

It appears that more data needs to be collected to further clarify this question, but in the mean time, more quiz opportunities will be added during lecture as to leave sufficient time for active learning.

Citations:

Gholami, V., (2013). The Effect of Weekly Quizzes on Students' Final Achievement Score. *I.J. Modern Education and Computer Science*. Vol. 1, 36-41.

Haberyan, K., (2003, Feb) Do Weekly Quizzes Improve Student Performance on General Biology Exams? *The American Biology Teacher*. Vol. 65, Issue 2, pg(s) 110-114. Retrieved from [https://doi.org/10.1662/0002-7685\(2003\)065\[0110:DWQISP\]2.0.CO:2](https://doi.org/10.1662/0002-7685(2003)065[0110:DWQISP]2.0.CO:2).

Weimer, M., (2017, Feb). Do Quizzes Improve Student Learning? A Look at the Evidence. *Teaching Professor Blog*. Retrieved from <https://www.facultyfocus.com/articles/teaching-professor-blog/quizzes-improve-student-learning>.