

# Impact of Course Section Sizes on Grading of Assignments

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## Abstract

Factors that improve student learning include student interaction with faculty members and feedback given to students through assessment processes. Larger class section sizes makes some of the assessment methods more difficult, including collecting and grading frequent homework assignments. A poll was conducted which validated the correlation between section size and rigor of assessment. However, faculty members indicated that they would add assessments to their courses that have higher enrollments if they had more resources for teaching assistants or graders. Therefore, larger class section sizes can implement frequent assessment if the faculty members are supported with resources.

## Introduction

Universities have a charge of educating students to lead fulfilling lives yet the institutions also need to balance their budgets. This can put pressure on offering courses with larger section sizes.

Faculty members faced with courses with large section sizes are sometimes challenged to deliver the course material in an effective manner. There are pressures on faculty members' time because they must also balance other aspects of their roles as professors such as research and committee work.

Factors that improve learning will be deliberated upon. Consideration of grading of assigned homework problems will be evaluated as a component of effective teaching methods. Large section sizes makes it more difficult to grade homework sets, but how strong is the relationship?

## Factors that Improve Learning

Teaching methods involve in-class and out-of-class learning. In-class learning is things done by the instructor in the classroom as part of teaching. Out-of-class learning is done by individual students or teams working on projects.

Knowledge that active learning improves memory has been known for a long time: “No reception without reaction, no impression without correlative expression,—this is the great maxim which the teacher ought never to forget. An impression which simply flows in at the

pupil's eyes or ears, and in no way modifies his active life, is an impression gone to waste. It is physiologically incomplete. It leaves no fruits behind it in the way of capacity acquired.”<sup>1</sup>

Therefore, class instructors must focus on getting students to think, whether in the classroom, or outside of the classroom. Recent research has supported these ideas in engineering education.<sup>2</sup>

How well must students learn the material? Students will remember the information based on how well they knew it by the end of the course. Harry Bahrick found that students who had learned Spanish remember it better 20, 30 and 50 years later depending on how well they knew it to begin with.<sup>3</sup> Fluency such as this requires that someone overlearn the material. It takes about 50% more time beyond initial learning so that something is overlearned.<sup>4</sup> This suggests that students need to have lots of practice. There is often inadequate time in the classroom to overlearn material, but that requires out-of-class work.

In-class techniques to get students to think are summarized in a book by McKeachie and Svinicki.<sup>5</sup> Chief among their recommended strategies is facilitating discussion and other forms of student interaction. By having the students speak up, they forced to summarize or apply the material. Large classes make discussion more difficult to organize and monitor, but not impossible with small group methods such as Turn to Partner.

McKeachie and Svinicki also summarize out-of-class methodology, including getting students to read the text, peer tutoring, and creating learning communities.<sup>5</sup> One assumption of any of these methodologies is that students need to be assigned these activities for them to do it. The average student likely wants to do the minimum work to earn the grade rather than overlearning.

Homework or projects assignments are an elementary component of out-of-class learning for engineering disciplines. Out-of-class assignments are by definition active learning, because a student needs to engage the material and apply it. A few previous studies have found a positive correlation between doing homework and achievement in a course.<sup>6,7</sup> Therefore, it is important to study the conditions such as class size that could impact collection and grading of homework problems.

There is a wide variety of expectations of faculty members at different Carnegie type Institutions. Faculty members at Research universities have higher expectations for research and grant writing. Faculty members at Comprehensive universities usually have a higher number of course sections to teach. Both groups likely have other responsibilities such as service or committee work. At each type of institution there is significant variability in class sizes from one course to another. These are all factors which could influence how much time a professor has to collect and grade homework problems.

## **Poll**

In order to determine the relationship between section size and number of assignments that are collected and graded, a poll was conducted among faculty members of Engineering & Science at the University of Detroit Mercy. The poll asked the respondents to list information about their largest course, such as course enrollment, whether assignments are collected and graded, and list of factors that control the number of assignments that are graded.

The poll stirred significant debate, but only elicited a response rate of 25%. Faculty members within the same institutions have significant variability in course section size. That can cause feelings of inequity. The poll and the debate surrounding it provided a means for expression of that feeling. This is particularly the case for faculty members who incorrectly believed that the purpose of the poll was to get the instructors with large section sizes to agree to grade more homework problems, and thus require them to work even harder.

## Results

The poll showed a significant relationship between course section size and whether assignments were collected and graded. See Figure 1. Other response options allowed for assigning homework, but only grading random problems. However, only a small number of faculty members chose this option, so it wasn't considered in the analysis.

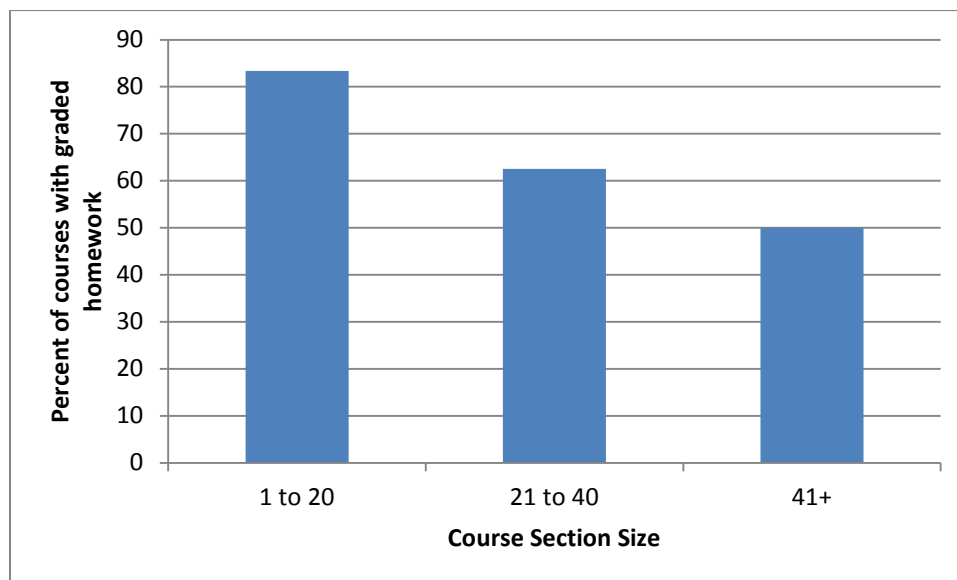


Figure 1. Relation Course Size to Grading Scheme

The results show that some courses with as many as 85 students had assigned homework that was graded. Also, some courses with less than twenty students had no homework. However, these results should not be taken as authoritative. Considering the debate around the survey and the resulting low response rate, it is possible that the instructors who responded were the ones that wanted to brag about putting the effort in to grading assignments. (The author was told by

one respondent that this was the case.) Therefore, the actual numbers may be much different. Additionally, these responses may be different at institutions with different Carnegie types because of varying work expectations.

The faculty members' written comments in the survey were informative. Workload was the primary reason cited for not grading all home work. This response is backed up by class-size correlation.

There were a couple comments about other assessments (e.g. quizzes) being more effective than home work. Those faculty members stated that homework assignments were ineffective assessment measures because of the potential for students to copy each other's work. Faculty members who said they were concerned with this issue said that they more heavily relied upon tests.

In order for an assignment to be taken seriously, it would need to have credit assigned to it. If a large number of students copied assignments, then that could impact whether students become proficient with the material. If the goal is to get the students to overlearn the material, then copied homework problems would not reach that goal.

The majority of all faculty members who replied that they did not grade home work because of workload issues said that having graders would make it more likely for them to require homework sets. Again, as mentioned above, some faculty members thought other assessment means were more appropriate, therefore having a grader would not impact the those courses.

Many faculty members commented that having graders would improve learning. The reasons included: more meaningful assignments, and getting the students to actually do the work rather than recommending it. The faculty members who regularly grade their homework also expressed that having a grader would improve the experience. Therefore, there are faculty members who feel that their students would benefit from assigning and grading more homework problems.

Other comments included: (paraphrased)

- 1) Even with graders, the faculty members need to stay engaged in the grading process.
- 2) Some courses are too complex for graders to be effective in.
- 3) Large classes may be too big for a single grader.

## **Conclusions**

Students learn material when they actively engage it. Some of this active learning happens in the classroom, especially when discussion is used. However, out-of-class work such as homework assignments is a significant means for student learning.

Students benefit when they are required to expend effort to overlearn class material. Faculty members are less willing to assign out-of-class work for classes with large section sizes partly because they do not have time to grade it. However, many faculty members realize the importance of homework assignments and would increase the number of graded assignments if they had help through paid graders.

Some faculty members were concerned that students would cheat if they were given out-of-class assignments. These concerns were not addressed in this paper. Providing a means to prevent copying of homework would improve the willingness of some faculty members require graded assignments.

Future work in this area will be to determine under what conditions students benefit most from assigned homework problems. As one respondent implied, if the students are not doing the homework themselves, then they do not gain from the assignment.

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