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Deadline Flexibility and the Effects on Assignment Resubmission Rates and Course Performance

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Deadline Flexibility and the Effects on Assignment Resubmission Rates and Course Performance

This complete research paper will present a model for offering students flexibility in assignment deadlines and the practical ramifications of enabling that flexibility on student performance in the course.

Background – It is generally acknowledged that students benefit from reviewing feedback and revising their work. It's also widely recognized that this kind of iteration is logistically difficult to implement and rarely occurs in engineering courses.

Purpose – The purpose of this paper is to describe the structure of a first-year Introduction to Graphical Communications course that provided deadline flexibility and the effects that flexibility had on students iterating on their work. The course was taught at a medium-sized, private, Business+STEM-only institution in the southeast United States.

Design/Method – The course was designed using the ILEARN flipped-classroom framework. The ILEARN framework divides course content into six components. (I)ntroduction lists the learning objectives of that module. (L)essons are theory-focused passive content with comprehension quizzes at the end. (E)mulates are worked examples with a think-aloud protocol where students are required to submit the emulated problem solution. (A)ctivities are akin to traditional homework assignments; new problems that can be solved using the tools and techniques demonstrated in the Lesson and Emulate tasks. (R)eflections are meta-cognitive reflection surveys. (N)ext Steps are an application of the content toward their final project. Out-of-class instruction is contained across the Lesson and Emulate tasks. In-class time is now spent in one-on-one or small group consultation to answer questions and help students move forward through the content. The flipped nature of the course enabled a more flexible deadline policy and removed the requirement for content lockstep. All assignments were given a recommended due date throughout the week. A hard deadline for each module was set 2 weeks after the Next Steps task's recommended due date. There was no grade penalty for submitting in this two-week window, but multiple nudges were in place to encourage students to submit their assignments by the recommended due date. Most notably, this 2-week buffer often enabled graders to provide feedback on work submitted on time and for students to revise and resubmit their work.

Results – On 50 unique tasks assigned to 90 students, there were 4352 total assignment submissions. Students averaged 1.05 submissions per task. The maximum number of resubmissions was 4 attempts. 56 of the students resubmitted at least one task throughout the semester.

Introduction

One of the most frustrating parts of teaching is that, as instructors, we seek to provide students with meaningful feedback on their work but, for a variety of reasons, students may not look at the feedback and are rarely given the opportunity to revise their work based on that feedback. We know that reviewing feedback and revising work is beneficial to learning, but we also suffer from the tyranny of content; there is always more material to cover, and we cannot continue to dwell on the old work when there is new work to be done. This often leads to course designs that limit the ability for students to iterate on their work.

Background

Deadlines can motivate students to complete tasks on time, but they can also create stress and anxiety, potentially leading to negative impacts on student performance and mental health. One study by Miller, Asarta, & Schmidt [1] found that flexible deadlines can have a positive impact on student performance. Their work is consistent with the findings of both Burger, Charness, and Lynham [2], and Bisin and Hyndman [3] who found that rigid deadlines can be harmful to student performance. Waller, Conte, Gibson, and Carpenter [4] identified how deadlines can be perceived differently and that for some, deadlines create a sense of urgency, which motivates individuals to complete their work.

Kappe and van der Flier [5] identified how student conscientiousness was a predictor for student success and that students lacking conscientiousness might be better served by having shorter deadlines. Conversely, longer deadlines can give students more time to plan, research, and write their assignments, which can lead to higher quality work and increased student understanding.

Peterson and Digman [6] explored rigid assignment deadlines (RAD) versus a semi self-paced (SSP) course design in a flipped classroom environment. While there were no differences in traditional learner outcomes (e.g., homework and exam scores, course grades), students in the SSP design were granted too much flexibility in their deadlines. SSP students only had two deadlines throughout the semester before each of the two examinations which led to students procrastinating and cramming.

Viswanathan and Charlton [7] found giving students opportunities for feedback and revision to lead to performance improvements in more generalized student visualization skills. Verleger and Diefes-Dux [8] found feedback and revision to be an essential component of student mathematical modeling skills. Feedback and revision have been a standard part of writing instruction for years [9]–[11], but the feedback-revision cycle is not as common in engineering courses.

The purpose of this paper is to describe a novel course design and the effect that a more flexible deadline policy that enables resubmission has on student performance.

Methods

Institutional & Course Context

This research was done in an Introduction to Graphical Communications (CAD) course at a medium-sized private institution in the southeastern United States. Enrollment in the course was 90 students spread across 4 sections. All sections received the same treatment.

Course Structure

The course was designed using the ILEARN flipped-classroom framework, a modular scaffolding framework co-developed by the author. The ILEARN framework divides course content into six weekly components described in Table 1. Two additional summative "-ed" categories (making it the ILEARNed framework) were added to incorporate the final project more fully into the course.

Table 1. ILEARN Components

Component	Description	Percent of course grade
Introduction	Learning objectives of the module	0%
Lesson	Theory-focused passive content with automatically graded quizzes at the end of the content.	10%
Emulate	Long-form video showing worked example problems using a think-aloud protocol. Students are required to submit the emulated problem solution.	20%
Activity	Akin to traditional homework, these are new problems that can be solved using the tools and techniques shown in the emulate and lesson content.	30%
Reflection	Self-reflective survey about the students' learning.	3%
Next Steps	Project mini-milestones aimed at continually moving their project forward. Often tangentially aligned with the content being covered in the module.	12%
evaluation	Larger draft project milestones	4%
demonstration	Final project submission	20%

Out-of-class time was meant to be spent reviewing the instructional content presented through the Lesson and Emulate tasks. In-class time was primarily spent in one-on-one or small group consultation to answer questions and help students move forward through the content. The start of each class included 2-3 minutes of announcements and context setting, but minimal content coverage. Students were encouraged to use class time in whatever manner was most beneficial to

them, including possibly studying for other courses they are taking, but that it was also a time when dedicated help was available for them to get course-related questions answered.

Deadline Policy

The flipped nature of the course enabled a more permissive deadline policy and removed the requirement for content lockstep. All assignments were given a recommended due date throughout the week. A hard deadline for each module was set 2 weeks after the Next Steps task's recommended due date. All EARN tasks were due by this date. Lesson quizzes were graded automatically, so students were given all semester to complete those tasks. There was no grade penalty for submitting in this two-week window. A visual representation of one module's timeline is shown in Table 2.

Table 2. ILEARN Deadline Model

Week #	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.
X	Lesson		Emulate		Activity	Reflection	Next Steps
X+1							
X+2							Hard Deadline for all EARN tasks

Multiple nudges were in place to encourage students to submit their assignments by the recommended due date. First was that Canvas would enter an automatic 0 on any assignment once the recommended due date had passed. This 0 would negatively affect their projected course grade until the assignment was graded and the 0 was replaced with a proper evaluative score. The second nudge was that attendance was optional if students had submitted all the Lesson, Emulate, and Activity tasks due in the 7 days prior to class. Attendance counted for 1% of the course grade and was re-calculated at the end of the term to reflect students "attending" if they were not required to be in class on a particular day.

The third nudge was a color-coding on the course webpage. The author developed a Canvas LTI plugin named Altimeter to display the course task list with color-coding by due date. Tasks due in the future were colored various shades of green, while tasks for which the due date had passed were coded shades of yellow, orange, and red. Tasks that have been submitted appear in light blue. A screenshot is shown in Figure 1. Based on anecdotal feedback, for some students, the yellow/orange/red coloring was a strong motivator to submit their work, but also provided a quick indicator of what they needed to be working on. The LTI plugin also included a column showing the class's submission percentage for a particular assignment. This enabled students to see how much of the class had already completed that work.

Legend

>7 days left	3-7 days left	<3 days left	<3 days past	3-7 days past	>7 days past
Task Submitted			No Due Date		

WEEK 01 - INTRODUCTION, LETTERING, LINE TYPES, READING DRAWINGS

NAME	STATUS	DUE DATE	AVAILABLE UNTIL	CLASS SUBMISSION RATE
Lesson - Week 01 - (1/5) Lettering	graded	Mon, Aug 29, 07:59 PM	Wed, Dec 7, 11:59 PM	100%
Lesson - Week 01 - (2/5) Engineering Drawings	unsubmitted	Mon, Aug 29, 07:59 PM	Wed, Dec 7, 11:59 PM	99%

Figure 1. Color Coded Task List

Finally, the 2-week submission window often enabled graders to provide feedback on work submitted on time and for students to revise and resubmit their work. Students were told that this was on the grader's schedule and ability, and that the graders may not be able to get feedback in time for resubmission.

Grading

Lesson and Reflection tasks were automatically graded by the Canvas LMS. Grading of the Next Steps, Evaluation, and Demonstration tasks was done by the instructor. Grading of all but four of the Emulate and Activity tasks were completed by one of the four undergraduate TAs for the course. Each assignment was generally graded by a single grader using a rubric. The four tasks not graded by the graders were graded automatically by Canvas as a quiz activity that could be retaken multiple times.

24 Emulates were graded on a 10 point Excellent-Very Good-Good-Fair-Poor scale based on how well the submitted work emulated the content in the video. The average score on submitted Emulate tasks was 9.55/10.

26 Activity tasks were graded based on an outcomes-based rubric, with each assignment being evaluated on between 2 and 11 generalized course outcomes (median 6 outcomes). Each outcome was worth 10 points. The average score on submitted Activity tasks was 93.8%.

Results

Assignment Resubmission Rates

Considering only the Emulate and Activity tasks graded by the graders, there were 50 tasks. Of those 50, 38 had at least some of the submissions graded before the hard deadline. Across those 38 assignments, there were 4352 total submissions (4178 first attempts, 144 second attempts, 24 third attempts, 6 fourth attempts). The breakdown of submissions is shown in Table 3.

Table 3. First Attempt Assignment Statistics

Total 1st Attempt Submissions: 4178	Students received 100% on the assignment (i.e., they had no reason to resubmit)	Students received less than 100% on the assignment.
Feedback was given before the hard deadline (i.e., students could resubmit based on the feedback)	1638 39.2%	869 20.8%
Feedback was not given before the hard deadline (i.e., students were unable to resubmit based on the feedback)	852 20.4%	819 19.6%

Of the 869 who received less than 100% on the assignment and received feedback before the hard deadline, 725 (83.4%) accepted a score lower than 100% on the assignment and did not resubmit a 2nd attempt. 144 (16.6%) resubmitted their assignment a 2nd time. The breakdown of submissions is shown in Table 4.

Table 4. Second Attempt Assignment Statistics

Total 2nd Attempt Submissions: 144	Students received 100% on the assignment (i.e., they had no reason to resubmit)	Students received less than 100% on the assignment.
Feedback was given before the hard deadline (i.e., students could resubmit based on the feedback)	76 52.8%	49 34.0%
Feedback was not given before the hard deadline (i.e., students were unable to resubmit based on the feedback)	12 8.3%	7 4.9%

Of the 49 who received less than 100% on the assignment and received feedback before the hard deadline, 25 (51.0%) accepted a score lower than 100% on the assignment and did not resubmit a 3rd attempt. 24 (49.0%) resubmitted their assignment a 3rd time. The breakdown of submissions is shown in Table 5.

Table 5. Third Attempt Assignment Statistics

| Total 3rd Attempt Submissions: 24	Students received 100% on the assignment (i.e., they had no reason to resubmit)	Students received less than 100% on the assignment.
Feedback was given before the hard deadline (i.e., students could resubmit based on the feedback)	12 50.0%	6 25.0%
Feedback was not given before the hard deadline (i.e., students were unable to resubmit based on the feedback)	4 16.7%	2 8.3%

Of the 6 who received less than 100% on the assignment and received feedback before the hard deadline, 4 (66%) accepted a lower score than 100% on the assignment and did not resubmit a 4th attempt. The two resubmissions for a 4th attempt both received 100% and were given that feedback before the hard deadline.

Regrade Effects on Assignment Scores

Of the 170 total regrades (2nd – 4th submissions), assignment scores went up an average of 20%. 28 of the 170 (16.5%) submissions saw the grade stay the same (26/28) or decrease (2/28), meaning that the feedback did not have a positive effect.

Task Resubmission Participation Rates

Of the students who resubmitted at least 1 task, most students only resubmitted 1 or 2 tasks, while 2 students resubmitted eight of the 50 total tasks. The distribution is shown in Figure 2.
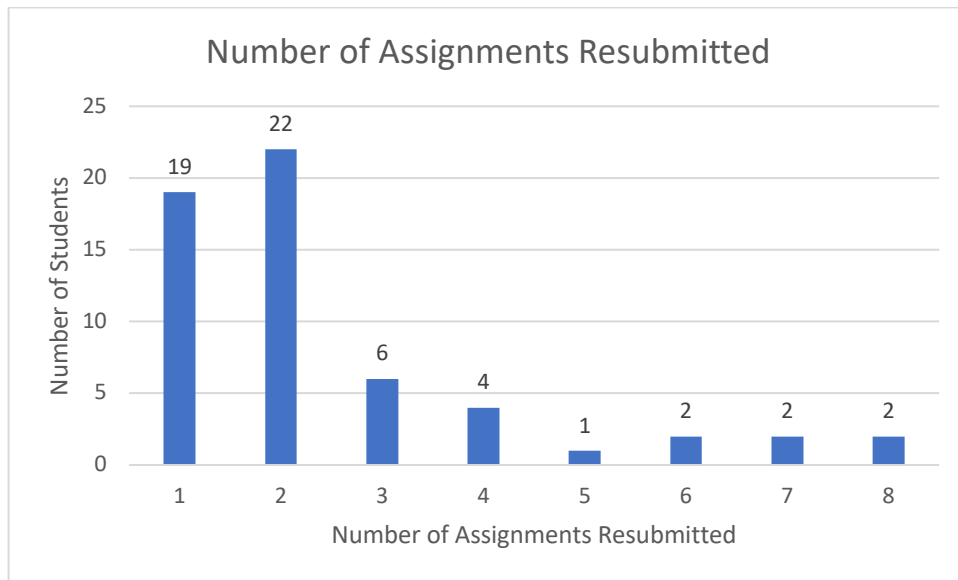
Figure 2. Resubmission Participation Rates

Regrade Effects on Overall Course Grades

Submitting a final project is typically an indicator of who has given up trying to pass the course. Often students will stop trying to pass (i.e., not submit work or attend class) but not drop the course due to needing to maintain enrollment in a minimum of 12 credit hours to be considered full-time students. These students almost universally receive an F in the course. Table 6 shows the breakdown of students who resubmitted at least one assignment versus the students who submitted their final project.

Table 6. Resubmission Rates vs. Project Submission Rates

N = 90	Resubmitted at least 1 assignment	Resubmitted no assignments
Submitted a final project	54 (60%)	29 (32.2%)
Did not submit a final project	2 (2.2%)	5 (5.6%)

For those students who submitted a final project, there was no significant difference in the final course grade of those that resubmitted an assignment versus those that did not. Further, the effect of reviewing feedback and resubmitting revised tasks based on the feedback had only a small effect on final course grades. Course grades were recalculated based on the grade received on the first submission students made and the average course grade only increased 0.552% (range: 2.274% to -0.099%[1]) because of regraded work. Only 2 students received a higher course letter grade as a result of being able to resubmit their revised work.

Conclusions

The most valuable conclusion for faculty who may consider adopting this type of deadline structure is that empowering students to resubmit their work can be done in a way that does not drastically increase grader workload but that still encourages students to review their feedback. Of the 4352 total submissions, only 174 (4.0%) were regrades. By giving students a longer submission window and not guaranteeing that all assignments will receive feedback in time to make revisions, students make each submission meaningful. They cannot view the opportunity to potentially resubmit their work as a trial-and-error cycle between them and the grader.

The other key finding is that allowing regrades may not necessarily drastically increase student grades, particularly when using outcomes-based assessment. Faculty may be concerned that students could use regrades to boost their overall grade to a level that does not reflect their knowledge of the course material. This should not be a significant concern.

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[1] One student only resubmitted 2 Activities and received a lower score on one of those two activities, resulting in a small net decrease in final course grade due to regrades.

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