

Engaging Students with Extra Tasks: Motivational Design and Student-Generated Improvements

Ilya Musabirov¹, Joseph Jay Williams¹

¹ University - University of Toronto, Toronto, Ontario, Canada

Abstract

Online courses have become increasingly popular in recent years, providing students with the flexibility to learn at their own pace and from any location. Optional activities, such as practice problems or additional readings, are commonly included in these courses to provide students with additional opportunities for learning. However, previous research has shown that students often elect to skip these optional activities, despite their potential benefits for improving learning outcomes. Providing students with motivational text prompts as they solve optional practice problems as the potential to engage students and encourage them to continue to pursue more activities. In this work, we leveraged messages that rely on motivational theories, such as explaining how solving additional problems will benefit student learning. We also asked students to provide their own motivational reasons to pursue additional and optional problems, which can then be used as motivational prompts for future courses.

Keywords

Learnersourcing, Motivation, Nudges

1. Introduction

Engaging students with optional additional activities is one of the crucial success factors in choice-rich learning environments. Thus, if we assume these activities have a potentially positive effect on learning, engaging students with them becomes a significant underlying factor for them to have an effect. If a student does not choose to perform the activity, they are missing valuable opportunities. While the benefit of having students participate in activities is supported, they can not always be made mandatory. For instance, one might include optional activities in their online course to allow students a choice in what material they use to practice. Additionally, optional activities allow students who might have more time or motivation to pursue additional practice opportunities.

Interventions based on motivational theories [9] can come to the rescue, encouraging students to pursue these optional activities. We propose applying the ideas behind educational psychological interventions to create just-in-time interventions that are triggered straight at the decision points with a focus on stimulating students' engagement with extra activities.

In this paper we briefly describe our approach to design of extra task nudges, reflect on learnersourced student improvement ideas for them, outline open questions for students' engagement with learnersourcing, and discuss implementation efforts.

2. Designing Extra Tasks Nudges

To stimulate student engagement with extra activities, we created a factorial mechanism generating nudges in text prompt format (Fig. 1), emphasizing the potential benefits of engaging with the activity from the standpoint of different motivational theories and behavioral science techniques [4, 5, 10]. These types of prompts encourage students to take the extra time and participate in these different

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EMAIL: imusabirov@cs.toronto.edu (I. Musabirov); williams@cs.toronto.edu (J. Williams)



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optional activities. Leveraging the motivational theory, they can include the benefit of students participating in these activities, citing how it can help their learning.

Procrastination and bad time management are common problems stopping students from achieving great results

Solving another problem will help you to:

- train your brain to become better at programming problems
- see how to apply programming to real-life contexts

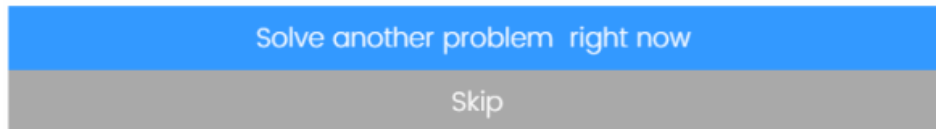


Figure 1: An example of a text prompt that serves as a nudge to prevent student procrastination.

3. Students' Ideas of Better Messages

We followed up with an end-of-term survey, asking students to reflect on nudges' utility and propose better messages to get them to attempt another problem. Fig. 2 shows keywords from top frequency skip-grams (two-word sequences with 0–3 words in between) of student message ideas. Using that as a high-level map to navigate the text corpus by looking at keywords in context [2], we can outline the most frequent student ideas

These ideas are connecting motivation to:

- providing extra credit or bonus marks to stimulate optional activities
- the benefits of better understanding course concepts and content
- the benefits provided by regular practice
- a chance to be ready for similar problems in other assignments and exams

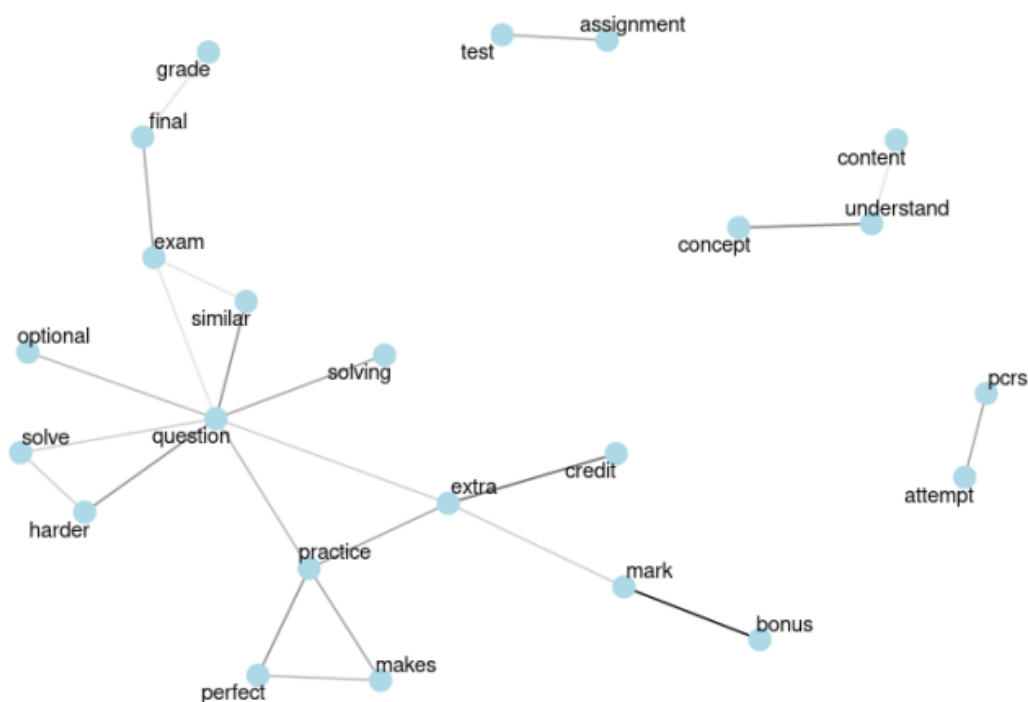


Figure 2: Skip-grams of student proposed prompt improvements.

While the last three ideas rely on the same motivational factors as the original nudges design, students helped generate new ways of representing them, referring to enactment mechanisms and outcomes they see as important. In the next iteration of our study, we plan to test these ideas on the next student cohort together with the effect of framing them as student advice.

4. Relevant Questions for Learnersourcing

During the research phase, motivational or instructional intervention activities are often tested without direct competitors for students' attention in the intervention group. However, during production deployments in online and blended environments, these activities, e.g. learnersourcing activities, extra problems, and reflection exercises, often compete with what the instructors feel is "the core content," maladaptive behaviors [8], and other direct and indirect competitors.

This underlines the importance of finding ways to engage and sustain students' engagement with learnersourcing and other optional activities. Many interventions based on traditional theories of student motivation [9] were tested in the traditional intervention format, where part of the potential effect relies on students' monopolized focus on the intervention during a relatively long period.

Meanwhile, decisions to engage in extra activities are often situationally motivated [5] and do not provide an opportunity to use full-scale interventions. The format we propose borrows from rich behavioral science research on nudges and allows us to create just-in-time micro-interventions integrated into the fabric of the everyday learning process.

Thus, we follow the recent turn to situational motivation theories [5,9], but inherit the need to answer the open questions both from this turn and from research on nudges, namely:

- What specific constructs we nudge for [5]?
- How to take into account different susceptibility of students to nudges [3]?
- Do we need to and how to provide personalized ways of students' engagement and adaptivity [1, 7]?
- What are the limits, cumulative and long-term effects [5] of repeating micro interventions or combinations of traditional interventions and supporting nudges?

5. Towards Implementation Efforts

The motivational text prompts we served to students in this work were in-the-moment, as they went about solving problems in their online courseware. Many digital courseware platforms can make use of these messages, such as adding in a purely text-based "questions" to students as they complete practice problems or even a quiz, encouraging them to keep going and putting forth their best effort. Outside of these in-the-moment interventions, motivational prompts can be leveraged before or after the problem solving process.

For instance, before student embark on a set of problems, such as a summative quiz at the end of a unit, they could be prompted to read such a motivational message before beginning. This extra motivation before engaging with the activity could increase their engagement with it, potentially leading to better outcomes. When the activity is optional, such as a learnersourcing one that has students generated a multiple-choice question, motivational prompts before the activity can potentially increase student participation. These tasks are typically quite daunting and potentially time consuming for the students, thus a motivational prompt prior to engaging with it could give the student the extra push needed to elect to participate in it.

Further tailoring of these motivational messages to the students can also increase the potential effect they have in encouraging the students to participate in optional activities [8]. Using an adaptive algorithm, such as multi-armed bandits, could enable an online course to begin with multiple motivational prompts that the course authors believe will be effective. Then as students go about working on the course and receiving these different prompts, the algorithm could identify which

motivational messages seem to work the best for certain students, based on factors such as their prior knowledge level measured by previous assessments in the course. Depending on these student factors, a different motivational message might then be shown to a student to encourage their participation with optional activities.

6. Conclusion

In conclusion, the use of text-prompts to engage students in optional activities that rely on different motivational theories and behavioral science techniques can be effective at encouraging students participation. As students work through optional problems in an online course, a simple motivational prompt that encourages them to continue and states how this practice benefits their learning can lead to a student completing more of these optional activities. In regards to learnersourcing, students can be asked to contribute their own motivational reasons for participating in optional activities, which can then be leveraged for future prompts. We found that when we polled students for these ideas, many of their contributions related back to our original message intent, which relies on highlighting the learning benefit for solving additional practice problems. Future work can look to leverage adaptive algorithms that allow for more variety in the motivational prompts that can be served to students and potentially identify which motivational messages might work best for certain students.

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