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Improving Student Outcomes in Online Learning

A behavioral approach

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About ideas42

We're a non-profit looking for deep insights into human behavior—into why people do what they do—and using that knowledge in ways that help improve lives, build better systems, and drive social change. Working globally, we reinvent the practices of institutions, and create better products and policies that can be scaled for maximum impact.

We also teach others, ultimately striving to generate lasting social impact and create a future where the universal application of behavioral science powers a world with optimal health, equitable wealth, and environments and systems that are sustainable and just for all.

For more than a decade, we've been at the forefront of applying behavioral science in the real world. And as we've developed our expertise, we've helped to define an entire field. Our efforts have so far extended to 40 countries as we've partnered with governments, foundations, NGOs, private enterprises, and a wide array of public institutions—in short, anyone who wants to make a positive difference in peoples' lives.

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EXECUTIVE SUMMARY

Online learning plays a growing role in postsecondary education, through online courses offered by colleges and universities, online professional development offered by employers, as well as MOOCs (Massive Open Online Courses) available to the general public. While online learning has enormous potential to improve postsecondary access, affordability, and success, online courses too often fail to enable students to complete courses and develop the knowledge and skills they need. Research shows this is especially true for students with less academic preparation and lower academic performance.[1]

Because online education is still in an early stage, not all of its strengths, weakness, and opportunities for improvement are fully understood. But one opportunity for improvement is already apparent: the student experience in most online courses can be meaningfully enhanced using evidence-based behavioral design to eliminate or ameliorate behavioral barriers that undermine student learning. Students encounter behavioral barriers throughout the online learning experience, and though these obstacles may seem small or adjacent to learning, they can have an outsized effect on outcomes.

This white paper is not meant to be an exhaustive list of how to improve online education, or even a complete collection of possible enhancements using behavioral science. Rather, it is a tool that identifies relatively simple, quick ways to use behavioral science that is supported by our own behavioral investigation into online learning, as well as by evidence in the literature about how humans make decisions and do or do not follow through on those decisions.

We recommend four behavioral solutions that educators and course designers can use to address behavioral barriers, leaving students with more time, energy, and attention to devote to the substance of the course and to realize the potential of online learning.

1. **Encourage goal setting** to strengthen students' motivation and translate it into concrete, measurable steps. This helps keep students engaged and on task in the absence of the structure and in-person contact that enhance motivation in traditional courses. Effective goals should be realistic but challenging, achievable through education, set by students, and attainable through a clear course of action.

2. **Prompt students to plan**, laying out a sequence of the interim steps required to achieve their goals. Effective plans should be concrete and granular, breaking down larger tasks into discrete intermediate steps and specifying how and when tasks will be completed. Plans should also estimate the amount of time required and consider obstacles that are likely to arise.

[1] Bettinger and Loeb, 2017

3 **Eliminate hassles** in the user interface and process flow, and provide assistance to help students overcome hassles. Even small hassles—like a confusing instruction, an unnecessary step in the process, or a minor technical glitch that delays progress—can knock students off the path and ultimately keep them from completing a course.

4 **Help students manage attention** by repeating key information, reminding them about required tasks at the right moments, and providing tools to help them block out distractions when completing coursework.

INTRODUCTION

Online learning plays an important and growing role in the landscape of postsecondary education. Colleges and universities frequently offer online courses and learning resources to their students; in fact, a third of college students today take one or more online courses.[2] Employers commonly offer professional development and training opportunities through online courses. The availability and enrollment in Massive Open Online Courses (MOOCs) has also grown exponentially. As of 2015, over 35 million people had signed up for at least one MOOC and in 2016 more than 4,200 MOOC courses were available.[3] Though they are no longer the "new new thing," the availability of MOOCs has continued to grow.

Online learning is appealing and increasingly popular because it offers convenience to students, educators, and employers and it can be delivered at scale for a low cost. Its availability coincides with growing numbers of non-traditional students, as well as increased access to high-speed internet. All of this suggests that the growth of online learning is likely to continue. It also suggests that online learning has great potential to increase access to low-cost, quality education for millions of people. But that potential will only be reached if online learners actually complete courses and develop knowledge and skills through them. Unfortunately, many of these potential benefits of online education remain unrealized.

While course completion is somewhat low throughout postsecondary education, the problem is worse online. MOOCs have particularly low completion rates, generally ranging from 5-12%.[4] Online versions of traditional postsecondary courses sometimes fare better than MOOCs, but they also suffer from generally poor completion rates and student performance compared to in-person courses.[5] This represents an enormous lost opportunity for students who enroll, not to mention for colleges, educators, funders, employers, course providers, and others. The current low levels of course completion and student performance in online courses are not an inevitable result of difficult content, lack of preparation, or insufficient student commitment. Rather, these outcomes are driven in part by a combination of inherently challenging but improvable aspects of the online learning context, and insufficient use of insights from behavioral design to better support students in simple but important ways.

The online learning context creates unique barriers to student engagement, which can make learning and course completion more difficult.[6] One example of this can be found in arguably the core feature of online learning: its flexibility. Intuitively, flexibility seems like it should help students by allowing them to do the work, learn the material, and complete the course at their

[2] Allen and Seaman, 2016

[3] Shah, 2015

[4] Perna et al. 2014

[5] Jaggers et al. 2013; Bettinger and Loeb, 2017

[6] Terras and Ramsay, 2015

own pace and from anywhere—and indeed it does, which creates enormous potential. However, flexibility also introduces more opportunities for procrastination, leading students to defer work until the last minute or fail to complete assignments altogether because the urgency of traditional course deadlines is reduced. The result is that the same flexibility that makes online courses more accessible to more students also makes these courses more difficult to complete.

Online learning includes many such "behavioral barriers"—subtle obstacles that make it harder for students to follow through on their intentions and complete a course. Behavioral barriers may appear minor, but they often have outsized impacts on our actions. In the online learning environment, behavioral barriers stem not only from flexible course structure and pacing, but also from the solitary and remote nature of the learning experience, challenges in user interfaces, and other aspects of online courses. Barriers are present to varying degrees in nearly all online courses, and they contribute to poor course completion rates and student outcomes.

Applied behavioral science and behavioral design offer a proven and cost effective way to address many of the challenges in online learning. Behavioral science offers a unique set of analytical tools to understand human behavior and in what circumstances people are likely to make (or not make) certain decisions and take (or not take) certain actions. It reveals that the circumstances in which we operate play a large role in shaping our behavior. As a result, shaping the context is often a powerful lever for influencing outcomes by helping people follow through on their intentions. Behavioral science research has unpacked these influences on human behavior and can provide strategies for adapting or redesigning programs, products, and policies to better align them with human tendencies.

This paper recommends four solutions to address common behavioral barriers in online learning: (1) encourage goal setting, (2) prompt students to plan, (3) eliminate hassles, and (4) help students manage attention. These solutions set up students to devote their time, effort, and attention more fully and more effectively to the substance of online courses, rather than being undermined by a range of behavioral bottlenecks. The remainder of the paper explores each of these four recommendations in depth and concludes with a discussion of the way forward for educators, course designers, and others seeking to improve online education.

ENCOURAGE GOAL SETTING

Why set goals?

In-person classes have a number of contextual features that help keep students on track. Students are continually exposed to visible social cues for completing out-of-class work on schedule, attending lectures, and being engaged in the classroom. The classroom setting itself reminds students why they are there, and seeing other students engage and progress through the course can be a powerful motivator for students to persist when coursework is challenging and they are stretched with other obligations. These features reinforce social norms (see box) for continually devoting time, attention, and energy to the course.

The behavioral science of motivation and goal setting

In the absence of a context where social norms and expectations can be observed—like an in-person classroom—students' internal motivation to complete a task is particularly important. However, even strong motivation is easily undermined by present bias, our general tendency to weight the immediate costs of hard work more heavily than the future benefits. ***Present bias*** leads us to avoid small immediate costs (such as the effort and tedium of doing school work) even when they would produce much larger gains in the future (such as greater economic security, career advancement, and pride in our achievements).[7]

Goal setting can be an effective way to combat present bias and maintain motivation. When we clearly articulate our goals they become more salient, which increases motivation. Periodically returning attention to our goals helps us sustain the effort required to complete the tasks needed to achieve those goals. It can also increase our capacity to persist in the face of challenges.[8]

Firsthand information to establish and reinforce social norms is weak or absent in most online-only learning contexts, which by their nature are generally solitary. In addition, the lack of structure in most online courses creates an environment that is more flexible but less conducive to "pulling" students through the course. Without a conducive context, students must exert greater individual effort to progress through an online course.

The struggle is compounded by present bias, which can cause students to focus on the immediate costs, in time and effort, of each step the course requires, to the detriment of larger but far-off future benefits from advancing one's education. Most students in online settings are working toward something, but their goals may not be vivid, concrete, or clearly articulated enough to over-

[7] O'Donoghue and Rabin, 1999

[8] Locke and Latham, 2002

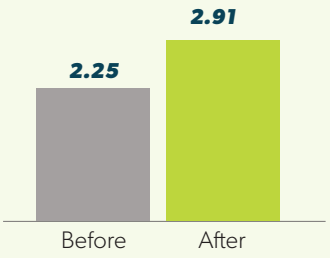
come the lack of social norm reinforcement in-person courses offer. Students who lack clearly articulated goals are more easily thrown off track by setbacks.[10] Across postsecondary education, older students, part-time students, and non-degree-seeking students are particularly vulnerable to falling off track, and they persist at lower rates than peers who are more traditional students.[11] These student groups are heavily represented in the online learning context.

Goal setting is a tool to help students harness and strengthen the motivation that led them to enroll in an online course in the first place. It has been proven to work in a wide range of other contexts,[12] including traditional postsecondary education (see box). ***Articulating clear and concrete goals for what they hope to achieve through the course helps students direct greater attention and effort to the hard work needed to achieve their goals. Reminders of goals help keep students engaged and call attention to what they are working toward, improving their ability to persist in the face of challenges.*** By ensuring that goals remain at the top of students' minds, reminders help them stay on track absent the social cues from instructors and peers that a physical classroom setting offers.

» Goal setting for struggling university students[9]

University students with low grade point averages (GPAs) were guided through an eight-step goal setting program in which they set specific, personal goals and developed detailed strategies for achievement. The exercise led to increases in students' GPA and likelihood of maintaining a full course load (both significantly different from a control group that did not engage in goal setting).

GPA before and after goal setting program



Features of effective goals

Different types of goals have different and often complementary effects on motivation and achievement. Goals typically fall into one of four categories.

Mastery goals are longer-term and focused on learning outcomes and refining a skill or competency, like speaking a second language. Task-based goals focus on concrete actions, such as completing a homework assignment. Performance goals focus on one discrete achievement, such as earning a particular grade on an exam. Lastly, effort goals are framed around what one does rather than what is accomplished, like "study more" or "work hard."[13]

» Task-based goal setting in an introductory course[14]

First-year university students were prompted to set goals at the start of a course that were either performance-based (course grades) or task-based (number of practice exams they would complete).

Compared to students who set performance-based goals or who did not set goals at all, students who set task-based goals completed more practice exams and earned higher grades in the course.

[9] Morisano et al, 2010

[10] Grubb, 2006

[11] National Student Clearinghouse Research Center, 2017

[12] Locke and Latham, 2002

[13] Locke et al, 1981

[14] Clark et al, 2016

Mastery goals and task-based goals are generally more effective in motivating achievement than performance goals.[15] In general, goals that are focused around a specific outcome—whether it is a mastery, task, or performance-based outcome—lead to greater success than goals that are framed around exerting effort.[16]

TYPES OF GOALS

MASTERY	TASK	PERFORMANCE	EFFORT
			
Become conversant in Spanish	Complete reading exercise #1 for Spanish course	Earn at least a "B" in Spanish 301	Study more for Spanish
Generally best at motivating achievement		*Desired outcome is clear, but motivation less concrete*	*Difficult to measure success or define steps needed to achieve*

Feedback on performance and progress can help keep goals salient and students engaged, and there is some evidence for effectiveness in an online context. In one experiment, some of the students enrolled in a MOOC were randomly assigned to receive feedback on their performance on the first quiz relative to other students. For one group of these students the feedback was framed positively (the proportion of peers the student out-performed), and for a second group it was framed negatively (the proportion of peers who out-performed the student). Both messages nudged students to spend more time working on the course, measured by the number of attempted quizzes compared to students who did not receive any feedback. The negatively framed message worked best for those who were doing relatively poorly, and the positive framing worked for those who were doing relatively well.[17]

How to incorporate goal setting

Goal setting can be incorporated into an online course with short, focused activities that prompt students to think about and articulate their goals, and that later remind them of their goals and progress at important times. To do so effectively, course designers and instructors must consider the content and messaging of the activities, as well as how they are incorporated into the overall process and experience.

[15] Ames, 1992; Clark et al, 2016

[16] Locke et al, 1981

[17] Martinez, 2014

The content and messaging of goal setting activities should generally guide students toward mastery and task-based goals, rather than performance or effort goals. Early in the course, students can be prompted to set specific, concrete mastery goals for what they hope to achieve through the course and why. Later prompts to reflect on those goals and the progress students have made can be particularly valuable at times when an extra boost of motivation is needed to get through difficult assignments. Such reminders make students' longer-term goals salient and can help them re-energize and re-focus on the task at hand.

To complement mastery goals and help articulate a path to achieving them, students may also be prompted to set specific task-based goals related to course assignments. Prompts to follow through on task-based goals, including plan making activities and reminders, can help students translate their goals and intentions into action.

The following is an example of the sequence of goal setting activities that an online course might offer.

INCORPORATING GOAL-SETTING INTO AN ONLINE COURSE

When?	What?	Example: Online Intermediate Spanish course
Beginning of the course 	**Set mastery goal:** Encourage students to articulate goals for the course, using guidelines and tips to help students think through their motivations for taking the course and anchor students to mastery-style goal language.	*Now that you know the topics that will be covered in this course, take a few minutes to reflect on what you want to get out of it and what it will help you achieve in your life. There are no right or wrong answers, the important thing is that your goal is meaningful to you.* *Here are some goals that students have shared with us in the past:* • *I want to become proficient in Spanish so I can better communicate with the immigrant communities I serve as a case worker.* • *I want to improve my Spanish skills so I can communicate better with my grandmother who is from El Salvador.* • *I want to apply to a graduate program in Latin American studies.* *Type your goal in the box below.*
At critical times in the course 	**Remind students of their mastery goal:** When a boost of motivation may help students get through a heavy workload (e.g., leading up to an assignment deadline or a midterm exam), remind them of their goal.	*When we first started the course, you said this course would help you to achieve the following: _____* *Before getting started on your writing assignment, take a minute or two to reflect on this goal and think about the progress you've made so far. Imagine yourself in the future having achieved your goal and what that will feel like.*

Periodically throughout course 	**Set task-based goals, and prompt students to follow through:** Regularly prompt students to set specific task-based goals related to high impact practices. Task-based goals focused on specific actions can complement mastery goals and link them to concrete plans. Planning exercises and/or reminders can be used to help students follow through.	*In a few weeks you'll need to submit a 5-page essay, which is one of your major course milestones. Because this is an important assignment, it's a good idea to begin preparing now. As a first step, create a plan of what you'll need to do to choose a topic for the essay (e.g., look back at reading assignments you found interesting, or talk to a friend to help you narrow your ideas). Select below the date by which you'll get this done.* *Tip: When choosing a topic, think back for inspiration to the goal you identified at the beginning of the course, and try to connect your essay topic to that goal in some way.*
After course assignments and milestones 	**Feedback on performance:** Regularly provide feedback on performance to keep students engaged and help them improve. This feedback might include: the student's performance relative to peers, work completed to-date, and/or personalized insights into what students are doing well and where they can improve.	*Congratulations on submitting your essay! Comments from your peer grader are below. Your score of 85 on this essay puts you in the top half of students enrolled in the course. Keep up the hard work as you move on to the second half of the course!*

Online courses can integrate goal setting through a variety of formats and channels. Perhaps the most straightforward approach is to embed goal setting activities into the course platform as brief mini-assignments mixed in with substantive coursework. Such assignments could be mandatory or encouraged but optional. Course designers might also consider other methods of communicating with students about their goals. For example, instructors could discuss goals in lectures or embed them into substantive course assignments, making it less likely students will skip them. Reminders might be sent to students via email or text messages, to ensure students receive them even if they aren't regularly visiting the course platform.

The timing and frequency of goal setting activities, reminders, and feedback should also be structured so that goals and progress remain salient, but that students are not overwhelmed or intimidated. All of these decisions should be made in light of the type of course and the needs of students. Finding the optimal mix of channels, frequency, and timing will require some experimentation and might vary across different student profiles.

PROMPT STUDENTS TO PLAN AND FOLLOW THROUGH

Why make plans?

The "anytime, anywhere" flexibility of online courses is attractive to students who are busy with work, childcare, and other responsibilities, and who might otherwise be unable to pursue postsecondary education. However, the flexible nature of online courses creates its own challenges. Time management problems are a common reason for failure to complete online courses, mentioned by 69% of MOOC non-completers in one survey.[18] Students busy with other priorities may struggle to set aside time to engage with course material, complete readings, and prepare assignments. Even when they see the value in the course and could find the time, students often procrastinate and fail to finish.

The behavioral science of procrastinating and planning

As anyone who has tried to eat healthier, exercise more, or save money can attest, good intentions do not always translate to the actions we desire. This gap between our intentions and what we achieve is often quite large,[19] and it is driven by a number of underlying psychological influences. One is ***procrastination,*** which happens when we prioritize immediate pleasantness by choosing to avoid the small costs of working hard now in favor of doing it later. But when later comes we make the same choice and procrastinate further.[20]

The consequences of procrastination are made worse by our tendency to be overly optimistic about the amount of time it will take us to complete tasks ***(planning fallacy).***[21] This means that when we do get around to tackling a task, we have often failed to leave enough time to complete it.

Plan making is a strategy to overcome these behavioral obstacles and translate broad intentions into specific actions. Plans help us to remember our goals and intentions and the path to achieving them, prompt us to anticipate and address potential obstacles to success, and create a sense of commitment to carry out the plan.[22] Prompting individuals to make simple, specific plans has been proven effective in a wide range of contexts, helping people follow through with activities that we recognize are important but do not always seem urgent, including voting,[23] making savings deposits,[24] and getting flu shots.[25]

[18] Nawrot and Doucet, 2014

[19] Webb and Sheeran, 2006 (finding, in a meta-analysis of 47 experiments, that a medium-to-large change in intention leads to only a small-to-medium change in behavior)

[20] O'Donoghue and Rabin, 1999

[21] Buehler et al, 1994

[22] Rogers et al, 2013

[23] Locke et al, 1981

[24] Fiorillo et al, 2014

[25] Milkman et al, 2011

Procrastination results from underlying psychological tendencies that are common to all of us, but are particularly relevant in the context of online learning. ***More flexible deadlines, a lack of rigid class schedule, and the absence of social and contextual cues of in-person courses create a situation in which it's especially easy to procrastinate.*** When students do procrastinate, the human tendency to underestimate how long tasks will take compounds the problem. Online learners trying to squeeze coursework into an already busy schedule are also hit harder by affective forecasting errors, which lead them to overestimate how productive they can be late at night or on weekends.

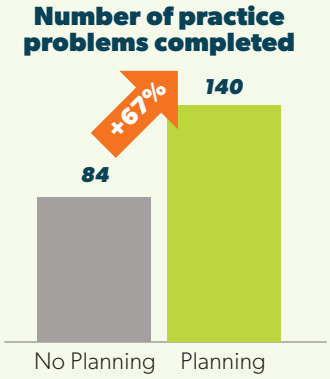
Incorporating plan making strategies into the online learning context can help students overcome these behavioral barriers that make it difficult to translate intentions into action. ***Making plans is complementary to setting goals. Goals are the objectives that motivate hard work and persistence. Plans help us identify and sequence the interim steps required to achieve our goals.*** Making plans has been shown to increase engagement, effort, and performance in a wide range of contexts, including academics (see box).

Plan making exercises are well suited to online learning for several reasons.[26] First, plans provide concrete reminders of students' goals and intentions; these reminders are less likely to arise naturally through an online course than they might in a standard classroom setting. Planning can also prompt students, online or not, to identify potential obstacles to carrying out their plans, and think of strategies to overcome them. Finally, making a plan creates a sense of commitment to follow through, by sending a subtle message that our time has already been allocated to the planned activities. This sense of commitment to follow through is less present for many students in online courses, especially when students have not paid for the course and there are no clear consequences of failing to finish (as is often true for MOOCs).

Despite the promise of plan making in online learning, planning elements should be incorporated into online learning carefully, to avoid discouraging students or undermining the flexibility that attracts many nontraditional students in the first place. Otherwise, they may backfire. An experiment that incorporated a scheduling nudge in a MOOC (an email

» Example: Planning for test preparation by high school students[27]

High school students were assigned to reflect on the value of completing practice problems for a standardized test. Some students were also asked to reflect on potential obstacles to doing so and specific ways to overcome those obstacles, completing a short exercise in which they wrote down those reflections and a plan for completing the practice problems. The students who were assigned to complete this planning exercise completed 67% more practice problems than a control group of students who only reflected on intentions and the value of the practice.



[26] These reasons follow the broader evidence base for effectiveness of plan making, summarized in Rogers et al, 2013

[27] Duckworth et al, 2011

prompting students to indicate a day and time they would watch the video) found no short-term effects on engagement in the course. More troubling, the study also found weak evidence that the scheduling nudge may have had *negative* effects on longer-term course engagement, persistence, and performance.[28] The reason for these surprising negative effects is unclear, especially in light of the strong evidence that plan making works in other contexts. The authors suggest the planning prompts may have signaled a degree of seriousness that did not match students' views of the course (if they were taking it for fun or personal enrichment rather than with a specific academic or professional aim). The prompts may also have undermined the sense of flexibility that drew some students to the course. Or they may have discouraged students by highlighting the time pressures they face. While the precise reason this planning tool was not effective is not known, these results underscore the importance of getting the details right in balancing flexibility and structure.

Features of effective plans

The most effective plans share a number of features, and course designers can offer guidance and structure to ensure that students' plans work. Planning is successful, in part, because it can provide clear, ongoing reminders of what we want to achieve, enhancing the impact of goal setting. This link should be made as explicit as possible, by prompting students to think about how their plans contribute to achieving their goals.

An often-surprising feature of successful plans is just how concrete and granular they must be, specifying precisely when, where, and how activities will be done. For example, research has shown that a prompt to plan not just the date but also the time when one will complete an activity can substantially increase the likelihood of following through.[29] Similarly, breaking down large tasks into smaller pieces leads to more accurate plans; this is especially important for large, multifaceted tasks.[30] Without specifying the intermediate steps required to complete coursework, it is easy for students to underestimate the amount of time the entire task will take, miss a critical step, or simply fail to construe the task in a way that facilitates follow-through.

Plans with deadlines are more effective than plans without them. Both self-imposed and externally imposed deadlines work, but evidence from a traditional postsecondary setting suggests that externally imposed deadlines may be more effective.[31] Making and communicating a commitment to follow through also makes plans more effective. Just the act of making a plan creates a sense of commitment to follow through, but that commitment is enhanced when people share their plan with others because most people want to be known as someone who does what they say they will do.[32]

[28] Baker et al, 2016

[29] Milkman et al, 2011

[30] Kruger and Evans, 2004

[31] Ariely and Wertenbroch, 2002

[32] Rogers et al, 2013

While breaking down tasks into granular steps helps to combat planning fallacy, students are still likely to underestimate the time they'll need to complete tasks. Plans can directly address this over-optimism in other ways. For example, when students are made aware of planning fallacy, they can be guided to set aside more time than they think they need, which may end up being the right amount of time. Plan making exercises should prompt students to anticipate other types of obstacles as well, and to strategize about how they can be overcome.

Link to goals

I signed up for this course to learn skills that I'll be able to apply in my job. These skills will help me get to the next level at work.

Concrete & granular

- Read chapters 1 and 2 (75 minutes)
- Watch first lecture video (45 minutes)
- Review practice exercises (1 hour)
- … and continuing…

When and where, with deadlines

I will do the reading during my lunch breaks on Monday and Tuesday, and the other tasks on Thursday after work (6-8pm), in the public library to minimize distractions.

Make a commitment

I will write my plan down to help me feel committed to following through.

Combat planning fallacy

I'll set aside an extra hour from 8-9am on Saturday mornings to catch up in case I need it.

Anticipate obstacles

If I need to work late on Thursday, I'll do half of the reading over my lunch break on Friday and finish the rest on Saturday morning.

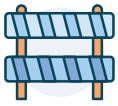
How to incorporate planning and encourage follow through

An online course can harness the power of plan making in two ways: by prompting students to make their own plans for completing coursework, or by embedding the principles of successful planning into the course materials and structure of assignments. Using the first approach, students would be prompted to break down coursework into discrete tasks and estimate the time required to complete them. With the second approach, the coursework would do this for students, presenting them with discrete reading assignments and activities, shorter lecture videos, and estimates of the amount of time needed for each piece. Students could be asked to select (and commit to) intermediate deadlines for completing work, or such deadlines could be assigned to them.

The best approach will likely combine elements of both the self-directed and course-imposed approaches to plan making. The precise balance that works best will depend on the specific course and context. Some structure can be built into the course, but too much structure may undermine one of the most important advantages of online learning: its flexibility.

The following is one example of how of the elements of successful planning could be incorporated into an assignment for an online course.

PROMPTING EFFECTIVE PLAN MAKING FOR A MAJOR ONLINE COURSE ASSIGNMENT

Feature	How?	Example: Open-ended analysis project for an online Applied Statistics course
Link to students' goals 	Create an explicit statement of how completing the assignment will help students work toward their goals, or prompt students to think about how it does.	*This project gives you more practice with the concepts you're studying in this course, but perhaps more importantly gives you the opportunity to apply them to a real world problem. Many students who take Applied Statistics tell us that they hope to apply what they learn here to real problems they encounter in their careers and future studies. As you go through the steps of completing this assignment, you'll learn to do just that.*
Break down the task into detailed, concrete steps 	Turn a large assignment into several smaller deliverables interspersed throughout the course. Or, list the steps needed to complete the assignment (or guide students to do this themselves) and prompt students to create a schedule for completing all the steps.	*Before getting started on the project, we'll guide you to plan out the necessary steps. The following table lists the steps you'll need to complete, with estimates of how long you should expect each to take.*
Specify how and when, with deadlines 	Prompt students to think about and write down how, when, and where they will complete each component task, in as much detail as possible.	
Make a commitment 	Ask students to write down their plan, submit it as an "assignment" or share it in some other way to make the commitment to follow through concrete.	*Fill in the blanks in the table above, being as specific as possible. Take a look at the example here for inspiration. Then, use this table to remind yourself of the schedule and keep track of your progress.*
Combat planning fallacy 	Suggest the amount of time each task is estimated to take. Propose "rules of thumb" for estimating (e.g., double however long you think it will take). Suggest leaving extra time or build cushions into the assignment structure.	*Keep in mind that the final project must be submitted by October 30. Plan to finish everything at least a day or two before then, just in case something comes up to delay you.*
Identify and address potential obstacles 	Prompt students to think about what might go wrong with the plan or what might take longer than anticipated.	*Now that you have a plan for your project, read through each step and think about what might go wrong, and how you could address it. Make adjustments to your plan to reflect this (for example, adding extra time to complete a task because you think it might be difficult for you, or moving up one of your internal deadlines so it doesn't fall on a week when you expect to have a lot of other commitments).*

Although the example above focuses on planning for a large assignment, tools and guidance to help students make effective plans can be incorporated into other components of online coursework. For example, students might be prompted at the start of the course to specify how, when, and where they will complete the regular assignments and tasks, such as weekly readings and problem sets. This might involve creating and committing to specific deadlines, setting aside time blocks during the week for coursework, and specifying where they will do their work.

ELIMINATE HASSLES

Why eliminate hassles?

Online learning is rife with potential annoyances and inconveniences: technological glitches and spotty internet connections may disrupt momentum and consume limited time, required course materials or resources may be difficult to find, and getting help may require multiple steps or long waits. Many of these hassles are unique to (or more prevalent in) the online context. The inconveniences they cause may seem minor compared to the importance of the project or the benefit of the course, and it may be tempting to presume that if students are committed and motivated, such minor inconveniences will not keep them from persisting. However, hassles can have a surprisingly large effect on behavior. At best, hassles lead students to waste time and feel frustrated. At worst, they can throw students off track and contribute to them failing to complete the course.

The behavioral science of hassles and channel factors

Hassles are seemingly small inconveniences that often have a surprisingly large impact on our behavior. Removing hassles can have correspondingly large impacts on behavior and outcomes. For example, automatic enrollment in a retirement plan, which eliminates the need to actively sign-up by completing a simple form, greatly increases participation and savings.[33]

Positive ***channel factors*** can play a complementary role. They are seemingly minor aspects of our environment that can have significant effects on a desired behavior.[34] Just as small hassles play a surprisingly large role in holding us back from achieving what we intend to, channel factors can provide the push we need to move forward. In one study, students were more than eight times more likely to follow through on getting a tetanus shot when given a campus map on which the health center was circled.[35] In another study, nearly half of the participants in financial education workshops who intended to open a bank account failed to follow through and do so. But when participants were given the opportunity to begin the necessary paperwork on the spot, the number of accounts opened increased meaningfully.[36]

[33] Madrian and Shea, 2001

[34] Lewin, 1951

[35] Levanthal el al, 1965

[36] Bettinger et al, 2009

Learning can be frustrating at times: understanding new topics, acquiring and practicing new skills, and challenging previously held conceptions are all essential parts of the learning process. But hassles create unnecessary and unproductive challenges for students, which detract from the learning process. ***Eliminating or mitigating hassles frees up more of students' time, effort, and cognitive energy to focus on the substantive challenges of learning***, and in the process can help students progress more quickly and easily through the course.

Addressing hassles and creating channels through online learning

We can think about three strategies for addressing hassles, all of which can be used to help students more easily navigate online courses. The first is to eliminate them entirely, by removing inconveniences or eliminating unnecessary steps. Course designers might accomplish this by improving the course interface, fixing all bugs in the application, or adapting course content so it can be accessed easily.

Second, when it is impossible to remove a hassle entirely, tools and resources can help students to overcome the hassle. This might include clear instructions for finding necessary resources or an on-demand channel to ask questions and clarify uncertainties. Finally, hassles might be avoided entirely by creating channel factors that facilitate desired behavior: overhauling processes, changing default options, or making certain actions automatic to help pull students through the course.

» Assistance with applying for financial aid[37]

Working with the tax-prep service H&R Block, researchers provided a group of students with hands-on, one-on-one assistance filling out financial aid forms (the FAFSA, specifically), while another group of similar students only received information about the application. Both groups had similar intentions to go to college.

The forms are long and confusing, taking several hours to complete. But with something as potentially life-changing as thousands of dollars in financial aid, scholarships, and low-interest loans to support a college education at stake, one might expect that students would persevere despite a frustrating or annoying process. However, the students who received the hands-on assistance (about 8 minutes of help, on average) were 16% more likely to submit the form than students who didn't get this help. They were also 24% more likely to enroll in college.

[37] Bettinger et al, 2009

STRATEGIES FOR ADDRESSING HASSLES

Eliminate hassles

Help students surmount hassles

Create channels through the course

The following table highlights some common hassles that arise in online learning, with examples of how they might be addressed.

ADDRESSING AND AVOIDING COMMON HASSLES IN ONLINE LEARNING

Hassle factors	Example solutions
Limited connectivity or slow internet speeds make it difficult to view coursework or cause delays 	*Course materials can be downloaded simply and quickly, and there are clear instructions for doing so.* *Content is also adapted for use on mobile devices (since some students will have better access to cellular service than to wi-fi).*
Technological glitches in the platform trip students up 	*It is simple to report bugs, and bugs are fixed as promptly as possible when they are reported.* *Assistance for technology-related issues and questions is easy to access (clearly labeled and visibly located on the course home page). This includes contact information for support as well as a list of frequently asked questions.*
Important resources are hard to find 	*Key resources that students may need throughout the course have been identified and housed in a logical, accessible, and clearly labeled location.* *Students receive prompts throughout the course reminding them of these resources and providing direct access to them.*
Course structure and upcoming assignments and deadlines are unclear 	*Students are guided seamlessly through the lectures, readings, and assignments needed. They do not need to refer to a separate syllabus to identify what they need to do next, and when one activity is completed they are automatically navigated to the beginning of the next one.*
Students need to find or access course materials from other sources 	*To the extent possible, all course materials are embedded in the online platform. Students aren't required to purchase a print book from another source, visit an outside web page, or create an account for some outside resource or service.* *If any of these steps are unavoidable, they are made as simple and straightforward as possible for students, with clear instructions, links, and assistance when needed.*

HELP STUDENTS MANAGE ATTENTION

Why help students manage attention?

The behavioral science of managing attention

We all have limited cognitive capacity, which generally leads us to focus on what stands out among the many features of our environment (this quality of standing out is called ***salience***).[38] This limited capacity for attention often leads us to overlook important information without realizing it, to focus on what is immediately in front of us (even if it is not the most important thing), and to forget some details.

Reminders can help to refocus our attention on what's most important rather than what's most salient or urgent. For example, in one study a series of email reminders ahead of the FAFSA (financial aid form) deadline dramatically increased timely submissions. Some students procrastinate or simply forget to complete steps before the deadline, and well-timed reminders help to prompt action at the right time.[39]

The online learning environment taxes students' capacity for attention in a number of ways. Students may not receive regular reminders to come back to their coursework, and days or weeks can slip by between visits to the course site. When students do log on to the course platform, they face potential distractions both online and in their physical surroundings. The flexibility of class sessions and deadlines makes it even easier to succumb to these distractions.

The struggle to devote attention to coursework may be a particular challenge for the types of students who commonly enroll in online courses: people with other responsibilities that prevent them from taking an in-person course. While online courses offer convenience and flexibility, they do not solve the problem of being stretched with other responsibilities, which in many cases may be more urgent.

Behavioral science offers some simple solutions to help students effectively manage their attention. ***Timely reminders about classes and assignments can draw students back to the course. When they return, smart tools and techniques can help them block out distractions so they can focus on their work.***

[38] Kahneman, 1973

[39] Ross et al, 2013

How to incorporate reminders and minimize distractions

Reminders can be incorporated into online courses in a variety of ways. For example, salient messages can be sent to students at critical times during the course, reminding them to begin assignments or helping them meet deadlines. The best reminders are both timely, arriving at just the right moment when they will be attended to, and actionable, meaning they make it as easy as possible for students to execute the next step. Reminders can help students keep their goals and plans in mind, which may be particularly valuable during challenging times in the course. Some reminders might be delivered solely via the course platform, but some should also come through more frequently used channels such as email or text message to ensure they reach students who have gotten out of (or failed to form) the habit of logging on to the platform.

The following table provides some examples of the types of reminders that can help students stay on track in online courses.

APPLYING REMINDERS IN ONLINE LEARNING

Reminder to...	When?	Examples
Complete reading in advance of the course session	After the prior session's activities have been completed	*Remember to read Chapter 2 before next week's session. It will take about one hour, and you can find the materials here.*
Stay on track with course progress	When the student has not logged on to the course site in a certain number of days	*Hi ____, we noticed that you haven't visited your Physics 101 page in the past week. Click here to log in and continue your progress so you can stay on track to finish the course.*
Access important course resources	Key times when those resources may be needed	*If you're having a harder time with this first assignment (as many students do), take a look at the course message board here to see answers to other students' questions or ask one of your own.*
Plan ahead for larger projects or commitments	In advance of the project (with sufficient lead time), with follow-ups as it draws closer	*[3 weeks ahead]: Remember that you'll need to complete your final exam by December 1. Make a plan now for reviewing the course materials and getting help with anything you need to prepare.* *[2 weeks ahead]: Your final exam needs to be completed by December 1. Below is the goal you shared with us at the beginning of the semester. Remember how this course is bringing you closer to that goal! If you need any help, you can ask questions on the course message board here.* *[1 week ahead]: The December 1st deadline for taking your final exam is now just one week away. Choose a time now when you can block off the 1 hour you'll need to take it. Try to choose a place and time when you'll be able to concentrate and avoid distractions.*

Once a student sits down to work, tools that keep distractions—especially online distractions—at bay can help her focus on the work at hand. By incorporating features to help students manage attention into the technical architecture of the course platform, online course designers can help students stay focused on coursework, meet deadlines, and stay on track. In a recent study conducted within a MOOC hosted by Stanford University, researchers tested whether tools that allow students to block distracting websites like Facebook would improve course outcomes. These simple software tools proved to be quite effective, increasing the number of students who completed the course by 40%.[40] Other online course designers might use similar tools that enable students to pre-set time limits on distracting internet activities.

Alternatively, course designers might help students manage attention by offering tips and techniques for minimizing exposure to distractions. For example, students might be advised to use a dedicated internet browser for coursework, and to close out of all other browsers and applications so they are less tempted to check their email or social media accounts. Tips for minimizing distractions in the physical environment (finding a quiet place, asking family members not to bother them at certain times, or avoiding multi-tasking while completing assignments or watching lectures) could also help students to make the most of the time they are able to dedicate to coursework.

[40] Patterson, 2014

CONCLUSION

This paper highlights four promising behavioral approaches to improve student outcomes in online courses. Behavioral solutions that improve learning and course completion will increase the return on investment—of time, money, and effort—that both course creators and students make in online learning. The goal of these behavioral solutions is not to make the content of courses easier; learning is hard and the inherent challenge of it is the essence of learning and education. However, behavioral barriers often make online courses counterproductively difficult in ways that traditional in-person courses are not. These subtle barriers in the process flow, user interface, and emotional experience undermine students' effort and detract from learning.

The four approaches we recommend target common behavioral barriers in online learning, leaving students with more time, energy, and attention to devote to the substance of the course. And while we have focused on the evidence-based solutions we believe are likely to have the most impact, we are also confident other innovative behavioral solutions are worth exploring and testing. In particular, given that people are inherently social creatures, we believe experimenting with different ways to foster community and human connection in online learning environments is likely to be a fruitful direction for further innovation.

Certain versions of the behavioral approaches we recommend could be implemented with relatively simple changes to course materials, software, interface design, and algorithm-driven communication with students. For example, updating a course landing page to make help resources more prominent, or adapting course materials so that they are easily downloadable are straightforward changes. Other solutions, such as adding goal-setting exercises or planning tools, may require more effort to implement. But because they can (and should) be embedded within the existing online platform, they generally will not require large investments to roll out. Moreover, although some customization may be needed for a particular course, standard elements of these solutions could be applied across courses and, potentially, organizations. Broader changes, such as re-architecting an online course platform with a behavioral lens, would require a larger up-front investment. However, the scale inherent in online learning suggests that with a reasonable time horizon, even larger investments would likely be cost effective.

We encourage institutions and online course designers to think creatively about how these and other behavioral solutions might benefit their students. We also encourage them to rigorously test the interventions they introduce and to publicly document the results in order to build an evidence base for best practices in online course design. Online education presents a unique opportunity for rigorous evaluation due to the ability to track (anonymized) student behavior, as well as the large numbers of students taking online courses. This context provides a fertile environment to rapidly test innovative approaches at low cost. A shared commitment to innovation, rigorous evaluation, transparency, and learning from each other will enable online learning to steadily improve.

We hope this paper serves as a call to action for educators and course designers to integrate proven behavioral design techniques in online education. Online learning aims to expand access to education and offer a new pathway to professional advancement and greater financial security for millions of people around the world. The many students and eager learners who look to online learning to achieve their goals will be better served when we remove unnecessary roadblocks. Behavioral science can be a powerful tool in the effort to improve the efficacy of online courses.

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