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GO TO CLASS! PARTICIPATE! STUDY!

How might altered incentives—including cash rewards—affect student success in college?

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I. INTRODUCTION

In recent years politicians and foundations have focused attention on the large numbers of students who begin college but never finish. More than 40 percent of full-time starting students fail to complete within six years, and more than 70 percent of community college students fail to complete within three years (NCES 2012). Whether or not these rates are a sign of a problem, it remains true that the nation would gain the benefit of more college graduates if policies could be identified that would substantially increase graduation rates, assuming the increase does not come with a reduction in standards or a problematic shift in majors.

The goal of this paper is to apply theories regarding behaviors and cognitive biases to the task of improving college outcomes. We start by making some simplifying assumptions about the motivations of college students in order to pinpoint relevant barriers to student progress. This allows us to tap the research literature for strategies to consider applying, including altering incentives. In the second section, we discuss *behaviors* to which these strategies can be applied, and we describe some approaches that could be considered.

The point of college is to create independent and self-motivated learners. The reader should be warned that the lists of possible experiments, when reviewed en masse, can create a disturbing specter of students being micromanaged through every aspect of a college education. In considering creative use of incentives, we must be careful not to undermine the point of the education itself. At the same time, we must acknowledge that extrinsic rewards already play a major motivating role in education.[1]

After analyzing approaches based on the simplifying assumption about students' motivations, in the final section we examine the broader array of motivating factors that can influence student behaviors, including the role of good teaching.

[1] The dream of every caring teacher is that students will be intrinsically motivated – they want to do the work because they love the subject. But unless that teacher doesn't give grades, extrinsic rewards are already a part of the equation. Adjusting and adding to that stable should not be considered a scandalous idea. Further, worries that extrinsic rewards can crowd out intrinsic motivation may be overblown. The findings in studies involving exercise (Royer, Stehr, and Sydnor, 2012), eating fruits and vegetables (Just and Price, 2012), and performance on reading and math tests (Levitt *et al.* 2013) suggest that rewards can introduce people to an activity that benefits them without undermining their potential willingness to continue the activity without the incentive.

II. BARRIERS AND STRATEGIES

For the purposes of examining possible incentive-based approaches to improving college completion we start with an instrumentalist view of the purpose of college (we relax this narrow view later). The student in college has a long-term goal—having a remunerative career—and sees earning a college degree as the most likely way to get there. The student's logic is essentially: *if I do the stuff I'm supposed to do in college, I will earn my degree, and then I'll be able to get a better job than I would be able to get otherwise.*

If students in college want that pot of gold, why aren't they doing "all the stuff I'm supposed to do in college"? This apparent mismatch between desire and action is common: Consider for example all of the people who want to be more physically fit but who eat poorly and don't exercise regularly. One possible explanation is that they don't fully appreciate the connection between the stuff-they're-supposed-to-do (their behaviors) and their ultimate goal. Posting calorie counts on menus can change people's food choices because it increases the *salience* of the action in relation to the weight-loss goal.

Colleges increase salience by making it clear what is needed to graduate college. For each major, the college stipulates which courses the student needs to take in order to graduate. Therefore, to get credit toward graduation students need to pass individual courses. Within each course, instructors determine what the student can do to earn a specific grade or credit. This might include points for completing assignments satisfactorily, passing exams, or participating in class. Students can calculate the effect that their performance on each component will have on course credit and, in the end, on graduation.

In behavioral economics terms the courses, assignments and exams are forms of narrow bracketing: isolating a particular expectation to make the choice (of whether to do it or how much effort to put into it) more salient (Read *et al.* 1999). Even small incentives can be powerful motivators when the action steps are narrowed and individually rewarded. For example, Just and Price (2013) found that paying elementary school children a mere 5 cents was enough to incentivize them to eat their vegetables at lunch. As any parent has experienced, telling a child that his spinach will make him strong is rarely the effective motivator we hope for, even if the child has a Superman fetish.

The way a student's tasks are presented, or *framed,* can also be an important factor influencing the student's behavior. Consider how different students react when an unanticipated assignment is described as "extra credit" as opposed to a requirement.

Points, credits, grades—the whole scheme is not terribly different from Farmville or any other game that requires you to engage in particular behaviors in order to earn points toward some end. They are strategies that motivate you to engage in some type of activity. Employers do the same thing, using money and other types of rewards (the accompanying paper by Charles Kurose examines motivations in the workplace setting).

Like saving for retirement, college success requires choices now (involving some sacrifice) aimed toward a future goal. Bracketing choices, framing them creatively, and attaching rewards all help to counteract the problem of *time-inconsistent preferences:* wanting to do what is best for the long term but in the moment focusing on the short term (Downs and Loewenstein 2011). Many of us have had this feeling: *I want to lose weight, but I want the cookie*. Both are true and legitimate desires, but the reward from losing weight is in the future, while the scrumptiousness of the cookie is immediate. So the cookie is eaten, and the weight-loss goal is pushed (again, and again) into the future.

Taking advantage of people's time-inconsistent preferences can be a profitable business strategy. Before consumer protection laws curbed the practice, gyms would charge a large fee for a long-term membership that seemed reasonable on a per-use basis to a gung-ho consumer eager to commit to exercising frequently. But of course the buyers were vastly over-estimating their likelihood of actually going to the gym. Using this strategy, the gym could sell far more memberships than would fit in the facility because they knew that most of the people were fooling themselves when they bought the membership. The gyms had no financial incentive to implement strategies to get people to actually use the gym. Much the opposite: It was best if members stayed away, because more memberships could be sold. And the buyers couldn't really complain, since after all their own slothfulness was at fault (DellaVigna and Malmendier 2006).

In the college context, one strategy for addressing time-inconsistent preferences is to make a *specific commitment* based on the longer-term goal. A scheduled course in college is essentially that. A student is telling the college: "For the next 15 weeks, I will show up every Tuesday and Thursday at 10 a.m. for an hour and a half.," Even with a commitment to a course, however, time-inconsistent preferences can undermine success. For example, as a student selects and enrolls in classes she might say to herself, "I am going to dedicate myself to being an exemplary student this term. I think I will sign up for that class that meets at 8:00 in the morning.," Her determination is strong and she is pleased that the schedule fits her other commitments and will provide her with more flexible time each afternoon. However, during the second week in school when her alarm sounds to wake her with just enough time to get ready for that 8 o'clock class, she is faced with a new decision: Should I stay or should I go? She knows she should attend class—she is the same person who enrolled in the class—but she now faces a conflict between the long-term desire and the short-term impulse. Such is the struggle of time-inconsistent preferences.[2]

Our task in this paper is to begin to identify ways to increase the salience of college success behaviors by creating and enhancing narrow-bracketing strategies, and applying tweaks that are designed to take advantage of common cognitive biases. (Helping people trick themselves into doing what their long-term selves want). One such bias is the tendency for people to be loss-averse: They are less motivated to achieve a gain than to avoid a loss of the same amount. The feeling we get when we feel like something is ours (as opposed to potentially ours) is the *endowment effect*. One way of incentivizing positive behaviors that lag due to time-inconsistent preferences is to have people commit funds up front that are lost if they do not follow through (Kane *et al.* 2004).[3] Bail bonds are perhaps the most prominent example.

A second bias that we seek to address is that individuals discount future payments such that future rewards are not effective in modifying behavior. A now famous 1972 Stanford study examined the behavior of children offered a marshmallow or a cookie and told that if they waited a few minutes to eat it, they would get two treats. As the "marshmallow study" showed, many choose the less preferred *immediate* reward over a delayed and more desirable reward (Mischel *et al.* 1972). By having rewards provided for successful behavior paid out more frequently, students are more likely to engage in the targeted behavior.

A third cognitive bias we can mine is people's tendency to overestimate the probability of unlikely events (Kahneman and Tversky, 1979). Offering each of 30 children 5 cents to eat their vegetables might get 20 of them to do so, at a cost of $1. Research suggests that telling the class that everyone who eats their vegetables will have a chance to get a whole dollar could yield more than the 20 entries, at the same cost as the non-lottery approach. In other words, using a lottery with the same expected payout can be more effective in modifying behavior. (This bias explains why state-sponsored lotteries can make money: People buy tickets even though it is mathematically irrational. And even some people who understand statistics buy lottery tickets).

A fourth cognitive bias is often used by colleges: defaults. People tend to accept a decision that has already been made for them, even when they are free to choose something different. Colleges package financial aid assuming full-time enrollment to encourage students to attend full time. Some make health insurance the default, or living on campus, a pre-freshman summer program for some students, or even certain classes. In helping people save for retirement, framing the pro-savings choice as the expected choice or *default* (they need to opt out rather than opt in), increases savings (Beshears *et al.* 2009).

[2] More flexible approaches do not necessarily help. It seems like a spectacular idea to let students sign up for online courses in which they can watch lectures and do assignments at their own pace. Unfortunately, most people drop out of these courses, even those who would have completed a traditional course with the same lectures and assignments. Without the long-term, scheduled time-and-place commitment it is extremely difficult for people to battle short-term desires to do something else. Life gets filled up with other tasks, to the point that it is never "convenient" to actually do the tasks necessary to complete the wonderfully convenient course.

[3] A disadvantage of this approach is that individuals may choose not to risk their own funds (Jeffrey 1978).

III. BEHAVIORS AND INCENTIVES

When faced with the college dropout problem, it is not uncommon for policy makers and even college administrators to undertake efforts to increase the saliency of *graduation* or good grades as goals. They launch information campaigns about the career and salary benefits of having the degree, for example. Many scholarship programs cut students off if GPAs drop below 3.0. However, trying to make an already-salient motive more salient is not likely to make much difference; it is like telling someone who is enrolled at a fat camp that it's important to lose weight.

Some have suggested making the penalty for failure more severe, such as by requiring students to repay scholarships if they do not complete on time. Again, this is the wrong approach if our simplifying assumption is generally accurate. If students have chosen college in the first place because there are substantial career and salary benefits of having a degree, then the general incentive to earn the right credits as efficiently as possible is already there.

If time-inconsistent preferences are preventing students from doing what it takes to get their desired longer-term goals, then the key to helping them is to *influence the near-term behaviors that contribute to the desired long-term outcome*. Strategies such as narrow bracketing, immediacy, and the endowment effect should be focused on discrete behaviors, as in the causal model below.

Motivation	→	**Behavior**	→	**Outcome**
Want to be thinner	→	**Substitute fruit for potato chips**	→	Lose weight
Want a good career	→	**Study every day**	→	Earn credits, get good grades

The "right" behaviors in college are more complicated than the frequently cited examples in behavioral economics: increasing savings by enrolling in a 401k; reducing the spread of germs by washing hands; improving health by eating fruit, or by exercising regularly. If we want to make use of those behavioral insights to improve success in college, we need to first identify the behaviors that make a difference. Astin (1993) studied 57 different measures of student involvement. After adjusting for student characteristics, the behaviors that that were associated with college success included:

Positive correlation with retention or degree attainment

- Hours spent studying or doing homework
- Working on an independent research project
- Giving class presentations
- Taking essay exams
- Interacting with faculty
- Hours spent attending classes or labs
- Participation in an internship program
- Participation in intramural sports
- Working part-time **on campus**
- Participating in volunteer work
- Alcohol consumption[4]

Negative correlation with retention or degree attainment

- Working at a full-time job
- Working part-time **off campus**
- Hours spent watching television
- Hours spent commuting to campus

[4] While consuming alcohol was positively associated with retention and attainment, presumably because of the social bonding aspects, it was negatively associated with GPA and graduating with honors.

The next step is to apply the concepts we discussed in the previous section to some of these behaviors. For the purposes of our initial attempt, we chose three:

- attending class (because it is easier to "count" in order to apply incentives);
- studying (identified by Astin as having among the largest positive effects); and,
- participating in class (because research supports its relationship to student success).

For each behavior, we have suggested several ideas for using incentives (financial and non-financial), divided into those that require the involvement of the instructor, and others that could be implemented independently.

IV. GOING TO CLASS

As obvious as it may seem that students should go to class, skipping out is surprisingly common in many colleges. Romer (2003) conducted a survey at three different types of institutions to measure absenteeism rates during a "typical" week of school (the proportion of students not in attendance). He found that 34 percent of students were absent at a medium-sized private university, 40 percent at a large public university, and 23 percent at a small liberal arts college. At an anonymous university, Marburger (2001) found that absenteeism averaged 20.7 percent and increased as the semester progressed. At the University of Milan, a study showed that about one-third of the students missed class (Stanca 2004). A survey at a public university in the southern United States showed the absentee rate at only 15 percent (Broker *et al.* 2013). Absenteeism varies across different types of schools.

The evidence suggests that showing up to class does correlate with higher grades. A meta-analysis of 69 studies indicates that class attendance is a "better predictor of college grades than any other known academic performance, including scores on standardized admissions tests such as the SAT" (Credé *et al.,* 2010). In an attempt to quantify the effects of student absenteeism on performance Margurger conducted a micro experiment in an introductory economics class. The course was structured with three non-cumulative exams, using questions that all could be answered correctly by relying solely on the textbook. Each exam question was connected to the class period when the topic was covered and student attendance was monitored. Students who were absent during the relevant class session were more likely to get the corresponding questions wrong. Overall, absenteeism reduced the mean score in the course by slightly more than a quarter of a letter grade. While this study does not control for student characteristics, studies that do include student characteristics (i.e. prior GPA, gender, major, homework completion) find similar results (Romer, 1993; Dobkin *et al.,* 2010).

Absenteeism doesn't only affect the student who misses class. There is also evidence suggesting that absenteeism of classmates can negatively affect the performance of other students within a course. Collaborative learning—involving students in team or group activities and discussions—is a common, effective teaching strategy. Koppenhaver (2006) finds that students who had team members absent from class performed worse on homework assignments and on exams. Therefore, increasing attendance can benefit not only the marginal student but also other students in the course.

Below are some strategies for making class attendance more salient and for making the benefits more immediate to counter the problem of time-inconsistent preferences undermining attendance. We start with approaches that assume significant involvement of an instructor, and then offer ideas that could potentially be implemented with little instructor involvement (other than the need to track attendance).

Approaches Tied To Instruction

Lost credit for non-attendance: The importance of attending class can be framed in ways that give it more salience. Rather than simply saying that, say, a quarter of the grade is based on attendance, the instructor can explain that each class of 25 classes is worth one point of the final grade (based on 100 total points). This makes each class more salient. Perhaps more powerful is to endow students with the full credit at the start, telling them that each class period missed will lower their final grade by one point. By changing how the attendance policy is framed, the policy can be more effective by relying on loss aversion of the individual students.

Some colleges and universities already implement a program in which students lose credit for missing too many classes. For example, Baylor University mandates that "a student must attend at least 75 percent of all scheduled class meetings. Any student who does not meet this minimal standard will automatically receive a grad of 'F' in the course" (Baylor 2013). Brevard Community College requires students to attend 85 percent of classes to receive credit (Brevard 2013). Tarrant County College gives instructors sole discretion to drop students from the course if they miss 15 percent of the classes in a given term (TCC 2013). Lafayette College allows instructors to refer students who miss an excessive number of classes (as determined by the course syllabus) to the dean for a review assessment of the "student's commitment to the class" (Lafayette 2013).

Dobkin *et al.* (2010) demonstrated the effectiveness of a mandatory attendance rule implemented in the middle of the term for a subset of students: those who scored below the median on the midterm exam. Using a regression discontinuity approach (which compares students just below the median to students just above the median) the study shows that attendance increased by a whopping 28 percentage points, and scores on the final exam increased significantly.

Refundable Grade: Student intentions at the beginning of a term are usually just what educators would want: The students expect to attend their classes. This strategy captures that good intention by having students post a bond equal to a portion of their grade. For example, a student might attach 20 percent of the grade to a commitment to miss no more than two class sessions. If he does not meet this standard, he loses 20 percent of his grade.

Exam Prep in Class: Research indicates that attendance in class spikes the days before a midterm or final exam (Romer 2003). One way to make the benefits of attending class more salient for students is to be more explicit about exam preparation being a part of every class throughout the semester rather than on a specific day before the exam. Students may be more motivated to attend class when they know material on an exam will be discussed. Using phrases like, "this would be a good test question" or "this might be something you will see on the midterm" help make the benefits of attending class more salient for students. By doing this on a daily basis, each class period provides a well-defined benefit for the students, preparation for an exam.

Friendly Nudges: The University of Tennessee at Chattanooga has implemented a Freshmen Academic Success Tracking program (FAST) to make the benefits of attending class more salient. The FAST program identifies students who miss two or more classes in a term and reaches out to "gently nudge them back on course.," The program has peers talk with students face-to-face, explaining the "connection between attending class and academic success.," As a result of this program, average freshmen GPA is the highest ever recorded and fall-to-spring retention increased six percentage points (UTC 2009).

Quizzes: Many instructors already provide rewards for students who show up to class. One of the more common rewards used for attendance is the use of pop quizzes. Unannounced quizzes have been shown to increase attendance in classes (Wilder *et al.,* 2001). However, Thorne (2000) proposes to use frequent unannounced quizzes for extra credit to make them more effective. Similar quizzes worth minimal class credit have also been shown to increase student motivation to attend class (Kouyoumdjian 2004). These studies indicate that for quizzes to be effective in encouraging attendance they should be frequent, unannounced, and need not be worth a significant amount of points.

Approaches Requiring Little Instructor Involvement[5]

Cell Phone Prompts: Committing to a portion of a grade may be more than is necessary to make a difference. An alternative approach would be to have students commit at the start to attending class, and send students an automated text message shortly before each class as a reminder. The founder of a student support app called Grad Guru reports that students receiving these prompts indicate that the nudge got them to attend when they had decided not to. While this has not been systematically studied, implementing a policy like this can be an inexpensive intervention that might be effective in increasing attendance.

Pay for Attendance: Financial rewards have been successfully applied to healthy behaviors such as exercise (Royer *et al.*, 2012; Charness and Gneezy 2009), weight loss (Cawley & Price, 2013; Volpp *et al.,* 2008), and even as a way to get elementary schools kids to eat their vegetables (Just and Price, 2013). Paying students to attend class might be an effective way to increase attendance. A simple experiment would be to pay students an immediate financial reward for each class attended.[6] By narrowly bracketing the decision to attend class, small rewards can be effective in motivating the desired behavior.

Attendance Lottery: It may be prohibitively expensive to offer every student a dollar for every class attended (or for every class in excess of 75 percent of classes). One way to reduce the cost but still get the benefit of the incentive would be to create a lottery, taking advantage of the tendency to overestimate the value of the reward. A student could get a lottery entry for every class attended (or for every class beyond a minimum).

Refundable Bond: A refundable bond could be implemented university wide. If the school would charge every student a fixed amount upon registering for classes, then students who attend a pre-determined percentage of classes would be refunded the full amount. As students face the short-term decision of whether to attend class or not, their aversion to losing their own money motivates them to make choices aligned with their long-term preferences.

Priming or Social Identity: Individuals relate to specific sociocultural groups and performance on academic tasks is affected as individuals are primed to potential stereotypes of these groups. Nih *et al.* (1999) examined Asian American women and how they performed on quantitative tasks. When subjects were primed with the stereotype that women perform worse on these types of tasks, they experienced a reduction in performance. However, when they were primed with the stereotype that Asian Americans perform better on these tasks their performance improved. Using this method, students can be dissuaded from skipping class by priming them that with a statement like, "Students who pass this course are the type that come to class every day.," Therefore, students who want to pass the course will identify with a student who passes the course and will adopt their behavior; that is come to each class.

III. STUDYING AND COMPLETING ASSIGNMENTS

Astin found that "the most basic form of academic involvement—studying and doing homework—has stronger and more widespread positive effects than almost any other involvement measure or environmental measure.," Studying not only contributes to retention and completion, students learn more when they dedicate more time to a given task (Frederick and Walberg 1980). Students who spend more time doing homework experience higher scores on exams and are more likely to get A's and B's (Grodner and Rupp, 2011). Using a nationally representative sample, Eren and Henderson examine the impact of homework on student achievement and conclude that "relative to more standard spending related measures such as class size, extra homework appears to have a larger and more significant impact on math test scores" (Eren and Henderson 2008).

[5] Some of these experiments assume a method is implemented for reliably determining whether a student attended class.

[6] Other variations might be used: attending every class classes in one week (or other time frame) or paid at the end of the week (or other time frame) for each class attended.

Despite the importance of studying, many students fail to put sufficient time into studying. Some evidence indicates that the time students spend studying has dropped dramatically over the past few decades. Today, the average college student spends less time in class and studying than a high school student spends in class without including homework. Experiments can be designed to encourage students to spend more time learning outside of the classroom, but there is a bit of chicken or egg problem that must be considered. For students to spend time on assignments that take serious time and effort, they need assignments that take serious time and effort. For faculty to make those assignments, they need to believe that the students will be ready and willing to do the work. Most of the strategies, therefore, require the involvement of the faculty.

Approaches Linked To Instruction

Assign homework and give credit: One survey showed that almost one-third of courses do not provide credit for the completion of homework assignments (Grodner & Rupp 2011). The primary culprit is the time it can take to grade homework assignments. One solution available to instructors is to assign and collect regular homework assignments but only grade a random subset (other than credit for having completed it). In this way students feel the need to do every assignment, but the time required for grading is reduced.

Lost credit: As noted in Levitt *et al.* (2012), framing incentives as losses instead of gains may be more effective. Students can be told they are at risk of losing credits they were granted at the beginning of the course, rather than asking them to earn the credits as a gain. (It should be no surprise that assignments that are framed as "extra credit," even when they can make a difference in someone's grade, can be the least effective at incentivizing students).

Reminders: At the K-12 level, technology has given parents the ability to much more closely monitor current grades and the assignments that their children have or have not completed. If faculty were to input assignments and grades during a term using this technology, students could be prompted automatically regarding missing assignments.

Study log: Using the technology described in the previous approach, or using pen and paper, students can be required to keep study logs. This study log is designed for students to record the amount of time they spend on each assignment and to record questions, insights, or things that they learned while studying. The study logs can be collected occasionally. Credit could be awarded, or other types of feedback provided.

Work in groups: To encourage group interaction, instructors can assign group homework assignments. One approach is to give each student two grades, one from his or her own work, and another the average of other team members. This incentivizes them to work as a group to help all team members achieve the highest marks.

Priming or Social Identity: Just as priming can be used to affect attendance, it can also be used to increase time that students spend studying. For example, the primer given can be directed at students who do well in courses, namely students who get A's or B's. The instructor can make a statement like, "Other students taking a schedule like yours find that to get A's and B's they need to set aside X hours a day to study.,"

Approaches Requiring Less Instructor Involvement

Time in a defined study area: By providing a set area for students to study, students can work on assignments individually or in groups as needed. To incentivize students to use the shared study space, a time log can be kept with students rewarded for each interval (e.g. 30 minutes) they spend there.[7] For each interval the student receives a lottery entry. Prizes can include a cash reward, gift card or voucher.

[7] To maintain time logs students can swipe their cards using an electronic time reader, students can sign in and out on a piece of paper, or teaching assistants can record time use.

One of the reasons students may fail to finish homework is that they have job responsibilities in addition to the courses in which they enroll. In order for financial incentives to induce the desired behavior, it may be necessary for them to be more substantial and more certain. This could be achieved by paying for the time spent in the study area as if it were an hourly wage. (The rate need not necessarily be as a high as a wage since there are benefits to studying beyond the payment).

Reward students for keeping a study log: Sometimes just by keeping track of something people are more attentive to it. Students can be rewarded for keeping a study log, such as by making it a requirement of scholarship programs. It could be based on time and subject, or could ask for a brief reflection on the value of the activity. The information could be used by administrators or scholarship programs to identify the student's needs and ways the institution and instructors could better support students.

Online discussion groups: Students no longer need to be located in the same geographic space in order to collaborate. Online discussion groups have been shown to be effective in improving student performance in college courses (Cheng *et al.,* 2011). Students could be rewarded for posing questions or discussion topics on the forum, and provided with extra rewards for the types of interactions that help to connect discussion threats and deepen learning for the group. Rewards can be structured to provide a large reward to encourage first-time participants and then provide smaller rewards for continued participation.

IV. PARTICIPATION IN CLASS

Getting students to participate is such a core element of effective college pedagogy that the U.S. Department of Education commissioned a study in 1984 entitled "Involvement in Learning: Realizing the Potential of American Higher Education" (National Institute of Education, 1984). Subsequent studies have confirmed that "active learning" in the classroom improves student performance (Tinto 1987; Nunn, 1996; Tinto, 1997; Billings and Hallstead, 2009). Efforts to improve teaching in college continue to promote the central importance of active participation by students in class. For example, the new 2013 standards of the Association to Advance Collegiate Schools of Business state that course curricula will "facilitate and encourage active student engagement in learning" and "facilitate and encourage frequent student-student and student-faculty interaction designed to achieve learning goals" (AACSB 2013).

What are the obstacles that impede students from active learning?[8] First, students may not understand the importance of active learning compared to passive learning. A traditional college class is often portrayed (and experienced) as a professor speaking while students take notes: the "sage on the stage.," Students are probably learning, but they are passive and would learn more if they were engaged in active learning (Benware and Deci, 1984). Because they are interested and are learning, students may not recognize the need to learn better, especially if the current learning method meets their expectations for a college class.

Second, in large classes it is simply not feasible for every student to participate regularly by asking a question or making a comment. Students recognize this and decide to let others raise their hands to respond to or ask questions. Third, research suggests that the dominant reason students do not proactively participate in class is that they lack the confidence to do so (Fassinger 1996), and are particularly worried about peer approval (Weaver and Qi 2005). Saying something unintelligible in front of their peers, not communicating their ideas clearly, or even simply having to speak in front of others makes many students nervous. These studies find that higher levels of student preparation can improve confidence. However, even with proper preparation students may still choose not to participate because they perceive the risks of embarrassment outweigh the expected benefits.

[8] For ease of measurement, all of the studies cited below define "active" engagement as whether a student vocally participates in class—that is, asks a question or makes a comment. Some give credit for participating once, while others measure intensity by considering the number of times a student participated. Since there is evidence that grading based on participation can lead to discussions dominated by a small number of students (Michael, 2006), it may be useful to base incentives on participating at least once. Over longer periods, however, encouraging more intensive involvement may be the better approach.

The approaches described below aim to encourage student participation in class through the use of incentives. They all require the involvement of the instructor.

Academic Credit: Making class participation a part of the course grade has been shown to increase participation in class. In fact, multiple studies suggest that the level of participation is proportional to the amount that credit counts toward the final grade in the course (Berdine, 1986; Smith, 1992). Therefore, in order to incentivize students to participate in class, a significant portion of the final grade needs to be based on participation. Increasing the weight of participation in the final grade comes at a cost of reducing the relative significance of other aspects of the course that might be more important to learning (such as homework assignments, presentations, quizzes, or exams). One way to ameliorate this problem, if grades are not on a curve, would be to offer "extra credit," which are not as effective as a requirement but still can make a difference (Boniecki and Moore, 2003).

Credit for written comment or question: Rather than directly incentivizing participation, students could be provided credit for turning in a question or comment written on a provided index card. Foster *et al.* (2009) used this method to record participation in their study. This may be especially effective in large classes where there may not be time for every student to participate in class. It may also benefit small classes by encouraging students to prepare their comments or questions before vocalizing them. During class the instructor might ask for questions and students who had already written something may feel more confident about speaking up.

Pay for Posting: As noted, one of the obstacles for participating in class is that students don't come to class prepared. This experiment would incentivize students to come to class prepared. Students can post questions on an online forum on the topic of the upcoming class. Students also can respond to questions other students post. By providing this medium of participation, an instructor can encourage students to come to class with prepared questions or discussion. Students would receive rewards for posting questions and for responding to other posts.

Rewarding follow-ups: Asking one question may not be an accurate measurement of whether a student is actively engaged in the learning process. In addition to participating in class, students could be offered the option of following their in-class participation with a brief write-up expanding upon the in-class topic, asking additional questions, or responding to comments made by others. Students would be rewarded for their follow-ups.

Note card lottery: In large classes note cards can be used instead of verbal participation. Students can participate in class by putting their comment or question on a note card and handing the note card in. Note cards are then collected during class and entered into a lottery drawing, with each note card serving as an entry. At the end of class, the instructor pulls one note card at random and the winner receives a reward.

This method provides a way for students to participate without having to bear the costs of how they are perceived by their peers. It also allows them time to formulate their thoughts and communicate them in a non-threatening way as opposed to being called upon in front of the entire class. It also is a method that can be used in large classrooms, where time does not make it feasible for every student to participate.

Other variants can be added to reward active engagement in learning and not just writing on a note card. When a card is drawn there can be a quality control measure to validate the note card as a winner (it must answer the question, provide a contribution to the discussion, etc.). Furthermore, note cards can be collected more than once per class period to ensure that students stay actively engaged the whole class period.

VII. MOTIVATIONS AND MOTIVATORS

The previous section assumed that students are motivated by the pot of gold that a college degree can lead to, and that time-inconsistent decisions get them off track. In this formulation, the solution is to add little carrots tied to the specific student behaviors along the route to the degree, supplementing the grades that perform a similar function. In this final section we consider whether it is the behavior of institutions and instructors that merits attention more than the behavior of students.

The interest in the long-term reward (the degree) may not be the dominant motivator for most students. In attempting to understand performance motivation in the workplace, Liu and Mills list 10 different theories of motivation. Maslow's classic hierarchy of needs, for example, reminds us that social, esteem, and self-fulfillment needs can be powerfully important. Not surprisingly, effective colleges tend to build social supports that surround students. Effective instructors understand the importance of self-efficacy to student engagement: Students need to feel that they are making progress, from wherever they are starting. Interpersonal strategies tied to specific assignments may be more effective than mass implementation of external incentives. For example, an instructor may tell a student that his voice matters and he would really like him to speak up more in class discussions. If that doesn't work because the student is nervous, the instructor might help the student prepare before class by telling him what he will call on him to discuss, or having him write down some thoughts.

In other words, while students may enter college because they know it's good to have a degree, they may stay because they like the people and they feel good about themselves and about the progress they are making. If they feel frustrated (or bored) by the academics, or disconnected, they leave.

Even if earning the degree remains the dominant motivator, it is quite possible that students are being rational in their calculus when they drop out. At the start, the long-term reward seemed worth the shorter-term sacrifices. However, as a student engages as a student, she may discover that the amount of effort she needs to put forward is more than had been anticipated. Or she may feel inadequate to the task and therefore likely to fail classes. In that case, dropping out is quite rational.

Helping students feel that they are capable of doing the intellectual work necessary is the very definition of good instruction. Improving instructional quality leads to higher rates of attendance (Romer 1993). Strategies like smaller class sizes can make better, more interactive and personalized learning possible and have been shown to decrease absenteeism (Devadoss and Foltz, 1996; Romer, 1993). For example, the way an instructor manages student participation can serve as a promotion or deterrent to future participation.[9] Advocates interested in improving college outcomes should consider how poor pedagogy might be undermining learning and completion.[10]

While improving instruction is the holy grail of improved college outcomes, it is unfortunately also an exceedingly difficult task. Former Harvard President Derek Bok wrote a whole book about it, in which he complained that "On most campuses, no systematic attempt is even made to determine which students are underperforming or how they might be helped to do better.,"

[9] Loftin *et al.* (2010) discuss specific actions of faculty during class which impede students from participating. These include both verbal and nonverbal actions: ridiculing or disregarding a student's comments, not providing adequate time for responses or interjections, answering questions with questions, negative body language, and facially expressing displeasure. Students participate more if the instructor moves around the classroom to be in closer physical proximity.

[10] Weaver and Qi (2005) find that "faculty-student interaction seems to have the largest direct, indirect, and total effects on participation as reported by students." Fassinger (1995) added that the faculty's greatest impact on class participation comes from course designs. Therefore, changing the design of the class, from a talk-and-chalk lecture to one involving students more in the learning process through class exercises, activities, or discussion, can be an effective way to actively engage students in the learning process.

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