ResearchGate

See discussions, stats, and author profiles for this publication at: https://www.researchgate.net/publication/352895612

Five Steps to Improve Student Motivation in Your College Courses

Article · July 2021

CITATION
1

READS
947

3 authors, including:

Kenneth E. Barron
James Madison University
80 PUBLICATIONS **14,570** CITATIONS

SEE PROFILE

Chris Hulleman
University of Virginia
81 PUBLICATIONS **8,502** CITATIONS

SEE PROFILE

Some of the authors of this publication are also working on these related projects:

Project Expectancy-Value-Cost Measurement View project

Project Motivation Interventions View project

All content following this page was uploaded by Kenneth E. Barron on 06 July 2021.

The user has requested enhancement of the downloaded file.

Five Steps To Improve Student Motivation In Your College Courses

Stephen R. Getty[1], Kenneth E. Barron[2], and Chris S. Hulleman[3]

[1]Quantitative Reasoning Center, Colorado College

[2]Motivation Research Institute, James Madison University

[3]Motivate Lab, University of Virginia

(In press, Journal on Excellence in College Teaching)

Author Note

This research was supported by a grant from the National Science Foundation (DRL1228661). The authors also would like to recognize the thoughtful reviews from our blind reviewers as well as Jessi Smith who provided feedback on earlier drafts.

Correspondences concerning this article should be addressed to Steve Getty, Quantitative Reasoning Center, Colorado College, 14 E. Cache La Poudre, Colorado Springs, CO 80903, United States. Email: SGetty@ColoradoCollege.edu.

Abstract

To improve student motivation, we propose a five-step process that entails learning about a motivation framework, identifying students' motivational challenges based on that framework, adopting interventions to address those challenges, and assessing the effectiveness of your interventions. In particular, we recommend adopting the Expectancy-Value-Cost framework of motivation, which suggests motivation is optimized when students expect that they can successfully complete a task, value that task, and have limited barriers (i.e., costs) preventing them from engaging in the task. We also present data from two college psychology courses to offer an example of how to engage in the five-step process.

Keywords: Motivation, Expectancy-Value-Cost framework of Motivation, Expectancy-Value Theory, Motivational planning

Five Steps To Improve Student Motivation In Your College Courses

A new initiative is being championed on your campus. Your teaching and learning center is encouraging instructors to "flip their classrooms" in general education courses. One version of flipping has students watching a video of you lecturing on the topic the night before class, so you can spend more time applying and discussing information when students attend class. While you are told this is a novel teaching strategy to promote active learning during class time, you are skeptical because you are concerned that many of your general education students currently lack the motivation to read and study outside of class. You wonder how requiring students to do more outside of class will motivate them?

Motivation is essential in students' academic performance, engagement, and persistence, and a broad body of work has laid a foundation for the key role that motivation plays in educational contexts (e.g., Elliot et al., 2017; Pintrich, 2003; Stipek, 2002). This is especially true when students doubt their ability, see little value for engaging in classroom activities, or feel their efforts for success come at too high of a price (e.g., Hulleman & Harackiewicz, 2009; Yeager & Walton, 2011). Research and reform efforts have focused on better understanding the role of motivation to improve students' achievement and persistence (e.g., NRC, 2017; Olson & Riordan, 2012; Lazowski & Hulleman, 2016). In particular, over the past decade, researchers have developed several "targeted" (or "wise") interventions to support student motivation, achievement, and persistence in academic settings (e.g., Yeager & Walton, 2011; Yeager, Walton, & Cohen, 2013). Moreover, these interventions have been found to be especially beneficial for students from traditionally marginalized and minoritized backgrounds, such as women, first-generation, Black, and Latinx students (e.g., Harackiewicz et al., 2016; Walton & Cohen, 2011).

While research on targeted interventions is yielding critical insight into the role of motivation in promoting student learning, this approach typically involves researchers delivering interventions directly to students without involving classroom instructors (e.g., Yeager et al., 2019). Unfortunately, less work has centered on how to train instructors to directly support student motivation by changing their teaching practices. When training opportunities are provided to instructors, we are struck by four additional challenges. First, although most instructors can quickly describe student motivation problems in their classrooms (e.g., as in the opening vignette to this paper), few instructors can connect their issues to motivation theory, frameworks, or tested interventions (Hulleman & Barron, 2013). Second, solutions to improve teaching are often presented to instructors as a list of "best practices" without connecting the practices to motivation theory or frameworks. Third, even when connections are made to a specific motivation theory or framework (e.g., self-efficacy theory, achievement goal theory, self-determination theory), specific theories or frameworks often fail to capture the range of motivational challenges that students experience or to offer a full range of solutions. Finally, instructors often don't appreciate the motivational perspective of the most marginalized students in their classrooms who can have markedly different learning experiences compared with more privileged students.

In contrast, we suggest instructors are better supported when teaching practices are grounded and connected more meaningfully to motivation theory and research, when a comprehensive (vs. specific) theory or framework is adopted, and when instructors are trained to engage in motivational planning, especially to counteract biases in practices that disadvantage students from traditionally marginalized backgrounds (Okonofua et al., 2016). We do that here using the Expectancy-Value-Cost of motivation (Barron & Hulleman, 2015) and propose a five-

step process on how to engage in motivational planning where instructors: 1) learn about the Expectancy-Value-Cost framework of motivation, 2) identify the main motivational challenges in their classroom, 3) determine if the motivational challenges are related to Expectancy, Value, and/or Cost, 4) adopt research-based strategies to address their most pressing motivational issues, and 5) assess for intervention effectiveness (Figure 1).

To illustrate this process, we share an example conducted at the first author's institution to demonstrate how to engage in motivational planning for two different psychology courses: introductory psychology and research design. We also highlight how to use both quantitative and qualitative data to support motivational planning, and we report additional analyses to demonstrate the relationships that Expectancy, Value, and Cost have with important student outcomes. Finally, we highlight disaggregating data by student demographics to better understand differences in motivation for traditionally marginalized students in the learning context.

Step 1: Learn the Expectancy-Value-Cost Framework of Student Motivation

The first step of our five-step process entails selecting and learning about a motivation framework. While many motivational theories have been proposed and used in different settings to understand student motivation (e.g., Brophy, 2010; Pintrich, 2003), we find motivational frameworks grounded in Expectancy-Value theory (Eccles et al., 1983) to be particularly helpful. Expectancy-Value theory provides a comprehensive approach for understanding student achievement and persistence in education by proposing that student motivation is impacted by two distinct types of beliefs. *Expectancy* beliefs involve whether or not students think that they can successfully complete a given academic task. *Value* beliefs involve whether or not students want to do the task. While students with higher expectancy and value beliefs experience higher

levels of achievement and interest in their coursework, students' expectancy beliefs are particularly predictive of their achievement and students' value beliefs are particularly predictive of their interest and subsequent engagement (e.g., Eccles & Wigfield, 2002). Thus, understanding students' motivation level on each belief is crucial in knowing how to create a classroom environment to optimally motivate your students.

For example, in our opening vignette, we introduced a new, campus-wide teaching initiative of flipping classrooms in general education courses. However, studies of student motivation in general education courses often reveal that students experience different motivational challenges depending on the area of general education. Using an Expectancy-Value framework, Barron et al. (2014; see also Kosovich et al., 2019) found that students had lower levels of expectancy in math and science general education coursework, while having lower levels of value for art and humanities general education coursework. To counteract these challenges, more targeted motivational interventions addressing expectancy issues in math and science and value issues in arts and humanities are warranted. Simply adopting a one-size-fits-all, across-the-board teaching strategy may not help address the unique motivational issues for a particular course.

In addition, it is equally important to consider motivational issues tied to particular students. For example, Eccles et al. (1983) originally adopted Expectancy-Value theory to understand why girls were less likely than boys to pursue math. Thus, we recommend disaggregating course data to look at differences in motivation and learning outcomes by key student demographics whenever possible (such as gender, race/ethnicity, generation status, among others). In fact, adopting a particular teaching strategy may lead to unintended

consequences that could make that problem worse for some students (e.g., Smith et al., 2015). This leads us to a revision recently proposed for the Expectancy-Value framework.

Specifically, theorists recognized that a student could hold high expectancy and value beliefs for a task, yet still be at risk for lower achievement and persistence. This occurs when a student experiences *costs* that limit the time, energy, or resources that a student has to invest in a task. For example, students often report that general education requirements compete with time and energy to pursue students' primary focus on their major and/or minor. In addition, students who experience stereotypes about lack of ability in specific fields (such as Black and Latinx students, or women in traditionally male dominated fields like math and science) can experience high levels of cost due to concerns about conforming to negative stereotypes (Deemer et al., 2014; Smith et al., 2013). The adverse effects of *cost* on an individual's motivation were theorized by Eccles et al. (1983), yet reliable cost measures were never fully developed to test how *cost* combined with *expectancy* and *value* beliefs to influence students' motivation (Barron & Hulleman, 2015; Wigfield & Cambria, 2010).

Fortunately, a renewed interest in cost has emerged, and recent work highlights the role that cost beliefs can play independent of expectancy and value beliefs in student motivation and students' subsequent interest and achievement in a course (Flake et al., 2015; Kosovich et al., 2015; Perez et al. 2014; Rosenzweig et al., 2019). Cost is an especially helpful variable to consider when trying to understand why students from traditionally marginalized groups may experience less success in your courses than other students. As a result, to offer a more complete view of motivation, theorists have suggested a revised Expectancy-Value-Cost framework of motivation (e.g., Barron & Hulleman, 2015). This can be expressed as a formula, where students' overall motivation is a function of expectancy, value, and cost (i.e., $M = f(E,V,C)$), which we

often present to faculty more simply as M = E + V - C. In other words, students are optimally motivated when we promote their expectancy (E) and value (V), while noting ways to decrease their cost (C). Numerous researchers (e.g., Eccles & Wigfield, 2002; Hulleman et al., 2016) also note how other specific motivational theories and constructs can be organized as falling under one of these three major motivational dimensions, which we will elaborate on in Step 4. For more detailed reviews of an Expectancy-Value-Cost framework and how it offers both a parsimonious and comprehensive approach to understanding motivation, see Barron and Hulleman (2015) and Hulleman et al. (2016).

Step 2: Identify the Main Motivational Challenges in Your Classroom

With knowledge of expectancy, value, and cost, the next step is identifying which factors may be particularly an issue for your students in a given class. While there may be several ways for you to identify motivational issues for your course (e.g., midsemester or end-of-the-semester teaching evaluations), we developed and validated a brief measure of Expectancy-Value-Cost motivation that instructors can use (see Appendix A; Barron et al., 2017). Below we share an example using this brief measure at the first author's institution to help us identify the main motivational challenges occurring in two different psychology courses.

Context and Participants

Rather than a more traditional semester approach where students average taking 15 credits over 15 weeks, the courses at the first author's institution are taught one course at a time in a 4-week format (known as the block plan) or over two blocks in an 8-week format. Teaching in this format can present both opportunities as well as challenges for student motivation. For example, the intense focus on one course at a time could afford unique opportunities to promote expectancy and value (or reduce some types of cost), which could positively affect motivation,

achievement, and other sought outcomes such as future interest. Alternatively, the accelerated pacing could heighten students' experience of cost, which, if not adaptively addressed, could negatively impact student motivation and outcomes. Either way, using a measure of expectancy, value, and cost provides important formative data to instructors to help them understand their students' motivation level and design a teaching and learning environment to better promote student success.

We collected students' responses on the Expectancy-Value-Cost scale in two different psychology courses taken in either 4 or 8 week compressed formats. Because these courses are taught as small classes, student data from 4 sections of each course were collected and combined for an overall sample. One course was a 100-level introductory psychology course (N=90; female=51, male=39) taken over 4 weeks, and the second was a 200-level psychology research design course (N=46; female=25, male=21) taken over 8 weeks. At this institution, psychology is considered a natural science (i.e., included with physical sciences, computer science, and mathematics), and both courses are required courses for the psychology major. But the introductory course also fulfills a general requirement and is taken by students outside of the psychology major. Demographics of the sample reflect the institution, where approximately 24% identify as students of color, 56% are female-identified, and about 5% are first-generation.

Measures

Expectancy-Value-Cost Scale. The version of the scale collected in this project was part of a larger project developing and validating a brief measure of Expectancy-Value-Cost motivation that could be used widely across academic subject areas and student grade levels (e.g., middle, high school, and college) (see Getty et al., 2017, for more details). Part of this project involved testing different questions and response options. Thus, the question format,

response options, and total number of items used here differed slightly from the final recommended scale included in Appendix A (Barron et al., 2017). The scale used here had 18 survey items, with response options assessed on a 1 (lowest) to 5 (highest) scale. The current, recommended Expectancy-Value-Cost format uses 10 items on a 1 (lowest) to 6 (highest) scale.

To complement the quantitative Expectancy-Value-Cost scale, we also included two open-ended questions for students to list specific factors that increased and decreased their motivation in the course (e.g., "*In the space below, please list specific things that [INCREASE/DECREASE] your motivation to learn in your [class subject] class*."; see Appendix A). The qualitative data provide rich, context-specific feedback for instructors, and when combined with quantitative data offer a mixed-method assessment approach. In this case, it offers an explanatory mixed-method approach (Creswell & Plano-Clark, 2017) because the two open-ended questions followed the expectancy, value, cost items allowing students to explain their ratings with specific examples.

Outcome Measures. We collected two outcome measures to test the predictive validity of the Expectancy-Value-Cost scale: final grade and future interest. At the end of the course, we obtained students' final grades, which were assigned on a traditional 0-4 point scale. To complement the measure of academic performance, we also collected a four-item scale to assess students' future interest in the topic of the course (e.g., *"I want to take more [insert area or discipline] classes in the future?"*), with each item rated on a 1 (lowest) to 5 (highest) scale.

Equity Disaggregation Variable. To illustrate how to investigate equity differences in the motivational experiences of marginalized students, we used students' gender identity as our disaggregation variable. Using gender identity as an equity variable aligns with framing equity in relative terms, rather than absolute terms. Equity refers to who has access to resources,

opportunities, and power in a specific context, and whose identities are valued in that context (e.g., Gutierrez, 2012). Due to small sample sizes on other student demographics, our dataset was limited in allowing us to investigate other equity differences. However, we encourage instructors to consider and track equity differences relevant for your context and student population.

Step 3. Determine the Source of your Motivational Challenges

Once you identify motivational issues for your course (e.g., using the brief Expectancy-Value-Cost scale introduced in Step 2), the next step is reflecting on the data that you collected to determine if your challenges are most linked to expectancy, value, or cost sources. Below we share descriptive and inferential results for both psychology courses we described in Step 2.

Quantitative Data: Descriptive Statistics and Correlational Analyses

Means for students' expectancy, value, and cost, final grade, and future interest were calculated for each course (See Figure 2). Means for expectancy and value clustered around 3.5 for each class, while cost clustered around 2.5. For outcomes, while final grades for both courses had similar mean levels, students in the research design course reported higher future interest (M=4.1, SD=1.1) compared with students in the introductory course (M=2.9, SD=1.4; $t(134)=5.36$, $p<0.001$; d=0.9). Because students in the research design class are pursuing psychology as their major, we would expect that their future interest would be higher than students in the introductory course. In contrast, the introductory course is taken by a diverse range of students from a variety of disciplines to fulfill general university requirements.

Because the means for expectancy, value, cost, and final grade were very similar between courses, we combined both courses into one sample to increase statistical power. Correlations among motivation factors and student outcomes highlight relationships that have implications for teaching practices and classroom environments (Table 1). For the combined sample, expectancy

demonstrated a strong, negative correlation with cost and positive correlation with final grade, and more moderate, positive correlations with value and future interest. In contrast, value showed no appreciable correlation with cost or final grade, yet a strong correlation with future interest. Cost showed a notable, negative correlation with final grade.

Equity comparisons: Disaggregating by gender. Key gender differences also emerged that were similar across both courses. Students who identified as female (M=3.7, SD=0.72) reported more value than male-identified students (M=3.3, SD=0.81; t(134)=3.30, p=0.001; d=0.6), and female-identified students (M=2.6, SD=0.6) reported more cost than male-identified students (M=2.4, SD=0.6; t(134)=2.44, p=0.016, d =0.4). There were also differences in the relationship between the motivation measures and outcomes. In particular, although cost was negatively correlated with achievement across for the entire sample, this relationship was especially strong among women.

Qualitative Data: Coding Open-ended Items for Expectancy, Value, and Cost

As an important complement to the quantitative survey items in the Expectancy-Value-Cost survey, we coded whether students' open-ended comments on what increased or decreased their motivation for specific themes related to expectancy, value, or cost (See example responses in Table 2). We evaluated interrater reliability between two judges for all open-ended responses from the research design course. Correlations among raters for both “increased motivation” and “decreased motivation” items were high and statistically significant (0.65-0.80). We also found that agreement between raters was strong most of the time (86-96%). Disagreements were addressed by discussion with a third party.

Factors that increase motivation. For specific examples of what increases students' motivation in the introductory psychology course, 120 responses were recorded, and of those,

about 93.3% were codable as relating to expectancy, value, or cost (Figure 3). In the case of the remaining 6.7% of responses that we could not code, students offered more general responses (such as "*Great Professor!*") that did not specify promoting expectancy or value, or reducing cost. Then, overwhelmingly, 81% of what students reported increasing their motivation were identified as value themes, with very few students identifying supporting expectancy (3%) or reducing cost (8%).

The results for what increases students' motivation in the research design course were similar. Of the 43 responses, 97% of the responses were codable, and once again, the majority of responses (73%) were coded as value themes. Expectancy themes were noted slightly more often (15%) in the research design course than the introductory psychology course, and very few cost themes (6%). This might be expected as research design courses often contain some of the most difficult material in the psychology major, and supporting students' beliefs that they can succeed may be particularly motivating and needed.

Factors that decrease motivation. For factors that decreased motivation in the introductory course, cost issues were mentioned the most (51%) followed by issues related to value (24%), such as not making the course content and activities interesting (Figure 3). The results were nearly identical for research design, with factors related to cost (49%) and insufficient value (22%) associated with decreased motivation.

Equity comparisons: Disaggregating by gender. When disaggregating the qualitative data by gender, we again found that female-identified students mentioned cost issues (20%) related to psychological and emotional challenges significantly more than male-identified students (2%) as a key factor decreasing motivation for female-identified students.

Summary

In sum, the quantitative data suggested expectancy and value could still be improved in each course (based on having average means of 3.5 out of 5), and cost could be lowered, especially for female-identified students. The qualitative data further emphasized the role of value for increasing overall motivation, and the role of cost in decreasing overall motivation. For female students, these data showed that cost was particularly linked to psychological or emotional stresses.

Step 4. Adopt Teaching Strategies to Address Your Motivational Challenges

Once you have collected motivation data (e.g., the brief Expectancy-Value-Cost survey) and identified which combination of expectancy, value, or cost issues are most pressing, the question arises – What next? This is step four in the motivational planning process, where an instructor can adopt research-supported instructional strategies to treat the most pressing motivational issues (Figure 1). Below we offer research-based sources for expectancy, value, and cost to consider when engaging in Step 4 of motivational planning. Then, we share how the data from the introductory and research design psychology courses offered formative feedback on possible next steps to better support student motivation in each course.

Research-Based Sources of Expectancy, Value, and Cost

Being able to identify and link the motivational challenges instructors identify in their classes to expectancy, value, and/or cost issues is an important step. However, instructors also need clear, actionable tips on what they can do to better promote students' expectancies and values while mitigating costs. To assist faculty in motivational planning for a course, we created three separate lists summarizing research-based sources linked to expectancy (Table 3), value (Table 4), and cost (Table 5).

First, a student's sense of expectancy is a key element of many motivation theories (such as attribution theory, goal-setting theory, and self-efficacy theory). Table 3 summarizes the major sources of expectancy that have been supported through correlational or experimental research across different motivational theories (see Hulleman et al., 2016 for more elaboration). For example, when students experience direct success or indirectly see similar others succeed (E3 in Table 3), they are more likely to feel higher levels of expectancy. Direct and indirect success experiences are key sources of expectancy based on self-efficacy research (e.g., Bandura, 1997).

Second, a student's sense of value is based on whether there is a worthwhile reason to engage in the task. Eccles et al. (1983) initially theorized three types of values. First, *intrinsic value* (V1 in Table 4), is the inherent enjoyment or satisfaction that an individual gains by engaging in a task. Second, *utility value* (V3) characterizes tasks that a student sees as useful, important, relevant, or necessary toward some other end. Third, *attainment* value (V4) refers to engaging in a task because it affirms a part of the individual's identity or self-concept (Eccles & Wigfield, 2002). But once again, other motivation theories have been linked to sources of value (such as interest theories and need theories). In Table 4, we offer a summary of the major sources of value that have been found in correlational and experimental research across different motivational theories (see Hulleman et al., 2016 for more elaboration). For example, when students' situational interest is activated in class (V2), they are more likely to experience value in that day's lesson.

Third, as noted earlier, a re-evaluation of cost in the context of expectancy-value frameworks is relatively new. Initially, Eccles et al. (1983) theorized *cost* as a negative type of value that a student would weigh in a cost-benefit analysis to determine their overall value for

the activity. However, recent work has re-evaluated how cost connects to expectancy and value (Barron & Hulleman, 2015). For example, Kosovich et al. (2015) investigated the factor structure of expectancy, value, and cost items and found that cost functions independently of expectancy and value. Furthermore, Getty et al. (2017) found that cost has different patterns of correlations with other measures of motivation and learning outcomes compared to both expectancy and value.

Importantly, Flake et al. (2015) corroborated and extended earlier theorizing by Eccles by noting four sources of cost. The first, *effort-related cost* (C1 in Table 5), pertains to the task at hand, indicating that the effort required for the task (i.e., the course) comes at a high cost that could decrease motivation. In contrast, *effort-unrelated cost* (C2) reflects lacking time and energy to engage in a task due to competing demands from other outside tasks and obligations (e.g., a student not having sufficient time to study due to time demands of other classes, a job, extracurricular activities, athletics, or family obligations). The third source of cost, *loss of valued alternatives* (C3), reflects the cost of what is sacrificed or given-up as a result of engaging in the task at hand. Finally, *psychological cost* (C4) reflects negative psychological affect (e.g., stress, fear of failure, or fear of success) that occurs when engaging in the task. Researchers continue to evaluate other possible sources of cost, and in Table 5, we offer a summary of the major sources of cost that are emerging from this work (again for elaboration see Hulleman et al., 2016).

Motivational Planning for the Two Psychology Courses

The quantitative data from the two psychology courses revealed some informative patterns for the instructors. The averages for expectancy and value were 3.5 out of 5 across both classes, suggesting there is room for improvement to help students' feel greater confidence and value in course content. Similarly, the average for cost was 2.5, meaning costs can likely be

reduced. In addition to overall averages, it can be useful to look for student outlier scores. For example, compared to the cost average of 2.5, a number of students scored above 3 in each course (see Figure 4). In particular, many academic programs take steps to recruit and improve the diversity of their minority student populations, so interventions may be needed to address outlier data, especially if those outliers involve students you are trying to recruit and retain. The good news is that targeted motivational planning can address educational inequity and greatly benefit historically marginalized and disadvantaged students (Harackiewicz & Priniski, 2018; Hulleman & Harackiewicz, 2021; Yeager et al., 2013). Depending on the context or other formative student motivation data, instructors could decide from Tables 3-5 what might be the most appropriate approach (or approaches) to increase overall motivation in their course.

The quantitative data also allowed us to test correlational relationships between expectancy, value, cost, and educational outcomes. In particular, we found students' expectancy highly correlated with their final grade (Table 1). Thus, to promote course performance, instructors may want to adopt additional research-based approaches to increase students' expectancy beliefs. For example, when asking students to complete a major assignment, engaging in goal setting (E6) and completing the assignment in a series of steps can make the work more manageable. Similarly, offering clear expectations (E7) on assignments can help students better understand what is expected, which can be particularly important for first-generation students new to the college learning environment.

We also found that value correlated highly with cultivating students' future interest in a discipline (Table 1). Thus to promote students' subsequent interest, instructors need to help students see value in what they are learning. For example, in much of our research, we recommend creating meaningful connections between course content and students' lives (V3 and

V4). Additionally, when students have some degree of choice and control in completing assignments (V8), those choices are more likely to be personally relevant to students. For example, in a research design course, this can occur by allowing students to pick topics for research projects based on their interests rather than being assigned a topic or doing a "canned" research project.

The quantitative data also illustrated how cost led to decreased student motivation, and that cost had a negative correlation with achievement outcomes, particularly for female-identified students. To motivationally plan, instructors could re-consider how much reading and homework is essential and what might be too much (C1). In addition, students could be advised on how many other outside obligations to take on (through employment, extracurricular activities, athletics) while also enrolled in their compressed courses (C2). Similarly, it is helpful for instructors to be aware of the prevalence of mental health challenges faced by students, and to apprise students of relevant campus resources (C4).

Then in addition to corroborating the quantitative data patterns above, students' open-ended, qualitative responses provided additional feedback for motivational planning. For both psychology courses, promoting value was overwhelmingly identified as leading to increased motivation, with themes connecting to intrinsic value (V1) and utility value (V3) being featured prominently (especially for utility value in the research design course). At the same time, elements of cost played the main role in decreasing motivation for both courses, with themes connecting to effort-related cost (C1) being featured most prominently.

Furthermore, when disaggregating the qualitative responses by gender, we found that female students mentioned psychological cost themes (C4) at a significantly higher rate than males (especially related to feeling stressed). Although the reason why women are reporting

higher levels of cost is unknown, one possibility is that they may be experiencing identity-related threat, such as those that can emerge from the learning context or cultural norms. One emerging intervention to address identity-related threats is a social belonging intervention. Originally developed by Walton and colleagues for students transitioning to college (Walton & Cohen, 2007; 2011), it has more recently been applied to reduce identity-related threat for women in engineering (Walton et al., 2015). Rather than interpreting academic difficulties as an indicator that engineering is not for them, the intervention helps students reframe difficulties as common for most students and temporary for many of the challenges they are facing. This helps threatened students, in this case women, view daily stressors as less threatening, which has resulted in enhanced GPAs and persistence.

Step 5. Assess the Effectiveness of your Teaching Strategies

Once strategies to address your expectancy, value, and/or cost issues are adopted, a final step to close out the process is to assess if your newly adopted strategies to improve motivation are working. This could entail using a similar motivation assessment like we introduced in Step 2, or it could involve including a subset of motivation items on an end-of-course teaching evaluation survey. Additionally, you could assess the impact of your motivational planning more broadly, for example, if your overall teaching evaluations improve, if students' overall performance in your course improves, and if students are more likely to persist at your college or in your major as a result of their experience in your course (e.g., if you are teaching a gateway course). During this process, once again, we recommend disaggregating data to understand whether instructional changes were beneficial for historically marginalized students; in our case it was women.

After engaging in Step 5, you may find the need to return to Steps 2, 3, 4 and 5 to continue redesigning your class to optimally motivate all of your students, and particularly students from traditionally marginalized backgrounds (See Figure 1). This is quite common as we learn how to better address the motivational needs of all of our students. In the example that we've shared for the two different psychology courses, we guided Department of Psychology faculty through the first 4 steps of the motivational planning process as they helped us pilot the new motivational assessment tool that we introduced at Step 2. Although we did not formally engage in Step 5 with individual faculty members, we partnered with the Department of Psychology to discuss how they could increase student motivation in each of these foundational courses of their major and recommended they engage in Step 5 after implementing changes.

Conclusion

Motivational planning using an Expectancy-Value-Cost framework provides a powerful process to determine what new teaching strategies and pedagogy to learn and adopt. For instance, the faculty member in the opening vignette now has criteria backed by theory, research, and practice to assess exactly *why* flipping a classroom might have benefits for students in terms of expectancy (e.g., getting help with "homework" problems in the classroom and building confidence), value (e.g., getting opportunities to collaborate and do group work that meaningfully applies course content), or cost (e.g., having students engage more deeply with course material each week to reduce psychological stress caused when only working on a course the night before a major assignment or test is due).

But in some situations, flipping a classroom may not be appropriate. For example, more rigorous course material, when first attempted on one's own, might unintentionally reinforce a fixed mindset about one's competence and ability to learn, thereby threatening expectancy. This

negative effect could be particularly acute for students already feeling threatened in math and science. Similarly, the benefits of discussion-intensive lectures, which may include instructor enthusiasm, productive spontaneity in class, or an innovative classroom infrastructure, may be lost, thereby decreasing value. In other cases, cost could greatly increase in a flipped classroom, especially if it takes significantly more time and energy to read difficult course materials or watch videotaped lectures on one's own. Such challenges may be less likely to occur in a face-to-face class where students can immediately ask questions for clarification. Similarly, when other pedagogies are encouraged by faculty development centers (e.g., inquiry-based teaching, team-based learning, case-based teaching, or service-learning), an Expectancy-Value-Cost framework of motivation can help instructors critically evaluate whether that pedagogy would be beneficial for teaching their particular course, as well as if that pedagogy could lead to unintended, negative motivational consequences.

We would like to close by noting a few qualifiers from the current data that we've presented. First, in his seminal work on course design, Fink (2003) highlighted a variety of situational factors to consider when making instructional design decisions involving unique course and student characteristics. For example, an accelerated course format offers a unique set of opportunities and challenges compared with those arising in a traditional semester course format. In addition, student characteristics may play another important factor to shape instructional design decisions. For example, we found significant gender differences for cost, where female-identified students reported experiencing higher cost. Regularly surveying student motivation offers instructors insight into identifying the role of both types of course- and student-specific situational factors, especially when collected confidentially or anonymously to encourage students to provide more honest and authentic responses. Second, in terms of cost, we

do not want to imply that we are advocating the elimination of student costs. Time on task and expending effort will require some cost, which is critical to the learning process (Astin, 1993). Instead, we suggest that instructors be mindful of creating *too much* cost in a course, and avoid creating disproportionate costs for one group of students versus another.

In sum, having knowledge of a practical and comprehensive framework of motivation based on expectancy, value, and cost (i.e., M = E + V – C for short), along with research-based lists of recommendations to promote each source of motivation, places an instructor in a much stronger position to improve student motivation and learning outcomes. In our professional development work taking instructors through the five-steps of the motivational planning process, we find it relatively easy for instructors to identify their student motivation challenges and to link those challenges to expectancy, value, or cost issues once they learn about the Expectancy-Value-Cost framework. We also find it relatively straightforward to have instructors identify research-based teaching practices to better promote expectancy or value, while being mindful of reducing cost, using the research-based sources proposed in Tables 3-5. However, taking time to formally assess what motivational challenges students experience (Step 2) and re-assessing if interventions are working (Step 5) are the steps we find needing to most encourage and support faculty to do. Finally, we have demonstrated the potential power of disaggregating data to better understand the unique challenges that historically marginalized and minoritized students can face in your learning context, and whether instructional changes may be beneficial for these students. While our goal is to better support all learners, it is critical for instructors to create learning contexts that are inclusive and do not reproduce, even unintentionally, historical inequalities. By engaging in all five-steps of motivational planning, instructors have a process to learn which

instructional strategies are needed to improve student motivation and the overall quality of their instruction.

References

Astin, A. W. (1993). What matters in college?: Four critical years revisited. Jossey-Bass.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. Freeman.

Barron, K.E., Grays, M., & Hulleman, C.S. (2014, April 3-7). *Assessing motivation in general education* [Poster presented], American Educational Research Association 2014 Annual Meeting, Philadelphia, PA.

Barron, K. E., & Hulleman, C. S. (2015). Expectancy-Value-Cost model of motivation. In J. D. Wright (Ed.), *International encyclopedia of the social & behavioral sciences*, 2nd edition (Vol. 8, pp. 503-509). Elsevier Ltd.

Barron, K.E., Hulleman, C.S., Getty, S., & Taylor, J.A. (2017). Expectancy-Value-Cost Survey of Student Motivation: User's Guide. Retrieved from https://www.researchgate.net/publication/319433479_User's_Guide_for_the_Expectancy-Value-Cost_Survey_of_Student_Motivation.

Brophy, J. E. (2010). *Motivating students to learn*. Routledge.

Creswell, J. W., & Plano Clark, V. L. (2017). *Designing and conducting mixed methods research* (3rd ed.). SAGE Publications.

Deemer, E. D., Thoman, D. B., Chase, J. P., & Smith, J. L. (2014). Feeling the threat: Stereotype threat as a contextual barrier to women's science career choice intentions. *Journal of Career Development*, *41*(2), 141-158.

Eccles (Parsons), J., Adler, T. F., Futterman, R., Goff, S. B, Kaczala, C. M., Meece, J. L., & Midgley, C. (1983). Expectancies, values, and academic behaviors. In J. T. Spence (Ed.), *Achievement and achievement motives* (pp. 75–146). Freeman.

Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology*, *53,* 109-132.

Elliot, A. J., Dweck, C. S., & Yeager, D. S. (Eds.). (2017). *Handbook of competence and motivation: Theory and application* (2nd ed.). Guilford Press.

Fink, L. D. (2003). *Creating significant learning experiences*. Hoboken, NJ: Jossey-Bass.

Flake, J. K., Barron, K. E., Hulleman, C., McCoach, B. D., & Welsh, M. E. (2015). Measuring cost: The forgotten component of expectancy-value theory. *Contemporary Educational Psychology*, *41*, 232–244. http://doi.org/10.1016/j.cedpsych.2015.03.002

Getty, S.G., Hulleman, C.S., Barron, K.E., Ruzek, E.R., Flake, J.K., & Foley, K. (2017). Using the Expectancy-Value-Cost theory of motivation to understand student achievement and future interest in STEM classrooms [Technical Report]. https://www.researchgate.net/publication/326354387_A_Rapid_Measure_of_Student_Motivation-Using_an_Expectancy-Value-Cost_Model_of_Motivation_to_Understand_Student_Achievement_and_Future_Interest_in_STEM_Classrooms

Gutiérrez, R. (2012). Context matters: How should we conceptualize equity in mathematics education? In *Equity in discourse for mathematics education* (pp. 17-33). Springer, Dordrecht.

Harackiewicz, J. M., Canning, E. A., Tibbetts, Y., Giffen, C. J., Blair, S. S., Rouse, D. I., & Hyde, J. S. (2014). Closing the social class achievement gap for first-generation students in undergraduate biology. *Journal of Educational Psychology, 106(2)*, 375-389.

Harackiewicz, J. M., & Priniski, S. J. (2018). Improving student outcomes in higher education: The science of targeted intervention. *Annual Review of Psychology*, *69*(1), 409-435.

Hulleman, C.S., & Barron, K.E. (2013, April 27–May 1). *Teacher perceptions of student motivational challenges and best strategies to enhance motivation* [Paper presentation], American Educational Research Association 2013 Annual Meeting, San Francisco, CA, United States.

Hulleman, C.S., Barron, K.E., Kosovich, J.J., & Lazowski, R.A. (2016). Current theories, constructs, and interventions within an expectancy value framework. In A. A. Lipnevich, F. Preckel, & R. D. Roberts (Eds.*), Psychosocial skills and school systems in the twenty-first century: Theory, research, and applications*, 1st edition (pp. 241-278). Springer International Publishing.

Hulleman, C. S., & Harackiewicz, J. M. (2009). Promoting interest and performance in high school science classes. *Science, 326*(5958), 1410-1412.

Hulleman, C. S., & Harackiewicz, J. M. (2021). The utility-value intervention. In Walton, G. W., & Crum, A. (Eds). *Handbook of wise interventions: How social-psychological insights can help solve problems* (pp. 100-125). Guilford Press.

Kosovich, J.J., Hulleman, C.S, & Barron, K.E. (2019). Measuring motivation in educational settings: A case for pragmatic measurement. In S. Hidi & K.A. Renninger's (Eds.) *Cambridge Handbook on Motivation and Learning*. Cambridge University Press.

Kosovich, J. J., Hulleman, C. S., Barron, K. E., & Getty, S. (2015). A practical measure of student motivation: Establishing validity evidence for the Expectancy-Value-Cost scale in middle school. *Journal of Early Adolescence, 35*(5-6)*,* 790-816.

Lazowski, R. A., & Hulleman, C. S. (2016). Motivation interventions in education: A meta-analysis. *Review of Educational Research, 86*(2), 602-640.

National Academies of Sciences, Engineering, and Medicine (2017). *Supporting Students' College Success: The Role of Assessment of Intrapersonal and Interpersonal Competencies*. The National Academies Press. https://doi.org/10.17226/24697

Okonofua, J. A., Walton, G. M., & Eberhardt, J. L. (2016). A vicious cycle: A social–psychological account of extreme racial disparities in school discipline. *Perspectives on Psychological Science*, *11*(3), 381-398.

Olson, S., & Riordan, D. G. (2012). Engage to Excel: Producing One Million Additional College Graduates with Degrees in Science, Technology, Engineering, and Mathematics. Report to the President. Executive Office of the President.

Perez, T., Cromley, J. G., & Kaplan, A. (2014). The role of identity development, values, and costs in college STEM retention. *Journal of Educational Psychology*, *106*(1), 315–329. http://doi.org/10.1037/a0034027

Pintrich, P. R. (2003). A motivational science perspective on the role of student motivation in learning and teaching contexts. *Journal of Educational Psychology, 95*(4), 667-686.

Rosenzweig, E., Hulleman, C., Barron, K., Kosovich, J., Priniski, S. & Wigfield, A. (2019). Promises and Pitfalls of Adapting Utility Value Interventions for Online Math Courses. *The Journal of Experimental Education. (87)*2, 332-352. https://doi.org/10.1080/00220973.2018.1496059

Smith, J. L., Brown, E. R., Thoman, D. B., & Deemer, E. D. (2015). Losing its expected communal value: How stereotype threat undermines women's identity as research scientists. *Social Psychology of Education*, 1–24. https://doi.org/10.1007/s11218-015-9296-8

Smith, J. L., Lewis, K. L., Hawthorne, L., & Hodges, S. D. (2013). When Trying Hard Isn't Natural Women's Belonging With and Motivation for Male-Dominated STEM Fields As a Function of Effort Expenditure Concerns. *Personality and Social Psychology Bulletin*, *39*(2), 131–143. https://doi.org/10.1177/0146167212468332

Stipek, D. (2002). *Good instruction is motivating.* In A. Wigfield & J. S. Eccles (Eds.), *A Vol. in the educational psychology series. Development of achievement motivation* (p. 309–332). Academic Press.

Walton, G. M., Logel, C., Peach, J. M., Spencer, S. J., & Zanna, M. P. (2015). Two brief interventions to mitigate a "chilly climate" transform women's experience, relationships, and achievement in engineering. *Journal of Educational Psychology*, *107*(2), 468–485. https://doi.org/10.1037/a0037461

Walton, G. M., & Cohen, G. L. (2007). A question of belonging: Race, social fit, and achievement. *Journal of Personality and Social Psychology, 92*, 82–96. doi:10.1037/0022-3514.92.1.82

Walton, G. M., & Cohen, G. L. (2011, March 18). A brief social-belonging intervention improves academic and health outcomes of minority students. *Science, 331*, 1447–1451. doi:10.1126/science.1198364

Wigfield, A., & Cambria, J. (2010). Students' achievement values, goal orientations, and interest: Definitions, development, and relations to achievement outcomes. *Developmental Review*, *30*(1), 1–35. https://doi.org/10.1016/j.dr.2009.12.001

Yeager, D. S., Hanselman, P., Walton, G. M., Murray, J., Crosnoe, R., Muller, C., . . . Dweck, C. S. (2019). A national study reveals where a growth mindset improves adolescent achievement. *Nature*, *573*, 364–369.

Yeager, D.S., & Walton, G.M. (2011). Social-psychological Interventions in education: They're not magic, *Review of Educational Research*, *81*(2), 267–301.

Yeager, D.S., Walton, G.M. & Cohen, G.L. (2013). Addressing achievement gaps with psychological interventions. *Phi Delta Kappan*, *94*(5), 62-65.

Table 1

Descriptive Statistics – All Students

Factor	1	2	3	4	5
1. Expectancy	1.00				
2. Value	0.26**	1.00			
3. Cost	-0.44**	0.06	1.00		
4. Final Grade	0.58**	0.11	-0.39**	1.00	
5. Future Interest	0.34**	0.51**	-0.14	0.24**	1.00
Means	3.52	3.54	2.49	3.28	3.33
SD	0.69	0.79	0.59	0.55	1.41
Scale Min (theoretical)	1	1	1	0	1
Scale Max (theoretical)	5	5	5	4	5
Cronbach's Alpha	0.87	0.87	0.87	-	0.98

Note. N = 136. Correlations at 95% significance levels are * $p<0.05$, and ** $p<0.01$. N=126 for Final Grade because 10 students could not be included who opted for pass/fail course credit.

Table 2

Example Student Responses Linked to Expectancy, Value, or Cost Themes

	Expectancy	**Value**	**Cost**
Increase Motivation	*"Good previous grades."*	*"Understanding the material and applying it to everyday life, or other school classes."*	*"No busy work assignments."* *"Energy and good nutrition."*
Decrease Motivation	*"The fact that the tests are hard and I perform poorly on them."*	*"When we talk about methodologies, I will never use because of the fields of neuroscience I'm in."*	*"The amount of time that I have to sacrifice to do my assignments well and completely."*

Table 3

Research-based Sources of Expectancy

		Students are more likely to experience higher EXPECTANCY when:
E1	**Ability**	They have a high level of ability and/or skill in an activity.
E2	**Effort**	They believe that their effort and strategy use will lead to learning.
E3	**Success Experiences (Direct or Indirect)**	They are successful at an activity or watch similar others succeed.
E4	**Improvement Experiences**	They experience growth in an activity.
E5	**Authentic Encouragement**	Others communicate that students can succeed (rather than doubt or suggest they can't succeed).
E6	**Goal Setting**	An activity is broken down into smaller, short-term goals that will help accomplish a bigger, long-term goal.
E7	**Clear Expectations**	They know what is expected of them on an activity.
E8	**Appropriate Challenge**	The difficulty of the activity matches students' skill levels.
E9	**Feedback**	They receive feedback that is specific (rather than general) and task-focused (rather than ability-focused).
E10	**Support**	They are appropriately supported in completing an activity and know where they can seek help.

Table 4

Research-based Sources of Value

		Students are more likely to experience higher VALUE when:
V1	**Intrinsic Value**	An activity is connected to their personal interests.
V2	**Situational Interest**	An activity is designed to "catch" their interest in a given situation (e.g., using variety, novelty, demonstrations, activities).
V3	**Utility Value**	An activity is perceived to be useful and relevant.
V4	**Identity Value**	An activity affirms an important aspect of who they are and is something they want to be good at.
V5	**Prosocial & Communal Value**	An activity allows them to make a difference in the world or a difference for their family and friends.
V6	**Context & Rationale**	They understand what the purpose and meaning of an activity is.
V7	**Enthusiastic Models**	They interact with teachers and students who are enthusiastic and passionate about learning.
V8	**Autonomy**	They feel a sense of choice and control.
V9	**Competence**	They engage in activities that help them grow and improve.
V10	**Belonging**	They experience meaningful relationships and connections with others (e.g., student-to-student and student-to-instructor).
V11	**Extrinsic Value**	They receive external rewards and incentives for learning (caution: extrinsic rewards for learning can undermine students' development of intrinsic interest and overall quality of work).

Table 5

Research-based Sources of Cost

		Students are more likely to experience higher COST when:
C1	**Effort & Time Needed for the Activity**	The effort and time required by an activity becomes too much.
C2	**Competing Activities**	They have too many other activities competing for their time and energy.
C3	**Loss of Valued Alternatives**	They feel like the learning activity is not worth their time compared to other things they might do.
C4	**Psychological Reactions**	They feel negative emotions towards an activity (e.g., anxiety, stress, identity-related threats, belonging uncertainty).
C5	**Physical Reactions**	They lack physical energy or are physically uncomfortable when doing an activity (e.g., tired, sick).
C6	**Scarcity**	They lack key resources (e.g., food, shelter, money) or have the perception of lacking key resources that distract them from doing an activity.

Figure 1

Five steps in motivational planning using an Expectancy-Value-Cost framework of motivation.

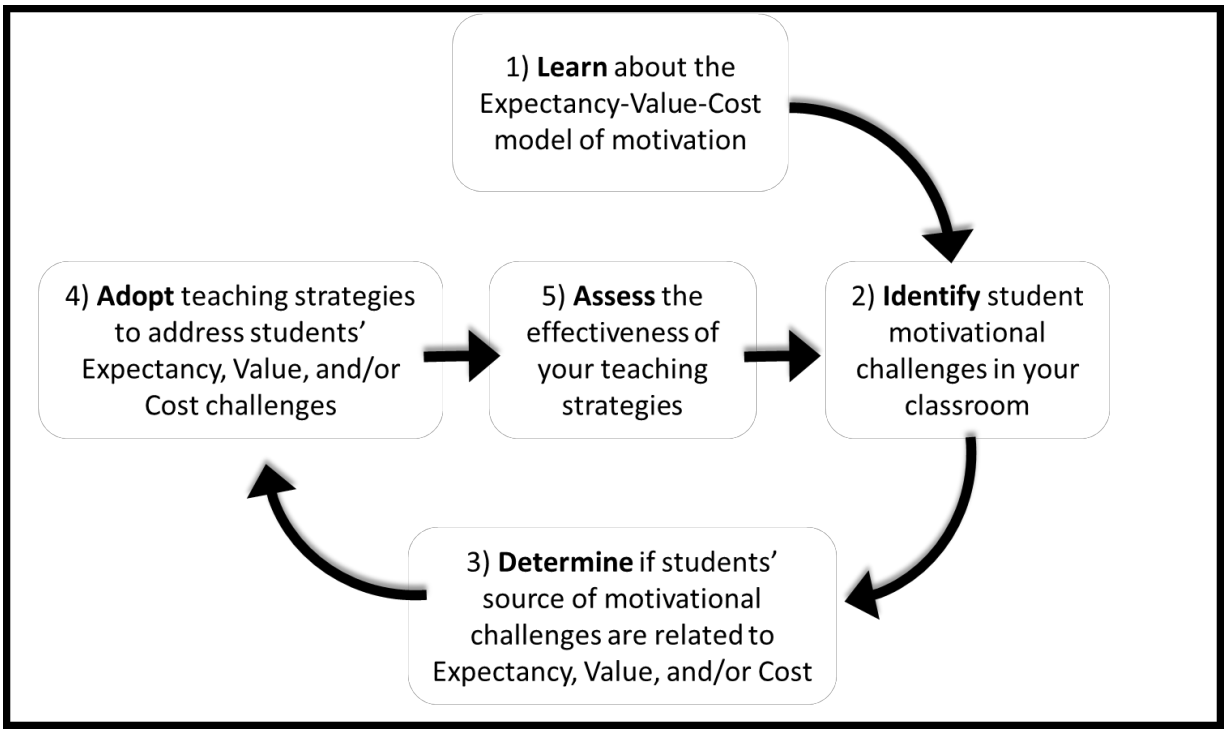
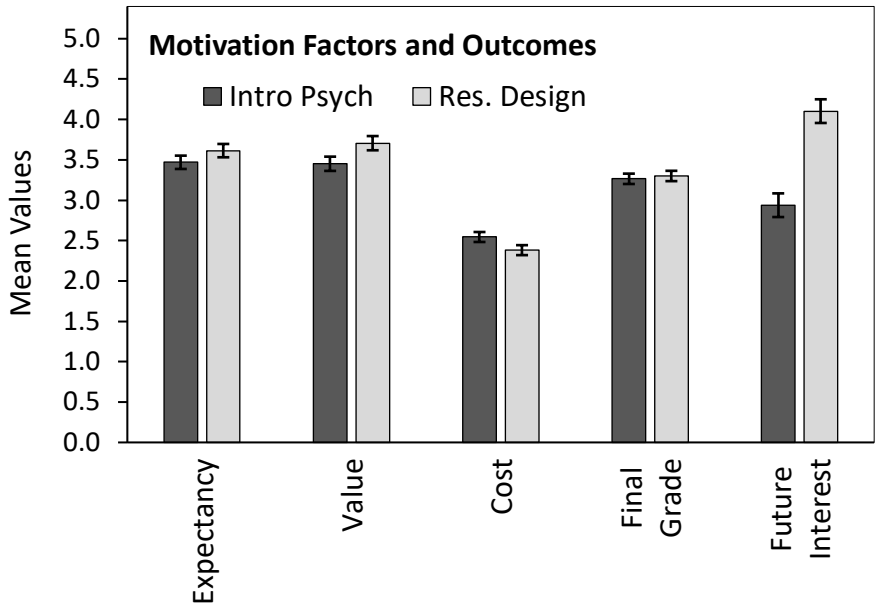


Figure 2

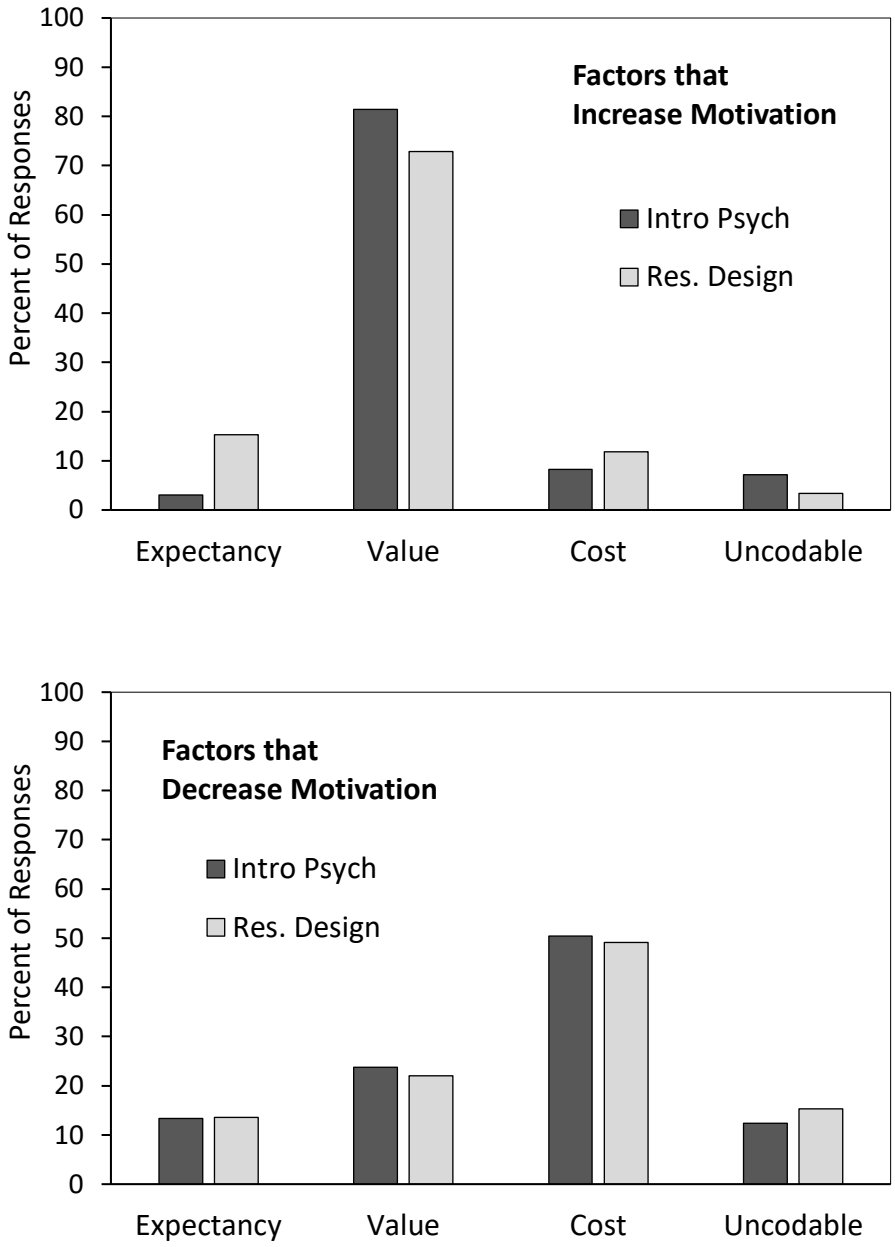
Means for motivation factors (expectancy, value, cost) and two outcome measures (final grade and future interest) in two psychology courses.



Note. *Error bars are ± 1 standard error.*

Figure 3

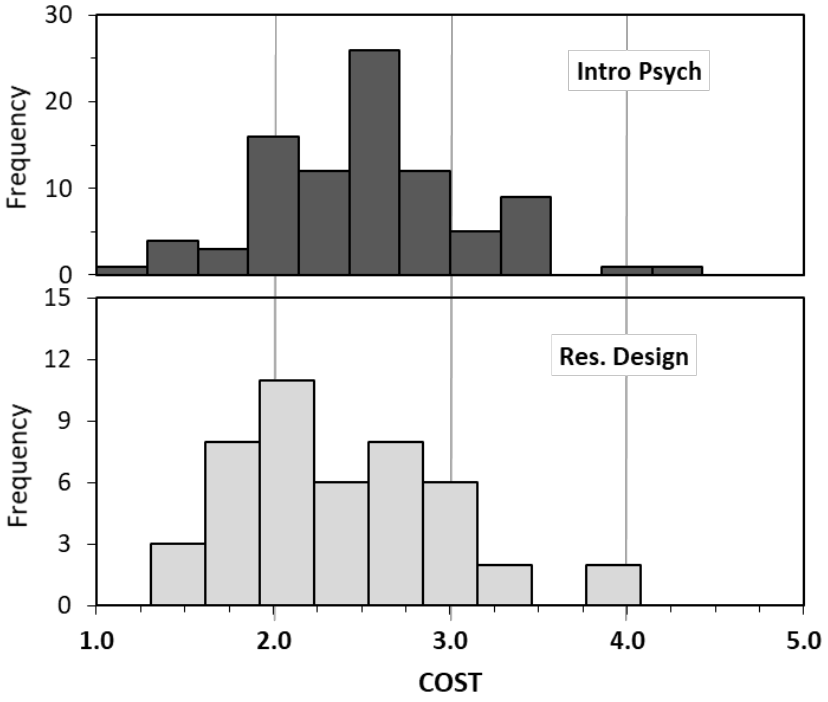
Percentage of expectancy, value, or cost motivation factors indicated in open-ended responses that either increase motivation (top panel) or decrease motivation (bottom panel) in two psychology courses (introductory psychology and research design).



Note. "Uncodable" represents the percentage of open-ended responses that we were unable to confidently link to a specific motivation source.

Figure 4

Frequency distribution of individual scores for cost on a scale from 1 (low cost) to 5 (high cost) for students in two psychology courses (introductory psychology and research design).



Appendix A – Expectancy, Value, Cost Items from User Guide (Barron et al., 2017)

Ten expectancy, value, cost items are rated using a 6 point Likert-scale, ranging from 1 (Strongly Disagree) to 6 (Strongly Agree).

Expectancy, Value, Cost Items

1. I think [insert class subject] is important.
2. I know I can learn the material in [insert class subject].
3. I value [insert class subject].
4. My [insert class subject] classwork requires too much time.
5. I believe that I can be successful in [insert class subject].
6. Because of other things that I do, I don't have time to put into my [insert class subject] class.
7. I think [class subject] is useful.
8. I'm unable to put in the time needed to do well in [insert class subject].
9. I am confident that I can understand the material in [insert class subject].
10. I have to give up too much to do well in [insert class subject].

The Expectancy-Value-Cost Survey is designed to measure three different components of motivation. A mean average score for each component can be calculated using the following formulas.

Expectancy mean average score = (Item 2 + Item 5 + Item 9) / 3

Value mean average score = (Item 1 + Item 3 + Item 7) / 3

Cost mean average score = (Item 4 + Item 6 + Item 8 + Item 10) / 4

In addition to quantitatively measuring expectancy, value, and cost components, we frequently include two open-ended, qualitative questions at the end of the survey to allow students an opportunity to list reasons why they were motivated (or not motivated) to learn in their class.

Open-Ended Items

1. In the space below, please list specific things that INCREASE your motivation to learn in your [class subject] class.

2. In the space below, please list specific things that DECREASE your motivation to learn in your [class subject] class.

Appendix B – Future Interest Items (Barron et al., 2017)

Four future interest items are rated using a 6 point Likert-scale, ranging from 1 (Strongly Disagree) to 6 (Strongly Agree). Future interest is then gauged by the average of the 4 items.

1. I look forward to learning more about [insert area or discipline].

2. I want to take more [insert area or discipline] classes in the future.

3. [insert area or discipline] is important for my future.

4. I want to have a job someday that involves [insert area or discipline].

View publication stats