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Unpacking the Dynamics of Online Motivation: A Study of Short-Term Changes in Task Value and Cost Utilizing Multiple Change Analyses

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Abstract

Motivation is critical to student success in learning environments. However, changes in situation-specific motivation over time are rarely explored among online learners. Drawing from the Situated Expectancy Theory (SEVT), in the current study, I examined changes in situational task-specific task value and cost over the short term and tested the impact of these changes on achievement. I collected task value and cost over four time points from 68 students in an upper-division online Educational Psychology course. Grades on two discussion posts and one exam represented academic performance. I used multiple analytic techniques, scarcely used in the literature, to measure change across time, including task value-cost switching and group and individual-level task value-cost intensity. Group-level intensity analyses revealed task value and cost stability across most time point comparisons. However, individual-level analysis demonstrated variability in task value and cost across comparisons. There was no evidence of task value or cost switching. One significant increase in cost across tasks predicted academic performance in the subsequent assessment. The study highlights the importance of using various techniques to explore motivational changes among online learners and demonstrates the applicability of SEVT in online learning environments.

Keywords: academic achievement, situated expectancy-value theory, motivation change

1. Introduction

The consequences of motivation in online courses are important. Motivation improves academic success in gamified online learning environments (Özhan & Kocadere, 2020), enhances the generation of creative ideas (Wang, 2022), leads to the achievement of course objectives (Hsu et al., 2019), and promotes course performance (Chang et al., 2014; Zhu et al., 2022). However, despite the breadth and depth of knowledge about the consequences of motivation in online learning environments, the literature on how student motivation changes in the short term in online courses is not as well developed. Short-term changes in online motivation are important to consider because motivation is influenced by context (e.g., content) (Lauermann, 2023), and in online learning, like all courses, learning situations change as time progresses in a regular semester. Students in online classes learn a myriad of course topics over a semester. It is plausible that these varying learning situations can impact students' motivation as they transition through learning contexts. Thus, it is crucial to understand the dynamics of motivation because it will allow for an understanding of real-time fluctuations and inform the exact time interventions are needed. Exploring the impact of motivation changes on learning outcomes is also critical.

A theoretical framework suitable for exploring trajectories of motivation in online learning environments is Eccles and colleagues' Situated Expectancy-Value Theory (SEVT) (Eccles et al., 1983; Eccles & Wigfield, 2000, 2002, 2020), which assumes that motivational constructs, including task value (the usefulness of task engagement) and cost (the negative experiences of task engagement), are dynamic and a significant positive (task value) or negative (cost) predictor of academic outcomes, including academic performance. The theory highlights the *situative* nature of motivational constructs in that they can change depending on the situation or context (Eccles & Wigfield, 2020). However, studies framed from the SEVT have typically examined these changes in traditional learning settings, limiting an understanding of how online motivation fluctuates in real time. Moreover, and equally relevant, SEVT studies have primarily explored changes in motivation dispositions and not context-specific changes, focused on one indicator of change at a time (e.g., motivation intensification) and not others (e.g., motivation switching), and

rarely examined the influence of motivation change on academic performance in the short term. With this study, I intend to fill these gaps in the literature. Therefore, using multiple change indices, I investigated situation-specific changes in task value and cost as students learn different content in an online Educational Psychology course over a regular semester and explored how these content-specific changes in task value and cost influence academic performance.

1.1 A Brief Overview of Situated Expectancy-Value Theor

As noted in the introduction, SEVT presupposes that task value (the usefulness of task engagement) is one motivational construct in the framework and relevant to the current study. Task value is dynamic and a predictor of academic outcomes. Task value is multifaceted and is impacted by four distinct types of value (Eccles et al., 1983): *utility value* (usefulness of a task for meeting one's goal), *attainment value* (personal importance of a task), *intrinsic value* (enjoyment or interest derived from a task), and *cost* (negative consequences from engaging in a task). Cost is also multifaceted, typically comprising *opportunity cost* (missed opportunities to engage in other preferred tasks), *effort cost* (effort needed for successful task performance), and *emotional cost* (negative emotions linked with engaging in a task) (Eccles et al., 1983; Wigfield et al., 2017). These facets were measured in the present study.

Eccles and colleagues (Eccles, 2005; Wigfield & Eccles, 1992) proposed that the first three facets of subjective task value represent the potential benefits of engaging in a task, whereas cost relates to all the likely adverse outcomes of engaging in academic activities. Prior SEVT-based research has represented task value as a combination of utility value, attainment value, and intrinsic value scores (e.g., Brown & Putwain, 2021; Dietrich et al., 2019; Kosovich et al., 2015; Part et al., 2020). Researchers have also collapsed the dimensions of cost to represent overall cost (e.g., Flake et al., 2015; Muenks et al., 2023). Furthermore, there is evidence that cost is distinct from task-value elements (Part et al., 2020), and SEVT-based researchers typically measure task value and cost separately (e.g., Beymer & Rosenzweig, 2023; Kosovich et al., 2015; Muenks et al., 2023). I applied the same methodology in this study, meaning I combined utility value, attainment value, and intrinsic value scores to create an overall task value score and collapsed all three cost scores (opportunity, effort, and emotional) to represent an overall cost score.

Prior research examining task value and cost provides empirical support for SEVT, demonstrating their predictive influence on various educational outcomes, including academic performance across different educational contexts. For example, task value is positively associated with academic achievement among college-age populations (Bong, 2001; Greene et al., 2023; Phan, 2014; Tonks et al., 2021; Zusho et al., 2003). A similar pattern of results was recorded among online learners (Alanazi et al., 2020; Joo et al., 2013). Cost negatively predicts academic performance among college students (e.g., Bergey et al., 2018; Perez et al., 2019).

Task value and cost are *situative* influenced by various situations (Eccles & Wigfield, 2020; Wigfield & Eccles, 2020). In other words, different learning contexts, such as the type of tasks assigned in a semester-long course, can influence a student's valuation of the activity, affecting academic performance. This implies that as educational contexts change across one semester (e.g., changing course content), concurrent changes in task value and cost are likely to occur. Testing this assumption is critical, especially because online educators routinely assign different tasks in semester-long courses, and these tasks might differ in content, difficulty level, or length.

1.2 Exploring Changes in Task Value and Cost

SEVT researchers have investigated task value and cost changes over the short term in college (Benden & Lauermann, 2022; Beymer & Rosenzweig, 2023; Bong, 2005; Dresel & Grassinger, 2013; Johnson et al., 2014; Kosovich et al., 2017; Perez et al., 2014; Schnettler et al., 2020; Tanaka & Murayama, 2014; Zusho et al., 2003). For instance, Kosovich and colleagues (2017) demonstrated utility value declined over a semester in introductory psychology courses. Zusho et al. (2003) confirmed these results among students in introductory chemistry courses, revealing that utility value and interest decreased across a semester. Finally, Beymer and Rosenzweig (2023) demonstrated that cost increased every week across a semester.

A common theme across some of the studies is to measure variability in "general" task value and cost over the short term (e.g., "What I'm learning in this class is relevant to my life," Kosovich et al., 2017; "I have to give up a lot to do well in my major," Schnettler et al., 2020). These general representations of task value and cost are considered *dispositions*, distinct from *situation-specific value* and *cost* (Eccles et al., 1983; Eccles & Wigfield, 2020). Indeed, Eccles and colleagues (Eccles, 2005; Eccles et al., 1983; Eccles & Wigfield, 2020) posited that individuals adopt general task value and cost. Nevertheless, task value and cost are also situation-sensitive, changing depending on the academic event (Eccles & Wigfield, 2020; Wigfield & Eccles, 2020).

Several researchers have examined variability in task value and cost as a function of task/lesson-specific contexts among postsecondary students (Benden & Lauermann, 2022; Dietrich et al., 2017, 2019; Johnson et al., 2014; Rach, 2023; Tanaka & Murayama, 2014; Umarji et al., 2021). For example, Benden and Lauermann (2022) reported declines in utility and intrinsic value and increases in cost among first-year German university students in the first few weeks of a semester across several tasks. The current study adds to this growing line of inquiry.

1.3 Exploring Changes in Task Value and Cost in Online Learning Environments

It is critical to understand online motivation because it is central to success in online learning (Hartnett, 2016). The nuances underlying online motivation provide another compelling reason for exploring changes in online motivation. For example, recent research has shown that students opting for online courses perceive them to be costly mainly because of other opportunities they must give up to engage in online learning (Vanslambrouck et al., 2018) and less interesting (Jaggars, 2014; McPartlan et al., 2021). Evidence has also shown that some students start online coursework with appropriate motivation levels (Fryer et al., 2014). These findings indicate that, generally, motivation varies across online learners at the beginning of the semester.

Regarding completing and engaging in learning tasks specifically, online learners cluster into various profiles of motivation ranging from very high, moderate, and very low (Xu, 2022). In other words, online students exhibit variation in motivation as they engage in and complete coursework. However, various factors can undermine or support student motivation, including the nature of the academic context (e.g., challenging and interesting coursework) (Hong et al., 2017; Saadé & AlSharhan, 2015; Subramanian & Budhrani, 2020). This implies that the trajectory of student motivation can change as they learn different course content over a semester.

Recently, research has demonstrated that SEVT can be used to comprehend students' motivation and its precursors and outcomes in online learning environments, mirroring knowledge gained in traditional face-to-face academic settings (e.g., McPartlan et al., 2021; Rosenzweig et al., 2019; Xu, 2022; Xu et al., 2019). However, examining short-term situational changes in task value and cost online is rare. One SEVT-based study investigated the malleability of online task-specific task value and cost over one week (Umarji et al., 2021), uncovering changes in the adoption of these constructs over time. However, the study was limited to examining interest or intrinsic value and did not represent the other task-value facets. Although framed from the Self-Determination Theory, Liu and Kim (2024) found variability in intrinsic motivation, conceptually akin to intrinsic value (Ryan & Deci, 2016), in an online Chemistry course over a semester. Similarly, these findings do not provide a complete picture of task value-cost changes because they only explored intrinsic value and did so from a general context.

The lack of studies on context-specific task value and cost changes in online learning environments leaves uncertainty about task value and cost trajectories over the length of a regular semester in an online learning environment. Moreover, it is important to understand how real-time motivation changes can influence online academic performance, which is not well addressed in the literature. The current study filled the gaps in the online learning literature concerning moment-by-moment changes in task value and cost and the impact of these changes on academic performance.

1.4 Measuring Changes in Task Value and Cost

Motivational change can be assessed using multiple indicators (Bernacki et al., 2015; Fryer & Elliot, 2007; Muis & Edwards, 2009). For example, individuals can engage in motivation intensification/weakening ("Is motivation changing in intensity?") and switching ("What types of change are occurring?"). In other words, individuals can increase or decrease their adoption of a motivational construct over time or adopt one type of motivational construct at one point and abandon it at another time (for a detailed discussion, see Fryer & Elliot, 2007).

However, traditionally, researchers exploring short-term situation/task-specific task value-cost changes have primarily examined the strength or intensity of these constructs over the short term at the group and individual levels (e.g., Benden & Lauermann, 2022; Dietrich et al., 2017; Rach, 2023; Schnettler et al., 2020). As a notable exception, Deitrich et al. (2019) investigated changes in students' expectancy, value, and cost profiles as they encountered different situations across multiple weeks. Four profiles emerged, including low motivating (low value and expectancy and moderate costs), highly motivating (high expectancy and value and low costs), motivating but costly (medium expectancy and value but moderate costs), and low-cost motivation (medium expectancy and value and low costs). Moreover, they evaluated shifts between profiles, revealing similar levels of cost and different levels of expectancy and task value across profiles over time. Umarji et al. (2021) also documented multiple profiles of online cost, interest, and academic emotions for various tasks across one week. However, as noted above, the research focused solely on intrinsic value.

These findings suggest that students prioritize motivational constructs and may switch their endorsement in

different situations. Explorations of this nature are relevant from the SEVT perspective because the model assumes that as students encounter various settings, different components of task value can become more relevant than others for each context (Eccles & Wigfield, 2020). However, examining multiple indicators of task value-cost change is uncommon. In the current study, I tested multiple indices of task value and cost changes, including intensity and switching.

1.5 Impact of Task Value-Cost Change on Academic Performance

A vital component of SEVT is the postulation that academic performance is a critical outcome of task value and cost (Eccles et al., 1983; Eccles & Wigfield, 2020). Task value and cost changes can also predict academic performance over time. For instance, Robinson et al. (2019) discovered that slower declines in task value over the first two years of college predicted higher grades. These researchers examined what will be called in this article, *dispositional task value-cost changes*.

Relevant to the current study, a handful of studies have explored the association between *situation-specific* task value-cost changes and academic performance in the short term. Notably, Benden and Lauermann (2022) investigated the impact of changes in intrinsic and utility values and cost on final exam performance, revealing that decreases in utility value and increases in cost in the first few weeks of the semester predicted poor exam performance. The present study adds to this body of literature, particularly clarifying how task value and cost changes predict academic performance on various assessments over the short term.

1.6 The Current Study

A clear understanding of online students' situational motivation trajectories is still lacking. This lack of research indicates that there is still uncertainty surrounding how motivation changes moment by moment as students encounter various learning situations, including different course material. Given the importance of motivation to academic success in the online learning environment (Hartnett, 2016), these explorations are critical. Although the SEVT can provide a basis for examining these situation-specific motivation changes, SEVT-based research focuses primarily on traditional learning environments. Furthermore, these studies use one motivation change index and rarely examine situation-specific changes in motivation and the influence of motivation change on academic performance in the short term. This study intends to fill these gaps in the literature. I investigated changes in situation-specific task value (i.e., combined utility, attainment, intrinsic values) and cost (i.e., combined opportunity, effort, emotional costs) among online introductory educational psychology students as they learn different course material across one semester. I measured multiple changes in task value and cost, including motivation strength at the group and individual levels and switching. Further, I examined the link between task value-cost change and academic performance on various assessments. I posed three research questions: 1) How do task value and cost change in intensity at the group and individual levels over time? 2) How do students switch between task value and cost over time? 3) How do task value and cost changes influence performance on subsequent assessments?

Prior studies utilizing group-level change analyses have consistently shown variability in situational task value and cost over the short term; however, the direction of change has been inconsistent across studies. For example, some researchers have shown increases and decreases in task value and cost over a semester (Dietrich et al., 2017; Johnson et al., 2014), whereas others have demonstrated exponential declines in task value and increases in cost as the semester progresses (Benden & Lauermann, 2022; Schnettler et al., 2020). SEVT-based researchers have also found varying individual-level changes in task value-cost intensity (Dietrich et al., 2017; Schnettler et al., 2020). These studies focused on different types of learning situations (e.g., class activities: Benden & Lauermann, 2022; course content: Dietrich et al., 2017; Johnson et al., 2014; Schnettler et al., 2020) for different content areas (e.g., math: Benden & Lauermann, 2022; teacher education program: Dietrich et al., 2017; educational psychology: Johnson et al., 2014; math and law; Schnettler et al., 2020, which coupled together could explain the inconsistency in results. However, given Johnson et al.'s (2014) study closely mirrors the current work (i.e., examining group-level changes across course content among educational psychology students), the current study's hypothesis was that task value and cost would change at the group-level, with evidence of increases and decreases in task value and cost. Considering the findings on individual-level changes over a semester when reflecting on course content, the expectation was for individual-level task value and cost to vary. Based on recent findings, students can switch their task value-cost profiles over time across a semester (Dietrich et al., 2019; Umarji et al., 2021). The expectation was, therefore, that as students learn different course material over the semester, they would switch their task value and cost. Finally, there should be a negative relationship between situational cost changes and academic performance and a positive relationship between situation task value and academic performance based on prior findings (Benden & Lauermann, 2022).

2. Method

2.1 Participants, Context, and Procedure

Participants were 68 students (88.2% female; 10.3% male; 1.5% transgender) enrolled in two sections of an online upper-division Educational Psychology course at a relatively large university in the southeastern United States. The university comprised primarily in-state students (93%). Much of the sample was White (41.2%), followed by Black (33.8%), Hispanic (13.2%), Asian (4.4%), and American Indian/Native Alaskan (1.5%). Some students selected another race or did not report their race (5.8%). The sample was predominantly seniors (69.1%) and juniors (30.9%). The mean age of the participants was 22.7 years (SD = 4.80), ranging from 18 to 48 years. The mean self-reported GPA was 3.27 (SD =.40).

The current author was the instructor of record. However, a graduate research assistant (GRA) coordinated data collection and aggregation and facilitated the communication of the study to the students. The course covered various topics in weekly modules. Each module typically covered one chapter. Students completed four discussion posts, four exams, and weekly quizzes to assess learning in the course. Discussion posts supplemented materials covered in the course textbook (with a digital option), instructor-recorded audio screen-captured lectures, assigned readings (e.g., PowerPoint slides and notes, open educational resources, journal articles), and YouTube videos (e.g., Khan Academy). Each exam was noncumulative and covered topics from several modules, which were outlined in the course's semester-long schedule. In the current study, I targeted the task value and cost for the content, which was evaluated via discussion post (DP) 1, DP 3, and exams 1 and 3, completed in the following order: Exam 1 (time 1; week 3), DP 1 (time 2; week 5), Exam 3 (time 3; week 11), and DP 3 (time 4; week 13). Exam 1 covered various topics, including effective teaching, research methods, and development, totaling three modules. Students were required to analyze case studies for their discussion posts, applying topics covered in class. The course topics assessed by DP 1 were effective teaching, research methods, development, individual variations, and sociocultural diversity (five modules). Exam 3 covered behavioral–social cognitive approaches, memory (split into two modules), complex thinking, and social constructivist approaches, totaling five modules. Finally, DP 3 addressed social constructivist approaches, instructional planning and instruction, and motivation (three modules)

More than 80% of the students across sections voluntarily participated in the study in exchange for 15 extra credit points toward their final course grade for completing all phases of the study. A GRA applied extra credit to each student one by one after all phases of the study were complete. Students completed Qualtrics surveys before completing the assessments (i.e., Exam 1 [time 1], DP 1 [time 2], Exam 3 [time 3], and DP 3 [time 4]). The author's institutional review board approved all the study procedures.

2.2 Measures

2.2.1 Task Value and Cost

The task value-cost scales were adapted from Benden and Lauermann (2022) and Dietrich et al. (2019). Items were changed to reflect the relevant assessment that covered the course topics at each time point and ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). The task value scale comprised six items measuring *utility value* (e.g., "The information covered in [Insert Assignment Name] is useful for my future"), *attainment value* (e.g., "The content covered in [Insert Assignment Name] is important to me"), and *intrinsic value* (e.g., "I enjoy the content that is covered in [Insert Assignment Name]"). The cost scale consisted of six items assessing *emotional cost* (e.g., Learning the content covered in [Insert Assignment Name] is stressful for me"), *effort cost* (e.g., "Learning the content covered in [Insert Assignment Name] drains a lot of my energy"), and *opportunity cost* (e.g., "I have to give up a lot to do well in [Insert Assignment Name]"). The task value and cost scales demonstrated good internal consistency across each time point, ranging from α = .82 to .90 and .84 to .90, respectively. Appendix A presents Cronbach's alphas for each variable across time points.

2.2.2 Academic Performance

Academic performance was measured using DPs 1 and 3 and Exam 3 scores. Exam grades are the percentage of items correct on the 50-item multiple-choice/true-false exams. Discussion grades were transformed into percentage scores on rubrics worth 14 points.

2.3 Data Analytic Procedures

Six separate comparisons were made across the four time points to address the first two research questions. To answer the first question, task value and cost intensification were measured using three complementary techniques used in prior motivation change studies (see Bernacki et al., 2015; Edwards, 2023; Fryer & Elliot, 2007; Muis & Edwards, 2009) and common in the personality development literature (see Bleidorn et al., 2022; Damian et al., 2019) differential continuity, mean-level change, and individual-level change (reliable change index; RCI).

Differential continuity, represented by Pearson's test-retest correlations, relates to the extent to which the relative order of individuals within a group on a particular measure remains consistent across two time points (see Jackson & Beck, 2021). Accordingly, differential continuity measures change at the group level. For the current study, it shows how the class intensified their task value and cost as they prepared to learn various course topics. For differential continuity, high test-retest coefficients indicate that task value and cost remained stable over time. However, moderate reliabilities suggest moderate fluctuations in task value and cost and, low reliabilities indicate substantial changes.

Mean-level change, another group-level index, refers to the degree to which the mean level of a measure of interest changes across the group over time. It is typically measured using dependent sample *t*-tests, as was done in the present study. Statistical significance demonstrates changes in the measures between the time points, whereas nonstatistical findings reveal relative stability over time.

These normative changes, however, can conceal potential changes at the individual level (Damian et al., 2019). In other words, these changes do not provide nuance about individual differences across time points, especially because individual changes may be obscured by group-level changes if the mean number of increases and decreases in a group score is comparable, therefore nullifying each other. Reliable change index (RCI), used in the present study, is one way to measure individual-level changes across two time points, grouping individuals' scores into three categories: increased, decreased, or stayed the same across time (Bischoff et al., 2020; Christensen, 1986; Fryer & Elliot, 2007; Jacobson & Truax, 1991). RCI is calculated by dividing the difference between the scores obtained at time-point two and time-point one by the standard error of the difference score. RCIs exceeding 1.96 and falling below -1.96 are deemed improbable to occur by chance and are thus regarded as reliable changes (Jacobson & Truax, 1991). RCI provides a reliable account of the magnitude and direction of individual changes, thereby providing more meaningful results beyond group-level findings. Experts have advocated for applying RCI in psychological research (Zahra & Hedge, 2010).

To answer research question two, switching between task value and cost over time was measured using ipsative (profile) consistency, which assesses the extent to which an individual's pattern of traits stays stable across two time points (McCrae, 2008; Poier, 2022; Terracciano et al., 2010). From the current study's perspective, ipsative consistency measures the relative stability of the arrangement of task value and cost *within* an individual over time. Put simply, ipsative consistency evaluates the rank order of the constructs within or endorsed by an individual over time. To measure ipsative consistency, the Pearson double-entry intraclass correlation coefficient (ICCDE) was calculated as is standard in the personality development literature (see Furr, 2010; McCrae, 2008; Terracciano et al., 2010). Scores at each time point were first standardized. The task value and cost scores for each participant at the second time point were added under the scores of these constructs at time one, and vice versa. According to Koo and Li (2016), profile consistency is deemed poor when the ICCDE value is less than .50 and acceptable when the ICCDE value ranges from 0.5 to .75. A score between .75 and .9 is considered good. A value greater than .9 is regarded as excellent.

The third research question was addressed using one-way ANOVA to explore the impact of task value and cost changes on grades in subsequent assessments. Utilizing the RCI results, participants were classified into three independent groups: increase, decrease, and no change in task value and cost. The outcome measures were DP 1, Exam 3, and DP 3 grades. Only RCI results that indicated reliable increases and decreases were used in the analysis.

3. Results

3.1 Preliminary Analysis

Appendix A reveals the findings of the preliminary analyses, including descriptive statistics and Cronbach's alpha coefficients. Mean task value was generally greater than cost at each time point.

3.2 Task Value and Cost Intensification Over Time

3.2.1 Differential Continuity

Appendix B displays the Pearson product-moment correlation used to assess differential continuity. The correlations for task value varied between .37 and .69, while the correlations for cost ranged from .52 to .69. When considering comparisons across all time points, the average task value correlation was .57, and the average cost coefficient was .62. Both task value and cost appear to have moderate stability, except for one task value correlation of .37. Thus, in general, the degree of intensification of task value and cost was moderate. Upon closer analysis of each time point comparison, the greatest task value stability occurred between Time 1 (Exam 1 content) and Time 2 (DP 1 content). By contrast, the period of highest stability in terms of cost was between Time 2 and Time 3 (DP 3 content). The stability of task value was lowest between Time 1 and Time 3 (Exam 3 content), while cost was

least stable between Time 1 and 3.

3.2.2 Mean-Level Change

A series of dependent sample *t*-tests were used to measure mean level change, with alpha set at .008 to control for Type 1 errors (see Appendix C for results). None of the task value comparisons between time points yielded significant differences (*ps* >.05). The only significant group-level change in cost was between Time 1 (Exam 1 content) and Time 4 (DP 3 content), $t(53) = 2.90$, $p < .006$, showing an average decrease of .28. These results suggest that at the group level, task value remained relatively stable over time. However, there was a cross-time change in cost between Time 1 and Time 4. Figure 1 demonstrates task value-cost mean level change across learning situations.

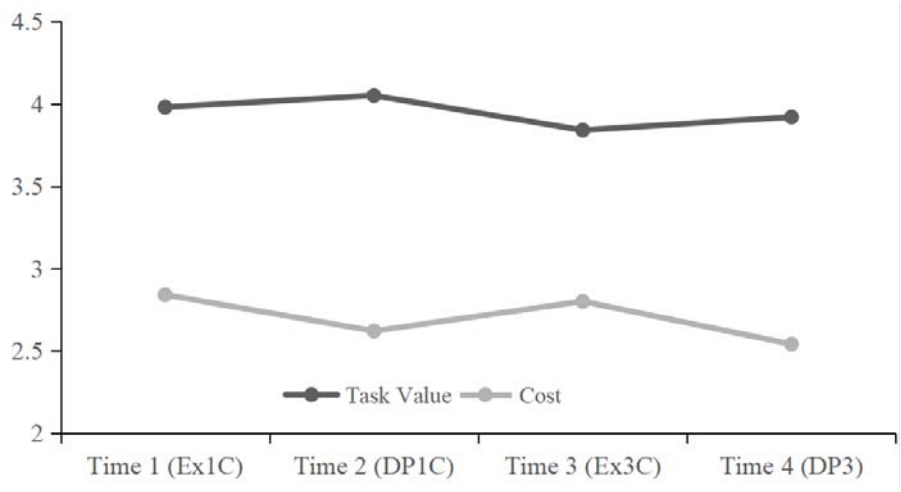

Figure 1. Mean Level Change Across Time

Note. Ex = Exam. DP = Discussion Post. C = Content.

3.2.3 Individual-Level Change

RCI was utilized to investigate individual-level changes in task value and cost. Appendix D provides the RCI scores, displaying the proportion of participants whose endorsement of task value and cost changed significantly, decreased significantly, or remained unchanged across time points. Except for a couple of time-point comparisons, students were inclined to change the intensity of their task value and cost endorsement over time. Table 1 presents a summary of task value-cost intensity results by analytic technique.

Table 1. Summary of Task Value-Cost Intensity Results by Type of Analytic Technique

Analysis	T1 to T2		T1 to T3		T1 to T4		T2 to T3		T2 to T4		T3 to T4	
	TV	Cost	TV	Cost	TV	Cost	TV	Cost	TV	Cost	TV	Cost
DF	MOD	MOD	LOW	MOD	MOD	MOD	MOD	MOD	MOD	MOD	MOD	MOD
MLC	NC	NC	NC	NC	NC	DEC	NC	NC	NC	NC	NC	NC
ILC	INC	DEC	NC	DEC	DEC	DEC	DEC	INC	DEC	NC	INC	DEC

Note. T = Time point. DF = differential continuity. MLC = mean-level change. ILC = individual-level change, MOD = moderate stability.

Students reliably decreased their adoption of task value more frequently over time than increased them, with a range of 46% to 55.4% of the sample. Similarly, students reported reliable decreases in cost in four of the six time-point comparisons, ranging from 36.2% to 48.1% of the participants. Students' task value primarily increased when reflecting on content in exams and discussions, ranging from 43.6% to 48.1% of students. Students did not change their endorsement of task value and cost across time points in a similar pattern, except between Time 1 (Exam 1 content) and Time 4 (DP 3 topics), where most students decreased their adoption of both task value and cost. For example, whereas most students' task value increased between Time 1 and Time 2 (DP 1 content,43.6%), most students' cost decreased within that time frame (47.3%).

3.3 Task Value and Cost Switching Over Time

Ipsative consistency measured by the double-entry intraclass correlation revealed intra-individual stability values across all six comparisons. The ICCDE values were .75 between Time 1 (Exam 1 content) and Time 2 (DP 1 topics), .74 between Times 1 and 3 (Exam 3 material), .77 between Time 1 and Time 4 (DP 3 topics), .77 between Time 1 and Time 3, .83 between Times 2 and 4, and .78 between Times 3 and 4. This finding suggests there was acceptable to good ipsative consistency, and students' task value and cost profiles remained relatively stable across comparisons. Thus, there appeared to be little switching between task value and cost across time.

3.4 The Impact of Task Value-Cost Changes on Academic Performance

One-way ANOVAs were conducted to examine the impact of task value-cost changes on subsequent grades in DP1, Exam 3, and DP 3. Because there were no reliable changes in task value between Times 1 (content in Exam 1) and 3 (Exam 3 topics) and cost between Times 2 and 4 (topics covered in DP 1 and 3, respectively), these comparisons were excluded from the analyses. The results revealed that task-value changes across time points did not significantly influence academic performance in any of the subsequent assessments (ps >.05). In contrast, a reliable change in individuals' cost between Time 2 (DP 1 material) and Time 3 (Exam 3 topics) significantly influenced grades in Time 3, $F(2, 53) = 5.18$, $p = .009$. Students who reported a reliable increase in cost over this period ($n = 27$) had significantly lower grades ($M = 72.89\%$) than students whose cost decreased ($n = 18$; $M = 86.1\%$). There were no other statistically significant post hoc comparisons or any other statistically significant impacts of cost on grade.

4. Discussion

In the current study, I sought to expand the literature on short-term changes in *situational-specific* motivation using SEVT as the theoretical framework and utilizing multiple analytic procedures. In particular, I examined how task value (i.e., combined utility, attainment, intrinsic values) and cost (i.e., combined opportunity, effort, emotional costs) among students (primarily female) enrolled in an online Educational Psychology course intensified and switched as they encountered different course topics over time and how task value-cost changes influenced academic performance. Overall, group- and individual-level analyses revealed divergent patterns of task value-cost changes, task value-cost profiles were stable across time points, and only variability in cost influenced grades across one time point.

4.1 Task Value-Cost Intensity: Variability of Results Across Group and Individual-Level Analyses

Findings from group-level change analyses (i.e., differential continuity and dependent samples *t*-test) primarily showed moderate or relative stability in the degree of task value and cost intensification across time points. Moreover, differential continuity revealed that group-level task value and cost had varying stability patterns across time points, in that task value was more stable at some time points than cost and vice versa. Nonetheless, these constructs were generally stable across time/learning situations for the class. These results were typically inconsistent with the expectations of changes in intensity over time, as documented by prior research on situational task value and cost changes across course content (e.g., Johnson et al., 2014). However, group-level changes might not provide the complete picture, as is explained below.

Intensity in task value and cost across time points at the individual level using RCI confirmed the hypothesis. These findings imply that group-level changes might mask individual motivation changes (Damian et al., 2019; Fryer & Elliot, 2007). These individual-level change findings mirror prior group-level change findings, revealing persistent declines in task value across time (Benden & Lauermann, 2022; Kosovich et al., 2017; Rach, 2023; Schnettler et al., 2020). The comparative usefulness of learning course materials over time appears in question as the semester progresses. This finding is particularly critical because task value is linked to important educational outcomes, including engagement, course-taking patterns, and class participation (e.g., Guo et al., 2015, 2016; Jones & Carter, 2019; Safavian, 2019). Several factors can affect task value. For example, greater perceived teacher support (Wang & Eccles, 2012) and online social presence (Catyanadika, 2021; Huang, 2017) can lead to higher task value. Perhaps, over time, students did not feel supported or socially connected in the course, leading to decreased task value. This possibility was not evaluated in the current study and could be an area for future research.

Interestingly, task value increased for most students moving from learning content in exams to learning course material in discussion posts, except for one comparison. There might be several explanations for these results. First, the type of assessment connected to the course content might have impacted students' task value over time. Elements of a problem-based learning approach were integrated into discussion posts. Students were required to complete case study analyses by solving classroom-based problems, which might account for this result. Problem-based learning, a form of experiential or active learning (Wijnen et al., 2018), can influence interest (Sangestani

& Khatiban, 2013), which is conceptually similar to intrinsic value (Hidi & Renninger, 2006). Thus, it is likely that the anticipation for discussion posts contributed to the overall increase in task value for the particular content compared to that of exams. Finally, the nature of the course content might offer insight into the results. The content covered in Exam 1 and DP 1 and Exam 3 and DP 3 were similar. The two assessments also occurred close in time (Week 3 and Week 5). Perhaps familiarity with some of the topics covered in the discussion topics, after just encountering them in the exams, triggered positive emotions, which can enhance task value (e.g., intrinsic value; Løvoll et al., 2017).

However, I did not observe these results between Time 1 (Exam 1 content) and Time 4 (DP 3 topics). Instead, I recorded a significant decrease in task value over time. Students reflected on different content across these two time points. Students likely had a lower expectation of learning the content covered in DP 3 than in Exam 1. Expectancy closely correlates with task value (Perez et al., 2019). The current study did not consider the role of expectancy in task-value changes over time. Future studies could explore this.

Like task value, students reported significant declines in cost across most of the time-point comparisons. These findings are significant, considering cost is linked to negative outcomes, including poor achievement, dropout intentions, negative affect, and avoidance behaviors (e.g., Kim et al., 2022; Part et al., 2020; Perez et al., 2014). Students' level of motivation regulation might explicate these results. Evidence shows that individuals become more effective at adopting techniques to sustain motivation over time, with adults being more regulated (Cooper & Corpus, 2009). Participants in the current sample were primarily juniors and seniors who might have been adept at regulating their perceptions of cost. Motivation regulation has been found to temper perceived cost (Kim et al., 2023).

Nevertheless, given that task value predominantly declined rather than increased across time, self-regulatory strategies to maintain motivation may not have been applied to the same extent across constructs. Wolters and Benzon (2013) found that college students vary the degree to which they regulate different motivational constructs. However, the current results are inconsistent with prior findings documenting persistent short-term increases in college students' cost across tasks utilizing group-level change analyses (Benden & Lauermann, 2022; Schnettler et al., 2020). Group-level increases in cost intensity might have obscured individual cost decreases.

4.2 No Evidence of Task Value-Cost Switching Across Time

Results from ipsative consistency revealed that students' task value and cost profile remained the same across the various time-point comparisons, with mean task value greater than cost at each time point. Therefore, there was relatively no switching between task value and cost across time points. These results contradict prior evidence of task value-cost switching among college students across a semester (Dietrich et al., 2019; Umarji et al., 2021). However, whereas participants in the present work were asked about their task value and cost for different content assessed by discussion posts and exams, participants in prior work reported task value-cost for a specific lesson (Dietrich et al., 2019) or daily online course activities (Umarji et al., 2021). The nature of the learning context across academic settings likely influences profile switching.

Additionally, the SEVT suggests that perceived gender roles can influence task value-cost, resulting in males attributing higher task value to male-dominated domains and females perceiving greater task value in female-dominated domains than cost (Eccles, 2005). The present study was primarily composed of female students and was conducted in psychology considered female-dominated (Gruber et al., 2021). Given the subject matter, it is probable that most of the female participants in the sample had greater perceived task value than cost and were less likely to switch.

4.3 Change in Cost and Not Task Value Influences Academic Performance

One-way ANOVAs revealed that a significant increase in cost in one time-point comparison influenced grades in the subsequent assessment. In particular, students who believed engaging with the content covered in DP 1 was more costly than studying Exam 3's content performed worse on the exam than students whose perceptions of cost decreased. This finding is consistent with prior work recording a predictive influence of cost on academic performance on final exams (Benden & Lauermann, 2022).

Expectancy, which is closely associated with academic performance (e.g., Meyer et al., 2019; Plante et al., 2013; Putwain et al., 2019; Wu et al., 2020) and plays a mediating role in the relationship between other motivational constructs and academic performance (Doménech-Betoret et al., 2017), could account for this finding. Perhaps students who reported high levels of cost between the periods in question had lower expectations of success on the exam, which negatively impacted their performance. However, this inference should be taken with caution because none of the other cost changes at the individual level predicted subsequent academic achievement. Additional

investigations are warranted.

Likewise, task-value changes did not significantly influence academic performance, inconsistent with prior findings in situation-specific contexts (Benden & Lauermann, 2022). However, these findings mirror short-term changes in domain-based task value, albeit only utility value was measured (Kosovich et al., 2017). Task-value changes among online students might impact other factors not measured in the current study, including task completion (see Umarji et al., 2021). Nonetheless, researchers should further explore the impact of task value changes on achievement for better clarity.

4.4 Theoretical and Educational Implications

4.4.1 Theoretical Implications

The study has several theoretical implications. First, the results provide evidence that exploring changes in short-term motivation from multiple angles utilizing various statistical techniques could elucidate more nuances in motivation changes. Second, when considering task value and cost changes at the student level, the study largely supported the postulation of the SEVT that these motivational constructs are dynamic and amenable to moment-by-moment changes (Eccles & Wigfield, 2020; Wigfield & Eccles, 2020).

Furthermore, the study builds on research that documents the volatility of student motivation as they engage in various academic situations in one class and semester (Benden & Lauermann, 2022; Dietrich et al., 2019; Rach, 2023; Schnettler et al., 2020; Umarji et al., 2021). Third, the switching results are important to elaborate in the context of theory. SEVT experts have asserted that individuals create hierarchies of motivational constructs for each task engagement (Eccles & Wigfield, 2020; Wigfield & Eccles, 2020), supported by prior research (Dietrich et al., 2019). However, I did not observe this in the current study. These discrepant findings warrant further empirical attention.

Finally, the study demonstrated that cost change predicted academic performance for one comparison. This result aligns with the SEVT's assumption that cost could impact achievement (Eccles & Wigfield, 2020) and demonstrates that SEVT is applicable in online learning settings. Nevertheless, the result is interesting because none of the other reliable changes in task value or cost predicted academic performance. Additional research is needed to clarify how task value-cost changes influence academic achievement.

4.4.2 Educational Implications

From a practical perspective, these results have important implications for pedagogical practice, especially online education. First, the group-level intensity analyses reveal task value and cost stability over time. Based on these results, it is easy to initially assume that students maintain the same level of task value-cost as the semester progresses and adopt pedagogical practices focusing on students as a homogenous group. However, the individual-level change analysis revealed that students experience different changes in their motivation as they learn different course content across the semester. This finding confirms the importance of differentiating instruction to meet students' varied motivational needs (Tomlinson, 2014). This also implies that instructors must understand the level of student motivation at any given time in a semester-long course. Assigning low-stakes diagnostic surveys before a course activity can help instructors determine the level of each student's perceived task value and cost and address them accordingly. Adopting these strategies is crucial because motivation can influence outcomes, such as online retention (Vanslambrouck et al., 2018; Watted & Barak, 2018).

Second, the individual-level change results demonstrated that task value and cost were more likely to decrease over various time points than increase. These patterns of change suggest that although there was potential for buffering against the negative impacts of cost, there might have been tempering of the positive consequences of finding value in engaging in learning content (see Jones & Carter, 2019; Safavian, 2019). Thus, instructors might need to adopt instructional techniques that promote optimal levels of adaptive motivation over time. For example, instructors can provide brief task-value interventions that demonstrate to students the value of engaging in course activities at opportune times in the semester. There is evidence that task value interventions, including utility value interventions (for a review, see Rosenzweig et al., 2022b) and attainment value interventions (e.g., Perez et al., 2022), can boost students' perceived value. Interventions to enhance interest have also been effective (e.g., Bernacki & Walkington, 2018; Crouch et al., 2018; Renninger et al., 2014). Prior research examining a combination of these interventions has also provided evidence of enhanced perceived task value due to the intervention (see Acee & Weinstein, 2010). Online learners can also benefit from these task-value interventions (Rosenzweig et al., 2019).

Finally, the finding that cost significantly predicted academic performance at one time point comparison highlights the need for instructors, including in the online environment, to adopt practices to address perceived cost directly.

Therefore, instructors should support and maintain a low perceived cost of engaging in course activities. For example, instructors can assign simple exercises that could mitigate high levels of perceived cost, similar to the cost reduction intervention tested in prior work (see Rosenzweig et al., 2020).

4.5 Limitations

Despite the study's positive contribution to the literature, it was limited by multiple factors. First, I conducted the study in one institution, primarily among upper-division and female students in an online Educational Psychology course. Therefore, the generalizability of the findings is unclear. Accordingly, additional research is needed to explore whether different student populations, with a more representative sample in various courses, provide similar findings.

Second, I measured composite task value and cost. There is evidence of the short-term malleability of situation-specific task value and cost components (Benden & Lauermann, 2022; Umarji et al., 2021). Although some current results mirrored findings from prior work, exploring the various facets of task value and cost independently could have yielded better knowledge about task value-cost intensity and switching and their impact on academic performance. Future research could explore this issue. Third, the sample used in the current study was relatively small. Although the results aligned with some prior results among online students (Umarji et al., 2021), the sample size might have impacted the power to detect significant changes. Future studies could use larger samples to examine online situational task value-cost changes over time. Fourth, I examined changes over only four time points. However, exploring intensification and switching for a longer period might clarify how students' motivation changes over time and how that change predicts achievement. Fifth, the study measured students' perceptions of task value and cost as a function of different situations, consistent with the postulation of the SEVT (Eccles & Wigfield, 2020b). However, students also have general task-value cost-dispositions (Eccles & Wigfield, 2002), which the current study did not explore. Moreover, prior research has revealed links between students' dispositional motivation and task value-cost situational profiles (Dietrich et al., 2019). Future work is needed to explore the dynamics between online students' dispositional task value-cost and changes in their situational task value and cost using the analytic procedures used in the present research.

Finally, I did not consider changes in expectancy, which is another construct in the SEVT and is postulated to be related to task value and cost (Eccles & Wigfield, 2020). Perhaps including changes in expectancy could have provided a better understanding of the trajectories of task value and cost and their impact on achievement. Future work could explore this.

5. Conclusion

According to the theoretical assumptions of the SEVT, task value and cost are dynamic constructs that can change according to the specific context (Wigfield & Eccles, 2020). In the current study, I tested this assumption among online students in one semester over time, which is rarely investigated in online learning contexts. These explorations are critical, considering motivation is key to success in online learning (Hartnett, 2016). Importantly, I used various change indices, including group- and individual-level intensity change and switching indices, which are seldom adopted in this line of inquiry. I further explored the predictive influence of task value-cost changes on academic performance. Group-level change analyses of task value-cost intensity over time provided evidence of stability, whereas individual-level change analyses showed that across various time points, most students change the intensity of their task value and cost. Moreover, the results demonstrated that a change in cost over time in a semester-long course is consequential for later achievement in that course. Generally, the study demonstrates the importance of SEVT-based researchers exploring short-term changes using various statistical techniques, particularly in online learning contexts. Importantly, the study supported the postulations of the SEVT among online learners and could provide educators with a deeper knowledge of the malleability of student motivation and its impact. With this knowledge, educators can better support and sustain students' motivation.

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Appendix A

Descriptive Statistics and Alphas for Task Value and Cost Over Time

Scale	Time 1: Exam 1			Time 2: DP 1			Time 3: Exam 3			Time 4: DP 3		
	M	SD	α	M	SD	α	M	SD	α	M	SD	A
TV	3.98	.55	.82	4.05	.54	.83	3.84	.72	.90	3.92	.63	.90
Cost	2.84	.81	.84	2.62	.89	.90	2.80	.91	.89	2.54	.88	.85

Note. DP = Discussion Post. TV = Task Value. Each assessment covered different content on which students were to reflect as it relates to their task value and cost.

Appendix B

Test-Retest Reliability Coefficients for Task Value and Cost

	rT1.T2	rT1.T3	rT1.T4	rT2.T3	rT2.T4	rT3.T4	Mean
TV	.69	.37	.55	.54	.66	.62	.57
Cost	.66	.66	.64	.50	.67	.62	.62

Note. T = Time point.

Appendix C

Dependent Samples t-Test Results

	rT1.T2	rT1.T3	rT1.T4	rT2.T3	rT2.T4	rT3.T4
TV	-.27 (-.02)	1.30 (.12)	1.16 (.09)	2.60 (.22)	1.06 (.07)	-1.80 (-.15)
Cost	1.61 (.16)	.54 (.05)	2.90 (.28*)	-.57 (-.07)	.88 (.09)	2.27 (.24)

Note. T = Time point. Mean differences are in parentheses, and *t*-values are outside the parentheses. *$p < .008$.

Appendix D

Individual-Level Change Results

	T1 to T2		T1 to T3		T1 to T4		T2 to T3		T2 to T4		T3 to T4	
	TV	Cost	TV	Cost	TV	Cost	TV	Cost	TV	Cost	TV	Cost
% dec	32.7	47.3	32.8	36.2	47.2	48.1	55.4	32.1	46.0	34.0	38.9	46.3
% same	23.6	25.5	39.7	29.3	13.2	25.9	17.9	19.6	16.0	36.0	13.0	27.8
% incr	43.6	27.3	27.6	34.5	39.6	25.9	26.8	48.2	38.0	30.0	48.1	25.9

Note. T = Time point.