# The Influence of Task Value on Academic Achievement: The Mediating Role of Metacognitive Regulation among Vocational Education

## Liu Caixia[a,b], Zainudin Abu Bakar[a], Xu Qianqian[a]

[a]Faculty of Educational Sciences and Technology, Universiti Teknologi Malaysia, Johor Bahru, Malaysia, [b]Faculty of Public Administration, Guangzhou City Polytechnic, Guangdong Province, China
Email: Liucaixia@graduate.utm.my

**Abstract**

Vocational education equips students with essential skills and knowledge to succeed in the labor market. This study examines how task value, cost perception, and self-regulation affect academic achievement in vocational education. Using data from 142 students, we explored the relationship between motivation and academic achievement. Our findings reveal that cost perception and maladaptive regulation are significantly negatively associated with academic achievement, while task value, metacognitive strategies, and maladaptive regulation positively influence learning satisfaction. Through multivariate covariance analysis, we identified notable differences in self-regulation strategies and academic achievement among groups classified by task value and perceived cost. Further hierarchical regression and mediation analyses demonstrated that metacognitive strategies fully mediate the relationship between task value and academic achievement. This study underscores the importance of increasing the task value within vocational education curricula and improving students' metacognitive regulation skills to boost academic performance.

**Keywords**: Task Value, Cost Perception, Metacognitive Regulation, Academic Achievement, Vocational Education

**Introduction**

Vocational education plays a crucial role in addressing the growing global shortage of skilled labor, offering essential training that directly meets labor market demands. It not only equips students with practical skills but also prepares them to become professionals capable of responding to evolving industry needs (Krötz & Deutscher, 2022). As the global demand for skilled labor increases, vocational education becomes even more pivotal in bridging the skills gap. This type of education emphasizes hands-on training and practical skills, aligning its curriculum closely with market requirements. As a result, vocational education students are

driven not only by the desire for academic success but also by the necessity of acquiring skills that directly enhance their employability (Pylväs et al., 2022).

Despite the significant role of vocational education, students in these programs face unique challenges. The demands for acquiring technical skills in a relatively short time can be overwhelming. In this context, both the perceived value of tasks and the perceived costs significantly influence students' learning behaviors. Research shows that when students perceive high task value, their motivation is enhanced, prompting them to invest more effort in their studies (Khalid et al., 2023). However, high perceived costs, such as stress and time pressure, can reduce students' self-regulation abilities and negatively impact their academic performance (Pylväs et al., 2022). Therefore, understanding how task value, cost perception, and self-regulation interact to affect academic achievement is crucial, both theoretically and practically.

Expectancy-value theory provides a useful framework for understanding students' motivation. It suggests that students' expectations of success, combined with the value they place on tasks, determine their motivation levels (Wigfield＆Eccles , 2020). Task value includes intrinsic value, attainment value, and utility value, all of which shape students' motivation. In addition, cost perception, as a crucial component, affects how students evaluate tasks. Recent studies have shown that while task value has a positive effect on academic achievement, high perceived costs can diminish this effect, particularly when students face stress or time constraints (Jiang et al., 2018; Wu＆Corpus 2023).

Previous studies have extensively explored the effects of task value and cost perception on academic achievement (Zhang, 2023; Lee et al., 2023). Task value is a key predictor of behaviors linked to academic achievement, such as persistence and effort (Wigfield＆Eccles 2000; Trautwein et al.,2012). On the other hand, perceived cost is often associated with negative academic outcomes, influencing students' choices and performance. Incorporating cost perception into the expectancy-value framework has been shown to improve predictions of academic success, especially in areas like math performance and learning motivation (Jiang et al., 2018). Studies also indicate that high perceived costs are linked to poor academic outcomes, such as low GPA and retention rates, particularly in college students (Wu＆Corpus 2023).

Furthermore, task value influences learning behavior and academic performance through self-regulation strategies. Research has shown that students who place high value on tasks are more likely to engage in self-regulated learning, leading to improved cognitive and motivational outcomes (Neuville et al., 2007；Metallidou＆Vlachou, 2010). However, high perceived costs may reduce the likelihood of students employing self-regulation strategies. For example, intrinsic and utility value have been shown to predict self-regulated learning, while perceived task costs do not (Li＆Zheng, 2018). Moreover, utility value acts as a mediator in the relationship between self-efficacy and self-regulation.

Despite substantial research on task value, cost perception, and self-regulation, few studies focus on vocational education. Vocational education students face higher skill acquisition demands and encounter unique challenges, including intensive curricula and technical difficulties. The impact of task value is particularly strong in vocational education,

but these students also experience higher perceived costs, which can hinder their self-regulation abilities and negatively affect their academic performance (Pylväs et al., 2022).

This study seeks to expand the understanding of task value's impact on academic achievement by examining the combined effects of task value, perceived cost, and self-regulation strategies in vocational education. Building on expectancy-value theory and previous research, this empirical study will explore the mechanisms through which these factors influence students' academic performance. By identifying key patterns and relationships, this study aims to provide recommendations for improving vocational education through targeted interventions that address both task value and cost perception.

The key research questions include:

i  What are the distribution characteristics of vocational education students based on different combinations of task value and perceived cost?

ii  How do students with varying levels of task value and perceived cost perform academically?

iii  How do task value and self-regulation influence academic achievement?

## Method

### Participants

This cross-sectional study involved 142 students enrolled in the mandatory Social Investigation course, part of the Social Work program at a higher vocational education institution. These students, all in their second year, completed the course for academic credit. The sample consisted of 62.7% male students, with participants completing the survey in small groups of 5-6 students.

The study examined task value and self-regulation as independent variables, while academic achievement—measured by course task performance and student satisfaction—was the dependent variable. The goal was to determine how task value and self-regulation within the specific task influenced academic achievement. To collect data, we distributed questionnaires assessing task value, self-regulation, and prior academic achievement. The study was conducted with voluntary participation from the students, and their course scores were not influenced by their participation in the survey. The Social Investigation course was conducted in the second semester and organized into six key topics, each culminating in a project presentation. Assessment criteria were developed based on the course themes, and all students were evaluated according to these standards.

## Measurements

### Task Value Scale

Task value was assessed in two components: task value and cost perception. Task value was measured using the Motivated Strategies for Learning Questionnaire (MSLQ) task value scale, which consists of six items (Alpha = .90) (Pintrich et al., 1991; de Araujo et al., 2023), such as 'The content of this course is important to me'. Cost perception was evaluated using a modified 26-item value beliefs survey (Alpha = .70) (Hagemeier and Murawski 2014), consisting 4 items (Alpha = .70), with statements like, 'I worry that taking this course will waste a lot of my time and money'. All items were rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree), and the scales demonstrated strong internal consistency with Cronbach's alpha values of 0.928 and 0.929.

### Self-Regulation Scale

Self-regulation was measured using three subscales: metacognitive regulation, effort regulation, and maladaptive regulation. Metacognitive regulation was assessed with 12 items (Alpha = 0.79) and effort regulation with four items (Alpha = 0.69) from the MSLQ. Maladaptive regulation was measured using the maladaptive regulatory behavior (MRB) subscale from the Self-Regulation Strategy Inventory, consisting of 8 items that assess the frequency of maladaptive behaviors, such as avoidance and ineffective self-management (e.g.,'When I don't understand something, I give up or withdraw'). Higher scores indicate greater maladaptive behavior. The MRB subscale demonstrated a reliability coefficient of 0.78 in previous studies (Cleary et al., 2021). In this study, all items were rated on a 5-point Likert scale, with Cronbach's alpha values of 0.943, 0.753, and 0.946, indicating good reliability.

### Academic Achievement Scale

Academic achievement was measured in two ways. Prior academic achievement was determined using students' average grades from the first semester, while current academic achievement was assessed through student satisfaction and course score. Student satisfaction was measured using a questionnaire based on the Course Experience Questionnaire (Yin＆Wang, 2015), which included 3 items evaluating students' experiences in areas such as knowledge, skills, and value attitudes (e.g.,'Through this course, I improved my practical skills'), with an internal consistency of 0.924. Course score was based on student presentations across six themes, with scores calculated using task-specific criteria. Final score is a combination of student (40%) and teacher (60%) assessments, with the average score across all tasks being calculated.

### Statistical Analysis

Data were analyzed using IBM SPSS Statistics 26 for Windows. Correlation analyses were performed to explore relationships between academic achievement, value motivation, and self-regulation. Cluster analysis was employed to identify groups with similar learning characteristics, based on task value and cost perception, using K-means clustering. Initially, two clusters were used, followed by three-cluster and four-cluster solutions, with the final four-cluster solution providing the best distribution of participants.

To examine differences in self-regulation and academic achievement among the clusters, we conducted multivariate covariance analysis (MANCOVA), controlling for gender and prior achievement, with clusters as the independent variable and satisfaction as the dependent variable. Pearson correlation analysis was used to examine the relationships between motivation and different regulation, and post-hoc Bonferroni tests were conducted to compare satisfaction across clusters. Hierarchical regression analysis was performed to investigate task value and self-regulation as predictors of satisfaction. Finally, Hayes' PROCESS macro was employed to examine the mediating role of metacognitive strategies in the relationship between task value and academic achievement, as measured by satisfaction.

## Results

### Descriptive Statistics and Zero-Order Correlations

Table 1 presents a detailed correlation analysis examining the relationships between academic achievement, task value, cost perception and self-regulation. The analysis indicated that course scores did not correlate statistically significantly with task value, cost perception,

metacognitive regulation, or effort regulation (p > .05). However, cost perception (r = -.189, p < .05) and maladaptive regulation (r = -.180, p < .05) exhibited significant negative correlations with course scores, suggesting that higher perceived cost and maladaptive strategies may hinder academic performance.

Conversely, satisfaction demonstrated significant positive correlations with task value (r = .397, p < .01) and metacognitive regulation (r = .521, p < .01), indicating that students who valued tasks more highly or engaged in metacognitive strategies tended to report greater satisfaction. Moreover, maladaptive regulation was positively correlated with satisfaction (r = .251, p < .01), highlighting that certain students may derive satisfaction from learning despite employing ineffective self-regulation strategies.

Regarding the relationship between value motivation and self-regulation, task value was significantly positively correlated with both metacognitive regulation (r = .600, p < .01) and maladaptive regulation (r = .269, p < .01), suggesting that students who perceive higher task value may engage in both adaptive and maladaptive regulatory strategies.Cost perception exhibited a strong positive correlation with maladaptive regulation (r = .730, p < .01) and a weaker positive correlation with metacognitive regulation (r = .206, p < .05), while showing a significant negative correlation with effort regulation (r = -.471, p < .01). These findings suggest that students who perceive high costs may rely more on maladaptive strategies and less on effortful regulation.

The significant positive correlation between task value and cost perception (r = .249, p < .05) further underscores the complexity of students' cognitive evaluations of learning tasks, where valuing a task does not necessarily equate to perceiving it as low-cost.Metacognitive regulation and maladaptive regulation were positively correlated (r = .312, p < .01). In contrast, maladaptive regulation demonstrated a strong negative correlation with effort regulation (r = -.621, p < .01), reinforcing the idea that ineffective self-regulation strategies may undermine effortful engagement.These findings illustrate the complex interplay among self-regulation strategies, emphasizing the dual role of metacognitive and maladaptive strategies in shaping academic outcomes (Table 1).

Table1
*Descriptive statistics and zero-order correlations among variables*

| Variable | M | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|---|
| 1. Score | 80.21 | 8.23 | – | | | | | | |
| 2.Satisfaction | 4.23 | .72 | -.030 | – | | | | | |
| 3. Task value | 3.99 | .65 | .002 | .397** | – | | | | |
| 4.Cost | 3.10 | 1.13 | -.189* | .099 | .249** | – | | | |
| Self-regulation | | | | | | | | | |
| 5.Metacognitive regulation | 4.98 | .74 | -.040 | .521** | .600** | .206* | – | | |
| 6.Effort regulation | 4.64 | .85 | .139 | .015 | .120 | -.471** | .025 | – | |
| 7.Maladaptive regulation | 4.13 | 1.54 | -.180* | .251** | .269** | .730** | .312** | -.621** | – |

Note. $*p < .05$. $**p < .01$.

*Cluster Analysis and Descriptions*

To examine distinct student group characteristics, we conducted a K-means cluster analysis using students' task value and perceived cost, identifying four unique clusters. The first cluster, termed the high value-low cost group (HVLC, n = 34), exhibited a high task value (M = 4.26) and low perceived cost (M = 1.68). These students placed significant importance on learning tasks while perceiving minimal required effort, time, and resources, leading to lower levels of perceived pressure. The second cluster, the medium value-high cost group (MVHC, n = 34), had a task value mean of 3.87 and a perceived cost mean of 3.15. These students recognized the significance of learning tasks but viewed the cost of completing them as high, potentially experiencing increased pressure and challenges due to task difficulty and substantial time and effort demands. The third cluster, termed the low value-medium cost group (LVMC, n = 32), had a task value mean of 3.18 and a perceived cost mean of 2.76. These students placed less importance on learning tasks, demonstrating lower intrinsic motivation and engagement. Their learning investment and perceived task difficulty were moderate, indicating a relatively lower level of academic involvement. The fourth cluster, the high value-high cost group (HVHC, n = 42), demonstrated the highest task value (M = 4.5) and perceived cost (M = 4.45). Although these students strongly recognized the importance of learning tasks, they also perceived a high cost of completion, potentially leading to considerable pressure and cognitive overload.

A multivariate covariance analysis (MANCOVA) identified significant differences in self-regulation and academic achievement among students across different task value and perceived cost groups, even after accounting for gender and prior achievement as covariates. However, no statistically significant differences were found in academic performance (Table 2).

Table 2

*Multivariate Analysis of Covariance for differences between* Cluster Membership *in self-regulated learning*

| Variable | Cluster | M | SD | F | Partial η2 |
|---|---|---|---|---|---|
| Metacognitive regulation (M=4.9842 SD=.73584) | HVLC | 5.16 | .70 | | |
| | MVHC | 4.74 | .68 | 13.610*** | 0.231 |
| | LVMC | 4.49 | .45 | | |
| | HVHC | 5.42 | .69 | | |
| Effort regulation (M=4.6373 SD=.85031) | HVLC | 5.35 | .90 | | |
| | MVHC | 4.69 | .93 | 12.720*** | 0.219 |
| | LVMC | 4.32 | .39 | | |
| | HVHC | 4.26 | .62 | | |
| Maladaptive regulation (M=4.1294 SD=1.5366) | HVLC | 2.79 | 1.06 | | |
| | MVHC | 3.96 | 1.03 | 32.317*** | 0.416 |
| | LVMC | 3.81 | .72 | | |
| | HVHC | 5.59 | 1.48 | | |
| Satisfaction (M=4.2254 SD=71959) | HVLC | 4.43 | .50 | | |
| | MVHC | 4.28 | .55 | 6.992*** | 0.134 |
| | LVMC | 3.73 | .76 | | |
| | HVHC | 4.39 | .80 | | |
| Score (M=80.2113 SD=8.2306) | HVLC | 83.12 | 7.30 | | |
| | MVHC | 79.74 | 8.53 | .617 | 0.13 |
| | LVMC | 78.59 | 8.58 | | |
| | HVHC | 79.48 | 8.13 | | |

The HVLC group exhibited strong performance in both metacognitive regulation (M = 5.16, P < 0.001) and effort regulation (M = 5.35, P < 0.001) while displaying the lowest maladaptive regulation score (M = 2.79, P < 0.001). This group also reported the highest satisfaction (M = 4.43, P < 0.001). Although their academic score was relatively high (M = 83.11, P = 0.605), the difference was not statistically significant. The LVMC group exhibited the lowest scores in both metacognitive regulation (M = 4.49, P < 0.001) and effort regulation (M = 4.32, P < 0.001), as well as the lowest learning satisfaction (M = 3.73, P < 0.001) . Figure 1 summarizes these findings.
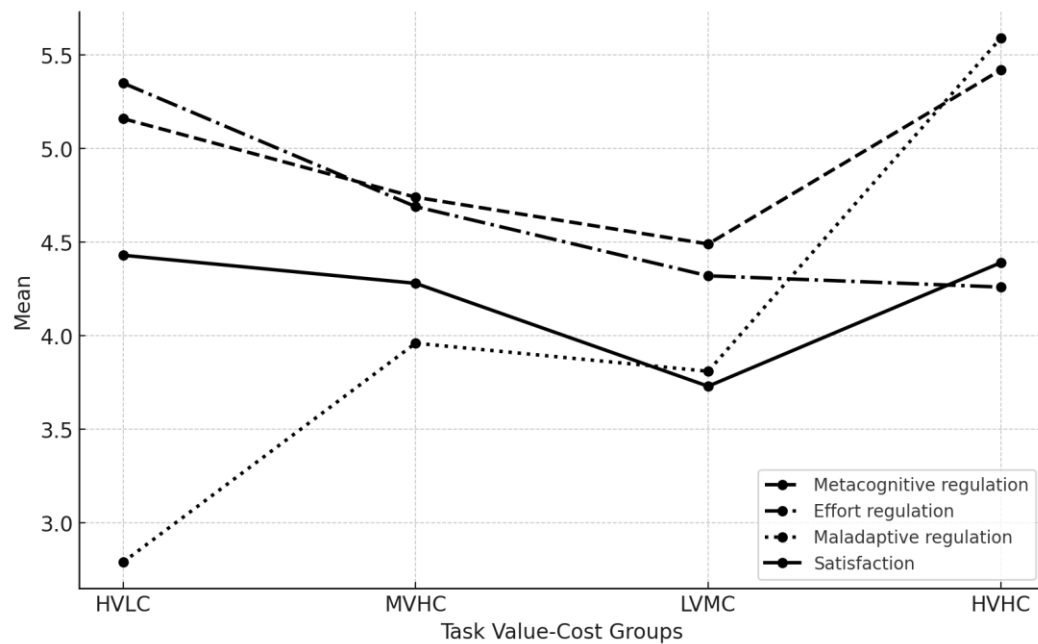
Figure 1 Differences in self regulation and satisfaction across different clusters.

*Clusters and Students' Academic Achievements*

After controlling for gender and prior academic achievement, multivariate covariance analysis (MANCOVA) identified significant differences in student satisfaction across task value and perceived cost groups. However, academic scores did not differ significantly between the groups (partial $\eta^2$ = 0.13, F = 0.617, p = 0.605). Gender had a notable effect on student satisfaction (partial $\eta^2$ = 0.46, F = 6.60, p = 0.011), while prior academic achievement significantly influenced academic scores (partial $\eta^2$ = 0.003, F = 37.275, p < 0.001).

An analysis of variance (ANOVA) was conducted with clusters as the independent variable and satisfaction as the dependent variable. Results showed significant differences in academic achievement across the clusters (HVLC, M = 83.12, SD = 7.30; MVHC, M = 79.74, SD = 8.53; LVMC, M = 78.59, SD = 8.58; HVHC, M = 79.48, SD = 8.13). Pairwise comparisons and post-hoc tests indicated that the LVMC group had significantly lower satisfaction compared to the other three clusters (Table 3).

Table 3

*Result of post-hoc test with satisfaction as dependent variable on different clusters*

Multiple Comparisons
Dependent variable: Satisfaction
Bonferroni

| (I) Cluster | (J) Cluster | Mean Difference (I-J) | Std. Error | Sig. | 95 %Confidence IntervalLower | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | 0.152 | 0.165 | 1 | -0.288 | 0.593 |
| | 3 | 0.698*** | 0.166 | 0 | 0.254 | 1.142 |
| | 4 | 0.138 | 0.16 | 1 | -0.291 | 0.567 |
| 2 | 1 | -0.152 | 0.165 | 1 | -0.593 | 0.288 |
| | 3 | 0.545** | 0.163 | 0.006 | 0.434 | 0.982 |
| | 4 | -0.015 | 0.157 | 1 | -0.434 | 0.405 |
| 3 | 1 | -0.698 | 0.166 | 0 | -1.142 | -0.254 |
| | 2 | -0.545** | 0.163 | 0.006 | -0.982 | -0.109 |
| | 4 | -0.560** | 0.160 | 0.004 | -0.988 | -0.132 |
| 4 | 1 | -0.138 | 0.160 | 1 | -0.567 | 0.291 |
| | 2 | 0.015 | 0.157 | 1 | -0.405 | 0.434 |
| | 3 | 0.560** | 0.160 | 0.004 | 0.132 | 0.988 |

Based on observed means.The error term is Mean Square (Error) = 42.356.
** Correlation is significant at the .01 level (2-tailed).
*** Correlation is significant at the .001 level (2-tailed).

*Regression Analyses*

To examine how task value, cost perception, and self-regulation relate to academic achievement and satisfaction, we conducted hierarchical regression analyses using a stepwise entry method. The statistical analysis confirmed no significant multicollinearity concerns, with all tolerance values exceeding 0.2 and VIF values ranging from 1.066 to 3.151, remaining well below the threshold of 10. These findings indicate that the independent variables were sufficiently distinct, minimizing potential bias in the regression results.

In the hierarchical regression model, task value and cost perception were included in Block 1, adaptive regulation in Block 2, and maladaptive regulation in Block 3, aiming to predict academic achievement. The analysis revealed that none of these variables had a significant impact on academic scores. However, when predicting satisfaction, task value emerged as the sole significant predictor in Block 1 ($\beta$ = .397, b = .442, t = 4.941, p < .001). In Block 2, metacognitive regulation significantly contributed to the prediction of satisfaction ($\beta$ = .443, b = .433, t = 4.888, p < .001). In Block 3, maladaptive regulation ($\beta$ = .264, b = .124, t = 2.083, p < .05) was also a significant predictor of satisfaction variance (Table 4).

Table 4

*Summary of hierarchical regression analysis for task value, metacognitive regulation, and inadaptive regulation predicting satisfaction (N= 142)*

| Outcome | Step | Variable | B | SEB | β | R² | Adjusted R² |
|---|---|---|---|---|---|---|---|
| | 1 | Task value | .442 | .089 | .397*** | .158 | .146 |
| | 2 | Metacognitive regulation | .433 | .089 | .443*** | .284 | .263 |
| Satisfaction | 3 | Metacognitive regulation | .391 | .090 | .400*** | .306 | .281 |
| | | Maladaptive regulation | .124 | .059 | .264* | | |

Note. **p < .01.  ***p < .001.

With the sequential addition of task value, adaptive regulation, and maladaptive regulation, the R² value progressively increased, enhancing the model's explanatory power. In Block 1, R² was .146, indicating that task value accounted for a significant portion of the variance in satisfaction. The inclusion of adaptive regulation strategies in Block 2 raised R² to .263.The introduction of maladaptive regulation in Block 3 further increased R² to 0.281.These results indicate that task value, metacognitive regulation, and maladaptive regulation are crucial predictors of satisfaction, while stronger metacognitive regulation positively influences academic achievement.

*Mediation Analyses*

To explore how task value motivation influences academic achievement, this study employed the expectancy-value theory framework and conducted a mediation analysis using Hayes' PROCESS macro. The analysis revealed a significant positive association between task value and academic satisfaction (β = 0.397, b = 0.442, t = 4.941, p < 0.001), suggesting that students who perceive greater task value tend to report higher satisfaction with their learning experience. The relationship between task value and metacognitive regulation was also significant (β = 0.6827, b = 0.600, t = 8.8795, p < 0.001), underscoring the strong connections. Additionally, metacognitive regulation was significantly associated with academic satisfaction (β = 0.443, b = 0.433, t = 4.888, p < 0.001), indicating that students who engage in metacognitive strategies tend to experience greater satisfaction in their learning process.

When metacognitive regulation was included in the model, the direct effect of task value on satisfaction weakened (β dropped from 0.397 to 0.120, b = 0.133, t = 1.272) and became statistically non-significant (p = 0.206). This suggests that metacognitive regulation fully mediated the link between task value and academic satisfaction. Bootstrap analysis further validated this mediation effect, revealing that task value indirectly influenced academic satisfaction via metacognitive regulation, with a confidence interval of [0.1223, 0.4641], excluding zero, confirming the significance of the mediation effect (Figure 2).
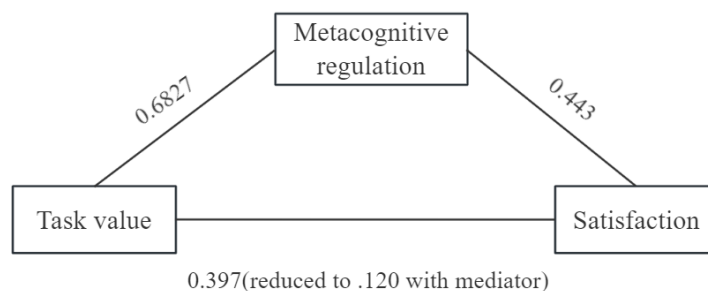
Figure 2 Mediation analyses showing metacognitive regulation partially mediating the relationship between task value and satisfaction.

## Discussion

To examine how task value and cost perception jointly influence academic achievement, we categorized students into four distinct groups. While no significant differences in academic scores were detected through covariance analysis, a notable pattern emerged: HVLC learners consistently outperformed other groups (M = 83.11). This suggests that a high perception of task value combined with low cost perception may be a beneficial motivational profile for academic success.This finding underscores the importance of fostering task value while minimizing perceived costs in vocational education.

After controlling for prior achievement, academic success remained significantly associated with students' previous academic performance, underscoring the cumulative nature of learning. This finding aligns with prior research suggesting that academic trajectories are influenced by prior experiences and socioeconomic factors. Future research should consider broader contextual variables, such as learning support systems, classroom engagement, and socioeconomic background, to provide a more comprehensive explanation of students' academic outcomes. Additionally, potential ceiling effects and score distributions should be addressed in future studies (Schunk & Pajares, 2010).

Task performance was evaluated by both students and teachers, revealing discrepancies in scoring. While students assigned themselves higher scores, teachers adopted a value-added assessment approach, providing positive reinforcement even for minor improvements to strengthen students' self-efficacy and motivation (Dweck, 2017). However, the reliance on positive reinforcement may inadvertently limit students' ability to critically assess their progress. These findings highlight the need for assessment methods that balance motivation with accurate performance measurement. Future instructional strategies should integrate formative assessment techniques that encourage self-reflection alongside positive reinforcement, promoting more balanced self-regulation.

The MVHC group exhibited heightened psychological stress due to their high cost perception. Despite recognizing the importance of their tasks, they demonstrated increased reliance on maladaptive self-regulation strategies such as procrastination and avoidance, which aligns with stress theories (Folkman, 2020). This phenomenon is particularly relevant in vocational education, where students often navigate both academic and external life pressures. High cost perception appears to act as a cognitive load, reducing students' capacity to engage in adaptive self-regulation strategies. Given this, educational interventions should

focus on stress-reduction techniques, such as structured time management training and self-regulation workshops, to help students mitigate the negative effects of cost perception.

Vocational students' task value is closely connected to career aspirations, as their learning is often directly applicable to professional settings. This intrinsic relevance helps sustain motivation even when perceived costs are high. However, this study found that high task value alone was insufficient to guarantee strong academic outcomes, suggesting that additional self-regulation support is necessary. Future interventions should aim to strengthen students' ability to manage cost perception by fostering time management and cognitive reappraisal strategies, ensuring that task value translates into effective learning behaviors.

While no direct significant relationship was found between task value and academic achievement, regression analysis indicated that task value accounted for 15% of the variance in academic scores. This highlights task value's indirect role in academic success, likely mediated through self-regulation mechanisms. Moreover, the strong link between task value and satisfaction suggests that motivational beliefs shape students' affective experiences in learning. These findings align with Eccles and Wigfield's (2002) expectancy-value theory and Pintrich's (2000) motivation-cognition integration model, which posit that task value enhances engagement and self-regulatory strategies, indirectly improving learning outcomes.

Another key finding was that the direct effect of task value on academic satisfaction disappeared when metacognitive regulation was included, suggesting full mediation. This result underscores the role of self-regulation in transforming motivation into academic satisfaction. The findings align with prior research (Neuville et al.,2007; Perez et al., 2019) and support Pintrich's (2000) motivation-cognition model, which suggests that task value enhances self-regulation, which in turn fosters academic satisfaction. Future research should explore whether targeted interventions in metacognitive regulation could further strengthen this effect.

**Limitations**
This study presents several limitations. First, the relatively small sample size of 142 students enrolled in a single course may have limited the statistical power, making it challenging to detect significant differences between groups. For instance, while the combination of high task value and low cost perception may influence academic achievement, the small sample may not have fully captured these effects. Additionally, as the sample was drawn from one vocational education institution, the findings may not be generalisable to all vocational education students. Future studies should aim to increase the sample size and include students from a variety of vocational education settings to enhance the external validity of the results.

Second, the academic performance distribution in this study was relatively narrow, with a high proportion of students achieving top scores. This likely contributed to a ceiling effect, which may have masked group differences. This effect could obscure the true impact of task value and self-regulation strategies on academic performance. Future research could address this limitation by implementing more nuanced assessment measures or creating evaluation standards with greater differentiation to reduce the ceiling effect.

Third, although this study explored the mediating role of metacognitive regulation between task value and academic achievement, it did not account for other potential mediators or moderators. Variables such as self-efficacy, academic emotions, and goal setting (Bandura, 1991; Pintrich, 2000) may also play key roles. Future research should examine these factors to develop a more comprehensive model for understanding vocational education students' learning behaviors.

**Conclusions and Recommendations**

This study highlights the interplay between task value, cost perception, and self-regulated learning in academic achievement. Students with high task value and low cost perception performed best, while those with low task value and medium cost perception had the lowest scores. Task value indirectly influenced academic satisfaction through metacognitive regulation, whereas cost perception and maladaptive regulation had a direct negative impact on performance. These findings suggest that while task value enhances motivation, high cost perception can undermine its benefits by increasing stress and maladaptive behaviors.

To support students' learning, educators should strengthen metacognitive regulation skills through self-monitoring and strategic planning training, while cooperative learning and peer support can help reduce perceived costs. Additionally, curriculum design should be closely aligned with career development to enhance the practical value of tasks, thereby motivating students to engage more deeply in their learning.

Despite its contributions, this study is limited by its small sample size and reliance on self-reported data. Future research should explore larger samples, longitudinal effects, and interventions that reduce cost perception while promoting adaptive self-regulation strategies.

**Disclosure Statement**
No potential conflict of interest was reported by the author(s).

## References

Bandura, A. (1991). Social cognitive theory of self-regulation. *Organizational Behavior and Human Decision Processes, 50*(2), 248–287. https://doi.org/10.1016/0749-5978(91)90022-L

Cleary, T. J., Slemp, J., & Pawlo, E. R. (2021). Linking student self-regulated learning profiles to achievement and engagement in mathematics. *Psychology in the Schools, 58*(3), 443–457. https://doi.org/10.1002/pits.22456

Araujo, J., Gomes, C. M. A., & Jelihovschi, E. G. (2023). The factor structure of the Motivated Strategies for Learning Questionnaire (MSLQ): New methodological approaches and evidence. *Psicologia: Reflexão e Crítica, 36*(1), 38. https://doi.org/10.1186/s41155-023-00280-0

Dweck, C. S. (2017). From needs to goals and representations: Foundations for a unified theory of motivation, personality, and development. *Psychological Review, 124*(6), 689–719. https://doi.org/10.1037/rev0000082

Folkman, S. (2020). Stress: Appraisal and coping. In M. D. Gellman (Ed.), *Encyclopedia of behavioral medicine* (pp. 2177–2179). Springer International Publishing. https://doi.org/10.1007/978-3-030-39903-0_215

Hagemeier, N. E., & Murawski, M. M. (2014). An instrument to assess subjective task value beliefs regarding the decision to pursue postgraduate training. *American Journal of Pharmaceutical Education, 78*(1), 11. https://doi.org/10.5688/ajpe78111

Jiang, Y., Rosenzweig, E. Q., & Gaspard, H. (2018). An expectancy-value-cost approach in predicting adolescent students' academic motivation and achievement. *Contemporary Educational Psychology, 54,* 139–152. https://doi.org/10.1016/j.cedpsych.2018.06.005

Jiang, Y., & Zhang, L. (2023). High school students' expectancy, value, and cost profiles and their relations with engagement and achievement in math and English. *Learning and Individual Differences, 101,* 102252. https://doi.org/10.1016/j.lindif.2022.102252

Khalid, S., Gao, C., Lianyu, C., Lu, J., Xiuyu, L., & Tadesse, E. (2023). Exploring Chinese and Ethiopian higher VET adolescent learning motivation through the lens of self-determination theory. *PLOS ONE, 18*(5), e0285439. https://doi.org/10.1371/journal.pone.0285439

Krötz, M., & Deutscher, V. (2022). Drop-out in dual VET: Why we should consider the drop-out direction when analysing drop-out. *Empirical Research in Vocational Education and Training, 14*(1), 1. https://doi.org/10.1186/s40461-021-00127-x

Lee, M., Lee, S. Y., Kim, J. E., & Lee, H. J. (2023). Domain-specific self-regulated learning interventions for elementary school students. *Learning and Instruction, 88,* 101810. https://doi.org/10.1016/j.learninstruc.2023.101810

Li, S., & Zheng, J. (2018). The relationship between self-efficacy and self-regulated learning in one-to-one computing environment: The mediated role of task values. *The Asia-Pacific Education Researcher, 27*(6), 455–463. https://doi.org/10.1007/s40299-018-0405-2

Metallidou, P., & Vlachou, A. (2010). Children's self-regulated learning profile in language and mathematics: The role of task value beliefs. *Psychology in the Schools, 47*(8), 776–788. https://doi.org/10.1002/pits.20503

Neuville, S., Frenay, M., & Bourgeois, E. (2007). Task value, self-efficacy and goal orientations: Impact on self-regulated learning, choice and performance among university students. *Psychologica Belgica, 47,* 95–117. https://doi.org/10.5334/pb-47-1-95

Perez, T., Dai, T., Kaplan, A., Cromley, J. G., Brooks, W. D., White, A. C., Mara, K. R., & Balsai, M. J. (2019). Interrelations among expectancies, task values, and perceived costs in

undergraduate biology achievement. *Learning and Individual Differences, 72,* 26–38. https://doi.org/10.1016/j.lindif.2019.04.001

Pintrich, P. R. (2000). An achievement goal theory perspective on issues in motivation terminology, theory, and research. *Contemporary Educational Psychology, 25*(1), 92–104. https://doi.org/10.1006/ceps.1999.1017

Pintrich, P. R. (1991). *A manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ).* National Center for Research to Improve Postsecondary Teaching and Learning, University of Michigan.

Pylväs, L., Nokelainen, P., & Rintala, H. (2022). Vocational students' perceptions of self-regulated learning in work-based VET. *Vocations and Learning, 15*(2), 241–259. https://doi.org/10.1007/s12186-022-09286-8

Schunk, D. H., & Pajares, F. (2010). Self-efficacy beliefs. In P. Peterson, E. Baker, & B. McGaw (Eds.), *International encyclopedia of education* (3rd ed., pp. 668–672). Elsevier. https://doi.org/10.1016/B978-0-08-044894-7.00620-5

Trautwein, U., Marsh, H. W., Nagengast, B., Lüdtke, O., Nagy, G., & Jonkmann, K. (2012). Probing for the multiplicative term in modern expectancy–value theory: A latent interaction modeling study. *Journal of Educational Psychology, 104*(3), 763–777. https://doi.org/10.1037/a0027470

Wigfield, A., & Eccles, J. S. (2020). Chapter five - 35 years of research on students' subjective task values and motivation: A look back and a look forward. In A. J. Elliot (Ed.), *Advances in motivation science* (Vol. 7, pp. 161–198). Elsevier. https://doi.org/10.1016/bs.adms.2019.05.002

Wu, S. H., & Corpus, J. H. (2023). The role of perceived cost in college students' motivational experiences and long-term achievement outcomes: A mixed-methods approach. *International Journal of Educational Research Open, 4,* 100229. https://doi.org/10.1016/j.ijedro.2023.100229

Yin, H., & Wang, W. (2015). Assessing and improving the quality of undergraduate teaching in China: The Course Experience Questionnaire. *Assessment & Evaluation in Higher Education, 40*(8), 1032–1049. https://doi.org/10.1080/02602938.2014.963837