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Student Motivation and Independent Learning in Social Studies, English, and Math: The Impact of the Classroom Environment

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Abstract

Recent studies on self-learning have emphasized the importance of the cognitive and motivational elements of the classroom environment. Most of these studies have explored these elements by considering the potential for contextual variation. The current study examined inequalities in students' average assignment scores in social studies, math, and English education, as well as several non-cognitive variables, namely self-efficacy, exam anxiety, the use of cognitive strategies, the use of regulatory strategies, and academic success in the class. Employing an in-subject correlational design, students of mathematics, social sciences, and English were divided by gender. Multivariate regression was used to evaluate the relationships among performance, strategy utilization, and motivation indicators. The participants in the study were 545 students in the seventh and eighth grades of a secondary school (51 percent girls) who were asked to complete a self-report questionnaire. The results of the study showed that factors involving motivation and cognitive strategies varied by gender and subject, but not the use of regulatory approaches or academic achievement. However, according to the data, the relationships between these constructs appear to be relatively similar across the three subject areas studied. The importance of the findings to understanding the context-specificity of students' self-learning is highlighted.

Keywords: English, Environmental education, Independent learning, Math, Social studies, Student motivation.

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1. Introduction

Recent studies on students' academic achievement have highlighted the significance of considering both the cognitive and motivational aspects of classroom learning. Although there are many significant motivating factors, three in particular – beliefs about one's ability to complete activities in the classroom, the importance of these tasks, and anxiety – have been consistently associated with independent learning [1-5]. According to these studies, two general cognitive components appear to be of the utmost importance: cognitive strategies to improve students' ability to remember and comprehend what

they learn in class, and a variety of metacognitive and regulatory techniques to help them keep track of and manage their own learning [6, 7].

The main goal of independent learning models is to utilize these cognitive and motivational elements in a comprehensive model of students' academic achievement in the classroom [8-11]. However, the majority of these models assume that independent study is a fairly universal process that behaves consistently in many contexts or scenarios. Few empirical studies have looked at how the different elements of independent learning might change depending on context. By adopting a within-subject approach to look at motivation and cognition components in three different academic disciplines, the current study aims to fill this gap in the literature. This study was specifically designed to investigate whether student motivation and cognition vary across domains and whether relationships between the motivational and cognitive factors of tone-regulated literacy alter as a function of the three disciplines.

Many motivational processes are believed to be sensitive to aspects of the assignment, classroom, or environment in which the student is involved. For instance, self-efficacy is frequently defined as both task-specific and a critical component of overall self-regulation [12-14]. According to the model, students provide efficacy judgments on particular classroom assignments, and it is believed that these opinions change depending on the assignment or the classroom's characteristics [15]. In expectancy-value models of motivation, assignment value is typically understood as a soft personal feature of the individual [16, 17]. Additionally, these models assume that people find various subjects (such as mathematics versus English) more or less personally attractive or valuable [18]. As a result, the level of assignment value ought to vary depending on the domain. Finally, anxiety is considered an individual difference variable that may differ by area, with some people experiencing greater anxiety for a given subject, such as mathematics [19-21]. In conclusion, it is believed that task- or domain-specific characteristics affect each of the motivating components.

According to research on the relevant cognitive elements, these elements may change depending on the activity or domain. The application of cognitive strategies, for example, frequently appears to depend upon contextual indicators and characteristics of the assignment, suggesting that techniques may not be transferable across settings [22-24]. However, there are also individual differences in consciousness and the use of cognitive methods that seem to go beyond contextual elements [25, 26]. Furthermore, if the use of cognitive strategies is related to motivational beliefs, as it appears to be (see, for a review, Feldon, et al. [13]), then it is predicted that the use of cognitive strategies would vary according to motivational beliefs.

An analogous case may be made for variances in the application of self-regulation techniques by setting or domain. Self-regulation has, in some instances, been regarded as being more independent of contextual factors. To achieve learning objectives, self-regulating students are presumed to be aware of and capable of controlling their behavior. The capacity to overcome contextual challenges is a crucial component of this awareness and control [27]. This capacity would entail the capacity to formulate one's own learning objectives, summon the motivation to pursue those objectives, and mobilize the cognitive tools required to achieve those objectives. Self-regulated learners can avoid or overcome challenges that get in the way of their academic objectives. This viewpoint is reflected in previous research on self-regulation, which has either examined self-regulation in a specific setting [28] or without any specific context at all [29]. According to this perspective, self-regulation may not vary according to the context.

However, Sun, et al. [11] contradicted this theory, arguing that the character of the classroom situation is crucial in promoting self-regulatory learning. Less freedom to choose how to spend class time, how to complete activities, or even which tasks to complete limits the opportunity for students to develop and apply self-regulation techniques. Additionally, research conducted in classrooms has demonstrated that variations in teachers' instructional strategies, such as the type of work they assign students, can have an impact on both the motivational objectives and the independent learning of students [30, 31]. More generally, studies on academic tasks [32] and classroom participation structures [33] have shown that students' engagement in activities can have a significant impact on their motivation and level of independent learning.

Nevertheless, the majority of these classroom studies have not looked at disciplinary or subject disparities in classrooms. There is evidence of considerable differences across teachers and classrooms representing different academic subjects, although contextual differences between classrooms representing different academic disciplines may not appear particularly evident. For instance, it appears that secondary instructors of various subjects (Mathematics, Science, Social Sciences, English & Foreign Languages) have distinct perspectives on the nature of the subjects they teach, and these perspectives are linked to different instructional philosophies and approaches [34].

Teachers of science, social studies, and English believe that their subjects are more dynamic, open, and less sequential than math and foreign languages. Math and foreign language instructors believe their domains are more well-defined, linear, and static. If Granberg, et al. [35] arguments about potential limits affecting opportunities for independent learning in many traditional classrooms are true, then mathematics classes may offer fewer opportunities for such learning. In support of this claim, Powell, et al. [36] discovered disparities in the types of teaching and types of educational activities offered to pupils in fifth-grade social studies and mathematics sessions. They discovered that math lessons were more regimented, systematic, and less interesting than social studies lessons and that math problems frequently lacked the variety and diversity of social studies problems. They also discovered that when the cognitive complexity of the task was high, student engagement, which they essentially determined through the dichotomous judgment of an observer of "on-task" or "off-task," was greater. This type of observational data, however, does not address the level of student cognitive involvement in terms of motivation or independent learning. Using self-assessments of students' cognition and motivation in different fields, the current research aims to fill this gap in the empirical literature.

Eccles and Wigfield on Bai and Zhang, and their colleagues, having conducted motivational belief-based research on students in a variety of fields, repeatedly observed discrepancies between primary and secondary English and mathematics

classes. They observed a consistent pattern in which, in comparison to English classes, mathematics courses generally include students who are less engaged, anxious, and confident in their abilities [37, 38]. However, they did not evaluate students' cognitive participation in other topic areas or include independent learning during in their investigation.

According to Shadden [39], fifth graders' attitudes towards social studies were more likely to be related to their excitement about the subject, whereas their attitudes toward mathematics were more likely to be related to their aptitude for the subject. In light of these findings, it would be prudent to investigate students' motivating attitudes towards independent learning in other topic areas. Additionally, some student groups may have discipline inequalities that are more noticeable than others. For instance, a good deal of research points to consistent gender disparities in the motivation of English and math classes that include both sexes.

For mathematics, men exhibit higher levels of self-efficacy or self-competence, according to Eccles and Wigfield on Bai and Zhang and their colleagues; however, in English classes, efficacy beliefs are higher among females. In mathematics, researchers found no variations in assignment value beliefs, but in English, females had greater assignment value beliefs [37, 38, 40, 41]. Additionally, research on self-regulation has revealed disparities between male and female self-regulation behaviors, with independent learning being more highly expressed in females [42-44]. Therefore, it is crucial to explore how disparities in student motivation and cognition across topic areas could interact with gender.

In summary, this study addresses three fundamental issues. First, are there any disparities in the motivation and self-control of pupils in the subjects of math, social studies, and English? While students' use of cognitive and regulatory techniques is used to explain independent learning, anxiety, assignment value, and self-efficacy are used to characterize motivation. Based on the theoretical review and in-class observations of self-efficacy and assignment value, it is predicted that learners will report higher levels of self-efficacy and achievement motivation in English and social studies than in mathematics. Secondly, depending on the subject matter, do these motivating and independent learning traits correlate differently? The relationships between the motivational, cognitive, and accomplishment elements are expected to be comparable across the three subject areas under consideration. In other words, although it is anticipated that students' motivational levels and/or use of cognitive or regulating methods vary across domains, it is additionally projected that the connections between the cognitive and motivating aspects will not change. Across all subject areas, higher levels of assignment value and self-efficacy are expected to increase the use of cognitive and regulatory strategies, while increased anxiety is predicted to have a detrimental effect on the use of these tactics. Finally, the last research question was whether gender directly or indirectly influences students' motivation and cognition in these three different subject areas.

2. Methods

2.1. Participants

The study involved 545 students in the seventh and eighth grades of a junior high school in a working-class suburb of a major midwestern city at west Denpasar, Bali, Indonesia. The sample included slightly more women (n = 280, or 51 percent) than men (n = 265, or 49 percent). Their ages ranged from 11 to 15, with an average age of 12.6 years (SD: 0.66). 95 percent of the subjects were Caucasian. All students in the seventh and eighth grades who were present at school on the relevant day during the class period when the surveys were conducted took part in the study. However, the present analysis only included students for whom all the outcome measures had valid data. English, social studies, and mathematics were required courses for all registrants. There were six math, six English, and five social studies instructors. None of the study's teachers taught more than one subject.

2.2. Measures of Cognition and Motivation

Assignment value, self-efficacy, and test fear were the three motivating ideas evaluated in the student responses to the self-assessment survey, as well as two aspects of cognition – the use of cognitive and self-regulatory strategies. The survey was modified from Pintrich [45] and Pintrich., et al. [46]; however, the assessment survey utilized in this study differed in two respects from earlier iterations. First, just a portion of the measures featured in earlier published variants of the Motivated Strategies for Learning Questionnaire were included in the current assessment survey [46]. Second, to more accurately represent the academic preferences and experiences of the age group under study, certain items on the survey were selected and/or adjusted. For instance, since it is customary for students in this age range to borrow textbooks and keep them unmarked, a cognitive strategy question about underlining significant passages in the textbook was eliminated. Students were asked to answer one question from each of the four academic areas – mathematics, English, social studies, and science – on this questionnaire. For each topic, students' responses ranged from (1) "Not at all like me" to (7) "Very much like me," on a seven-point Likert scale. The assignment value scale, which consisted of nine items, was used to gauge students' interest in and appreciation of the content covered in each subject. Students who scored these items highly thought the information in a particular subject was essential, interesting, and beneficial to them personally. The three topic areas' coefficient alphas ranged from 0.77 to 0.83. The self-efficacy questions included four items ('s = 0.80 to 0.84), which measured students' opinions of their ability to complete assignments in each academic area. Students who scored these items highly were confident in their ability to absorb and comprehend the course material and achieve success in the classroom. The four test anxiety items ('s = 0.75 to 0.80) questioned students about the affective and physical manifestations of exam anxiety. Higher scores on this scale indicated increased exam and performance-related anxiety. The nine items on cognitive strategy use ('s = 0.86 to 0.87) asked students about their use of various learning strategies like rehearsal and elaboration, while the seven items on self-regulation ('s = 0.69 to 0.70) asked them about potential planning, monitoring, and control strategies they applied in their learning. Students who scored the items in these two categories highly employed these strategies more frequently than those who scored them lower.

2.3. Academic Achievement in the Classroom

Grades reported by the teacher were used to gauge classroom performance. These grades, which the teachers assigned around three months after the information from the questionnaire had been received, indicated performance throughout the semester. A thirteen-point letter system was used for grades, with "A+" equaling 12 and "F" equaling 0. Before conducting the study, the classroom grades were normalized among teachers to reduce teacher effects and variations in grading patterns.

2.4. Procedures

The questionnaires were given to the students in late March. Members of the study team mostly handed questionnaires out to students during their math and English lesson hours. A brief set of instructions with practice questions was read aloud in each lesson, and any questions raised by the students were answered. Next, the entire questionnaire was read out to the class, and they responded by circling the appropriate options in their exam booklets. At the end of the semester, classroom grades were recorded using official school records.

2.5. Analyses

The first goal of the study was to investigate variances in academic achievement, spanning a variety of academic areas, motivation, and cognition. For each of the six outcome measures listed above, a repeated measures analysis of variance was performed, employing subject area as a repeated measures factor. Given our third study question, gender was also taken into account as a between-subjects factor. Multivariate results from these three (subject area) by two (gender) ANOVAs were used to test for the main effects of subject area, gender, and the subject area-gender interaction. To follow up on any significant subject area effects or subject area gender effects, univariate Scheffe confidence intervals were used. In the event of an interaction, these post hoc tests were computed separately for men and women.

Following these mean-level studies, we conducted analyses to look at the relationships among the performance, motivational, and cognitive variables to answer our second question. First, we report the results of the zero-order correlations among the six variables for each subject area. To predict the use of cognitive strategies, the use of regulatory strategies, and performance results in social studies, English, and math, we provide the outcomes of numerous multivariate regressions that took gender and motivational factors into account.

Table 1.
Descriptive data on the motivational, method usage, and performance components in math, English, and social studies.

Variables	Males		Females		Total	
	Mean	SD	Mean	SD	Mean	SD
Assignment value Math	5.61	1.06	5.51	1.100	5.51	1.08
English	5.32	1.08	5.37	1.160	5.34	1.12
Social studies	5.35	1.25	5.11	1.260	5.23	1.26
Test anxiety Math	3.25	1.58	3.67	1.64	3.47	1.62
English	3.13	1.51	3.26	1.41	3.19	1.46
Social studies	3.40	1.65	4.04	1.62	3.73	1.66
Cognitive strategy use Math	5.18	1.19	5.38	1.14	5.28	1.17
English	5.22	1.17	5.45	1.12	5.34	1.15
Social studies	5.34	1.13	5.54	1.15	5.44	1.14
Employing regulatory strategy Math	4.97	1.04	4.94	1.16	4.95	1.10
English	4.96	1.07	4.99	1.14	4.98	1.10
Social studies	5.00	1.08	4.91	1.17	4.95	1.12
Self-efficacy Math	5.60	1.15	5.36	1.23	5.47	1.20
Social studies	5.54	1.21	5.33	1.28	5.43	1.25
English	5.64	1.09	5.71	1.03	5.67	1.06
Performance Math	0.01	0.95	0.15	0.96	0.07	0.96
Social studies	0.01	0.92	0.16	0.94	0.08	0.93
English	0.05	0.97	0.20	0.86	0.08	0.92

Note: The total N is 545, the N for boys is 265, and the N for girls is 280.

3. Results

3.1. Differences in the Mean Level by Subject

In addition to the individual mean scores for men and women, Table 1 also displays the measures' total average scores. First, the motivational variables' ANOVAs and related follow-up tests are shown, followed by the results for classroom performance, and finally the two cognitive factors.

First, we looked at the importance of the tasks in various academic disciplines to students. The results showed that the subject area had a significant effect (p 0.001), although there was no main effect of gender, F(2,542) = 16.22. For the overall sample and by gender, see the descriptive statistics in Table 1.

The result of the interaction between subject and gender was F (2,542) = 6.78, p 0.001. These findings demonstrate that, contrary to what we had anticipated, the average assignment value varied across subject areas, with mathematics often outperforming the other two subjects (see Table 1). And for males and females, the distribution of these mean differences across subject areas differed. In math, compared to English and social studies, males indicated higher degrees of assignment value, according to the post hoc Scheffe tests (p 0.05). However, for males, there was no distinction between the assignment value expressed for social studies and English (p = 0.05). Females displayed a slightly different pattern of means, as shown by the substantial interaction effect. In math, females reported a higher mean assignment value than in either social studies (p 0.05) or English (p 0.05). Compared to social studies, the assignment value of English was higher for females (p 0.05).

3.2. Self-Efficacy

A self-efficacy analysis of the various activities revealed no gender effect (F(1,543) = 2.07, p 0.10), a subject-area effect (F(2,542) = 6.90, p 0.001), as well as a subject-area and gender interaction. Regarding the main effect of subject area, English displayed stronger self-efficacy than math or social studies, which was in line with our hypothesis. However, a gender and subject-area interaction was necessary for this impact to occur. In each of the three subject groups, the post hoc Scheffe tests showed that men reported identical levels of self-efficacy. In other words, none of the differences across math, English, and social studies were particularly large, see Table 1. In contrast, the average degree of self-efficacy among females was higher in English than in math (p 0.05) or social studies (p 0.05). Self-efficacy levels in social studies and mathematics among females were comparable.

3.3. Test Anxiety

Subject area (F(2,542) = 58.06, p 0.001), gender (F) (1,543)= 10.82, p 0.001), and the interaction of gender and subject area (F(2,542) = 14.39, p 0.001) all significantly affected the students' test anxiety levels. Concerning the direct impact of subject area, the highest levels of anxiety were reported for social studies, mathematics, and then English. The male students reported similar levels of exam anxiety for math, English, and social studies regardless of the subject area. However, males reported the least exam anxiety for social studies (p 0.05) (see Table 1). English made women feel less anxious than math (p 0.05) or social studies (p 0.05). Women also showed less anxiety in math than in social studies (p 0.05).

3.4. Use of Cognitive Strategies

Subject area had a direct influence on how often students used cognitive strategies, and gender was another primary factor, with F (1,543) = 5.13, p 0.05, and F (2,542) = 17.96, p 0.001, respectively. In contrast to these results, the interaction between subject area and gender fell short of significance, F(2,542) = 0.13, p 0.10. Due to the similarities in the relationships between subjects for both genders, the Scheffe post hoc tests were calculated for the student group as a whole. These evaluations showed that students, both males and females, reported utilizing cognitive techniques more frequently in social studies than in mathematics (p 0.05), and English (p 0.05). Additionally, students reported using strategies more frequently in English than in mathematics (p 0.05).

3.5. Self-Regulation

The principal impacts of subject matter, gender, and the subject matter and gender interaction were F(2,542) = 0.65, 0.12, and 2.62, respectively. All failed to approach significance concerning students' usage of regulatory techniques. Consequently, across all three subject areas, both men and women reported using regulatory strategies at almost identical rates.

3.6. Classroom Performance

An analysis of the average grade level discrepancies among students was also conducted. Given that we standardized instructors, these analyses did not reveal a significant subject area effect (F) (2,542) = 0.08, p 0.10) or a subject area and gender interaction; nevertheless, the direct effect of gender was significant (F) (1,543) = 6.50, p 0.05). In general, women scored higher than men in all subject areas, see Table 1.

3.7. Differences in the Relationships among Variables by Subject

The results of these mean-level analyses can be used to compare motivational, strategic, and performance evaluations in all subject areas, but they reveal little about the connections between these constructs or how these connections could differ across subjects. The links between the aspects of performance, motivation, and strategy use were next examined by computing the inverse relationships between variables within the same domain.

The motivational, methodological, and performance elements within and between the subject areas of social studies, English, and math are presented in Table 2 as zero-order correlations. These findings reveal strong relationships between numerous factors in each subject area that are in keeping with prior results [45]. The two strategy-use variables showed the strongest association within each subject area, with r = 0.66, 0.67, and 0.67, respectively, for math, English, and social studies. More significantly, there were few indications of significant domain differences in the associations because the

pattern of relationships among the three subject areas was comparable. The correlations between the same constructs in various subject areas were all substantial and positive, see Table 2. Significant correlations (r's between 0.85 and 0.90) were found between the measures of cognitive strategy use, regulatory strategy use, and the various subject areas, suggesting that students typically reported similar levels of strategy use across all three domains.

We subsequently ran several multivariate regression analyses to further address our second study question. Specifically, we developed a second regression equation to forecast the usage of cognitive and regulatory strategies.

Table 2.
Zero-order correlations among the motivational, strategy use, and performance variables.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Task Value																	
Mathematics																	
English	0.65																
Social studies	0.51	0.62															
Self-efficacy																	
Mathematics	0.6	0.37	0.33														
English	0.51	0.58	0.38	0.55													
Social studies	0.42	0.38	0.57	0.58	0.59												
Test anxiety																	
Mathematics	0.2	0.05	0.05	0.48	0.21	0.22											
English	0.13	0.14	0.04	0.23	0.41	0.2	0.72										
Social studies	0.12	0.07	0.17	0.26	0.24	0.39	0.69	0.72									
Cognitive strategy use																	
Mathematics	0.54	0.43	0.39	0.35	0.37	0.31	0.01	0.01	0.03								
English	0.49	0.54	0.41	0.29	0.46	0.3	0.05	0.02	0.04	0.87							
Social studies	0.47	0.45	0.51	0.32	0.41	0.41	0	0.03	0..00	0.85	0.85						
Regulatory strategy use																	
Mathematics	0.57	0.4	0.37	0.46	0.39	0.35	0.28	0.25	0.24	0.66	0.58	0.61					
English	0.51	0.5	0.4	0.38	0.47	0.34	0.24	0.29	0.24	0.64	0.67	0.62	0.9				
Social studies	0.46	0.4	0.51	0.38	0.41	0.45	0.22	0.25	0.29	0.59	0.56	0.67	0.85	0.85			
Performance																	
Mathematics	0.25	0.07	0.03	0.37	0.23	0.2	0.35	0.26	0.23	0.11	0.06	0.12	0.23	0.17	0.17		
English	0.27	0.19	0.06	0.28	0.38	0.25	0.2	0.35	0.24	0.13	0.14	0.19	0.23	0.23	0.21	0.68	
Social studies	0.29	0.2	0.17	0.34	0.37	0.35	0.3	0.3	0.36	0.16	0.15	0.22	0.29	0.27	0.3	0.68	0.63

Note: N= 545, r's ≥ 0.10, p <0.05.

We investigated the influence of the utilization of strategies on each subject area's classroom performance. To predict the cognitive outcomes, we used the general approach proposed by Pintrich [45]. These nine equations had three independent variables for each of the three subject areas: gender, Test anxiety, assignment value, and self-efficacy (math, English, and social studies). To test for interactions between gender and motivation, we first added the three cross-product terms for each of the three key predictors' interactions with gender. All these interactions were excluded from the final analysis and are not reported because none were found to be significant. Table 3 contains the findings of these final regression analyses. We will examine the connections between the use of cognitive strategies, the use of regulatory strategies, and classroom performance, in that order.

3.8. Use of Cognitive Strategies

The results revealed F(4,540) = 61.66 in math, F(4,540) = 75.12 in English, and F(4,540) = 62.77 in social studies, all at a significance level of 0.001. A significant portion of the variation in the use of cognitive strategies was explained by the combination of gender, self-efficacy, assignment value, and test anxiety. In the analysis predicting the use of cognitive strategies in math, English, and social studies, assignment value had the highest individual standardized coefficient, as shown in Table 3. Higher assignment value predicted increased use of cognitive strategies since this factor alone explained between 15 and 24 percent (in math) of the variation in the usage of cognitive strategies. In other words, in each of the three domains under examination, higher degrees of cognitive strategy use were reported by students who appreciated and

were engaged in the subject. Albeit to a much lower extent than assignment value, in all three topic areas, students' use of cognitive strategies was also significantly predicted by self-efficacy and test anxiety. After controlling for all other factors, between 2 and 9 percent (in math and English, respectively) of the variation in the use of cognitive strategies could be attributed to self-efficacy, although test anxiety only accounted for about 2% of the variance in all three subject areas. Those students who reported increased amounts of test anxiety and higher levels of self-efficacy in math, English, and social studies were more likely to report the use of cognitive methods than students who reported lower levels of these traits. After adjusting for variations in the three motivating variables, the gender standardized coefficient was also significant, although it explained less than 1% of the variance in method utilization in each of the three subjects. In each of the three subject areas, females generally reported employing cognitive methods more frequently than males, see Table 3.

Table 3.
Results of regression analyses for factors influencing math, English, and social studies performance (N = 545) as well as the application of cognitive and regulatory techniques.

Mathematics			**English**			**Math**			**Social Studies**
Factors	*B*	SE	B	B	SE	B	B	SE	B
Cognitive strategy use									
Gender	0.20	0.08	0.08	0.17	0.08	0.07	0.27	0.08	0.12
Assignment value	0.53	0.05	0.49	0.40	0.04	0.39	0.36	0.04	0.40
Self-efficacy	0.13	0.05	0.13	0.33	0.05	0.30	0.23	0.04	0.25
Test anxiety	0.10	0.03	0.14	0.13	0.03	0.16	0.10	0.03	0.15
R2			0.31			0.36			0.32
Regulatory strategy use									
Gender	0.04	0.08	0.02	0.01	0.08	0.00	0.10	0.08	0.04
Assignment value	0.48	0.04	0.47	0.36	0.04	0.36	0.35	0.04	0.39
Self-efficacy	0.11	0.04	0.11	0.20	0.05	0.19	0.14	0.04	0.16
Test anxiety	–0.09	0.03	–0.13	–0.12	0.03	–0.16	–0.12	0.03	–0.17
R2			0.36			0.32			0.32
Academic achievement									
Gender	0.26	0.07	0.13	0.24	0.07	0.13	0.28	0.07	0.15
Assignment value	0.04	0.04	0.04	0.02	0.04	0.02	–0.02	0.04	–0.02
Self-efficacy	0.18	0.04	0.23	0.22	0.05	0.25	0.20	0.04	0.26
Test anxiety	–0.15	0.03	–0.25	–0.16	0.03	–0.25	–0.15	0.02	–0.26
R2			0.19			0.20			0.18

Note: P values of 0.05, 0.01, and 0.001. Gender: 0 equals boys and 1 equals girls. B stands for unstandardized beta, SE. B = standardized beta + standard error of beta.

3.9. Use of Regulatory Strategies

Together, gender, assignment value, self-efficacy, and test anxiety explained about one-third of the variance in the use of regulation strategies in the subjects of math, English, and social studies, F(4,540) = 74.81, p 0.001, and F(4,540) = 63.87, p 0.001, respectively. In all three subject areas, assignment value was the best predictor of regulatory strategy use. The variance in the reported use of regulatory methods by students was to a great degree explained by this measure, which alone accounted for between 13% (for English) and 22% (for mathematics) (see Table 3). Students who reported higher assignment values for the subject areas used regulatory methods more frequently in all three subject areas than students who reported lower assignment values. The significant correlations for test anxiety and self-efficacy suggested that these factors were also significant determinants of the use of regulatory strategies. Self-efficacy accounted for between 1% (in math) and 4% (in English) of the variation in regulatory strategy use after controlling for all other factors in the analyses (see Table 3). Similarly, test anxiety contributed between 2% and 3% of the variation in the use of regulatory strategies in math and social studies, see Table 3. Whilst higher degrees of self-efficacy were linked to more frequently reported use of regulatory techniques across all three subject areas, students experiencing higher exam anxiety levels reported less use of regulatory strategies. English, math, and social studies all had non-significant gender normalized coefficients.

3.10. Performance

In terms of academic performance, the diversity in academic achievement for social studies and mathematics was significantly explained by the four factors, F (4,540) = 31.04, p 0.001, and F (4,540) = 30.61, p 0.001, respectively. In contrast to the strategy use equations, the assignment value factors were not a substantial predictor of academic achievement in any of the three subject areas investigated, as measured by the standardized regression coefficient (see Table 3). However, the standardized regression coefficients for test anxiety and self-efficacy in math, English, and social studies were all statistically significant. After taking into consideration the students' gender, the importance of the task, and their level of test anxiety, self-efficacy alone accounted for 6 percent of the variation in classroom grades. Similarly, test

anxiety accounted for about 6 percent of the variation in classroom grades in social studies, English, and mathematics, see Table 3. Students with higher levels of self-efficacy obtained, on average, higher classroom grades than those with lower levels in all three subject areas. However, compared to less anxious pupils, those who reported more test anxiety obtained poorer grades, see Table 3.

4. Discussion

This research explored independent learning and environmental factors across three distinct subject areas. The findings indicated that the motivating elements of self-controlled learning are, in part, context-dependent, which is pertinent to our initial research question regarding mean-level disparities. Students expressed different levels of assignment value, test anxiety, and self-efficacy in the academic subject areas of math, English, and social studies. Additionally, for each of the three motivational components under examination, its mean-level difference was modified by gender, as expressed in our third research question.

Student perceptions of the importance, utility, and interest of classroom assignments tended to favor mathematics over either English or social studies. Overall, mathematics was recognized as the most significant, practical, and fascinating topic by both genders. However, there were discrepancies between the genders when comparing English and social studies. For men, social studies and English were equally valued and interesting, while females assessed English as being more significant than social studies (albeit not nearly so much as math). These findings are consistent with those of Dowker, et al. [47] and McGeown and Warhurst [48], who found no difference in the tastes and principles of men and women for mathematics, but who found that men often regard English as interesting and significant. The findings for task interest and value were consistent with numerous previous studies involving primary and secondary pupils, indicating that any challenges women may experience with math are not related to differences in their appreciation of math.

The findings, however, indicate that women were less inclined to possess appropriate levels of test anxiety and self-efficacy in math. In particular, compared to women, males expressed comparable levels of self-efficacy across all subject areas, with higher levels in English than in math or social studies. Lastly, concerning test anxiety, men reported equal levels in both mathematics and English, whereas women reported lower levels in English than in mathematics. The results confirm earlier findings regarding the gender disparities in efficacy and competency attitudes in the subjects of mathematics and English. In fact, in all three subject areas, the women in the study performed better than the men. In studies on gender differences, this "inadequate calibration" (a poor correlation between efficacy expectations and actual performance) is a recurring theme, in which females typically underestimate their skill and effectiveness compared to males [49, 50]. Therefore, any difficulties females have with mathematics are more likely to be caused by perceptions of anxiety and less effective adaptation than by lower levels of value or interest.

The use of cognitive and regulatory strategies by females does not, it would seem, suffer as a result of the gender disparities in self-efficacy and anxiety. We discovered variations in the levels of cognitive strategy use in the various subject areas. Students overall reported using cognitive strategies more frequently in social studies than in English or math, and more frequently in English than in mathematics. Furthermore, across all three subjects, women reported using cognitive strategies more often than men. Contrary to expectations, both males and females reported using regulatory strategies at similar levels across all subject areas. Thus, even though pupils inevitably use a wider variety of mental methods, they did not report being better able to regulate during social studies than in their studies of math or English. Finally, possibly because we standardized grades among teachers, there were no variations in academic performance by subject area.

The fact that students employ more cognitive strategies when studying social studies is in line with the research of Tullis and Maddox [51]. They discovered that social studies classrooms may provide students with more varied and interesting assignments than math classrooms do. Our findings on cognitive strategy use and disciplinary issues collectively imply that the use of strategies can depend on how much independent learning takes place, which depends on differences in the field of study and the classroom environment. Certainly, research combining observations of discipline disparities in actual classroom activities, education, and contemporaneous disparities in the amount of independent learning among students is necessary before a definitive conclusion can be drawn. However, it appears that the degree to which cognitive strategies are used can vary depending on the setting, therefore further analysis is required to investigate connections between independent learning, the many aspects of the classroom, and academic subjects, as indicated by Chen, et al. [52].

In connection to our second research question, we discovered remarkably similar relationships between performance, strategy use, and motivation results across the different subject areas. For math, English, and social studies students, the correlational and regression analyses revealed comparable relationships between assignment value, performance, test anxiety, the use of cognitive and regulating techniques, and self-efficacy. For instance, the proportion of variation in students' use of cognitive and regulatory strategies that could be explained by motivating factors and gender was quite comparable across all three subject areas. Furthermore, the predictors that were significant in the subjects did not differ in any of the analyses. As demonstrated in previous studies, students who respected and were enthusiastic about a subject more frequently reported using cognitive and regulatory tactics. In short, when students were interested in and valued a subject, they exhibited greater sustained cognitive learning, paralleling findings from several previous studies [53].

In contrast to self-efficacy, assignment value did not significantly predict real performance. Self-efficacy was shown to be important in all three subjects and consistently predicted both the use of strategies and classroom performance. Students tended to report more often that they employed a range of cognitive and regulatory methods if they believed they had the capacity to learn, comprehended the subject matter, and were predicted to perform well. They also obtained better grades as a result. This suggests that assignment value predicts strategy use, although efficacy does not predict actual performance. In

terms of higher degrees of cognitive strategy use and self-regulation, it appears that assignment value is related to the initial "decision" to engage in academic tasks. However, in terms of the final outcome of grades, self-efficacy and the use of genuine methods are more significant [5].

It appears that curiosity and value can help a learner decide to choose a task during social, cognitive, and independent learning, similar to an automobile "starter." However, once engaged, to "steer" and manage their performance, adaptive efficacy beliefs and the use of cognitive strategies are more significant self-regulation mechanisms [54]. Nevertheless, there is a need for more research to study the links between assignment value, efficacy, and self-regulation processes in "real-time" while students are actually learning [3].

Similarly, across subject areas, test anxiety was revealed as a significant predictor of strategy use and performance; however, it related differently to the use of cognitive strategies than to performance and regulation. Particularly, students with higher exam anxiety used cognitive strategies more frequently but regulation strategies less frequently, and they tended to perform worse academically. Worried students may employ more cognitive techniques in an effort to perform well, but they struggle to control their academic progress and frequently perform worse in the end [55].

In summary, these findings offer some proof that metrics relating to motivational factors, method use, and performance have consistent relationships across subject areas. To replicate these findings, additional research is required as this study did not directly evaluate the similarities between these associations. A further qualification of these findings is that the manner in which the various aspects were evaluated may account for the considerably larger relationships between the notions of motivation and strategy use than the relationships between motivation and the performance indicators. Student self-reports were used to quantify the motivational and strategy use factors, while academic achievement was assessed utilizing academic standing. Because all the motivational and strategy use factors were dependent on students' self-reports, the strong relationships between them may be overstated.

5. Conclusion

The current research has demonstrated that whereas students may report mean-level disparities in cognitive and motivational aspects of self-controlled education across various academic contexts, the relationships between these aspects are consistent in different contexts. The pattern of links between motivation and cognition thus appears persistent across subject areas, despite differences in the amount and the level of students' interest in, or capacity for, certain subjects. Of course, the fact that just 17 instructors of three subjects were included in this study restricts its generalizability. By including additional teachers within each subject area, future studies will be able to assess the validity of the mean-level discrepancies between subjects we discovered. As mentioned above, it will be crucial to separate subject-area differences from overall instructional disparities by using genuine information on the nature of the classroom environment and teaching methods. The current findings would also be strengthened by studies that included online or observational assessments of motivation and strategy usage. Despite these limitations, our research indicates that because there is consistency between motivation and cognition across subject domains, broad models of independent learning can be developed. These models can be utilized in a variety of school settings to comprehend student learning.

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