The role of affective-motivational factors in freshmen's study time investment

The amount of study time invested, both in self-study and class attendance, has been shown repeatedly to relate to students' academic performance (e.g., Credé, Roch, & Kieszczynka, 2010; Stinebrickner & Stinebrickner, 2004). More specifically, beyond various intellective (e.g., high school GPA) and non-intellective (e.g., gender, employment) student characteristics (e.g., Brint & Cantwell, 2010), also study time has been reported to affect grades. Evidence that study time (ST) moderates the relationship between student characteristics and academic performance has also been found. Kuh, Cruce, Shoup, Kinzie, and Gonyea (2008) showed, for example, interactive effects between ST and ACT scores: ACT scores were positively related to grades, but this relation was less pronounced when students studied $\leq$ 5 hours/week. In sum, research demonstrates that ST plays an important role in students' study results in higher education.

Students significantly differ in the amount of time devoted to studying. A number of studies searched for possible student characteristics associated with these individual differences. Students with higher scores on general cognitive ability and prior learning tests have been shown to invest less study time (Plant, Ericsson, Hill, & Asberg, 2005). Female students, on the other hand, have been shown to work harder than males (Brint & Cantwell, 2010). But what about variables with a strong affective-motivational component? Boekaerts (1996) attributed a significant role to affective-motivational factors in learning, in that they may hinder or promote adequate learning processes. In the current study, this hypothesis is evaluated with respect to one aspect of the learning process, i.e., ST. Some indication has been found that students' motivation and preoccupation with failure affect ST (Brunborg, Pallesen, Diseth, & Larsen, 2010; Torenbeek, Jansen, & Hofman, 2010). The current study aims to add to the existing literature by exploring relations with affective-motivational factors from different theories, i.e., academic self-efficacy (Bandura, 1982), learning goal orientation

(Dweck, 1999), causal attribution of failure (Weiner, 1979), and action-orientation (Kuhl, 1994). An additional goal was to explore whether relations between affective-motivational factors and ST were similar for students with low vs. high grades at the end of the term exam. Because we were interested in capturing predictors of ST for a particular course, affective-motivational factors were not operationalized as general personality characteristics, but were measured at the course-level.

Method

Participants were 323 freshmen (180 males, 143 females) studying business economics. Students are unselected with respect to high school GPA. Students at our university are expected to engage in self-regulated learning by participating in lectures, workshops, and response sessions and by completing self-study tasks. Self-study tasks for each course (i.e., reading and application assignments, which aim to prepare or further elaborate upon classes) are described in study itineraries, which are available at the beginning of the term.

Measures

Study time. Students continuously recorded their ST investment in self-study tasks and class attendance by means of a web-based application during the entire term for either Macro-Economics, Mathematics, Micro-Economics, or Financial Accounting. Because these course differ in credit point load, the total amount of self-study time and class attendance per credit point is calculated. The variation in self-study time across term was also included as an indicator of how regularly students study (versus cram). The lower this measure, the more regularly students spread their self-study time.

Control variables. Gender, study delay (as indicated by the age of the student at enrollment), and prior domain knowledge in mathematics (number of hours of mathematics in the final years of high school) were derived from administrative records. All freshmen had

completed an intelligence test at university entry (AH56-L; Heim, Watts, and Simmonds, 1970).

Affective-motivational factors. As mentioned above, all these factors were measured at course-level:

◊ Self-Efficacy (18 items, α = .91)

e.g., During the past 8 weeks, I was certain that I could handle the workload of *(course x)*

◊ Learning Goal Orientation (7 items, α = .70)

e.g., I study *(course x)* because it interests me.

◊ Action-Orientation (Kuhl, 1994; Volet, 1997)

Disengaging vs. Being Preoccupied with Failure (10 items, α = .81)

e.g., When I am concerned about my progress in *(course x)*, I start with something else and don't think about it anymore/ it takes me a long time before I can concentrate on something else

Taking Initiative vs. Hesitating (7 items, α = .72)

e.g., When I have to complete an important assignment, I easily start working/ I often think too long about where to start

Being Persistent vs. Being Easily Distracted (4 items, α = .65)

e.g., When a part of *(course x)* is more difficult than expected, I keep studying until I have processed it/ I tend to engage in something else

◊ Causal Attribution of Poor Performance on self-study tasks for (*course x).* A low score means that students report high control over factors (e.g., intelligence, bad teaching, low effort), to which they had attributed poor performance.

◊ Finally, Confidence about Study Choice was measured at university entry by means of the following item: 'How certain are you about the following: This degree program is a good choice for me?'

Results

Descriptive statistics and intercorrelations are presented in Table 1, primary results in Tables 2-4. Affective-motivational factors were especially important for the amount of time devoted to self-study. Easily taking initiative to study and being persistent are associated with more self-study time, whereas more disengagement from the course and a higher course-related self-efficacy are related to less time investment. Differential results were, however, obtained when evaluating relations for students with a low (Pc 33: grade ≤ 7) vs. high (Pc 67: grade ≥ 12) course grade at the end of the term. Low performing students invest less self-study time, not only if they are highly disengaged, but also if they report low control over factors associated with poor performance. For high performing students, self-study time relates especially to taking initiative (+), self-efficacy (-), and intelligence test score (-).

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Table 1. *Intercorrelations and Descriptive Statistics of All Study Variables and Mean Level Differences according to Gender*

	1	2	3	4	5	6	7	8	9	10	11	12
1. Intelligence Test	1.00											
2. Prior Knowledge Math	.26***	1.00										
3. Confidence in Study Choice	.13*	.06	1.00									
4. Self-Efficacy	.15**	.18**	.24***	1.00								
5. Learning Goal Orientation	-.04	-.02	.15**	.31***	1.00							
6. Disengaging	.02	.05	.06	.26***	-.12*	1.00						
7. Taking Initiative	-.11*	.13**	.15**	.35***	.34***	.19***	1.00					
8. Being Persistent	.01	.07	.14*	.36***	.45***	.08	.47***	1.00				
9. Causal Attribution of Poor Performance[1]	.06	.02	-.08	-.32***	-.24***	-.09	-.21***	-.29***	1.00			
10. Self-Study Time	.11*	.04	.04	-.09	.11*	-.18**	.21***	.20***	-.04	1.00		
11. Variation Self-Study Time[2]	.11*	-.04	.04	.05	-.08	.08	-.16**	-.04	.06	-.30***	1.00	
12. Class Attendance	.02	.16**	-.08	.09	.12*	.03	.16*	.23***	-.05	.17**	-.13*	1.00
M_{boys} (SD_{boys})	36.83(8.31)	5.37(1.56)	3.96(0.61)	4.09(0.67)	2.77(0.42)	2.54(0.47)	2.56(0.45)	2.97(0.55)	0.67(0.56)	15.76(6.90)	0.12(0.04)	6.72(1.12)
M_{girls} (SD_{girls})	33.54(7.25)	5.29(1.51)	3.83(0.75)	4.09(0.62)	2.86(0.43)	2.41(0.51)	2.74(0.52)	3.11(0.56)	0.59(0.59)	17.64(6.17)	0.12(0.04)	6.90(0.82)
Independent samples *t*-test	3.74***	0.50	1.66	0.10*	-1.76***	2.31*	-3.35**	-2.17*	1.26	-2.55*	0.70	-1.71
Theoretical range	0-72	0-8	1-5	1-6	1-4	1-4	1-4	1-4	0-…	0-[19]	0-…	0-[8]

* $p < .05$. ** $p < .01$. *** $p < .001$. [1] A low score means that the student reports high control over factors he/she associates with poor performance.
[2] Students with few variation in self-study time study regularly.

Table 2. *Self-Study Time Regressed On Student Characteristics and Affective-Motivational Factors*

Predictors	All students (n=323)		Low Academic Performance (n=111)		High Academic Performance (n=118)	
	β	ΔR^2	β	ΔR^2	β	ΔR^2
Step 1: Student Characteristics		.03†		.02		.10*
Gender	.13*		.14		.04	
Study Delay	-.01		.05		-.07	
Prior Knowledge in Mathematics	.07		.05		-.03	
Intelligence Test	-.08		.07		-.28**	
Step 2: Adding Affective-Motivational Factors		.12***		.08		.21***
Gender	.06		.07		-.02	
Study Delay	.02		.06		-.04	
Prior Knowledge in Mathematics	.06		.10		-.02	
Intelligence Test	-.04		.07		-.19*	
Confidence in Study Choice	.04		.09		.01	
Self-Efficacy	-.19**		-.12		-.23*	
Learning Goal Orientation	-.02		-.04		.02	
Disengaging	-.18**		-.23*		-.16†	
Taking Initiative	.20**		.08		.34**	
Being Persistent	.18**		-.02		.18†	
Causal Attribution of Poor Performance[1]	-.02		-.24*		.16†	

† $p < .10$, *$p < .05$, **$p < .01$, *** $p < .001$. [1] A low score means that the student reports high control over factors he/she associates with poor performance.

Table 3. *Variation in Self-Study Time Regressed On Student Characteristics and Affective-Motivational Factors*

Predictors	All students (n=323)		Low Academic Performance (n=111)		High Academic Performance (n=118)	
	β	ΔR^2	β	ΔR^2	β	ΔR^2
Step 1: Student Characteristics		.02		.01		.15**
Gender	-.01		.03		-.12	
Study Delay	.03		-.02		.11	
Prior Knowledge in Mathematics	-.07		-.09		-.32**	
Intelligence Test	.13*		.01		.11	
Step 2: Adding Affective-Motivational Factors		.04†		.03		.07
Gender	.03		.09		-.08	
Study Delay	.03		.00		.11	
Prior Knowledge in Mathematics	-.06		-.11		-.32**	
Intelligence Test	.09		.00		.05	
Confidence in Study Choice	.03		.01		.05	
Self-Efficacy	.10		.00		-.05	
Learning Goal Orientation	-.05		-.08		.01	
Disengaging	.08		.12		.17†	
Taking Initiative	-.19**		-.10		-.26*	
Being Persistent	.05		-.02		.00	
Causal Attribution of Poor Performance[1]	.06		.00		.01	

† $p < .10$, *$p < .05$, **$p < .01$, *** $p < .001$. [1] A low score means that the student reports high control over factors he/she associates with poor performance.

Table 4. *Class Attendance Regressed On Student Characteristics and Affective-Motivational Factors*

Predictors	All students (n=323)		Low Academic Performance (n=111)		High Academic Performance (n=118)	
	β	ΔR^2	β	ΔR^2	β	ΔR^2
Step 1: Student Characteristics		.06**		.16**		.03
Gender	.07		.11		-.01	
Study Delay	-.15**		-.27**		-.09	
Prior Knowledge in Mathematics	.15*		.24**		-.01	
Intelligence Test	-.02		-.10		-.15	
Step 2: Adding Affective-Motivational Factors		.05*		.13*		.08
Gender	.04		.06		-.05	
Study Delay	-.13*		-.28**		-.10	
Prior Knowledge in Mathematics	.14*		.23*		-.02	
Intelligence Test	-.01		-.09		-.14	
Confidence in Study Choice	-.11†		-.19*		-.04	
Self-Efficacy	.00		.08		-.12	
Learning Goal Orientation	.07		.14		.20†	
Disengaging	.04		.09		-.01	
Taking Initiative	.00		.07		.13	
Being Persistent	.19**		.23*		.04	
Causal Attribution of Poor Performance[1]	.02		.18†		.13	

† $p < .10$, *$p < .05$, **$p < .01$, *** $p < .001$. [1] A low score means that the student reports high control over factors he/she associates with poor performance.