Exploring relations among students' implicit theories, achievement goals, and their self-regulated competencies in the context of writing an academic certificate paper

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Theoretical background

Beliefs are powerful predictors of students' motivation, strategic behavior, and performance in achievement contexts (Blackwell, Trzesniewski, & Dweck, 2007). According to Dweck and Legget (1998) students hold different implicit theories about ability. Students holding an incremental theory believe that abilities can be increased through one`s own effort. In contrast, students holding an entity theory tend to believe that abilities are traits or fixed characteristics of a person that cannot be changed. As a consequence, students with a more incremental view see achievement situations in terms of growing and expanding one`s own competencies, whereas students with a more entity theory may focus on the evaluation status of their competencies. Implicit theories of ability provide students with a cognitive meaning system that influences how they interpret and react in achievement situations. This leads to interindividual differences in students` motivational and development paths.

Researchers have linked implicit theories to various self-regulation processes, such as goal setting, motivational regulation, metacognitive knowledge, and strategy use. Students holding an incremental theory follow a deeper learning approach. They show higher metacognitive engagement, use various strategies, and increase their effort when facing difficulties. An entity theory however lead to maladaptive learning pattern such as higher behavioral disengagement when facing demands, use of helpless-oriented strategies, involvement of negative coping strategies, and procrastination (Burnette, O'Boyle, VanEpps, Pollack, & Finkel, 2013; Ommundsen, Haugen, & Lund, 2005; Robins & Pals, 2002). Further, implicit theories have been associated to students achievement goal orientations. Students holding an incremental theory construe achievement situations as possibilities to extend their capabilities why they most likely adopt mastery goals. In contrast, students holding an entity theory belief that proving their ability and appearing smart is more important than learning why they most likely adopt performance-avoidance goals. However, both value performance-related goals for approaching learning success (Cury, Elliot, Da Fonseca, & Moller, 2006). Taken together, previous findings suggest that students who hold an incremental theory are more likely to succeed academically, most likely because they have adaptive motivational beliefs and are strong self-regulated learners.

The present study and hypotheses

The present study adds to previous research by taking a task-specific perspective and examining the combined relationship of implicit theories of ability, achievement goals, self-regulation competences, and achievement in real-world achievement situation.
We investigate the following hypotheses:

H1: Implicit theories of ability are positively related to master goals and negatively to performance-avoidance goals.

H2: Implicit theories of ability are positively related to self-regulation competencies.

H3: Mastery goals are positively and performance-avoidance goals negatively related to self-regulation competencies.

H4: Motivational-emotional regulation and metacognitive competencies predict students` achievement.

Context of the study

In Switzerland, upper secondary school level has several tiers oriented towards different professional tracks. The "Gymnasium" is the highest track with a strong emphasis on academic learning that prepares for university. Toward the end of the Gymnasium, students must write a school leaving certificate paper ("Maturaarbeit"). This academic-oriented paper significantly contributes to the final exit exam. Students have about one year to complete their academic certificate paper. The academic certificate paper is written individually and outside of class. Therefore each student is responsible for contacting a teacher (advisor) of their choice, propose him or her their idea, and sign a certificate paper contract with that teacher.

Method

Participants

- N = 1250 students
- 12 schools (upper secondary school level)
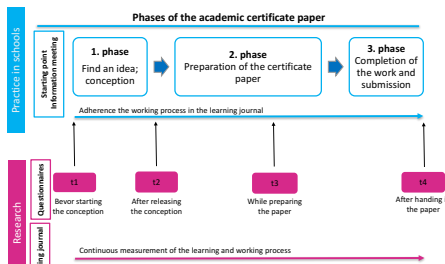- Age: M = 17.48; SD = 0.81; Range = 15-20
- Gender: 55.9% female (N = 698)

Analysis

- Mplus 7.4 using "type is complex" procedure (cluster = school)
- Full information maximum likelihood algorithm

Design

Fig. 1. Design of the longitudinal study.

Measures

Table 1. Descriptive statistics of all constructs.

Constructs	Number of items	Time	α	M (SD)	Possible Range	Observed Range	Sample item
Implicit theories of ability	4	t1	.72	4.27 (.70)	1-6	1.5-6	The ability to write an excellent demanding academic certificate paper can be acquired.
Mastery goals	4	t2	.78	4.31 (.92)	1-6	1-6	...to get a deeper understanding of the content.
Performance-approach goals	4	t2	.80	2.65 (1.02)	1-6	1-6	...to perform better than other students.
Performance-avoidance goals	4	t2	.80	2.02 (.88)	1-6	1-6	...to hide that I know less than others.
Work-avoidance goals	2	t2	.88	2.50 (1.11)	1-6	1-6	...to pass with as little effort as possible.
Cognitive regulation	4	t3	.83	4.22 (.76)	1-6	1-6	I can reduce a high amount of information to the essentials.
Metacognitive regulation	5	t3	.84	4.14 (.75)	1-6	1-6	I can estimate what parts of my approach are appropriate.
Motivational-emotional regulation	6	t3	.91	3.65 (.89)	1-6	1-6	If I lose stamina while writing my academic certificate paper, I know how to motivate myself.
Procedural knowledge	4	t3	.76	4.15 (.72)	1-6	1-6	I have a specific purpose for each strategy.
Prior achievement	1	t2	-	5.08 (.50)	1-6	3.5-6	Grade point average from the last report card (school subject specific).
Subsequent achievement	1	t4	-	5.12 (.57)	1-6	2.5-6	Grade point averages for the academic certificate.

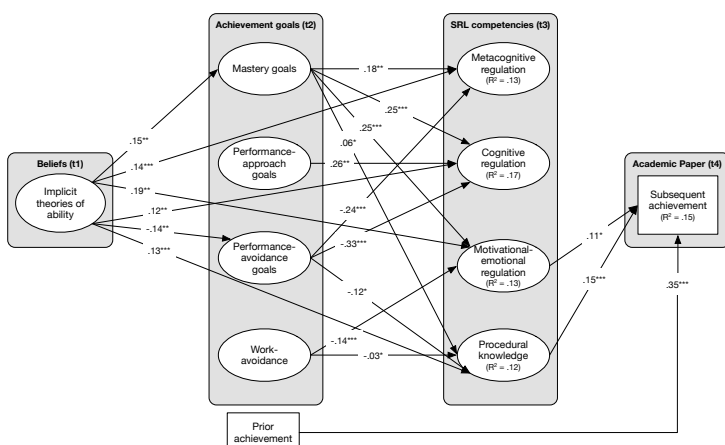## Result 1: Standardized estimated coefficient of the linear structural equation model

Fig. 2. Standardized estimated coefficients of the linear structural equation models testing the relationship between students` implicit theories of ability, achievement goals, self-regulation competencies, and achievement, controlled for prior achievement.
Note. For clarity of the graphical presentation, only significant paths are presented. Achievements goals construct were allowed to covary. SRL competencies constructs were allowed to covey.

Result 2: Indirect effects

Table 2. Estimates and confidence intervals for the mediated effects of implicit theories of ability on subsequent achievement via achievement goals and self-regulation competencies.

Predicated mediated effects						Observed mediated effects			
						Estimate	SE	90% CI limits	
								Lower	Upper
IT →	MG →	MER →	SA	(+)		**0.005**	**0.003**	**0.001**	**0.010**
IT →	MG →	PK →	SA	(+)		0.001	0.001	0.000	0.003
IT →	PAG →	PK →	SA	(−)		0.002	0.001	0.000	0.004

Note. IT = implicit theories, MG = mastery goals, PAG = performance-avoidance goals, MER = motivational-emotional regulation, PK = procedural knowledge, SA = subsequent achievement. Plus signs indicate that a positive mediated effect was predicted. Minus signs indicate that a negative mediated effect was predicated. Reported are standardized estimates. Significant estimates are in bold (when the 90%-confidence intervals for the unstandardized estimates do not include zero).

Table 3. Estimates and confidence intervals for the mediated effects of implicit theories of ability, mastery goals, performance-avoidance goals, and work avoidance goals on subsequent achievement via self-regulation competencies.

Predicated mediated effects					Observed mediated effects			
					Estimate	SE	90% CI limits	
							Lower	Upper
IT →	MER →	SA	(+)		**0.025**	**0.013**	**0.003**	**0.047**
IT →	PK →	SA	(+)		**0.022**	**0.007**	**0.011**	**0.034**
MG →	MER →	SA	(+)		**0.040**	**0.021**	**0.005**	**0.074**
MG →	PK →	SA	(+)		0.013	0.007	0.001	0.025
PAG →	PK →	SA	(−)		-0.021	0.011	-0.039	-0.003
WAG →	MER →	SA	(−)		**-0.028**	**0.014**	**-0.052**	**-0.004**
WAG →	PK →	SA	(−)		**-0.010**	**0.003**	**-0.015**	**-0.004**

Note. IT = implicit theories, MG = mastery goals, PAG = performance-avoidance goals, WAG = work avoidance goals, MER = motivational-emotional regulation, PK = procedural knowledge, SA = subsequent achievement. Plus signs indicate that a positive mediated effect was predicted. Minus signs indicate that a negative mediated effect was predicated. Reported are standardized estimates. Significant estimates are in bold (when 90%-confidence intervals for the unstandardized estimates do not include zero).

Significance and Discussion

Past research suggested that implicit theories are key beliefs that influence students' motivational, behavioural, and performance pattern in achievement situations (Blackwell et al., 2007; Robins & Pals, 2002). By taking a task-specific perspective on implicit theory of ability, this research confirmed those patterns in a real-world achievement situation. The findings of the present study linked students' implicit theories with their specific achievement goals for writing an academic paper. Students who hold a more incremental theory endorsed more likely mastery goals than their peers with a more entity theory. Further, implicit theories were negatively related to performance-avoidance goals (H1 confirmed). Implicit theories were directly and positively linked to students' self-regulated learning competencies (H2 confirmed). Students with a more incremental view reported higher SRL competencies while writing an academic paper than their peers with a more entity theory. As expected (H3), mastery goals were positively related to students SRL competencies. Furthermore, our findings stress the importance of motivational and metacognitive dimensions of self-regulated learning for achievement (H4 partially confirmed). Overall, the results of our study emphasizes the significance of implicit theories for students' performance. The results showed that implicit theories are linked to stronger achievement goals and higher self-regulated learning competencies, which in turn lead to higher achievement. Based on those findings, teachers may seek to guide students to adopt a more incremental view of ability and higher learning goals. Further, it would be of practical importance to strengthen students' motivational-emotional regulation competencies and their metacognitive awareness.

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