Implicit theories of intelligence, goal orientation, cognitive engagement, and achievement: A test of Dweck’s model with returning to school adults

Caroline Dupeyrat* and Claudette Mariné

LTC UMR5551 CNRS, Université Toulouse 2, Maison de la Recherche, 5 allées A. Machado, 31058 Toulouse Cedex 9, France

Available online 7 June 2004

Abstract

This study tested and extended Dweck’s social-cognitive theory of motivation with adults who deliberately chose to face the challenge of returning to school. We examined the relationships among beliefs (implicit theories) on the nature of intelligence, goal orientation, cognitive engagement in learning, and achievement using path analyses. Findings were generally consistent with Dweck’s theoretical predictions. Striving for competence improvement (mastery goals) had a positive impact on learning activities and outcomes, while striving to demonstrate competence (performance goals) or to avoid effort (work avoidance) had a negative influence on learning and achievement. Additionally, data suggested that mastery goals had a positive influence on academic achievement through the mediation of effort expenditure. The predicted effects of implicit theories of intelligence on goal orientation and cognitive engagement in learning, however, failed to emerge. Results are discussed in relation to their general theoretical implications and with regard to the specific characteristics of returning to school adults.

Keywords: Implicit theories of intelligence; Goal orientation; Work avoidance; Learning strategies; Effort; Achievement; Returning to school students

* Corresponding author. Fax: +33-61-50-35-33.
E-mail address: dupeyrat@univ-tlse2.fr (C. Dupeyrat).
1. Introduction

Dweck’s (1986; Dweck & Leggett, 1988) social-cognitive theory of motivation has attracted a great deal of attention since the past two decades. The key concepts of this model are: (a) beliefs (implicit theories) that learners hold on the nature of intelligence and (b) learners’ goal orientation. Dweck contrasts two types of implicit theories of intelligence: the belief that intelligence is a malleable and controllable quality, an incremental theory, and the belief that intelligence is a fixed and uncontrollable trait, an entity theory. The main postulate of this model is that implicit theories of intelligence determine the way students approach learning and achievement situations, the kinds of goals they adopt, and through the mediation of effort expenditure and persistence, their achievement.

Students who hold an incremental theory of intelligence are mainly focused on improving their competence and acquiring new knowledge: they are oriented towards mastery goals. In order to meet with these mastery goals, they are willing to expend the necessary effort, to seek out challenging or difficult situations that promote learning, and to persist to overcome possible or even necessary setbacks. Students holding an entity theory of intelligence are primarily focused on obtaining good performance in order to document to themselves or others the adequacy of their ability: they are oriented towards performance goals. This pursuit of performance goals leads them to minimize their effort expenditure, to give up easily when faced with challenges or drawbacks, and generally to avoid tasks they might have difficulties to master.

Dweck’s model does not postulate that achievement behavior is directly determined by a person’s implicit theory of intelligence but that this relationship is mediated by her or his goal orientation. However, as Harackiewicz and Elliot (1995) pointed out, in more recent descriptions of her model (e.g., Dweck, 1996; Dweck, Chiu, & Hong, 1995), Dweck seems to argue that implicit theories are the proximal determinants of achievement behavior without invoking explicitly goals as mediating variables. Nevertheless, given the central role attached to goal orientation in Dweck’s initial model, most research conducted under her framework in an academic context has examined the influence of goal orientation on various indicators of students’ cognitive engagement in learning.

Mastery goals are usually found to be related to greater effort exertion and persistence (e.g., Miller, Beherns, & Greene, 1993; Miller, Greene, Montalvo, Ravindran, & Nichols, 1996), as well as to reported use of deep-processing learning strategies such as elaboration or organization strategies (e.g., Ames & Archer, 1988; Bouffard, Boisvert, Vezeau, & Larouche, 1995; Greene & Miller, 1996; Meece, Blumenfeld, & Hoyle, 1988; Nolen & Haladya, 1990). The relationship between mastery goals and achievement seems less clear: this relationship has been found to be positive in some studies (e.g., Miller et al., 1993), but a number of other studies failed to observe any significant relation between these two variables (e.g., Harackiewicz, Barron, Carter, Letho, & Elliot, 1997; Meece et al., 1988).

Such a result is not necessarily unexpected since, according to Dweck’s model, mastery goals are not postulated to have a direct influence on performance outcomes,
but rather an indirect effect mediated by deep cognitive engagement and effort expenditure. Studies that used causal modeling could indeed document these indirect effects (e.g., Greene & Miller, 1996; Nolen, 1988). For instance, in Greene and Miller’s (1996) study, mastery goals were unrelated to achievement when examined with correlational analyses. Using path analysis, however, an indirect effect could be highlighted: the positive influence of mastery goals on achievement was completely mediated by students’ use of deep-processing strategies.

The results for performance goals are not as straightforward as for mastery goals. Though performance goals are usually found to be related to reported use of shallow-processing strategies such as rote learning or memorization (e.g., Meece et al., 1988; Miller et al., 1996; Nolen, 1988), unrelated to effort and persistence (e.g., Miller et al., 1993), and negatively related to achievement (e.g., Miller et al., 1996), this is not always the case. For instance, Meece et al. (1988) found that performance goals were related to both shallow and deep learning strategies, and Harackiewicz et al. (1997) found that, compared to students adopting mastery goals, those who adopted performance goals achieved higher levels of performance as measured by final course grades. These researchers extended Dweck’s two-goal orientation framework to include a goal of work avoidance. Students endorsing this goal seek to complete their work with a minimum of effort. Results pertaining to this goal clearly show its negative effects: in Meece et al.’s (1988) study, work avoidance was strongly related to reported use of shallow-processing strategies and negatively to the use of deep-processing strategies. In Harackiewicz et al.’s (1997) study, students who adopted work avoidance goals achieved poor performance. These detrimental effects of work avoidance has also been documented in a number of other studies (e.g., Archer, 1994; Nicholas, Pastashnick, & Nolen, 1985; Nolen, 1988).

Fewer studies have tested the relationships between implicit theories of intelligence and goal orientation in an academic context. The few studies that did so could only partially support Dweck’s postulates. Roedel and Schraw (1995), for example, found that the endorsement of an entity theory of intelligence was related to the pursuit of performance goals, but that it was unrelated to the pursuit of mastery goals (i.e., students whose dominant goal was one of progressing and acquiring new knowledge did not reject the belief that intelligence is a fixed entity). To the contrary, in two other studies (Dupeyrat & Escribe, 2000; Dupeyrat & Mariné, 2001) the belief in a fixed entity was not associated with performance goals but was negatively correlated with mastery goals.

Spinath and Stiensmeier-Pelster (2001) also found little evidence for the relationship between implicit theories of intelligence and goal orientation in a series of correlational and experimental studies where they included a measure of work avoidance besides mastery and performance goals. They found only in one of five studies that an incremental theory was significantly associated with mastery goals, in one other study that an entity theory was related with performance goals, and in yet another study that work avoidance was positively correlated with an entity theory. However, their results generally revealed only weak or non-significant correlations between implicit theories of intelligence and goal orientations. Furthermore, the relationships between these two constructs were very unstable over their different studies.
In another study (Hayamizu & Weiner, 1991), the belief that low ability is controllable and unstable (an incremental theory) was related to both mastery and performance goals.

The few studies using both measures of incremental and entity theories (e.g., Stipek & Gralinski, 1996; Vezeau, Bouffard, & Dubois, in press) could not always confirm the predicted relationships between implicit theories of intelligence and goals. For instance, Stipek and Gralinski (1996) found that an entity theory was related to performance goals and an incremental theory to mastery goals; however, as the authors note, these relationships were fairly weak. Vezeau et al. (in press) found that, although mastery goals were positively related to an incremental theory and negatively to an entity theory of intelligence, there was no significant relationship between either implicit theories of intelligence and performance goals. Thus, taken together, studies examining the relationships between implicit theories of intelligence and goal orientation yielded very inconsistent and unstable results.

Other studies examined the relation between implicit theories of intelligence and cognitive engagement in learning and achievement. These revealed that although only an incremental theory was related to a greater use of learning strategies (Braten & Olaussen, 1998), both views about the nature of intelligence were related to students’ grades (Faria, 1996; Faria & Fontaine, 1997). It must be noted, however, that neither of these studies included measures of goal orientation and could therefore not examine whether the influence of implicit theories on cognitive engagement and achievement is direct or mediated by goal orientation. Stipek and Gralinski (1996) measured implicit theories, goal orientation, reported strategy use and achievement. Using causal modeling to examine relationships between these variables, they found evidence that an entity theory had a direct positive effect on shallow strategy use as well as a direct negative effect on achievement.

To summarize, the studies reviewed above separately capture relevant relationships between different motivational factors from Dweck’s model, even though sometimes contradicting her postulates, especially as far as the influence of performance goals and the relationship between implicit theories of intelligence and goal orientation are concerned. However, very few studies attempted to test a causal model combining all of these constructs together. The only exception we know of, Stipek and Gralinski’s (1996) study, used causal modeling to examine the relationships between implicit theories of intelligence, goal orientation, and learning strategies and achievement. While this study could confirm Dweck’s model concerning the influence of an entity theory, it failed to do so as far as the influence of an incremental theory is concerned.

Therefore, the main purpose of the present study is to test a model derived both from Dweck’s theoretical postulates and the empirical findings reported above using path analysis. Such causal modeling procedures are the only procedures allowing to test a complex conceptual model as a whole and to go beyond the mere examination of relationships between two sets of variables. Furthermore, these procedures are the only way to capture mediational effects of variables such as postulated in Dweck’s model.

The sample chosen for this study was returning to school-students. We chose this population because Dweck maintains that the contrasted patterns of achievement
behaviors her model predicts should be strongest when students are confronted with challenging or difficult tasks (e.g., Dweck & Leggett, 1988; Grant & Dweck, 2003). For students who dropped out of school (after experiencing failure or for other reasons), returning to school is a deliberate choice and can be considered to represent a challenging situation (Eppler & Harju, 1997). Succeeding in this challenge often requires an important investment in time and effort for these students, especially because they are often involved in a variety of other activities besides their studies (e.g., professional and/or family life). Therefore, we expect that Dweck’s postulates pertaining to the influence of motivational beliefs on achievement behavior and outcomes will be particularly appropriate and important for this population.

The theoretical model tested in this study, as illustrated in Fig. 1, examines the links between implicit theories of intelligence and goal orientation, and the influence of these two sets of variables on measures of students’ cognitive engagement in learning and achievement. Beyond a test of the relationships between variables, such a model also allows us to address the question of the relative contributions of implicit theories of intelligence and goal orientation in predicting cognitive engagement and achievement. Unlike most other correlational studies, in this study we used two measures of cognitive engagement: a self-report measure assessing the frequency of use of different learning strategies and a behavioral indicator of effort expended as measured by the number of voluntary homework exercises completed by the students throughout the academic year. Based on Dweck’s postulates, it is hypothesized that an entity theory of intelligence is related to performance goals, while an incremental theory is related to mastery goals; also based on Dweck’s postulates and on empirical findings, goal orientations are predicted to influence achievement only through the mediation of strategy use and effort. Performance goals are predicted to influence shallow strategy use and mastery goals deep strategy use and effort.

Based on the findings reported earlier demonstrating the detrimental influence of work avoidance on students’ learning and achievement, the role of this goal will also be considered in the path model. It is hypothesized that work avoidance is influenced

![Fig. 1. Proposed causal model for explaining achievement. Solid lines depict positive relations; and dotted lines depict negative relations.](image-url)
by an entity theory of intelligence, and that in turn work avoidance is related positively to shallow strategy use and negatively to deep strategy use and effort. Finally, it is expected that shallow-processing strategies have a negative influence on achievement and that deep-processing strategies and effort have a positive influence on achievement.

2. Method

2.1. Participants

The sample consisted of 76 French returning students enrolled in a special one-year program giving them equivalence to the high school diploma\(^1\) (Baccalauréat in French) necessary for enrolling in University studies. This program is based on four courses, two compulsory (French and Foreign Language) and two optional (to be chosen between the four following courses: History, Geography, Economics, and Mathematics). The classes take place in the evenings, five days a week, in lecture-sessions of 3–4 h. The only assessment in this program is a final examination that the students have to take in all four courses at the end of the academic year. For all courses, the students are required to compose essays except in mathematics where they have to solve problems.

Participants were 45 women and 31 men, aged on average 31 years, ranging from 20 to 49 years. The majority (54\%) were between 20 and 30-years-old, 37\% were between 31 and 40 years, and 9\% were older than 41 years. Twenty-seven percent of the participants left school after 9 years, 34\% after 10 or 11 years, and 38\% stayed in school until their final year, but dropped out before taking the examinations for their high school diploma.

2.2. Measures

Participants completed a 121-item questionnaire developed to assess various aspects of student motivation and academic engagement. For most part, this instrument was adapted and translated from existing questionnaires (in English or German language). A preliminary version of the questionnaire was tested on a small sample of students in order to check and correct possible ambiguous or difficult item formulations.

The structure of the instrument was examined using exploratory and confirmatory factor analyses and the reliabilities of the resulting scales were assessed with Cronbach’s \(z\). We will report only the items of the questionnaire which pertain to this study, a total of 69 items.\(^2\) The first part of the instrument (Likert-scaled 1 = “strongly disagree” to 4 = “strongly agree”) included the two following subscales:

---

\(^1\) This diploma is similar to the American “Graduate Equivalency Diploma.”

\(^2\) The complete French scales and results from factor analyses can be sent upon request.
The implicit theories of intelligence subscale was adapted from Hong, Chiu, and Dweck (1995). Since this scale includes only items measuring an entity theory of intelligence, we added items allowing to measure also an incremental theory of intelligence. The resulting scale thus consisted of five items for the entity theory of intelligence (e.g., “My intelligence is something about me I cannot change very much.”; \( \alpha = .69 \)) and four items for the incremental theory of intelligence (e.g., “My intelligence is mainly the result of my experience.”; \( \alpha = .56 \)). Results from factor analyses clearly revealed two distinct factors with all items loading on their expected factor. The correlation between the two implicit theories of intelligence was negative and significant (\( r = -.55, p < .001 \)), but moderate, thus indicating that they are not two opposite poles of a single continuum.

The goal orientation subscale was adapted from various instruments (Balke & Stiensmeier-Pelster, 1995; Hayamizu & Weiner, 1991; Roedel, Schraw, & Plake, 1994) with seven items assessing a mastery goal orientation (e.g., “I study because I like to learn.”; \( \alpha = .83 \)), four items measuring a performance goal orientation (e.g., “I study because I would like to be proud of getting good grades.”; \( \alpha = .66 \)), and two items measuring work avoidance (e.g., “I don’t feel like working hard in order to succeed”; \( r = .79^3 \)). Results from factor analyses confirmed this three-factor structure.

The second part of the instrument measured the level of students’ cognitive engagement in learning with two subscales adapted from the Motivational Strategies for Learning Questionnaire (MLSQ; Pintrich & DeGroot, 1990; Pintrich, Smith, Garcia, & McKeachie, 1993) and from the Inventar zur Erfassung von Lernstrategien im Studium (LIST; Wild & Schiefele, 1994). Results from factor analyses confirmed the existence of the two following subscales: the first subscale, a measure of deep-processing strategy use, included 24 items addressing the extent to which students were involved in elaborating and organizing information, and relating new material to prior knowledge (e.g., “When I study, I put important ideas into my own words.”; \( \alpha = .92 \)). The second subscale represented a measure of shallow strategy use, with three items pertaining to rote memorization strategies (e.g., “I learn by repeating the material over and over again to myself.”; \( \alpha = .77 \)). Students rated how frequently they used each of the strategies described by the items on a 5-point Lickert scale (1 = “never,” 5 = “always”).

In addition to these self-reported measures of strategy use, a second measure of cognitive engagement was used by collecting from teachers the number of homework exercises completed by the students during the academic year. These homework exercises provided training for the final examination and their format was accordingly very similar to that of these examinations: essays for all classes and problem solving exercises for mathematics. The pedagogical aim of these homeworks was not only to provide students with information about their current level of achievement, but also to give them more qualitative feedback in order to help them to progress. Since this work, although strongly encouraged by teachers, was entirely voluntary (students had the choice to complete none up to as many exercises as they wanted), this

---

3 Cronbach’s \( \alpha \) for the work avoidance subscale is not reported since it consisted of only two items.
measure can be considered an indicator of how much effort the students effectively expended.

Finally, the measure of achievement was students’ global final examination grade computed by summing their exam grades for all four courses they took. The students could receive grades ranging from 0 to 80, with a minimum of 40 required for obtaining the diploma.

2.3. Procedure

The questionnaire was administered collectively during the last day of class (approximately one month before final examination). Students were informed that their participation was voluntary and that their responses would be confidential would they choose to participate.

3. Results

3.1. Descriptive statistics and preliminary analyses

Before examining the relations between variables and testing Dweck’s model, we will present a more detailed description of our sample and results from analyses controlling for the effects of age and school level—two specific characteristics of our sample which may account for some of the variance in motivational beliefs, study skills, and academic performance. The means, standard deviations, and ranges for the variables assessed are reported in Table 1.

Students from our sample endorsed more strongly the belief that intelligence is malleable (M=2.93) than fixed (M=1.68). Mastery goals were most likely to be adopted (M=3.42), closely followed by performance goals (M=3.31) whereas work avoidance (M=1.48) was more likely to be rejected by the students. They reported using deep strategies frequently (M=3.75) and shallow strategies from time to time (M=3.05). On average they completed a little more than three homework exercises (M=3.58) during the academic year. However, this measure of expended effort varied

<table>
<thead>
<tr>
<th>Table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Means, standard deviations, minimum and maximum scores for motivational variables, cognitive engagement, and achievement</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Entity</td>
</tr>
<tr>
<td>Incremental</td>
</tr>
<tr>
<td>Mastery goal</td>
</tr>
<tr>
<td>Performance goal</td>
</tr>
<tr>
<td>Work avoidance</td>
</tr>
<tr>
<td>Deep strategies</td>
</tr>
<tr>
<td>Shallow strategies</td>
</tr>
<tr>
<td>Effort</td>
</tr>
<tr>
<td>Achievement</td>
</tr>
</tbody>
</table>
importantly among students, with 10% of the students completing not any, 54% completing one to four, and 36% completing up to eight homework exercises. Finally, as far as their achievement was concerned, the average grade for the final examination in this sample was 38.86, a performance just below the minimum grade required for obtaining the diploma. However, the majority (61%) of the participants succeeded.

In order to control for age and school level effects, two one-way analyses of variance were conducted. There were no significant school level differences in any of the measured variables. For age, only one significant difference was revealed ($F(2, 73) = 3.90, p = .025$): students aged between 20 and 30 had somewhat higher scores on the performance goal ($M = 3.48$) than did students aged between 31 and 40 ($M = 3.09$). Thus, although age and school level varied in our sample, these two characteristics did not have important effects on neither motivation, nor study skills, nor performance.

3.2. Correlation analyses

Relations between variables were examined with Pearson product–moment correlations between variables (Table 2). As expected, mastery goals were positively correlated with the incremental theory and negatively correlated with the entity theory of intelligence. The mastery goal orientation also showed the predicted high, positive correlations with the measures of deep-processing strategies, effort and achievement. Correlations with reported use of shallow strategy use also reached significance, although these were weaker than the other correlations between mastery goals and measures of cognitive engagement. The pattern of correlations between work avoidance and the other variables were all in the expected direction. This goal orientation was positively correlated with the entity theory and negatively correlated with the incremental theory of intelligence. Correlations between work avoidance and deep and shallow strategies were both negative and significant, and with effort and achievement, correlations did not reach significance, but were in the expected, negative, direction. Correlations between performance goals and implicit theories of intelligence did not support hypotheses since this goal orientation was unrelated to

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Entity</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Incremental</td>
<td>$-.55^{***}$</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Mastery goal</td>
<td>$-.31^{**}$</td>
<td>$.27^{*}$</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Performance goal</td>
<td>$-.18$</td>
<td>$.13$</td>
<td>$.40^{***}$</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Work avoidance</td>
<td>$.29^{*}$</td>
<td>$-.33^{**}$</td>
<td>$-.46^{***}$</td>
<td>$-.43^{***}$</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Deep strategies</td>
<td>$-.23^{*}$</td>
<td>$.14$</td>
<td>$.61^{***}$</td>
<td>$.45^{***}$</td>
<td>$-.51^{***}$</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Shallow strategies</td>
<td>$.04$</td>
<td>$-.10$</td>
<td>$.23^{*}$</td>
<td>$.33^{**}$</td>
<td>$-.30^{**}$</td>
<td>$.35^{**}$</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Effort</td>
<td>$-.23^{*}$</td>
<td>$.13$</td>
<td>$.33^{**}$</td>
<td>$.02$</td>
<td>$-.16$</td>
<td>$.26$</td>
<td>$-.11$</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>9. Achievement</td>
<td>$-.14$</td>
<td>$.12$</td>
<td>$.30^{**}$</td>
<td>$.13$</td>
<td>$-.14$</td>
<td>$.11$</td>
<td>$-.05$</td>
<td>$.35^{**}$</td>
<td>—</td>
</tr>
</tbody>
</table>

* $p < .05$.
** $p < .01$.
*** $p < .001$. 

Table 2
Pearson-moment correlations among motivational variables, cognitive engagement, and achievement
either an entity theory or an incremental theory. Performance goals were related positively to both, shallow and deep, strategies. Finally, an incremental theory of intelligence was not related to any measures of cognitive engagement or achievement, while an entity theory of intelligence had negative, but moderate, correlations with both effort and deep strategy use measures.

3.3. Path analysis

In order to test the path model presented in Fig. 1, we run a series of multiple hierarchical regression analyses. Variables were entered into the regression equation on the basis of their temporal ordering in the model. That is, each dependent variable was regressed on the variables that had causal paths leading to it. A first set of regression analyses examined the influence of implicit theories of intelligence on goal orientation. The second set of analyses tested the relative effects of implicit theories and goal orientation on learning strategies and effort. The final set of analyses examined the respective influences of implicit theories, goal orientation and cognitive engagement measures on achievement. The overall results of this series of regression analyses are summarized in Table 3.

Results from the first set of regression analyses did not completely support the hypothesized relationships between implicit theories of intelligence and goal orientation. Neither the incremental theory nor the entity theory significantly predicted a performance goal orientation. For a mastery goal orientation, the entity theory was the best predictor, and for work avoidance, the incremental theory was the best predictor. However, in both cases the \( \beta \) weights were negative. Accordingly, these results suggest that the less students endorse the belief intelligence is a fixed entity, the more likely they are to be oriented towards mastery goals; the less they endorse the belief intelligence is a malleable and controllable ability, the more likely they are to be work avoidant.

Table 3
Multiple regression results

<table>
<thead>
<tr>
<th>DV</th>
<th>Predictor</th>
<th>( R^2 )</th>
<th>( \Delta R^2 )</th>
<th>( \beta ) on step</th>
<th>Final ( \beta )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal orientation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mastery goal</td>
<td>Entity</td>
<td>.097**</td>
<td>.097**</td>
<td>-.311**</td>
<td>-.311**</td>
</tr>
<tr>
<td>Performance goal</td>
<td>/</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work avoidance</td>
<td>Incremental</td>
<td>.095**</td>
<td>.095**</td>
<td>-.307**</td>
<td>-.307**</td>
</tr>
<tr>
<td>Cognitive engagement</td>
<td>/</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deep strategies</td>
<td>Mastery goal</td>
<td>.375***</td>
<td>.375***</td>
<td>.612***</td>
<td>.481***</td>
</tr>
<tr>
<td>Work avoidance</td>
<td>Work avoidance</td>
<td>.439***</td>
<td>.064**</td>
<td>-.285**</td>
<td>-.285**</td>
</tr>
<tr>
<td>Shallow strategies</td>
<td>Performance goal</td>
<td>.106**</td>
<td>.106**</td>
<td>.326**</td>
<td>.326**</td>
</tr>
<tr>
<td>Effort</td>
<td>Entity</td>
<td>.053*</td>
<td>.053*</td>
<td>-.231*</td>
<td>-.144</td>
</tr>
<tr>
<td>Achievement</td>
<td>Mastery goal</td>
<td>.124**</td>
<td>.071*</td>
<td>.280*</td>
<td>.280*</td>
</tr>
<tr>
<td></td>
<td>Effort</td>
<td>.088**</td>
<td>.088**</td>
<td>.297**</td>
<td>.206</td>
</tr>
</tbody>
</table>

Note. DV, dependent variable.  
* \( p < .05 \).  
** \( p < .01 \).  
*** \( p < .001 \).
For the second set of regression analyses examining the relative impact of implicit theories of intelligence and goal orientation on learning strategies and effort, the three measures of cognitive engagement were regressed on the two measures of implicit theory entered in the first step and on the three measures of goal orientation entered in the second step. With deep-processing strategies as the dependent variable, the best predictors were mastery goals and work avoidance. As hypothesized, mastery goals were positively and work avoidance was negatively related to reported use of deep-processing strategies. With shallow-processing strategies as the dependent variable, the only significant predictor was a performance goal orientation displaying the expected positive relation. With effort as the dependent variable, the entity theory and the mastery goal orientation explained a significant amount of variance. However, once mastery goals entered the equation, the contribution of the entity theory was no longer significant thus suggesting that the negative influence of holding an entity theory was countered by the positive effect a mastery goal orientation has on effort expenditure.

The final set of regression analyses was run with achievement as the dependent variable. Implicit theories of intelligence were entered into the regression equation on the first step, goal orientations on the second step, and cognitive engagement measures on the third step. Results revealed that mastery goals and effort were both significant predictors of achievement. However, the direct effect of mastery goals on achievement was not significant after controlling for effort. Accordingly, the positive impact of being oriented towards mastery goals on achievement seems to be mediated by effort expenditure. The path model resulting from these series of regression analyses is depicted in Fig. 2 where standardized \( \beta \) weights represent the path coefficients.

4. Discussion

Although results from our study provided only qualified support for Dweck’s model, logical patterns of relations among implicit theories of intelligence, goal orientation, and cognitive engagement in learning emerged.
The strongest support for Dweck’s postulates was the observed relations between goal orientation and cognitive engagement in learning. Mastery goals were found to be strongly related to measures of active engagement in learning activities such as deep processing strategies, effort, and performance. Results from the path model provided additional support that mastery goals exert their influence mainly on deep-processing strategies and effort. In this path model, mastery goals also positively affected achievement, but, as expected, these effects were indirect, operating through effort expenditure. Thus, consistent with theory and previous research, our own findings indicate that students placing a strong emphasis on developing their competence report using more active strategies and put more effort in learning activities. However, unlike in Greene and Miller’s (1996) study, the path between deep-processing strategies and academic performance did not reach significance, and effort was validated as the only mediator of the relationship between mastery goals and exam performance. This result may in part be explained by the proximity between the nature of the achievement test and the measure chosen for effort in the present study. Indeed, effort was assessed by the number of voluntary homework exercises completed by the students. Because these homeworks were aimed at training the students for the final examination, both were very similar in their nature and format.

The findings that students oriented towards work avoidance made little use of deep- and shallow-processing strategies were also expected and are consistent with previous research (e.g., Harackiewicz et al., 1997; Meece et al., 1988). Results from path analyses further documented that work avoidance exerts its negative influence primarily on deep-processing strategies.

As in some other studies (e.g., Greene & Miller, 1996; Meece et al., 1988), we found that at a zero-order correlational level, performance goals were related to both shallow- and deep-processing strategies. However, our path model indicated that performance goals were the only predictors of shallow-processing and that they did not contribute significantly to the variance of deep-processing strategy use after controlling for mastery goals and work avoidance. We conceived and measured performance goals in terms of a tendency to obtain good performance in order to document one’s competence. Yet, in recent literature (e.g., Elliot & Harackiewicz, 1996; Middleton & Midgley, 1997; Skaalvik, 1997; VandeWalle, 1997), performance goals have been partitioned into two dimensions: a performance-approach goal focused on the attainment of competence relative to others and a performance-avoidance goal focused on the avoidance of incompetence relative to others. The inclusion of the avoidance dimension in our model might have changed the observed relations. Perhaps, as in Elliot, McGregor, and Gable’s (1999) study, we would have found a negative relationship between the performance-avoidance goal and deep-processing and a positive relationship between this avoidance dimension and shallow-processing. This in turn might have lowered the present negative relation between work avoidance and deep-processing or strengthened the relation between the performance goal orientation and deep-processing.

Somewhat surprisingly, the links between both deep- and shallow-processing strategies and achievement were not significant. Although this is contrary to the assumption that deep-processing is positively related and shallow-processing is negatively related to academic performance, other studies also found these strategies were only weakly
related or unrelated to achievement measures (e.g., Elliot et al., 1999). Three issues might provide an explanation for these unexpected results regarding learning strategies. One possibility, as Elliot et al. (1999) pointed out, is that deep-processing strategies do not have a strong influence on immediate performance outcomes but that they facilitate long-term retention of the material that has been learned. Shallow-processing strategies, such as memorizing facts and definitions, on the other hand, might be sufficient for some examinations such as multiple-choice tests or exam questions that do not test for deep understanding or integration of the material. However, this explanation is unlikely to hold true in the present study because of the particular nature of the examinations students took. Indeed, succeeding examinations requiring to compose essays or to solve problems calls for deep understanding and well integrated knowledge which can only be acquired by learning with deep-processing strategies.

An alternative explanation pertains to the way strategy use was assessed. As in most other studies, the questionnaire we used consisted of statements describing commonly used learning strategies. It is possible that students tend to agree to such statements, either because of social desirability or because they truly believe they use these strategies while in real learning situations they actually use different types of strategies. The fact that our more objective measure of cognitive engagement—effort as measured by the number of voluntary homework completed by the students—was a better predictor of achievement tends to support this latter explanation.

A further explanation is related to the uniqueness of the returning student population. In our sample we had students with a varying number of years of schooling (ranging from 9 to 12 years), and it could be argued that the length of formal education provides students with opportunities to acquire and master a variety of study strategies in an academic context, especially deep-processing strategies. However, we found no evidence that students’ school level influenced any measures of strategy use or academic performance. It could also be argued with Zivian and Darjes (1983) that as individuals age, and when they are out of any formal educational system, some of their academic knowledge and skills decay with disuse or are replaced by skills and knowledge important in their current activities. Therefore, it is possible that in our sample some of the students may have been able to recognize the relative utility of some strategies (when responding to the questionnaire) but fail to use them efficiently when studying. Although we cannot completely rule out this explanation, we do not believe it holds true for returning students. Indeed, in a study investigating mnemonic strategy use in a free recall task by different age-groups of in-school and out-of-school adults, Zivian and Darjes (1983) found that actually being in school was a better predictor of differences in strategy use and memory performance than age was. Their results revealed that older in-school adults were very similar to younger in-school adults, whereas these older in-school adults differed from other older adults who were out-of school. In our study, we also found no effects of age on any of the measures of strategy use and academic performance. While this result may seem surprising it might be related to the timing of data-collection. In both Zivian and Darjes’ and our studies, data were collected while students were already attending school; more precisely, in our study, the academic year was nearly over and students had experienced a period of eight months during which they had opportunities to train or
retrain learning strategy use, particularly through the fulfillment of homework exercises. Thus, it appears that learning activities and outcomes can benefit from practice and effort which also seems to compensate to some degree for school level and aging.

Concerning the relations between implicit theories of intelligence, goal orientation, and learning, our results only partially validated Dweck’s model. Contrary to Stipek and Gralinski (1996) who found that performance goals were positively related to an entity theory of intelligence, in our study neither an entity nor an incremental theory were significantly related to performance goals. Though correlations between both implicit theories and mastery goals were significant and in the expected direction, the results from the path model indicated that an entity theory, but not an incremental theory, was a significant, negative, predictor of mastery goals. That is, in our sample, students tended to pursue mastery goals when they rejected the belief that intelligence is fixed, but not necessarily when they believed their intelligence is malleable and controllable. Although unexpected, this result does not invalidate Dweck’s theory. Indeed, in her own research, Dweck and her colleagues usually use only statements phrased in terms of an entity theory to measure implicit theories of intelligence. They consider that implicit theories of intelligence are a continuum from an entity to an incremental theory and they assume that a person rejecting an entity theory logically endorses an incremental theory. As in other studies using separate measures for each implicit theory of intelligence (e.g., Faria & Fontaine, 1997; Stipek & Gralinski, 1996; Vezeau et al., in press), we could not find evidence for the continuity of implicit theories. Results from factor analyses clearly revealed two separate factors and the correlation coefficient \( r = -.55 \) between the two factors was not strong enough to support that entity and incremental theories are two opposite ends of a continuous and unidimensional construct. This result replicates Vezeau et al.’s (in press) finding with adult students \( r = -.45 \) between the two implicit theories of intelligence, and Stipek and Gralinski’s (1996) finding with young children \( r’ \)s ranging from .06 to .10). One possible explanation is that individuals have a more complex conception of intelligence and believe that intelligence is multidimensional. Results from several studies by Sternberg and his colleagues (Berg & Sternberg, 1992; Sternberg, 1985; Sternberg, Conway, Ketron, & Bernstein, 1981) indeed revealed that individuals consider at least three distinct dimensions in intelligence (problem solving, verbal, and social abilities). It is therefore likely that some people believe some dimensions of their intelligence are fixed while others are malleable and improvable. This may be particularly the case for adults who were confronted to a diversity of life experiences beyond school and who had opportunities to develop competences in different areas and domains. Further research is needed to explore this possibility.

The observed correlations between work avoidance and implicit theory of intelligence measures (negative for an incremental theory and positive for an entity theory) were as expected, although path analyses revealed that an incremental theory was the best, negative, predictor of work avoidance. However, for work avoidance, as well as for mastery goals, the amount of variance accounted for by the respective implicit theory of intelligence was fairly weak \( R^2 = .10 \) in both cases) thus indicating that goal orientation is not entirely or solely determined by a person’s belief about her or his intelligence. Furthermore, contrary to other studies (e.g., Braten & Olaussen, 1998; Faria & Fontaine,
and to Dweck’s recent postulates, we found no evidence that implicit theories of intelligence are proximal determinants of learning behavior. We found that the influence of implicit theories on learning behavior, if any, was mediated by goal orientation, even though this relation was fairly weak. A possible explanation for this latter observation is that goal orientation is also determined by environmental factors such as the perceived meaning or purpose of the tasks, the classes, or more generally the learning structure or school. In her model, Dweck does indeed not neglect the role of these environmental factors and several studies demonstrated that the perceived purposes of a learning setting were strong predictors of goal orientation (Ames, 1992; Anderman & Young, 1994; Church, Elliot, & Gable, 2001).

An alternative explanation would be that goal orientation is determined by a more complex set of beliefs about learning and intelligence such as epistemological beliefs. Schommer (1998), for example, has recently developed a multidimensional theory of epistemological beliefs comprising other beliefs about learning and ability besides conceptions of intelligence: beliefs that learning is quick, that knowledge is simple, that knowledge is certain. Several of her studies (e.g., Schommer, 1990; Schommer, Crouse, & Rhodes, 1992) revealed that among these beliefs, the beliefs that knowledge is simple and that learning is quick were the best predictors of learning engagement and outcomes. As Hofer and Pintrich (1997) pointed out, an interesting research question would be to examine whether some of the epistemological beliefs would be stronger determinants of goal orientation and learning than an entity or incremental theory of intelligence. Indeed, in a recent study, Braten and Stromso (in press) found that epistemological beliefs played a more important role in goal adoption than implicit theories of intelligence.

In conclusion, results from our study revealed that Dweck’s theory is effectively very appropriate for examining achievement motivation and academic performance in adult returning students. Indeed, for this population, our study provided support for Dweck’s theory in all areas but one: the role of implicit theories of intelligence. If our results demonstrate the power of path modeling techniques to document mediation, an even more powerful statistical method, enabling to control for measurement error, would be to use structural equation modeling with a larger sample size. The fact that the only mediating variable validated in the present study was effort, as measured by the amount of completed homework, but none of the self-reported learning strategies, highlights the importance of including observational measures of learning engagement. Future research may further extend Dweck’s model by also considering the role of other motivational mediators or covariates such as for example interest, achievement motivation, or self-concept revealed as important determinants of learning behavior and outcome in other studies (e.g., Elliot, 1999; Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002).

References


