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### **Theoretical framework**

Although the primary goal of higher education is the ‘production’ of experts who are masters in their field (Fryer & Elliot, 2007), students often are led by the desire to pass their exams, as a way of demonstrating their competence. The former is known as a mastery orientation with respect to learning which has been shown to induce deep learning. The latter is known as a performance orientation which, has been shown to induce more surface learning (Elliot & McGregor, 2001). Ideally, from a learning perspective, teachers prefer working with students with the aim for mastering knowledge and skills. This ideal is not always shared by what some refer to as ‘calculating’ students and teachers (Van Bijsterveldt, 2011), because they are often directed to gaining credits and achieving high graduation rates in a short time. In reality factors like time and efficiency cause a more performance oriented approach. Mastery goal orientations have been shown to trigger behavior in which there is a deep-level, strategic processing of information while performance approaches have been shown to trigger superficial, rote-level processing (Elliot, McGregor, & Gable, 1999; Covington, 2000; Elliot & McGregor, 2001). A deep learning behavior is - just as a mastery orientation - favored by educators because of the willingness of students to really understand the learning material (Aharony, 2006).

As DeShon and Gillespie (2005, 1114) conceptualized goal orientation as “a label used to describe the pattern of cognition and action that results from pursuing a goal at a *particular* point in time in a *specific* achievement situation”, it could be interpreted that a person is able to switch goal orientations over the course of working on a task. Changes in goal orientation

have been found in the research of Winne, Muis, and Jamieson-Noel (2003), Muis and Edwards (2009) and Fryer and Elliot (2007). However, their findings are mixed. There is some evidence that feedback might cause the variation. For example, positive feedback resulted in a decrease of performance-avoidance and negative feedback resulted in a decrease of performance-approach in the study of Winne et al. (2003). According to Boud and Molloy (2013), for feedback to be as powerful as possible, it is important to shift the focus of feedback from 'telling' feedback to sustainable feedback: a shift from information transmitted to students to the acknowledgment of the need for students to be actively involved in their own learning and be agents of their own change. In concrete terms this means students asking for and seeking feedback.

#### **Aims of the study and research questions**

The question is whether sustainable feedback alters the adopted goal orientation of students into a mastery orientation and therefore also the learning behavior into a deep learning behavior. The following research questions were specified: 1) What is the relation between goal orientation and learning behavior; 2) Do goal orientation and learning behavior indeed change over time, and if so, in what direction; 3) What are the effects of sustainable feedback from peers and tutor on goal orientation and learning behavior?

#### **Methodology**

Participants were 105 first-year students in Marketing ( $N = 105$ , 54 male, 51 female;  $M_{\text{age}} = 20.29$ ;  $SD = 2.37$ ; range: 17–30 years) divided over 12 problem-based learning groups with 7 tutors. To investigate the effect of sustainable feedback on goal orientations and learning behavior, an experimental pretest-posttest non-equivalent group design intervention study was carried out. Existing groups were randomly assigned to the experimental and control conditions. Students completed the Achievement Goals Questionnaire (Elliot & McGregor, 2001), and the R-SPQ-2F (Biggs, Kember, & Leung, 2001).

Data analyses consisted of descriptive analyses, paired *t*-tests, one-way ANOVA Bonferroni post hoc analysis, correlation analyses, mixed model analyses, and multiple regression analyses. Mean-level analyses were complemented with individual-level analyses by calculating the reliable change index (RCI; Zahra & Hedge, 2010)

## **Results**

In the group as *a whole*, all goal orientations, except performance-avoidance, were significant positively associated with deep learning. Mastery-approach and performance-approach were significant negatively associated with surface learning. In the *experimental* condition mastery-avoidance associated significant negatively with surface learning behavior, and in the *control* condition this relationship was found significant positively.

### *Mean-level*

All students became more performance-approach oriented, the students lacking the feedback intervention increased in surface learning, the students in the experimental condition decreased in mastery-approach, with a concomitant increase in surface learning.

### *Individual-level*

The main findings on an individual level showed goal orientations being relatively stable, at least 83,6% of the students maintained their initial goal orientation. Deep and surface learning on an individual level were more subject to change, with the exception of deep learning in the experimental group: 98,4 % maintained their deep learning approach.

### *Intervention*

Multiple regression analyses were performed to examine the influence of the intervention on the goal orientations and learning behavior. The outcomes were controlled for differences in PBL group and the pretest scores. A significant negative effect for the intervention was found for performance-approach. No significant effects of the intervention were found for the other goal orientations and learning behavior

## **Discussion and conclusions**

The expected relation between mastery orientation and deep learning was found, this is in line with previous research (Covington 2000). However, the expected positive relation between performance orientation and surface learning was not found at all.

Furthermore, on mean-level there were changes in goal orientation and learning behavior in terms of decrease or increase, but on individual level changes occurred in both directions. The RCI index added insights to the results found on the mean-level. Although, there was no change in surface learning on mean-level in the *experimental group*, on the individual-level a reliable increase was found. Deep learning in the *control group* showed a reliable decrease on an individual-level, whereas it did not change in the *experimental group*. This might imply that sustainable feedback might have contributed to the stability of the deep learning. The perception of students and tutors might have influenced goal orientations and learning behavior and should be investigated in future research.

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