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Relations between classroom goal structures and students' goal orientations in mathematics classes: When is a mastery goal structure adaptive?

Einar M. Skaalvik[1] · Roger A. Federici[1]

Abstract   The purpose of this study was to test possible interactions between mastery and performance goal structures in mathematics classrooms when predicting students' goal orientations. More specifically, we tested if the degree of performance goal structure moderated the associations between mastery goal structure and students' goal orientations. Participants were 1628 5th to 10th grade students from eight elementary and middle schools from one large city in Norway. The data were analyzed by means of regression analysis. The results showed that the association between a mastery goal structure in the mathematics classrooms and students' personal goal orientations were significantly moderated by the degree of performance goal structure. This was true for all dimensions of goal orientation tested in this study.

Keywords   Goal structure · Goal orientation · Interaction · Mathematics

1 Introduction

Research on achievement goal theory has focused primarily on students' achievement goals which may be defined as students' purposes for engaging or not engaging in achievement behavior (Patrick et al. 2011). Three subtypes of achievement goals have consistently been explored: mastery orientation, performance-approach orientation, and performance avoidance orientation (Harackiewicz

✉ Roger A. Federici
    roger.federici@ntnu.no

    Einar M. Skaalvik
    einar.skaalvik@svt.ntnu.no

[1] Department of Education, Norwegian University of Science and Technology, 7491 Trondheim, Norway

et al. 2002; Skaalvik 1997; Walker 2012). Research consistently shows that these goal orientations are associated with a number of cognitive, emotional, and behavioral outcomes as well as student achievement (Meece et al. 2006; Senko et al. 2011).

An assumption in achievement goal theory is also that students' goal orientations are influenced by classroom characteristics. One such characteristic emphasized in achievement goal theory is the classroom goal structure or the type of achievement goals emphasized by the prevailing instructional practices and policies within a learning environment (Wolters 2004). Researchers have focused on two dimensions of goal structure: a mastery goal structure emphasizing the development of competence, and a performance goal structure emphasizing the demonstration of competence (Patrick et al. 2011). Previous research shows that students' perceptions of the classroom goal structure are associated with a number of cognitive, emotional, and behavioral beliefs and responses, including students' goal orientations (e.g., Ames and Archer 1988; Karabenick 2004; Nolen and Haladyna 1990; Polychroni et al. 2012; Walker 2012; Wolters 2004). This research indicates that a mastery goal structure stimulates a mastery goal orientation among the students whereas a performance goal structure stimulates a performance goal orientation.

The purpose of the present study was to explore relations between students' perceptions of the mathematics classroom goal structure and the students' personal goal orientations in mathematics classes. An important research question for the study was whether the associations between a mastery goal structure in mathematics classes and the students' personal goal orientations were moderated by the degree of performance goal structure in the mathematics classes.

2 Theoretical framework

2.1 Goal structure

Classroom goal structure refer to signals that students receive, primarily from their teachers, about what is important in school. In particular, it refers to the type of achievement goals emphasized by the prevailing instructional practices and policies within a learning environment. As noted above, researchers distinguish between a mastery and a performance classroom goal structure (Ames 1992; Meece et al. 2006; Patrick et al. 2011; Urdan and Midgley 2003). A characteristic feature of a mastery goal structure is that teachers emphasize understanding, recognize student effort, value improvement, and recognize mistakes as being a natural part of the learning process (Skaalvik and Skaalvik 2011, 2013). It follows from this description that success is defined as improvement and ability judgments are self-referenced (Ames 1992; Sproule et al. 2007; Urdan and Midgley 2003; Urdan and Schoenfelder 2006). Moreover, in such an environment all students may receive positive feedback and encouragement from their teachers. A mastery goal structure therefore enhances students' experiences of their teachers as supportive and caring (Skaalvik and Skaalvik 2013). According to Ames (1992) a mastery goal structure is communicated by a set of practices, for instance recognizing effort, goal attainment,

and individual improvement when evaluating students' work. In contrast, a performance goal structure is one that emphasizes standardized test scores, the public display of grades, and comparison between schools, classes, or students, rather than effort and improvement (Skaalvik and Skaalvik 2013). In such an environment, success is indicated by outperforming others or surpassing normative standards (Patrick et al. 2011). In order to promote a mastery goal structure in their classes, teachers should design tasks for variety and interest, offer reasonable challenges to individual students and recognize individual improvement, consider mistakes to be part of the learning process, avoid comparing students with each other, and let students have some choice regarding learning activities.

Research reveals that a mastery goal structure is associated with a number of adaptive cognitive, emotional, and behavioral outcomes; for instance the feeling of belonging (Walker 2012), positive relationships with peers and teachers (Polychroni et al. 2012; Skaalvik and Skaalvik 2013), intrinsic motivation (Skaalvik and Skaalvik 2013), the acceptance of challenging tasks (Ames and Archer 1988), effective learning strategies (Nolen and Haladyna 1990), adaptive help-seeking behavior (Butler and Shibaz 2008; Karabenick 2004), and greater effort and persistence (Wolters 2004). Research also indicates that compared to a mastery goal structure a performance goal structure is associated with several less adaptive outcomes, for instance less positive relationships with peers and teachers (Polychroni et al. 2012), the avoidance of help-seeking (Karabenick 2004; Ryan et al. 1998), lower levels of persistence (Wolters 2004), and procrastination and self-handicapping (Urdan and Midgley 2003; Wolters 2004).

Although goal structure is communicated through educational practices, students in the same school or even the same class are often treated differently and thus do not necessarily experience the same educational context. Achievement goal researchers emphasize that it is the individual student's perception of the goal structure that affects his or her motivational responses (Meece et al. 2006).

2.2 Goal orientation

An assumption in achievement goal theory is that students have different goals or different reasons for engaging or not engaging in learning activities but also different standards for evaluating the outcome of learning activities (Ames 1992; Patrick et al. 2011; Urdan and Schoenfelder 2006; Wolters 2004). Early goal theory emphasized two goal perspectives: mastery goals and performance goals (e.g., Ames and Archer 1988; Nicholls 1989). Mastery goals means that the focus of attention is on the task, a belief that learning, understanding, and solving problems are ends in themselves, and that learning and performance results from effort (Ames 1992; Duda and Nicholls 1992). Students with strong performance goals focus more on themselves and how they are perceived by others. Also, performance tends to be normatively referenced and ability is evidenced by doing better than others or by achieving success with little effort (Covington 1992; Senko et al. 2011). Anderman and Maehr (1994) claim that such a competitive view of school means that there will inevitably be winners and losers.

During the last two decades researchers have differentiated not only between mastery and performance goals, but also between approach and avoidance goals. Researchers first differentiated between performance-approach and performance-avoidance goals (Elliot and Harackiewicz 1996; Middleton and Midgley 1997; Skaalvik 1997; Skaalvik et al. 1994), resulting in a trichotomous model of achievement goals. Performance-approach goals focus on demonstrating competence and achieving well relative to others whereas performance-avoidance goals focus on avoiding demonstrating incompetence or being negatively perceived by others (Skaalvik 1997). Elliot (1999) further extended the model by discriminating between mastery-approach and mastery-avoidance goals. This led to a 2×2 framework of achievement goals. Students' goal orientations in mathematics classes were in this study conceptualized according to the trichotomous model.

Previous studies show that mastery goals are associated with a number of adaptive cognitive, motivational, and behavioral outcomes, for instance academic self-concept, task involvement, challenge seeking, deep processing of the learning material, and lower levels of anxiety (e.g., Ames and Archer 1988; Anderman and Wolters 2006; Harackiewicz et al. 2002; Senko et al. 2011; Skaalvik 1997; Wolters 2004). Although several researchers have found mastery goals to be unrelated to academic performance (e.g., Harackiewicz et al. 2000; Skaalvik 1997), a recent review of more than 90 studies reveals that mastery goals are positively related to achievement in more than half of the studies (Linnenbrink-Garcia et al. 2008). Because of the mixed results more research is needed to investigate long term achievement outcomes of mastery goals. Previous research also consequently show that performance-avoidance goals are associated with less adaptive outcomes, for instance higher levels of anxiety and lower motivation and lower levels of achievement (Elliot and Harackiewicz 1996; Middleton and Midgley 1997; Skaalvik 1997; Wolters 2004). More inconsistent results have been shown for performance-approach goals, however several researchers have found a positive relation between performance-approach goals and effort, persistence, and academic achievement (Church et al. 2001; Harackiewicz et al. 2002; Law et al. 2012).

2.3 Associations between goal structure and goal orientation

An assumption underlying goal theory is that students' personal goal orientations are influenced by the classroom and even the school goal structure (Ames 1992; Ames and Archer 1988; Midgley and Urdan 2001). A mastery goal structure, in which teachers emphasize understanding, recognize student effort, and value improvement is assumed to be associated with personal mastery goals whereas a performance goal structure, in which teachers compare students with each other and emphasize standardized test scores and grades is assumed to be associated with personal performance goals (e.g., Roeser et al. 1996). In particular, Midgley and Urdan (2001) claim that in the latter environment students' awareness of how they are perceived by others, which characterizes both performance-approach and performance-avoidance goals, will be a central concern.

Despite theoretical assumptions relatively few studies have tested the relations between classroom goal structure and students' personal goal orientation. The

available research indicates that students' achievement goal orientations are affected by the goal structure in the classroom or school (e.g., Luo et al. 2011; Midgley and Urdan 2001; Roeser et al. 1996; Urdan and Midgley 2003; Wolters 2004). For instance, in a study of middle school students Roeser et al. (1996) showed that students' perception of a mastery goal structure predicted personal mastery goals positively but was not significantly related to performance goals. They also found that students' perception of a performance goal structure predicted personal performance goals positively and mastery goals negatively. However, this study was conducted before researchers started discriminating between performance-approach and performance-avoidance goals and the measure of performance goals included a mixture of items tapping performance-approach and performance-avoidance goals.

In a subsequent study Midgley and Urdan (2001) explored relations between middle school students' perceptions of mastery and performance goal structures and three dimensions of goal orientation. They found that a mastery goal structure was positively related to mastery goals but not significantly related to performance-approach or performance-avoidance goals. Perception of a performance goal structure was positively related to both performance approach and performance avoidance goals and negatively related to mastery goals.

Wolters (2004) also found that students' perception of a mastery goal structure was positively related to mastery goals and that perception of a performance goal structure was positively related to both performance-approach and performance-avoidance goals. However, he did not find any significant relation between perception of a performance goal structure and students' personal mastery goals. He also found that perceptions of a mastery goal structure predicted performance-approach goals positively and performance-avoidance goals negatively.

Lately, in accordance with the finding by Midgley and Urdan (2001), Federici et al. (2015) found that students' perception of a performance goal structure was positively related to both performance-approach and performance-avoidance goals and negatively related to mastery goals. They also found that students' perception of a mastery goal structure positively predicted mastery goal orientation among students. Contrary to expectations they also found that perception of a mastery goal structure was positively related to both dimensions of performance goal orientation. A possible explanation offered by Federici et al. (2015) was that even in classrooms where teachers focus on learning and improvement the students may experience a strong emphasis on achievement. They argued that although achievements are recognized in different ways in classrooms characterized by a mastery goal structure and in classrooms characterized by a performance goal structure both these goal structures may send messages to the students that achievement is important and valued. For the students, the meaning of a mastery goal structure, where effort and improvement are emphasized, may be moderated by the degree of performance goal structure. Therefore, when both mastery and performance goal structures are emphasized performance goals may be increased among the students.

3 The present study

The present study builds on the study by Federici et al. (2015). An important question raised by Federici et al. (2015) was under what conditions a mastery goal structure may increase performance orientation among students. The question for the present study was if the association between a mastery goal structure and performance goal orientation is dependent on the degree of performance goal structure. We suggest that when combined with a performance goal structure, even a mastery goal structure may be perceived as a signal that achieving better than others is important. A mastery goal structure may therefore increase performance orientation in classes where there is also a strong performance goal structure. In contrast, we suggest that in classrooms with low performance goal structure students' performance goals will not be related to the degree of mastery goal structure. Following these assumptions we expected a significant interaction between mastery and performance goal structures when predicting students' performance-approach as well as their performance-avoidance goal orientation. Additionally, we tested if a strong performance goal structure moderated the association between a mastery goal structure and students' mastery orientation.

4 Method

4.1 Participants and procedure

The participants in the present study were students from eight schools located in one of the large cities in Norway. The schools were recruited by a team of research assistants and consisted of three primary schools (1st to 7th grade), two middle schools (8th to 10th grade), and three combined schools (1st to 10th grade). A total of 1628 students from 5th to 10th grade responded to the survey. The data were collected by means of a questionnaire administered in the school classes by trained research assistants. The sample consisted of 50.7 % males and 49.3 % females. Table 1 shows the number of respondents by grade and gender.

4.2 Instruments

The instruments used in the present study were developed and administered in Norwegian. The examples of items represent translations into English. The response

Table 1 Number of respondents by grade and gender	Grade	Female (%)	Male (%)
	5th grade	102 (44.2)	129 (55.8)
	6th grade	109 (47.2)	122 (52.8)
	7th grade	106 (51.5)	100 (48.5)
	8th grade	185 (53.6)	160 (46.4)
	9th grade	127 (51.0)	122 (49.0)
Percentages are within grade	10th grade	158 (47.4)	175 (52.6)

categories for all items were given on a 5-point scale ranging from "Absolutely disagree" (1) to "Absolutely agree" (5).

Mastery and performance goal structures were measured by means of five and three items, respectively. The items were modified from a previously used scale (Skaalvik and Skaalvik 2013) in order to refer specifically to mathematics classes. Examples of items measuring mastery goal structure are: "My math teacher praises students if they improve themselves", "My math teacher praises students if they do the best they can", and "My math teacher thinks it is OK to make a mistake because we can learn from it". Cronbach's alpha for the scale was .81. Examples of items measuring performance goal structure are: "My math teacher praises only the best students", and "My math teacher only cares about the best students". Cronbach's alpha for the scale was .78.

The students' personal *goal orientations* were measured by a 14-item goal orientation scale. The items were modified from the general School Goal Orientation Scale (Skaalvik 1997) to focus on mathematics. *Mastery orientation* was measured by four items. Examples of items are: "In mathematics it is important for me to learn something new", and "In mathematics I try to understand the problems I am working with". Cronbach's alpha for the scale was .82. *Performance-approach orientation* was measured by three items. Examples of items are: "In mathematics I try to do better than other students in my class" and "In mathematics, I try to manage tasks that other students do not manage". Cronbach's alpha for the scale was .83. *Performance-avoidance orientation* was measured by four items. Examples of items are: "In mathematics, it is important for me to avoid looking stupid" and "The worst thing about making a mistake in mathematics class is that other students may notice". Cronbach's alpha for the scale was .87.

4.3 Data analysis

The data were analyzed by means of confirmatory factor analysis and regression analyses.

5 Results

5.1 Correlations and descriptive statistics

Table 2 shows the correlations between the observed study variables as well as the possible maximum scores, statistical means, standard deviations, and Cronbach's alphas.

Mastery goal structure was strongly and negatively related to performance goal structure. It was also positively related to mastery goals but not significantly related to performance-approach goals. Moreover, it was weakly and negatively related to performance-avoidance goals. Performance goal structure was positively related to performance-avoidance goals but not significantly related to performance-approach goals. Performance goal structure was also negatively related to mastery goals. Mastery goals was moderately related to performance-approach goals but not

Table 2 Pearson correlations and descriptive statistics of the study variables

Variable	1	2	3	4	5
1. Mastery goal structure	–				
2. Performance goal structure	−.621**	–			
3. Mastery goals	.409**	−.375**	–		
4. Performance-approach goals	.034	.033	.259**	–	
5. Performance-avoidance goals	−.063*	.180**	−.019	.391**	–
Maximum possible score	25	15	20	15	20
Number of items	5	3	4	3	4
Mean	19.91	5.70	14.14	7.06	10.19
Standard deviation	3.72	2.77	3.52	3.03	4.32
Cronbach's alpha	.81	.78	.82	.83	.87

* $p < .05$; ** $p < .01$. The estimates are based on the observed data

related to performance-avoidance goals. Also performance-approach goals correlated positively with performance-avoidance goals.

5.2 Measurement model

A confirmatory factor analysis (CFA) was conducted to validate the measures in the study. To assess the model fit, we used well-established indices, such as CFI, IFI, TLI, and RMSEA, as well as the Chi-square test. For the CFI, IFI, and TLI indices, values greater than .90 are typically considered acceptable, and values greater than .95 indicate a good fit of the data (Byrne 2010; Hu and Bentler 1999). For well-specified models, an RMSEA of .06 or less reflects a good fit (Hu and Bentler 1999; Tabachnick and Fidell 2007).

The measurement model included the students' perceptions of goal structures and their goal orientations. None of the error variances in the measurement model was allowed to correlate. The model had an acceptable fit to the data [χ^2(142, $N = 1628$) $= 554.98$, $p < .001$, CMIN/DF $= 3.908$, RMSEA $= 0.042$, IFI $= 0.968$, TLI $= 0.957$, and CFI $= 0.968$], and all regression weights in the model were significant at $p < .001$. Supporting the zero-order correlations the correlations between the latent variables varied from low to moderate (see Table 3). The result from the CFA supports the conceptualization of five separate but correlated constructs.

5.3 Interaction analyses

To explore our research questions, three separate regression analyses were conducted investigating both main effects and interaction effects of perceived classroom goal structures on the outcome variables: mastery orientation, performance-approach orientation, and performance-avoidance orientation, respectively. The predictor variable was centered to reduce problems with multicollinearity

Table 3 Correlations between the latent variables in the model

Variable	1	2	3	4	5
1. Mastery goal structure	–				
2. Performance goal structure	−.741***	–			
3. Mastery goals	.477**	−.453**	–		
4. Performance-approach goals	.062*	.019	.325**	–	
5. Performance-avoidance goals	−.071*	.220***	−.017	.404***	–

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

Table 4 Interaction analyses: goal structures and goal orientations

	Mastery orientation			Performance-approach			Performance-avoidance		
	B	SE	β	B	SE	β	B	SE	β
Mastery goal structure	.303**	.029	.319	.038	.028	.046	.066	.039	.056
Performance goal structure	−.309**	.039	−.243	.126**	.037	.115	.385**	.053	.247
Interaction[a]	−.032**	.006	−.134	.025**	.006	.126	.020*	.009	.071
R^2	.21			.02			.04		

* $p < .01$; ** $p < .001$. Continuous predictors are centered

[a] Mastery goal structure × performance goal structure

(Cohen et al. 2003). The interaction term was created by taking the product of the predictor variable with the moderator variable. Table 4 summarizes the results of these analyses.

A mastery goal structure was positively related to mastery goal orientation whereas there were no significant main effects of a mastery goal structure on performance-approach goals or performance-avoidance goals. A performance goal structure was negatively related to mastery goals and positively related to performance-avoidance goals, but not significantly related to performance-approach goals.

The analyses revealed significant interaction effects in each of the analyses. The interaction effects are illustrated in Figs. 1, 2 and 3. The figures were produced by means of the Interaction software developed by Soper (2013) and show associations between a mastery classroom goal structure and personal goal orientations for students who experienced high, medium, and low performance goal structures in their math classes. A high performance goal structure was defined as scores above one standard deviation on a scale measuring performance goals structure whereas a low performance goal structure was defined as scores below one standard deviation. High, medium, and low performance goal structures are in Figs. 1, 2 and 3 indicated as "+1 SD", "Mean", and "−1 SD", respectively.

Figure 1 shows that a mastery goal structure is positively associated with personal mastery orientation regardless of the degree of performance goal structure. Those students who perceive the strongest mastery goal structure in their classrooms
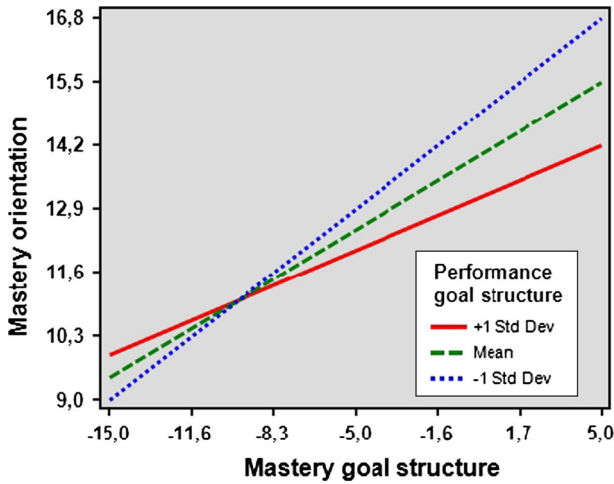
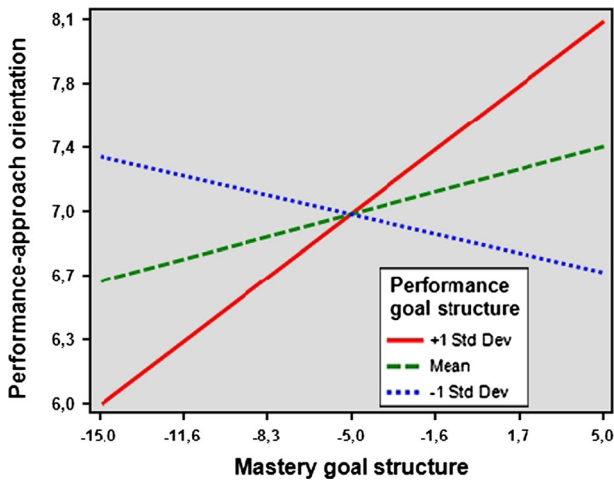Fig. 1 Interaction analysis of mastery orientation

Fig. 2 Interaction analysis of performance-approach orientation

endorse mastery goals most strongly. However, the association between a mastery goal structure and mastery goals or mastery goal orientation is weakest for students who perceive a strong performance goal structure. This is shown by comparing the steep dotted line for students perceiving the lowest level of performance goal structure with the less steep solid line for students experiencing the strongest level of performance goal structure.

Figure 2 shows that a mastery goal structure is predictive of lower levels of performance approach orientation when combined with a low performance goal structure, as illustrated by the dotted line. However, when combined with a high
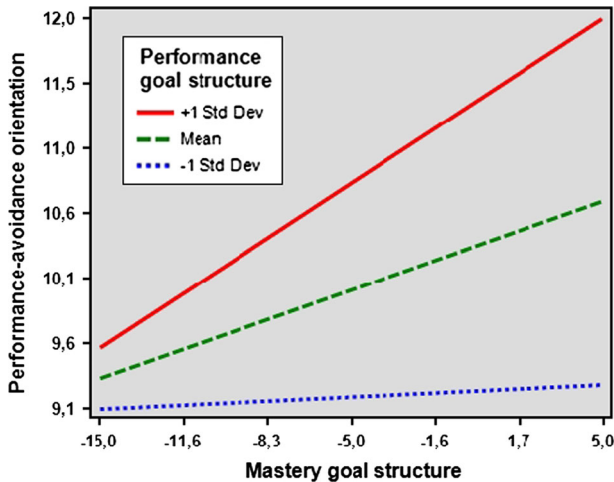
Fig. 3 Interaction analysis of performance-avoidance orientation

performance goal structure high mastery goal structure is predictive of higher levels of performance-approach orientation as illustrated by the solid line.

Figure 3 also shows that when combined with a high performance goal structure, a high mastery goal structure is predictive of higher levels of performance-avoidance orientation. This is illustrated by the solid line. However, when combined with a low performance goal structure mastery goal structure does not predict performance-avoidance orientation as shown by the dotted line.

When combined with a medium performance goal structure a mastery goal structure is (a) positively associated with mastery goals, although not as strongly as when combined with a low performance goal structure, (b) positively associated with performance-approach goals, but not as strongly as when combined with a high performance goal structure, and (c) positively associated with performance-avoidance goals, but not as strongly as when combined with a high performance goal structure.

6 Discussion

The present study reveals that the association between a mastery goal structure in the mathematics classroom and students' personal goal orientations are significantly moderated by the degree of performance goal structure. This is true for all three dimensions of goal orientation tested in this study. More specifically, a mastery goal structure was positively related to both performance-approach orientation and to performance-avoidance orientation when combined with a high performance goal structure, but not significantly related to performance orientation when combined with a low performance goal structure. A mastery goal structure also predicted mastery orientation more strongly when combined with a low performance goal structure than when combined with a strong performance goal structure.

Previous research has shown that a mastery goal structure is associated with adaptive cognitive, emotional, and behavioral outcomes whereas a performance goal structure is associated with less adaptive outcomes (see Sect. 2). Our results shed new light on the impact of a mastery goal structure. It indicates that in order for the students to benefit from a mastery goal structure one also has to establish a learning environment characterized by a low performance goal structure. In particular, combined with a performance goal structure a mastery goal structure seems to have maladaptive effects on students' performance-avoidance orientation.

As noted by Federici et al. (2015), a classroom where the teacher focuses on effort, learning and improvement, which characterizes a mastery goal structure, may be perceived by the students as emphasizing achievement. We suggest that the students' perceptions of the reasons why learning and achievement are important may vary as a function of the degree of performance goal structure. When a strong mastery goal structure is combined with a low performance goal structure we suggest that the students will be likely to perceive learning as valuable in its own right and that achievement will be perceived as an indication of learning and personal goal attainment. However, when a mastery goal structure is combined with a strong performance goal structure the students' perceptions of the reason for effort and learning may change into the demonstration of competence and superiority or the avoidance of demonstrating lack of competence and inferiority. Thus, we suggest that the meaning of the teacher's emphasis on effort and improvement, as understood by the students, changes when it is combined with a strong performance goal structure.

These interpretations need to be tested in future research using a mixture of methods. Interview studies using open-ended questions are needed to explore students' thoughts and interpretations of the signals sent by the teachers. Such interviews might also be employed in experimental research where mastery and performance goal structures are manipulated. Also, this study tested interaction effects when predicting students' goal orientations. An important task for future research is therefore to test if mastery and performance goal structures interact when predicting other cognitive and emotional variables, for instance, intrinsic motivation, effort, math anxiety, and help-seeking behavior. It is also important to test interaction effects using different measures of classroom goal structure.

Performance-approach goals are often found to be positively related to academic achievement whereas mixed results are found regarding the association between mastery goals and achievement. Some researchers therefore argue that a combination of mastery goals and performance-approach goals may be beneficial for student learning (e.g., Senko et al. 2011). Following this reasoning teachers and school administrators might come to believe that learning environments that promote performance goals as well as mastery goals will be adaptive. Teachers may therefore be encouraged to try to create performance goal structures as well as mastery goal structures in their classrooms. Based on the present study we warn against such an interpretation. One reason is that a strong performance goal structure may reduce the positive effect of a mastery goal structure on students' mastery goals. Even more important, the present study indicates that a mastery goal structure, when combined with a performance goal structure, may increase performance-avoidance goals among

the students. The study provides strong evidence of the detrimental effects of a performance goal structure in the classroom.

A practical implication of the present study is that teachers should strive to create strong mastery goal structures and to avoid performance goal structures in their classes. Teachers may use multiple measures in order to create a mastery goal structure, for instance, emphasize understanding, recognize students' effort, value improvement, and recognize mistakes as being a natural part of the learning process. Furthermore, it is important that teachers use test results formatively in order to tailor instruction to students' needs, whereas they should avoid making test results public or compare students' scores on tests.

In many countries, including Norway, these recommendations may be particularly important, but also difficult to implement. The reason for this is the strong emphasis on accountability followed by an increased use of national and international tests over the last decade. This development has likely led to a stronger performance goal structure in school, resulting in both an increase in teacher stress and achievement pressure among the students. For instance, a recent study shows that about half of the students in Norwegian middle school and high school experience a strong achievement pressure in school (Skaalvik and Federici in press). Also, those students who experienced the strongest achievement pressure reported the highest levels of exhaustion and depressed mood and the lowest levels of self-esteem.

7 Conclusion

This study confirms the expectation that mastery goal structures in mathematics classrooms are associated with mastery goal orientation among the students, whereas performance goal structures are associated with lower levels of mastery goals and higher levels of performance-avoidance goals. The study also reveals significant interactions between mastery and performance goal structures when predicting students' goal orientations. We particularly emphasize that a mastery goal structure is positively associated with a performance-approach as well as a performance-avoidance orientation when combined with a strong performance goal structure, but not when combined with a low performance goal structure. Interpreting these results, we suggest that the emphasis on meaning and understanding, which characterizes a mastery goal structure, is interpreted differently by the students when combined with a strong performance goal structure than when combined with a low performance goal structure. The study therefore indicates that in order for the students to benefit the most from a mastery goal structure, it is important to establish a learning environment characterized by a low performance goal structure.

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Einar M. Skaalvik is professor emeritus in educational psychology at the Norwegian University of Science and Technology in Trondheim, Norway. His research focuses on students' self-perception and

motivation, special education and teacher job satisfaction, stress, and burnout. He has written 22 research reports, 11 textbooks, and more than 100 research articles.

Roger A. Federici is associate professor in educational psychology and quantitative research methods at the Norwegian University of Science and Technology in Trondheim, Norway. His research focuses on motivation, self-perceptions, students' and principals' self-efficacy, mental health, high-school dropout, and educational leadership.