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On the Influence of Motivational Orientations on a Training to Enhance Self-Regulated Learning Skills

Heidrun Stoeger & Albert Ziegler
University Ulm, Department of Educational Psychology, Robert-Koch-Str. 289081 Ulm, Germany

Abstract

Recently published textbooks on educational psychology have recommended a promotion of self-regulated learning skills and a learning goal orientation to improve pupils' school achievement. This approach maintains that a learning goal orientation has a positive influence on the acquisition of beneficial self-regulated learning skills. However, only sporadic empirical evidence has been presented to support this assumption. Therefore, an examination was made to see how motivational orientations affect the success of a training program for the improvement of time management skills and self-regulated learning. Participants of the study were 393 4^{th} grade pupils in the subject of mathematics. Three clusters of motivational orientation were identified with the application of a cluster analysis before the training started. Training benefits surfaced with respect to time management and self-regulated learning skills as well as scholastic performance. A moderator effect due to motivational orientation was demonstrated with regard to both of the measures of self-related cognitions applied: expectation of success, and confidence in one's own mathematical abilities. Of particular interest was the fact that no training effects were found for pupils of the cluster which was labeled as learning goal oriented. However, the training was able to install a realistic manner of self-appraisal among these pupils. The results indicate that the general availability of goals and their attainment are possibly just as meaningful a prerequisite for adaptive leaning behaviors for younger pupils as the attainment of qualitatively specific motivational orientations is for older pupils.

Keywords*: self-regulated learning – motivational orientation – training study – elementary school – mathematics*

In research literature one finds a significant affinity between theoretical approaches to motivational orientation and self-regulated learning. This crystallizes the conviction that a learning goal (task goal, mastery goal) orientation is a promising prerequisite for the acquisition of skills in self-regulated learning (e.g., Pintrich, 2000a; Schunk & Ertmer, 2000). However, empirical support for the postulated relationship between motivational orientations and skills in self-regulated learning has not yet been presented. Before this discrepancy is examined further, it is important to first define the central terms to this study more precisely.

Motivational orientations and self-regulated learning

Traditionally a differentiation is made between a performance goal orientation and a learning goal orientation. Performance goal oriented students, according to this model, strive to make their successes visible for other persons and try to conceal their failures from others. They see themselves as being successful when they attain better performance assessments than others (e.g., Ames, 1992; Ames & Archer, 1988; Duda, 1993; Duda & Nicholls, 1992; Nicholls, Cheung, Lauer, & Patashnick, 1989). Learning goal oriented students focus on information pertaining to learning opportunities and the task at hand and strive to widen their competence levels (Nicholls, 1983). In comparison to performance goal oriented students, they are less interested in how other persons are evaluating their accomplishments (Ames & Archer, 1988; Duda & Nicholls, 1992; Nicholls, 1992), which is why they predominantly apply an intra-individual reference norm (Duda, 1993). While consistent with the theoretical assumptions, a learning goal orientation proofed to be adaptive in a scholastic learning context, findings for performance goal orientation were less uniform. Although a performance goal orientation predominantly demonstrated the negative correlations with

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achievement behavior predicted by normative models (Ames, 1992; Dweck & Leggett, 1988; Pintrich, 2000a; Pintrich & Schunk, 1996), positive consequences of a performance goal orientation could also be demonstrated with respect to various indicators of adaptive achievement behavior (Elliot, 1997; Elliot & Church, 1997; Elliot & Harackiewicz, 1996; Harackiewicz, Barron, Carter, Lehto, & Elliot, 1997; Harackiewicz, Barron, & Elliot, 1998, Harackiewicz, Barron, Tauer, & Elliot, 2002). On the basis of these conflicting findings, a sub-classification of performance goals into approach and avoidance components was suggested (e.g., Elliot, 1997; Elliot & Church, 1997; Middleton & Midgley, 1997; Skaalvik, 1997). A performance approach goal orientation refers to the demonstration of one's own abilities and the accentuation of achievement superiority. A performance avoidance goal orientation, in contrast, is dominated by efforts to camouflage incompetence and conceal inferiority in achievement. Although numerous studies have confirmed the maladaptive consequences of a performance avoidance orientation, the findings concerning the effects of a performance approach orientation on learning behaviors are far from concordant (e.g., Midgley, Kaplan, & Middleton, 2001). It is extremely significant that the original assumption that pupils tend to apply only one motivational orientation must be abandoned. On the basis of several empirical studies, it is now well known that individuals can rely on different motivational orientations in different situations and the entire ensemble of motivational orientations needs to be taken into consideration (see the reviews by Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002; Pintrich, 2000a).

Researchers in motivational orientation postulate a close connection between a learning goal orientation and skills in self-regulated learning, whereby self-regulated learning is understood as „[...] an active, constructive process whereby learners set goals for their learning and then do monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and contextual features in the environment" (Pintrich, 2000a, p. 453). Similar definitions have been offered by scholars such as Butler and Winne (1995) or Zimmerman (2000).

In fact, it has already been demonstrated that a learning goal orientation promotes some of the skills associated with self-regulated learning. For example, pupils with this motivational orientation are more likely to monitor their understanding and their learning (e.g., Middleton & Midgley, 1997; Pintrich & Garcia, 1991) or to use deeper processing strategies (Graham & Golan, 1991; Kaplan & Midgley, 1997). Pintrich (2000a) came therefore to the conclusion that: „[...] there is a good deal of converging evidence on the positive influence mastery goals have on the different components of self-regulated learning" (p. 479). Some studies also exist which show negative correlations between a performance avoidance goal orientation and self-regulated learning skills. Research concerning the relationship between performance approach goal orientation and self-regulated learning skills has, on the other hand, led to mixed results (e.g., Kaplan & Midgley, 1997; Middleton & Midgley, 1997; Wolters, 1998). Pintrich sums up the current state of the research with the following words: „Taken together, the conflicting results suggest that approach-performance goals do not have to be negatively related to cognitive self-regulatory activities in comparison to avoidance-performance goals" (p. 486). Considered as a whole, these findings support the assumption that a training of self-regulated learning skills has the greatest chance of success among pupils operating with a learning goal orientation. However, this evaluation must also consider the fact that – particularly among elementary school children – very little systematic research has been conducted which evaluates the relationship between motivational orientations and the processes deemed to be central for self-regulated learning. These processes include skills in self-evaluation, goal setting and self-monitoring, goal directed use and adaptation of learning strategies.

The special situation faced by primary school pupils

Before any critical remarks as to the role of a learning goal orientation for the acquisition of self-regulated learning skills among primary school pupils are formulated, it must be clearly stated that no theorists would maintain that self-regulated learning skills can only be acquired by pupils with a learning goal orientation (e.g., Dweck, 1999; Pintrich, 2000a; Schunk & Ertmer, 2000). Of

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course, also performance goal oriented students are able, for example, to set learning goals for themselves or monitor their own learning progress.

The basic problem, which makes the precise assessment of the relationship between motivational orientation and self-regulated learning in elementary school difficult, is the rather incomplete knowledge we have about motivational orientations for children at this age (Dweck, 1999; Wigfield & Eccles, 2002; in particular the literature review by Anderman, Austin, & Johnson, 2002). This is also the reason why there is very little information available about its relationship with self-regulated learning. For example, it is still unclear what relationship exists between the generally favorable and high levels of motivation, interest and learning optimism found in many studies among children at the start of schooling (Dweck, 1999; Heckhausen, 1991; Helmke, 1997; Wigfield & Eccless, 2002), and motivational orientations: Does this imply that at this age a learning goal orientation dominates (e.g., Dweck, 1989)? Or is the general high motivation a consequence of a strong learning goal orientation combined with a strong performance approach and performance avoidance orientation? The latter would imply that pupils in this age range are impelled not only by successful learning, but also by the social consequences of successful learning.

A further problem is posed by the contextual features of the learning environment. For example, Wolters, Yu and Pintrich (1996) claim on the basis of their empirical findings that a performance approach goal orientation in comparison to a learning goal orientation can lead to deeper processing strategies and more self-regulation by performing simple tasks which are not particularly interesting or challenging. This concept is also supported by a correlational study by Ziegler & Stoeger (2004), which investigated the specific conditions in elementary school classrooms, in which a learning goal orientation was bound to negative consequences and both a performance approach as well as a performance avoidance goal orientation was bound to positive consequences under certain conditions. To determine the precise relationship between motivational orientations and self-regulated learning skills in different learning contexts, systematic trainings of motivational orientations and self-regulated learning skills must be examined in the same study. Regrettably only one such study is currently available (see the reviews by Schober, 2002; Stoeger, 2002). In this study the expected interaction between motivational orientations and skills in self-regulated learning was confirmed (Schober & Ziegler, 2001). However, these findings cannot be directly transferred to regular classroom instruction. Although the training effects were measured in relation to scholastic performance, the training itself was conducted in tutorials outside the regular classroom activities by psychologically trained tutors.

In addition, a further problem must be addressed. The multiple goal approaches (Harackiewicz et al., 2002; Pintrich, 2000a) have pointed out that motivational orientations do not just surface in isolation. Therefore, an appropriate approach to the examination of the functionality of specific motivational orientations for self-regulated learning skills should not only take isolated motivational orientations into consideration, but rather must take the entire ensemble into account. As a result, it is difficult to generally speak of the advantageous or detrimental influence of one particular motivational orientation on the acquisition of self-regulated learning skills.

Aims of the Study

The focal point of this study was to find out to what degree the success of a training to improve self-regulated learning would depend on motivational orientations. To answer this question a pre-test-post-test design was used, whereby motivational orientations and self-regulated learning skills were measured twice. Between the pre-test and the post-test, a classroom based training on self-regulated learning was conducted with pupils attending the fourth grade in German public schools. The pupils in the training group received five weeks of training as depicted by Zimmerman, Bonner and Kovach (1996) during normal classroom instruction. A cluster analysis was engaged to categorize students into motivational orientation clusters based on the answers in a questionnaire designed to measure this attribute. An analysis was made to determine how successful the effects of the training were for the students.

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Because the study was of an explorative character, due to the small amount of previous empirical evidence, it was difficult to develop explicit hypotheses. Instead three research questions were formulated.

(1) The first research question concerned the success of the training developed by Zimmerman et al. (1996) at the elementary school level among 4th grade pupils. There were indicators which supported the expectation that this highly influential training would prove to be effective (Zimmerman et al., 1996; Zimmerman, 2000), but they were mainly based on the experiences of teachers because systematic empirical studies were not available.

(2) The second research question addressed the pattern of the motivational orientations. However, due to the aforementioned conflictive nature of the empirical findings currently available, it was difficult to develop explicit hypotheses on what pattern could be expected. For example, on the basis of the revised normative theory (Elliot, 1997; Elliot & Harackiewicz, 1996; Nicholls et al., 1989; Skaalvik, Valás, & Sletta, 1994) and the multiple goal approach (Pintrich, 2000b; Harackiewicz et al., 2002) it was equally possible that a pattern comprised of a high learning goal orientation and a low performance goal orientation (see also Dweck, 1986; Pajares, Britner, & Valiante, 2000), or a pattern comprised of a high learning goal orientation and a high performance approach goal orientation as well as a low performance avoidance goal orientation, would be found. The picture was further complicated when one took the usually very favorable motivational set of children during the first years at school into consideration (Dweck, 1999; Heckhausen, 1991; Helmke, 1997; Wigfield & Eccless, 2002). It was very well possible that equally high expressions of all motivational orientations would be registered.

(3) The third research question addressed the relationship between motivational orientations and the success of the Zimmerman et al. (1996) training among elementary school students. On the basis of the points discussed in the previous passage, it is clear that it would be next to impossible to formulate explicit hypotheses. However, one can speculate that the training would demonstrate positive consequences (on self-regulated-learning, performance, etc.) among those children whose ensemble of motivational orientations embraces a high learning goal orientation (Pintrich, 2000a).[1] Since so far mixed results have been confirmed for the role played by a performance approach goal orientation (Elliot & Church, 1997; Midgley et al., 2001), no concrete prognoses could be made here. One could, however, expect that ensembles which include high levels of performance avoidance goal orientation, should demonstrate rather negative consequences (Pintrich, 2000a).

Method

Design and participants

The analyses were conducted on the entire set of data collected from 393 children attending classes at two measuring points. The classes were randomly assigned to either the training group (12 classes; 234 pupils, of which 126 were girls and 108 were boys) or the control group (8 classes; 159 pupils, of which 81 were girls and 78 were boys). Out of the training classes a total of 59 children were excluded from the analyses because they were either absent from one of the two measuring points or on three or more of the 30 training days. From the control classes 14 children were excluded from the analyses because they were absent from one of the two measuring points. The analyses demonstrate that the children excluded from the analyses cannot be statistically differentiated from those who were included. At the start of the investigation the average age of the boys was 10.21 years (S=.81), and the average age of the girls was 10.42 years (S=.73). Participation in the study was voluntary and required parental permission.

Training of self-regulated learning skills

Zimmerman et al. (1996) suggested a cyclical model of self-regulated learning, which consisted of four phases. In the first phase a self-evaluation was conducted in which the pupils made an assessment of their present performance behaviors against the background of their earlier

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achievements. In the second phase they analyzed the learning tasks at hand, set specific learning goals and decided which strategies they wanted to engage in, in order to make the learning goals attainable. In the third phase they set these strategies in operation and made qualitative appraisals of their efficiency. In some cases adjustments in the strategy were needed. In the last phase a connection was drawn between the resulting learning success and the strategic process in order to make an assessment of the effectiveness of the strategy. After completion, the pupils returned to the first phase of the cycle and reevaluated their performance levels.

The training was administered by 12 teachers within the framework of normal classroom instruction. These 12 teachers were randomly chosen from a pool of 20 teachers who volunteered to participate in the study. The classes of the remaining teachers served as the control group. The teachers attended a three-day seminar which was conducted by the authors of this report. On the first day the theoretical groundwork of self-regulated learning was presented. The second day was dedicated to the topics of time management and behavior patterns relevant to home study. Exercises related to self-regulated learning were conducted, and in addition, all learning materials relating to the training were distributed and discussed. On the third day the teachers worked together to conceptualize 25 sets of exercises, six mathematics quizzes (see below) and a comprehensive final exam which would be completed by all students in all classes. The intention of this exam was to provide an indicator of the success of the training.

The content of the training addressed the abilities associated with time management and the preparation of classroom materials at home (for more details and the materials see Zimmerman et al., 1996). The training was conducted over a six-week period: In the first week the students recounted their own learning behaviors on standardized forms. For example, entries were made as to when and for how long the student studied, what kinds of breaks were made, what types of distractions were present, if the student studied alone or with partners and where this study took place. Additionally, these forms had room for the students to predict how well they expected to do on the homework exercises and the „Math Quiz“ and then to later record the actual results.

From the first day of the training the students received exercises to be completed at home on which they could score up to 10 points. The exercises were based on the topics currently being covered in the classroom. A grade in the traditional sense was not made. These daily homework exercises were composed by the teachers taking part in the study. Consideration was taken to insure that the exercises were standardized to the same level of difficulty, in order to maintain that effective learning/or less effective learning could be directly reflected by the performance on these exercises. The students inspected the homework exercises at the end of the lessons in which the material was covered, and estimated how many of the 10 points they thought they would be able to attain. After working through the exercises at home, the students recorded the actual scores attained. Additionally, at the end of each week a math quiz was given during the classroom period which covered the subject matter discussed that week. Once again the pupils had the opportunity to attain 10 points per quiz and the difficulty level remained appropriate for the achievement one would expect of a pupil who did not undergo this training.

After the first training week the students possessed an outline of their homework behavior skills for the prior week, their daily achievement levels on the exercise sets and their score on the weekly math quiz. At the beginning of the second training week the teachers addressed the entries made in the first week during the class period. They drew a relationship between the quality of the homework behavior skills and the performances on the exercise sets and quizzes, and gave hints on how the homework skills could be improved. The students then set achievement goals (for example 6 out of 10 points on the next exercise sets or 5 out of 10 points on the next math quiz), which were recorded in the materials prepared for them. They also recorded which strategic methods they intended to engage in, in order to attain these achievement goals. In addition to the clues given by the teachers, the students received leaflets on effective homework skills. These leaflets contained tips on various topics, such as how to organize a workplace, regulate study time and breaks, deal with distractions etc.

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In the records for the second week, for which the pupils once again received standardized forms, the pupils denoted, among other things (1) the goals they had set for themselves and the (2) strategies they chose to engage in, in order to attain these goals. As they had already done in the first week, the students continued to record (3) their daily scores on the exercise sets (both the predictions they made in school after viewing the homework exercise sets for the first time and the actual scores attained after working through the exercises at home) as well as those for the (4) math quiz. Since (5) analog to the documentation made for the first week, the learning behaviors with respect to home study were recorded, and (6) notice was taken as to how well the implementation of the chosen learning strategy supported the attainment of the goals set. The students were then able to establish a relationship between the effectiveness of their strategies and their learning performances.

At the beginning of every subsequent training week discussions were held with the pupils on examples of effective as well as ineffective learning strategies. Each pupil continued choosing specific goals for the coming week and making concrete decisions for, in his/her opinion, suitable learning strategies to meet these goals. The completion of the homework exercises, the math quiz and filling out of the materials etc. was formulated analog to the procedure followed for the second training week.

Measurement instruments

Since interests, attitudes and self-related cognitions about a particular topic assume a high degree of domain specification, measuring instruments specifically designed for the domain of mathematics were used. The study participants evaluated statements on various subjects along a six point Likert scale. The assessments were conducted as paper and pencil tests during regular mathematics instruction, under the supervision of the class teacher and required approximately 40 minutes to complete, including instructions. The test to assess mathematics achievement was conducted separately and also took about 40 minutes to complete.

Motivational orientations. In order to assess motivational orientation, a scale was applied which was developed in conjunction with the Manual for the Patterns of Adaptive Learning Scales by Midgley et al. (2000). Previous studies have proven that this scale is also appropriate for use among fourth grade pupils in Germany (Ziegler & Stoeger, 2004). The scale is comprised of 14 items. Six of these items measure mathematics related learning goal orientation. The remaining 8 items address mathematics related performance goal orientation: 4 of these items measure performance approach goal orientation and 4 measure performance avoidance goal orientation. Sample items: One of my goals is to master a lot of new skills this year (learning goal orientation), It's important for me that other students in my class think I am good at my class work (performance approach orientation), One of my goals is to keep others from thinking I'm not smart in class (performance avoidance orientation). All answers were made on the basis of Likert scales with the poles (1) I disagree completely and (6) I agree completely. The Cronbach´s α for the first and second measuring points came to: for learning goal orientation .91 and .92; for performance approach goal orientation .93 and .87; and for performance avoidance orientation .88 and .88.

Expectancy of success. In order to assess the pupils' expectations of how successfully they would be in terms of future mathematics challenges, five new items were constructed. Scales previously applied (Ziegler & Stoeger, 2002) in a pilot study, proved to be inappropriate for children attending the fourth grade. Three of these new items dealt with the expectation to be able to maintain good evaluations of ones own performances (sample item: „In the future, I will certainly not perform as well as most of the others in math."). The remaining two items intended to subjectively determine to what degree the pupils believed that they could attain learning gains (sample item: „In the future, I will certainly learn a lot of new things in math."). The items were assessed along a six-point Likert scale with the poles (1) „absolutely disagree" and (6) „agree completely". The analyses of the internal consistencies of the scale yielded satisfactory results for both measuring points (α=.76 and α=.83).

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Ability self-concept. In order to assess the ability self-concept for the subject of scholastic mathematics, a domain specific version of the scale „Belief in one's own abilities" (Dweck & Henderson, 1988; Dweck, 1999) was administered. This four item scale measures how secure students are in their cognitive (in this case the mathematics-related cognitive) abilities. The end-points are formulated as statements, e.g., I don't have a great deal of confidence in my mathematics abilities vs. I am confident in my mathematics abilities. Each of the statements in an item pair represented a pole along a six-point scale, whereby a low value represented a low ability self-concept. The Cronbach´s α was .86 for the first measuring point and .83 for the second measuring point.

Time management and self-reflection of own learning. In order to assess the constructs of time management and a self-reflective approach to one's own learning process, use was made of two subscales derived from the questionnaire „How do you learn?" developed by Gold and Souvignier (2000). This measuring instrument unifies items found in the questionnaire LIST (Lernstrategien im Studium [Learning strategies for university studies]) developed by Wild and Schiefele (1994) with questions out of the KSI from Baumert (1993) and WLI from Metzger, Weinstein and Palmer (1994). Both scales were adapted for the present investigation so that they could be answered along a six-point Likert scale, where the endpoints were designated as (1) very seldom and (6) very often.

The scale used to measure skills in time management consisted of five items. Sample items: Prior to every learning unit I establish a specific period of time for it. I always determine how far I want to proceed in the learning material before I start to study. I follow a specific time plan. The Cronbach´s α for the two measuring points came to .68 and .71. The scale used to assess self-reflection of ones own learning consisted of four items. Sample items: When I am studying math and don't understand everything, I try to determine where my difficulties are coming from. When I am studying math and a specific point seems to be confusing and unclear, I change my methods in order to get a better grip on the larger. The Cronbach´s α for the two measuring points came to .73 and .75.

Scholastic achievement. The test designed to measure scholastic achievement was developed by all teachers who either led a class participating in the training or one of the classes which was a member of the control group. The content of the test was based on the material covered in the classes during the 6-week training period, and validity and comparability among the various classes was closely monitored. For example, no question formats were included which had not yet been introduced in all classes participating in the study. The internal consistency of the 14 items comprising the examination came to α=.76.

Results

The results will be presented in two phases. In the first phase, the motivational orientations were placed under review to determine whether meaningful types of motivational orientation could be identified with a cluster analysis. In the second phase the effectiveness of the training was examined, whereby it was particularly interesting to discover whether the effectiveness of the training varied with respect to the motivational orientation being employed by the student.

Argumentation has been forwarded – largely based on the multiple goal approach – that instead of observing individual motivational orientations, the interaction among various motivational orientations should be considered. For this reason, a cluster analysis of motivational orientation was conducted which resulted in a three cluster solution (hierarchical method, Ward, Scree-Test; all F´s<1; all p´s for the t-tests <.05), the mean values of which can be seen in Figure 1. Clusters 1 through 3 contained 127, 164, and 102 pupils respectively. Gender proportions did not vary significantly from one cluster to another.[3]

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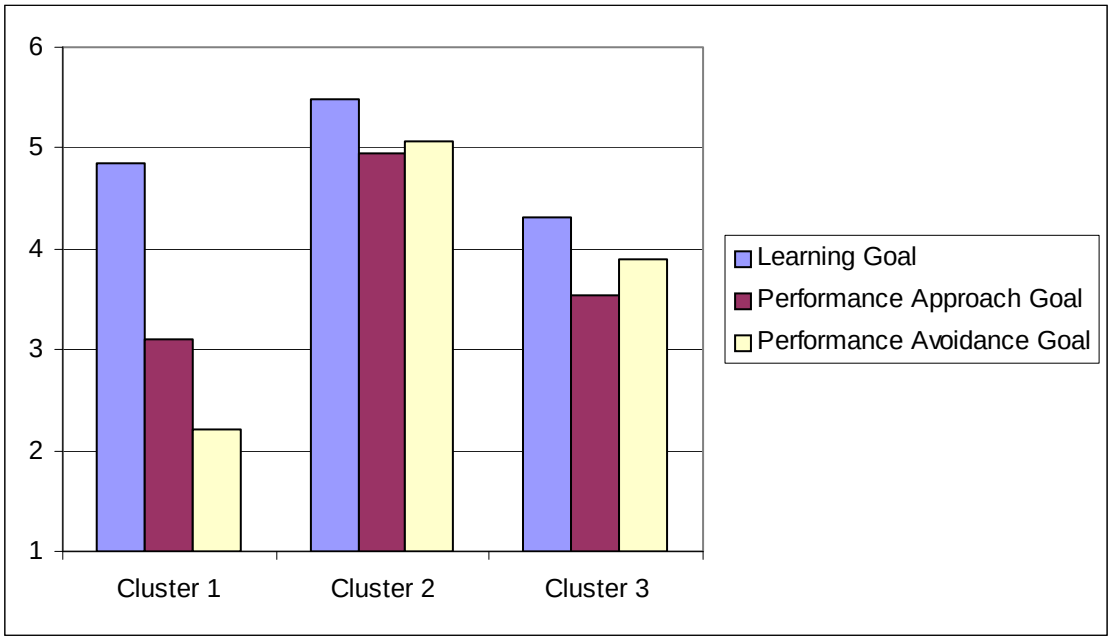

Figure 1: Motivational orientations by cluster membership

Table 1 exhibits the correlations among the various motivational orientations within each of the three clusters. For each of the three clusters the learning goal orientation was positively correlated with the performance approach goal orientation, which supplies strong evidence for the multiple goal perspective (Pintrich, 2000b; Harackiewicz et al., 2002). Interestingly, and contrary to theoretical assumptions, a performance avoidance goal orientation and a learning goal orientation were correlated with each other in all clusters (Elliot & Church, 1997; Elliot & Harackiewicz, 1996). A significant correlation between a performance avoidance goal orientation and a performance approach goal orientation was isolated only in cluster 2, which was further confirmation of the necessity to make both a sharp theoretical differentiation between the two types of performance goals, and to reinspect the original assumptions made by proponents of the normative theory (Anderman et al., 2002; Dweck, 1986; Martin, Marsh, & Debus, 2001; Nicholls, 1984; Pajares et al., 2000).

Table 1: Correlations of the three motivational orientations within each cluster

	Cluster 1	Cluster 2	Cluster 3	Cluster 1	Cluster 2	Cluster3
	Learning Goal			Approach Goal		
Approach Goal	.53**	.19*	.33***			
Avoidance Goal	.16*	.13*	.14*	.03	.23**	-.04

Note: **: p<.01; *: p<0.05

In attempting to formulate a meaningful characterization of the three clusters, one quickly notices that none of the three clusters is in accord with the theoretical assumptions formulated in the research literature pertaining to motivational orientations (Harackiewicz et al., 2002; Midgley et al., 2001; Pintrich, 2000b). If solely the mean values were considered, Cluster 1 would be representative of a classic conception of a striking detachment between a learning goal component and a performance goal component. However, this interpretation is not in line with the correlations found for a learning goal orientation with both performance approach goal orientation and performance avoidance goal orientation. Nevertheless, the pupils in Cluster 1 will be referred to as learning goal oriented in this report, due to the strong relative predominance of a learning goal orientation compared to both performance goal orientations. However, one must consider this in tandem with the correlations detected here, which do not conform to the theoretical assumptions.

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The pupils in Cluster 2 will be referred to as generally motivated, due to the high expressions of all three motivational orientations. This characterization is additionally supported by the fact that all three motivational orientations are correlated with one another.

Pupils in the third cluster will be addressed as performance avoidance goal oriented, since it is only in this cluster that this orientation is more strongly expressed than the performance approach goal orientation. A correlation between performance avoidance goal orientation and learning goal orientation in this cluster is nonetheless irritating.

Table 2 contains the mean values, standard deviations and the Δ_{change} of the independent variables as a function of cluster membership and treatment. The Δ´s are the differences between the mean values in standard deviation units.

Table 2: Means, standard deviations and Δ's by cluster membership and treatment

	t_1	t_2	Δ	t_1	t_2	Δ	t_1	t_2	Δ
	Cluster 1: Learning goal oriented Cluster			Cluster 2: Generally motivated cluster			Cluster 3: Avoidance goal oriented cluster		
Learning goal orientation									
Treatment	4.96 (.80)	4.90 (.80)	-.08	5.47 (.55)	5.41 (.52)	-.11	4.42 (.84)	4.34 (.79)	-.14
Control	4.81 (.81)	4.79 (.81)	-.02	5.50 (.61)	5.39 (.67)	-.18	4.20 (.97)	4.26 (.88)	.06
Approach goal orientation									
Treatment	3.22 (1.16)	3.26 (1.15)	.03	4.92 (.84)	4.79 (.95)	-.15	3.52 (.80)	3.65 (1.14)	.16
Control	3.06 (1.11)	3.03 (1.07)	-.03	4.98 (.74)	4.97 (1.09)	.01	3.54 (.75)	3.59 (1.05)	.07
Avoidance goal orientation									
Treatment	2.31 (.79)	2.41 (.91)	.13	5.06 (.83)	5.03 (1.07)	-.04	3.99 (.69)	3.94 (.84)	-.07
Control	2.17 (.74)	2.23 (.97)	.08	5.09 (.75)	5.02 (1.01)	-.09	3.81 (.66)	3.84 (.83)	.05
Ability self-concept									
Treatment	4.08 (1.21)	4.07 (1.19)	-.01	4.45 (1.05)	4.71 (.91)	.25	3.94 (.96)	4.33 (.84)	.41
Control	4.09 (.95)	4.24 (.75)	.16	4.71 (.91)	4.69 (.89)	-.02	3.83 (1.11)	3.99 (.97)	.14
Expectancy of success									
Treatment	4.93 (.77)	4.83 (.81)	-.12	4.99 (.74)	5.07 (.69)	.11	4.34 (.67)	4.57 (.62)	.34
Control	5.05 (.77)	5.01 (.65)	-.05	5.05 (.68)	5.09 (.62)	.06	4.38 (.80)	4.48 (.68)	.13
Time management									
Treatment	2.37 (1.25)	2.35 (1.14)	-.02	3.02 (1.22)	2.73 (1.27)	-.24	2.55 (.96)	2.57 (1.19)	.02
Control	2.47 (1.17)	2.28 (1.19)	-.16	3.08 (1.18)	2.64 (1.17)	-.37	2.66 (1.03)	2.38 (1.09)	-.27
Self-reflection of own learning									
Treatment	3.93 (1.11)	4.18 (1.18)	.23	4.39 (.80)	4.44 (1.13)	.06	3.75 (.97)	4.02 (1.09)	.28
Control	4.16 (1.06)	4.08 (1.02)	-.08	4.55 (1.07)	4.21 (1.05)	-.32	3.64 (.92)	3.77 (1.67)	.14
Achievement									
Treatment	2.85 (1.07)	3.10 (1.36)	.23	2.47 (.97)	2.64 (.97)	.18	2.90 (1.21)	2.91 (1.22)	.01
Control	2.58 (1.07)	2.66 (1.44)	.07	2.63 (1.06)	2.72 (1.20)	.08	2.98 (1.14)	3.10 (1.20)	.11

Note: All scales are based on Min=1 and Max=6. *: Achievement scaled inversely.

Considering the results from the perspective of adaptivity, the students in the generally highly motivated cluster demonstrated, on average, the most advantageous mean values in comparison to the members of the learning goal oriented and performance avoidance oriented clusters. This trend, which was only breached once, was also confirmed by Page L, $p<0.01$.

In order to determine the effectiveness of the training 3 (cluster) X 2 (treatment vs. control group) X 2 (girls vs. boys) ANOVA´s were calculated, whereby the results determined for measuring point 1 were used as co-variates. Although significant main effects were found for gender, this was not repeated within an interaction, and therefore was not subjected to further considerations.[4]

With the exception of negligible marginally significant changes, the motivational orientations remained unchanged over the course of the two measuring points. Furthermore, no significant interactions between treatment and cluster membership were identified. Although the training encompassed attributes which should foster learning goals and discourage performance goals, no changes could be ascertained. While improvement in motivational orientation was not an explicit

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goal of the training, according to Zimmerman et al. (1996) an improvement in self-efficacy should occur. Indeed, a main effect for the treatment occurred, $F(2,380)=5.695$, $p<.01$, which was qualified through a highly interesting interaction between treatment and cluster membership, $F(2,380)=2.603$, $p<.05$. Evidently, the students in the generally motivated and performance avoidance oriented clusters profited from the training, in contrast to the members of the learning goal oriented cluster. An analog picture can be drawn for the measure of confidence in mathematical ability. An interaction between cluster membership and treatment was also demonstrated here ($F(1,380)=3.484$, $p<.05$), whereby once again only the members of the generally motivated and the performance avoidance oriented clusters profited from the training.

The actual objective of the training was to promote the skills involved with time management and the overriding goal was to bring about an improvement in self-reflective learning behaviors. Main effects for the treatment were ascertained here (time management: $F(1,380)=3.136$, $p<.05$; self-reflective learning behavior: $F(1,380)=5.902$, $p<.01$), whereby the effects of the treatment turned out to be rather weak. Furthermore, the members of the treatment group received better scholastic grades ($F(1,380)=3.921$, $p<.05$). However, it should be kept in mind that in this case the Δ's were less meaningful, because a mean score for previously attained scholastic performance was compared with the test validated over the curricula.

Discussion

Many scholars agree that promotion of self-regulated learning and learning goal orientation will lead to an improvement in scholastic learning skills. Some implicitly assume, others formulate explicitly (e.g. Pintrich, 2001a), that a pursuit of both goals is not only possible, but rather that a learning goal orientation has a positive influence on the acquisition of self-regulated learning skills. Due to the rather inconsistent nature of existing research literature on this topic, this overriding question was broken down into three partial questions.

The first research question concerned the general effectiveness of the training used, originally published by Zimmerman et al. (1996), because it presented the study with a logical prerequisite with which possible moderator effects among specific motivational orientations were identified. In fact, the training, which took merely a few weeks, produced statistically significant improvements, although they were rather small. The effectiveness of the training was by no means limited to improvement in immediate time management skills, but was also demonstrated in two more general goals of the training: the improvement of self-reflective learning behavior, and scholastic achievement. As mentioned previously, better skills in self-reflective learning behavior should produce a general improvement in an individual's learning process. According to the authors of the training, this should not only be reached by means of the training administered in our study to improve time management skills, but also within the scope of five other trainings, which aim to improve writing and test taking skills, among others. The fact that this positive training effect was installed after only a few training weeks speaks for the usefulness of the remaining training blocks which are based on the same underlying principles. With respect to confidence in one's own mathematical abilities and success expectations, no main effects of the training could be confirmed, but rather an interaction of the training with clusters built on the basis of motivational orientation. A closer inspection of this interaction revealed that growth occurring over the course of the training was limited to the members of the two clusters we refer to as generally motivated and performance avoidance oriented. Reflections on this finding should be postponed briefly, but will be resumed after the discussion of the findings concerning motivational orientations, as was the focus of our second research question.

A cluster analysis was able to identify three clusters, which we referred to as generally motivated, learning goal oriented and performance avoidance oriented. In all three clusters the learning goal orientation was the most commonly expressed motivational orientation. Highly interesting and unexpected was the finding that a learning goal orientation and a performance avoidance goal orientation, however so slightly, were correlated in all cases (cf. Ames, 1992; Dweck & Leggett, 1988; Pintrich, 2000a). Correlational analyses showed that the most adaptive learning behavior was found among the members of the generally motivated cluster, followed by

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the pupils in the learning goal oriented cluster. The least adaptive learning behavior was found in the performance avoidance oriented cluster. How can these results be explained? In particular, how can the higher level of adaptivity shown among the children in the generally motivated cluster versus in the learning goal oriented cluster be interpreted? An assumption is that the generally motivated pupils would still be in an earlier phase of motivational development which gradually differentiates them from the patterns found among the learning goal oriented and performance avoidance oriented pupils. If this assumption is correct, this differentiation would be definitely associated with the losses recorded in adaptivity, whereby a parallel to the degeneration of motivation over the course of the primary school years can be drawn. In accord with other scientific reports (Covington, 2000; Pintrich, 2000b) the pattern of motivational orientations in the learning goal oriented cluster was more adaptive than the pattern in the performance avoidance oriented cluster.

From the perspective of motivational theory, the correlations identified here for the individual motivational orientations, and above all the existence of the generally motivated cluster, spawn the inference that the qualitative aspects of the content of goals (performance avoidance, performance approach etc.) may play a lesser role at earlier age levels than they do at later age levels, where these qualitative aspects of motivational orientation are dominant (Pintrich, 2000a). In fact, the members of the generally motivated cluster exhibited the most effective adaptation to the challenges of the learning environment, despite their high expression of performance avoidance goal orientation, reflected in, for example, their superior scholastic achievements. This finding also confirmed that a low level of performance avoidance goal orientation does not necessarily present a prerequisite for adaptive scholastic learning behavior patterns among younger pupils (Ziegler & Stoeger, 2004). In contrast, it appears that for younger students the general availability of motivational goals is of greater importance.

The third research question of this study addressed the presumption that a learning goal orientation would have a positive impact on the success of training of self-regulated learning skills (cf. Pintrich, 2000a; Schunk & Ertmer, 2000). A general effectiveness of the training developed by Zimmerman et al. (1996) could be substantiated with respect to time management skills, self-reflective learning behavior and scholastic achievement. These training effects were also remarkable on the basis of the theories of motivational orientation, in particular for the members of the generally motivated cluster due to their strong performance avoidance goal orientation, and also specifically for the members of the performance avoidance oriented cluster which actually expressed unfavorable prerequisites for the successful participation in a training program (Church, Elliot, & Gable, 2000; Elliot, 1997; Elliot & Church, 1997; Harackiewicz et al., 1998). These results were not explained by the fact that the mathematical content, which was addressed during the training period, was not particularly challenging (see Wolters et al., 1996). Rather the general availability of goals and their attainment – irregardless of which goal is being sought - turned out to be a prerequisite for adaptive learning behavior among younger pupils and may be just as significant as the attainment of qualitatively specified goals as are learning goals, for example, for older students.

Interactions between treatment and cluster membership were apparent for both of the confidence scales for mathematical capability applied and for expectation of success. Training effects were only determined among the pupils in the performance avoidance oriented and the generally motivated clusters, not among the members of the learning goal oriented cluster. This finding was unusual not only on account of the contentual affinity of the training for learning goals, but also with respect to the well documented finding that a congruence of individual goals and the learning environment is largely advantageous (Ames, 1981; Ames, 1984; Anderman et al., 2002; Urdan & Midgley, 2003). However, one must keep in mind that higher mean values do not indicate improvements per se (Zimmerman et al., 1996). On the one hand, a pupil should attain confidence in his/her learning potential, to such a degree that the effort placed into learning is seen as rewarding with respect to the attainment of the goal in sight. On the other hand, the student should also be able to learn to realistically assess him/herself, since this is a decisive prerequisite for self-

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regulated learning. Consequentially, an attempt was made through various mechanisms in the training to promote realistic self-appraisal. For this reason the correlation between achievement and self-efficacy appears to be a much better indicator for the actualization of a training program than an improvement in the two variables used to assess self-related cognitions. In fact, bringing the correlations into the picture changed the situation somewhat: Among the training participants in the learning oriented cluster, the correlation between achievement and self-efficacy is significantly higher, r=.46, than that found for the training participants in the performance avoidance oriented cluster, r=.29, and the generally motivated cluster, r=.17. Therefore, with respect to our central concern we must make due with the résumé, that the consideration of motivational orientations was certainly significant for the addressees of such a training of self-regulated learning skills. Although success expectation and confidence in one's own mathematical ability among the children in the learning goal oriented clusters decreased, the training improved their skills in self-regulated learning and scholastic achievement. Indications suggested that their pattern of motivational orientations enabled them to acquire a more realistic assessment of their learning potential, which is an important prerequisite for effective self-regulation (Zimmerman, 2000). In contrast, the self-related cognitions among the pupils in the generally motivated and performance avoidance oriented clusters improved after the training. However, the assessment of their learning potential was less realistic in comparison to that demonstrated by the learning oriented cluster. The short-term positive effects the training had on self-regulated learning skills and scholastic achievement show that this was not necessarily a disadvantage. One can even speculate that a higher level of self-confidence and higher success expectations were beneficial for these children in changing their usual learning behaviors and in assuming the larger degree of personal responsibility required by self-regulated learning. In the long term, however, one would expect that these children will be comparatively less effective in regulating their own learning behavior on the basis of these less realistic cognitions. In contrast to the expectations concerning the children with a learning goal orientation, one would be extremely skeptical whether these children would be able to cope with the decrease in success expectations and confidence in their own abilities (Dweck, 1999).

The next necessary investigative step is to supplement the measures applied in this study by explicit long term observations of self-regulation during and after such trainings. If this knowledge is not taken into consideration, the enrichment of primary school education may certainly benefit from the short-term effects of self-regulated learning. Neglect of the motivational aspects, however, will eventually lead to suboptimal promotion which is closely bound to long term risks for children with generally motivated and performance avoidance oriented patterns of motivational orientations.

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Footnote

1
The expectations that ensembles of motivational orientations with high learning goal orientation will have advantageous effects and those with high performance avoidance orientation will have detrimental effects on the acquisition of self-regulated learning skills should be upheld by two aspects of the training. First, our implementation of a training for self-regulated learning skills took place in a controlled learning environment which supported a learning goal orientation (Anderman, Austin & Johnson, 2002; Zimmerman et al., 1996). Various studies have demonstrated that a congruence of individual motivational goal structures and the goal structures which are predominant in the learning environment have a favorable effect on the learning process (Ames, 1981; Ames, 1984; Anderman, Patrick, Hruda, & Linnenbrink, 2002; Urdan & Midgley, 2003). Second, attempts were made to insure that during the training, tasks dealing with topics currently being discussed during normal classroom instruction were challenging, in order to avoid the problems discussed by Wolters et al. (1996).

2
Current research discussions are debating whether a differentiation should be made in a learning goal orientation analog to the subclassification of a performance goal orientation into approach and avoidance components. However, in two preliminary studies no evidence of an avoidance component for a learning goal orientation was isolated, and subsequently no assessments of this variable were made.

3
In the validation of the results it would have been desireable to split the sample space and to calculat the cluster analyses for each half. The sample space, however, was too small. Therefore the data base amassed by Schober (2002) was reanalyzed (5^{th} grade students), which generated fully analog results.

4
The results found here are very much in accordance with results previously reported in the relevant research literature at this early level (e.g., Zorman & David, 2000; Ziegler & Schober, 2000). The differences, for example, favor boys who demonstrate a higher confidence in their math abilities.

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