RESEARCH ARTICLE

Identifying mastery goal states in educational contexts

David Palmer

Abstract: The purpose of this study was to investigate mastery goal states that students might spontaneously adopt in individual lessons. Interviews were carried out with 32 grade 10 students, who were asked about a recent lesson they had experienced. Responses indicated that positive mastery goal states could be represented by a situated and dynamic feeling of "wanting to learn". However, students also reported a feeling of "not wanting to learn". This latter form did not fit any of the existing dimensions of achievement goals, so it was decided to refer to it as a negative mastery goal state. The positive and negative dimensions were educationally significant because they were highly correlated with students' self-reported learning behaviors during that lesson.

Keywords: achievement, goal theory, interview, motivation, secondary education

1 Introduction and theoretical framework

Achievement goals are the reasons students have for engaging in learning[1]. A mastery goal orientation is a focus on learning and understanding, whereas a performance goal orientation is a desire to demonstrate ability by getting a good grade or outperforming others. Achievement goals also have approach and avoidance dimensions[2]: In the mastery-approach condition, students focus on learning and understanding, whereas in the mastery-avoidance condition, students wish to avoid not fully understanding the material, or avoid not achieving their own standards for mastery[3]. Similarly, students with a performance-approach goal have a focus on outperforming others, whereas students with a performance-avoidance goal have a focus on trying to avoid appearing incompetent to others. Students often have multiple goals, and the goals a student has in one context may be different to those in other contexts[4].

Achievement goals are important because they exert powerful effects on learning behaviors and achievement. Mastery-approach goals have consistently been shown to be associated with the use of adaptive learning behaviors and increased understanding[4–8]. Mastery-avoidance goals can have mixed effects, as they can be

positively correlated with perceived competence, competitiveness, and interest, but negatively correlated with cognitive ability, help seeking, and performance [9, 10]. Performance-approach goals have also been found to have mixed effects, as they have often been associated with high achievement[11] but have also been linked to avoidance of help seeking, test anxiety and cheating[12]. Performance-approach goals can be particularly adaptive however, when they are coupled with mastery goals, so students want to understand the work and also obtain a good grade[13]. Finally, performance-avoidance goals have usually been found to be associated with surface learning strategies, lower engagement, and lower achievement[12, 14].

One feature of achievement goals is that they have often been found to be relatively stable. It has been found[15] that college students can have largely stable goals throughout a semester, and a similar pattern has been reported for middle school students[16]. Much of the research has focused on these semi-stable goals that students may adopt for a course of study. However, there is also evidence that achievement goals can be malleable, and can change in response to circumstances. It has been argued[4] that achievement goals can have a situational manifestation, as they can be "activated a priori by the individual as he or she enters into a situation and they can be influenced by the information available to them in the context"[4]. Evidence that achievement goals can change, and can be adopted in response to particular circumstances, has been obtained from studies of induced achievement goal states, as follows.

Studies of primed achievement goal states have shown

that, at least in laboratory and experimental settings, it is possible to induce temporary achievement goals for a particular task episode that might last only a few minutes. Senko and Harackiewicz[17] asked college students to perform a short task and were able to induce performance goals by advising students they needed to focus on doing better than the other participants. Similarly, Avery and Smillie[18] induced mastery-approach goals among university undergraduates by asking them to develop their proficiency for the task at hand, whereas performance-approach goals were induced by asking students to perform better than other students–post-task checks confirmed that the way students approached the task corresponded to their assigned achievement goal condition.

Unfortunately however, very little is known about whether students might spontaneously adopt achievement goal states within normal lessons. In what appears to be the only study of its type, Nieswandt and Shanahan[19] studied boys in a grade 11 science class and reported they typically had a performance goal orientation (to get a passing grade) for the course as a whole, but throughout the course they sometimes adopted mastery goals when they perceived the content as particularly useful or interesting. In this way, the temporary goal states that might occur at different times during a course of study can be different to the dominant achievement goal orientations for the course as a whole.

The aims of this study were:

(1) to investigate whether students naturally adopt mastery goal states for individual lessons;

(2) to describe the characteristics of those goal states;

(3) to investigate their effects on learning behaviors during the lesson.

2 Methods

The study used a mixed method design involving both qualitative and quantitative techniques.

2.1 Participants

The participants were 32 grade 10 students (i.e., 15-16 years old) who attended four schools in a regional city in southeastern Australia. The schools were located in different parts of the city and each drew students from a range of socioeconomic backgrounds. The sample consisted of nine females and seven males from upper achievement levels and nine females and seven males from lower achievement levels. All participants were volunteers who were told that participation in this study would not impact their school grades.

2.2 Data collection

Data were collected using semi-structured, individual interviews. Each interview lasted about 30 minutes and contained the same structured guide questions, but the interviewer made extensive use of probing and clarifying questions, and often paraphrased the student's statements in order to confirm meaning. All the interviews were audio-recorded and were administered by the same person. The interviews were carried out during normal school hours, and in a quiet location at each school. The interviewees were asked:

Question 1: Did you get a feeling that you did want to learn or didn't want to learn in s recent lesson? What was that feeling like? These questions were designed to identify whether students had experienced a mastery goal state in the target lesson (Aim (1)).

Question 2: When did that feeling start? This question was designed to investigate whether the mastery goal state was situated in the lesson (i.e., Aim (2)).

Question 3: When you had that feeling of wanting to learn (or not wanting to learn) were you listening, concentrating, and thinking? The purpose of this question was to investigate whether the mastery goal state was linked to learning behaviors (Aim (3)).

Question 4: Did anything change during that lesson that had an effect on the feeling of wanting to learn/not wanting to learn? The purpose of these questions was to investigate whether the mastery goal state was stable or malleable within the lesson (Aim (2)).

2.3 Data analysis

Qualitative techniques were used to code the students' responses to each question. After reading the transcripts, responses that seemed to express the same idea were organized into categories. Inter-rater reliability was carried out using two colleagues who independently coded a sample of 38 responses, and agreement was found in 87% of cases.

Percentages were calculated to identify the main patterns. Comparisons of male and female, and upper and lower achievement levels were carried out using chi-square tests (the Yates correction was necessary as numbers were too low in some squares for a standard chi-square) or Pearson correlation tests.

3 Results

In response to Question 1, 29 of the students (91%) were able to bring to mind a recent lesson in which they had experienced a strong feeling of either wanting to learn or not wanting to learn. The remaining three

students (males from upper and lower levels) gave responses in which it was not clear whether they had experienced either of the feelings. It was decided to not include these students in any further analysis, as they could not clearly be categorized for any part of the interview. The rest of this paper will only include responses from the 29 students who could be clearly categorized.

3.1 Question 1

In response to Question 1 (Did you get a feeling that you did want to learn or didn't want to learn in that lesson?), 41% of the 29 students described a lesson in which they had experienced a positive feeling of wanting to learn about the content at that time, which was interpreted as a positive mastery goal state. The following responses from Question 1 were examples of a positive mastery goal state:

(1) I really wanted to know how to do those equations. (upper level female)

(2) I wanted to learn about it. It's something I like. (lower level male)

On the other hand, 59% of the 29 students described a lesson in which they had experienced a feeling of not wanting to learn about that content at that time. For example:

(1) I just didn't really want to learn it. (upper level male)

(2) I got the feeling that I didn't really want to learn this because it seems too complicated. (lower level female)

These negative statements were interpreted as negative mastery goal states.

3.2 Question 2

Responses to Question 2 (When did this feeling start?) showed that for 97% of the 29 students, the mastery goal state was adopted very close to the beginning of the lesson. This comprised 34% who reported that the feeling had appeared just before the lesson started, as they already had an idea of what the lesson would be like, and 62% who reported that it had started when the teacher began introducing the new topic and content. Chi-square tests were used to compare students for whom the feeling started just before the lesson versus students for whom the feeling started just after the lesson began but there no significant differences between gender ($\chi^2 = 1.610$, $p = 0.2044$) or achievement level ($\chi^2 = 0.817$, $p = 0.3661$). These responses suggested that the mastery goal states were situated in the context of the target lesson.

3.3 Question 3

To investigate whether there was a correlation between the valence of the mastery goal state and the quality of the learning behaviors, each student was scored as either 0 (negative) or 1 (positive) for mastery goal state, and as either 0 (low), 1 (medium), or 2 (high) for quality of learning behaviors. The following were examples of how the learning behavior statements were coded:

(1) Whatever she was saying was just going into my head and I was taking it down and remembering it. I was focused. I was just listening and taking in what she was saying. (coded high)

(2) Most of the time I was trying to listen to the teacher, but distractions pop up and I kind of get side tracked. (coded medium)

(3) I sort of just wrote down what she wrote on the board. Although I was listening it wasn't really connecting to me at all. It was just words that went in one ear and out the other. I wasn't open to being able to understand. (coded low)

A Pearson correlation test showed a strong positive correlation, $r(28) = 0.7307$, overall between the valence of the mastery goal state and the quality of the learning behaviors. To investigate whether there were differences due to gender or achievement level, the correlation coefficients were first calculated separately for male students, $r(11) = 0.8333$; female students, $r(17) = 0.711$; upper achievement level, $r(13) = 0.7804$; and lower achievement level, $r(15) = 0.6719$. Fisher r-to-z transformations were then used to compare the two genders ($z = -0.696$, $p = 0.4862$) and the two achievement levels ($z = 0.542$, $p = 0.5876$), but no significant differences were found. These results indicated that adaptive learning behaviors were strongly linked with the positive mastery goal state for all groups.

3.4 Question 4

In response to Question 4 (Did anything change during that lesson that had an effect on the feeling of wanting to learn/not wanting to learn?) 68% of the 29 students indicated that the mastery goal state had either changed in intensity or valence (positive/negative) as the lesson progressed. Chi-square tests showed that female students (88% of 18 females) were more likely than male students (25% of 14 males) to have experienced this instability, $\chi^2(1) = 7.302$, $p = 0.0069$; but no differences were found between upper and lower achievement levels $\chi^2(1) = 0.172$, $p = 0.6784$.

Of the students who did report changes in the mastery goal state, 65% were changes in a positive direction (i.e., the mastery goal became positive or more positive)

and 35% were changes in a negative direction. Positive changes were most often due to increased success in understanding or improved confidence (*e.g.*, "It gave me a better feeling. I wanted to know more because I got better at it"); whereas negative changes often occurred when there was increased fatigue, boredom, discomfort, or lack of success in understanding (*e.g.*, "It was too boring, and I just gradually gave up").

4 Discussion

The first two aims of this study were to investigate whether students do experience mastery goal states in individual lessons, and if so, to describe their characteristics. The results identified two forms of mastery goal states. The positive form was coded when students indicated they did immediately want to learn the content that was being taught in that lesson. These goals also appeared to fit the criterion for a mastery-approach goal in that they represented the idea of wanting to learn the material[13]. However, the results of the present study differed to previous studies, in that these positive mastery goals were very specific to particular content that was being taught in the lesson at that time. This was noted through student statements such as "I really wanted to know how to do those equations". Thus, a positive mastery goal state was characterized as an episodic feeling of wanting to learn this content right now.

The other type of goal state identified in the study was a negative form, as students expressed a desire to not learn at the time, as represented by statements such as "I just didn't really want to learn it". One issue is whether this should be regarded as an achievement goal at all, as it did not seem to suggest a desire to achieve. However, achievement goals are the purposes or reasons that explain students' engagement[1] so they do not necessarily need to be positive reasons. If a desire to learn can be categorized as a reason then a desire to not learn should also be categorized as a reason. Thus, the negative forms could be interpreted as achievement goals. The second issue is whether these negative goals represent an avoidance orientation. However, mastery-avoidance is the idea of wanting to avoid not learning[2], and this did not seem to apply in the present case, as the students actually didn't want to learn. Consequently, these statements did not appear to match the accepted definition of a mastery-avoidance goal. Instead, it was decided to interpret the episodic feeling of not wanting to learn this content right now as a negative mastery goal state.

It should be emphasized that although students with negative mastery goal states reported they did not want to learn the content right now, it does not necessarily mean that they would not intend to learn it at a later time. As indicated in the results for Question 4, these negative statements became more common as students began suffering fatigue, boredom, discomfort, or lack of success in understanding. This suggests that when these mitigating factors could be removed, say in the comfort of their own home, then their approach to that particular content might not be as negative. Many studies have shown that students can successfully self-regulate their learning when studying at home[20] so students still had that option available. Thus, this feeling of not wanting to learn this content right now was highly episodic, as it only applied to a particular time and place.

Many of the recent studies on achievement goals have adopted the 2x2 model, which comprises mastery-approach, mastery-avoidance, performance-approach and performance-avoidance[21], and there does not appear to be any equivalent to a negative mastery goal state reported in this literature. There are two possible explanations for this. First, previous studies have focused on course-level achievement goals, whereas the present study focused on lesson-level achievement goal states. This is an important difference, because as has just been argued, the feeling of not wanting to learn this stuff right now only applies to a particular episode in time, so it does not imply that students will never want to revisit the content by studying it themselves at a later time during the course. This creates a very real difference between a course-level goal and a lesson-level goal, as the latter can be episodically negative, but can leave open the option of self-regulated learning at a later time.

The second aim of the study was to describe the characteristics of the mastery goal states. Responses to Question 2 showed that for 97% of the students, the episodic mastery goal had started either just before or just after the beginning of the lesson, and other student comments indicated that in some instances it could continue through to the end of the lesson (*e.g.*, "It went right through to when she told us to stop and pack up our bags"). This suggests that the mastery goal states were highly situated in discrete episodes of formal learning. However, responses to Question 4 showed that for 68% of students, there had been changes in the intensity or valence of the mastery goal state as the lesson continued. These changes were the result of changes in factors such as confidence, fatigue, boredom, discomfort, or levels of understanding. Similarly, Turner and Patrick[22] argued that many pedagogical and social factors can change as a lesson progresses, and these can potentially influence the way students think and feel about learning. These results imply that the mastery goal states (both positive and negative) are dynamic, in that they may change in intensity

in response to changing conditions.

The third aim of this study was to investigate whether mastery goal states affected learning behaviors. Responses to Question 3 showed strong positive correlations between the valence of the mastery goal state and the quality of the learning behaviors. When students experienced the positive form they typically reported high concentration, focused attention, and other learning behaviors such as writing their own notes, summarizing key points, asking questions, comparing ideas, and reflecting. These types of behavioral learning outcomes are usually indicative of a "deep" approach to learning[23]. On the other hand, students who were experiencing a negative mastery goal state reported being highly distracted, with little or no focused attention or concentration.

5　Conclusions and implications

This study has provided evidence that students do experience mastery goal states in individual lessons. The positive form is defined as an episodic feeling of wanting to learn this material right now, whereas the negative form is an episodic feeling of not wanting to learn this material right now. These goal states are highly situated and dynamic, as they occur in association with formal lessons, and can change during the lesson in response to changes in conditions. In this way, the study supports the assertion of Biggs[24] that student learning is best understood as an open system model that involves within-student factors as well as contextual factors. The positive mastery goal state is associated with highly focused attention and concentration, and it provides the general driving force to activate adaptive learning behaviors. By contrast, when students experience the negative form they are highly distracted, and educationally adaptive behaviors are typically absent.

Some of the specific findings of the study should also be followed up by further research. It was inferred that students' temporary mastery goal states were not necessarily closely tied to course-related mastery goal orientations. It would therefore be useful to investigate the extent to which the latter might influence the former, or vise versa. In particular, the negative mastery goal state does not appear to have been identified in previous studies, so it would be useful to establish how often students experienced this phenomenon and whether it was in any way related to core subjects more than electives.

This study has one important implication for teaching. High quality learning behaviors were almost exclusively associated with the positive form of the mastery goal state. The results indicated that these were enhanced when students experience increased confidence and increased understanding, so teachers should aim that students do experience these, while avoiding the fatigue, boredom and lack of understanding that were associated with negative shifts in these goal states.

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