

The Control-Value Theory of Achievement Emotions: An Integrative Approach to Emotions in Education

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For students and teachers alike, educational settings are of critical importance. Over the years, many hours are spent in the classroom, social relationships are created there, and the attainment of important life goals depends on individual and collective agency in educational institutions. Because of their subjective importance, educational settings are infused with intense emotional experiences that direct interactions, affect learning and performance, and influence personal growth in both students and teachers (Pekrun, Goetz, Titz, & Perry, 2002a, 2002b).

The significance of emotions experienced in educational settings has been recognized by researchers in different fields, including personality research that has analyzed students' test anxiety since the 1930s (Zeidner, 1998), research on achievement motivation (Heckhausen, 1991), and more recent educational studies focusing on a variety of emotions in education (as evidenced in the chapters of this volume). Emanating from these different

research traditions, various theoretical accounts of students' and teachers' emotions have evolved, but to date, these different traditions and their allied theoretical accounts have operated in relative isolation. As such, research on emotions in education, and on achievement emotions more generally, is in a state of fragmentation today. More integrative frameworks seem to be largely lacking, thereby limiting theoretical and empirical progress.

The control-value theory of achievement emotions (Pekrun, 2000, in press a) described here is an attempt to provide such an integrative framework. It is based on the premise that current approaches to achievement emotions share a number of common basic assumptions, and can be regarded as being complementary rather than mutually exclusive. More specifically, the theory builds on assumptions from expectancy-value theories of emotions (Pekrun, 1984, 1988, 1992a; Turner & Schallert, 2001), transactional theories of stress appraisals and related emotions (Folkman & Lazarus, 1985), theories of perceived control (Patrick, Skinner & Connell, 1993; Perry, 1991, 2003), attributional theories of achievement emotions (Weiner, 1985), and models addressing the effects of emotions on learning and performance (Fredrickson, 2001; Pekrun, 1992b; Pekrun et al., 2002a; Zeidner, 1998, 2007).

In this chapter, we first provide a brief overview of the theory, including a definition of the term *achievement emotion*. We then address the assumptions of the theory regarding the appraisal antecedents of achievement emotions. Next, conceptual corollaries and extensions of the theory are outlined. Specifically, we discuss implications for the multiplicity of achievement emotions, and for their more distal individual and social antecedents. Furthermore, we address assumptions of the theory regarding the effects of achievement emotions on learning and performance; the reciprocal relations between achievement emotions, antecedents, and effects; the regulation of these emotions; and their relative universality across socio-historical contexts, genders, and individuals. In closing, implications for educational practice are outlined.

In describing implications of the theory for emotions in education, we will primarily address emotions as experienced by students. Also, the related empirical evidence gathered so far primarily pertains to students' emotions. However, it should be noted that the theory applies to the achievement emotions experienced by other participants in educational settings as well, such as teachers (Frenzel, Goetz, Pekrun, & Wartha, 2006), principals, administrators, school employees, and parents. For example, many of the emotions experienced by teachers pertain to achievement-related occupational goals of increasing students' competences and fostering their development. The theory aims at explaining these emotions experienced by teachers, in similar ways as it explains the achievement emotions experienced by students.

OVERVIEW OF THE CONTROL-VALUE THEORY

Definition and Dimensions of Achievement Emotions

In the control-value theory, *achievement emotions* are defined as emotions tied directly to achievement activities or achievement outcomes. Achievement can be defined simply as the quality of activities or their outcomes as evaluated by some standard of excellence (Heckhausen, 1991). By implication, most emotions pertaining to students' academic learning and achievement are seen as achievement emotions, since they relate to behaviors and outcomes that are typically judged according to standards of quality—by students themselves and by others. However, not all of the emotions in educational settings are achievement emotions. Specifically, social emotions are frequently experienced in these same settings, as for example, a student's caring for a friend in the classroom. Achievement and social emotions can overlap, as in emotions directed towards the achievement of others (e.g., contempt, envy, empathy, or admiration instigated by the success or failure of others; see Weiner, 2007).

In past research, studies on achievement emotions typically focused on emotions relating to achievement outcomes (e.g., research on test anxiety, Zeidner, 2007; studies on emotions following success and failure, Weiner, 1985). The perspective used here implies that emotions pertaining to achievement-related activities are also considered to be achievement emotions (see Table 1). Examples of outcome-related achievement emotions are the joy and pride experienced by students when academic goals are met, and the frustration and shame when efforts fail. The excitement arising from learning, boredom experienced in classroom instruction, or anger about task demands are but a few examples of activity-related emotions. Activity emotions have traditionally been neglected by research on achievement emotions. The present perspective implies that the scope of existing research should be broadened to include this important class of emotions as well.

The differentiation of activity vs. outcome emotions pertains to the *object focus* of achievement emotions. In addition, as emotions more generally, achievement emotions can be grouped according to their *valence* (positive vs. negative; or pleasant vs. unpleasant), and to the degree of *activation* implied (activating vs. deactivating; see also Linnenbrink, 2007). Using these three dimensions, achievement emotions can be organized in a three-dimensional taxonomy (Table 1; Pekrun et al., 2002a).

Structure of the Theory: Overview of Assumptions and Implications

Figure 1 provides an overview of the different elements of the theory. Assumptions regarding the arousal of achievement emotions are at the heart of the theory. It is assumed that appraisals of ongoing achievement activities,

TABLE 1
A Three-Dimensional Taxonomy of Achievement Emotions

Object Focus	Positive ^a		Negative ^b	
	Activating	Deactivating	Activating	Deactivating
<i>Activity Focus</i>	Enjoyment	Relaxation	Anger Frustration	Boredom
<i>Outcome Focus</i>	Joy	Contentment	Anxiety	Sadness
	Hope	Relief	Shame	Disappointment
	Pride		Anger	Hopelessness
	Gratitude			

^aPositive, pleasant emotion; ^bNegative, unpleasant emotion.

and of their past and future outcomes, are of primary importance in this respect (Figure 1, link 1). Succinctly stated, this key element of the theory stipulates that individuals experience specific achievement emotions when they feel in control of, or out of control of, achievement activities and outcomes that are subjectively important to them, implying that *control appraisals* and *value appraisals* are the proximal determinants of these emotions.

To the extent that this is true, more distal individual antecedents should affect these emotions by influencing control and value appraisals in the first place (Figure 1, link 2). Examples of such antecedents are individual achievement goals as well as achievement-related control and value beliefs. However, the theory acknowledges that emotions are also influenced by non-cognitive factors, including genetic dispositions and physiologically bound temperament (Figure 1, link 3). Concerning determinants in classroom interaction, social environments, and the broader socio-historical context, the theory implies that factors influencing individual control-value appraisals should affect the individual's achievement emotions (Figure 1, link 4).

The theory also addresses the effects of achievement emotions on students' academic engagement and performance. Specifically, it is posited that emotions influence cognitive resources, motivation, use of strategies, and self-regulation vs. external regulation of learning (Figure 1, link 5). The effects of emotions on achievement are posited to be mediated by these processes (Figure 1, link 6). Furthermore, processes of learning as well as their achievement outcomes are expected to act back on students' emotions (Figure 1, link 7), and on the environment within, and outside of, the classroom (Figure 1, link 8). By implication, antecedents, emotions, and their effects are thought to be linked by reciprocal causation over time (see the chain of links 1 to 8 in Figure 1), in line with dynamic systems accounts of emotions in education (Turner & Waugh, 2007). Assumptions on reciprocity have implications for the

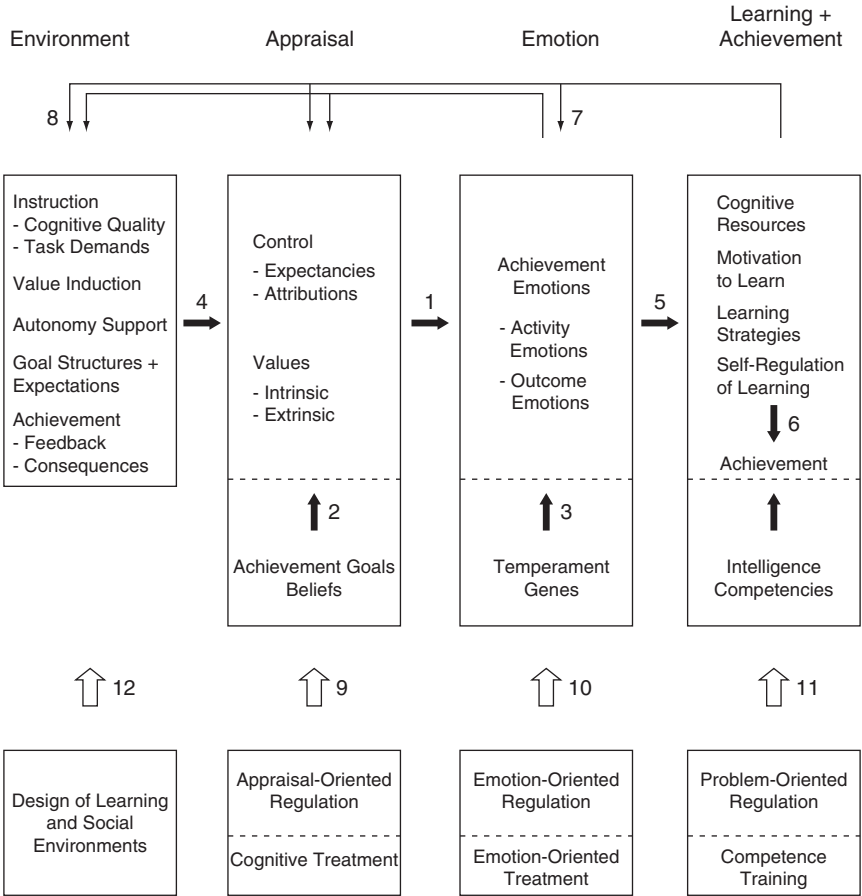


FIGURE 1
Overview of the control-value theory of achievement emotions.

regulation and treatment of achievement emotions (Figure 1, links 9 to 11), and for the design of "emotionally sound" (Astleitner, 2000) learning environments (Figure 1, link 12). Finally, there are some additional features of the theory that are not displayed in Figure 1, including assumptions on the multiplicity of achievement emotions and on their relative universality.

In the following sections, these elements of the theory are addressed in turn. A more complete treatment, however, is beyond the scope of the present chapter (see Goetz, Frenzel, Pekrun, & Hall, 2006; Pekrun, 1988, 1992a, 1992b, 2000, in press a; and Pekrun et al., 2002a, 2002b, for more elaborate discussions of facets of the theory).

CONTROL, VALUES, AND EMOTIONS: LINKAGES BETWEEN APPRAISALS AND AFFECT

Generally, emotions can be influenced by a host of proximal factors, such as situational perceptions, cognitive appraisals, physiological processes, or feedback from facial expression. For the emotions arising from achievement activities and performance outcomes, however, appraisals relating to these activities and outcomes can be assumed to be most important. Among the different appraisals addressed by appraisal theories of emotions (Scherer, Schorr, & Johnstone, 2001), subjective control over activities and outcomes and the subjective values of these activities and outcomes are held to be most relevant by the control-value theory, as noted previously.

Subjective control over achievement activities and their outcomes is assumed to depend on causal expectancies and causal attributions that imply appraisals of control. Three types of causal expectancies are relevant (Pekrun, 1988, in press a; see also Skinner, 1996): *action-control* expectancies that an achievement activity can successfully be initiated and performed ("self-efficacy expectations"; Bandura, 1977); *action-outcome* expectancies that these activities lead to outcomes one wants to attain; and *situation-outcome* expectancies that these outcomes occur in a given situation without one's own action. Examples would be a student's expectation that he will be able to invest sufficient effort in learning some material (action-control expectancy); the expectation that he will, because of his efforts, attain a good grade (action-outcome expectancy); and the expectation that he will get a good grade even if he does *not* act at all (situation-outcome expectancy). Expectations of the latter type, however, will typically be low in achievement situations. The attainment of success and prevention of failure are normally contingent on one's own efforts. By implication, expectations that success can be attained, or failure prevented, presuppose to perceive sufficient internal control over activities and their achievement outcomes, as implied by positive action-control and action-outcome expectancies.

Regarding the *subjective values* of activities and outcomes, the theory makes a distinction between intrinsic and extrinsic values. *Intrinsic values* of activities relate to appreciating an activity per se, even if it does not produce any relevant outcomes. For example, being interested in mathematics, a student can value dealing with math problems, irrespective of the contribution this activity might have to getting good grades in math. *Extrinsic values* pertain to the instrumental utility of activities to produce outcomes, and of outcomes to produce further outcomes (Heckhausen, 1991). An example would be a student who values academic studying because it helps in getting good grades, and who values good grades because they contribute to the attainment of future goals like getting the job she wants (Husman & Lens, 1999).

The theory next makes predictions about how different patterns of these appraisals instigate different achievement emotions (Figure 1, link 1; see Table 2 for a summary of assumptions). These predictions can be grouped according to the type of emotion addressed. Using the object focus dimension of the taxonomy of achievement emotions described above, three types of achievement emotions are distinguished: prospective outcome emotions, retrospective outcome emotions, and activity emotions.

Prospective Outcome Emotions

Prospective, anticipatory outcome emotions are experienced when positively valued success or negatively valued failure are to be expected. If perceived control is high and the focus is on success, *anticipatory joy* is assumed to be instigated. For example, if a student expects to be able to master an upcoming exam, she may simply look forward to the good grade that will result. If the focus is on failure, on the other hand, and there is high subjective control implying the expectation that failure can be avoided, *anticipatory relief* will be experienced. For example, if a student notices that she will be able to prevent an anticipated failure on an exam because her preparation for the exam was successful, she will feel relief upon noticing that she likely worried needlessly, even if the exam has not started yet.

If there is partial control only, implying that success and failure are subjectively uncertain, *hope* will be instigated if the focus is on success, and *anxiety* if the focus is on failure. Since uncertainty implies both chances for success and the threat of failure, mixed feelings comprising both hope and anxiety will be quite typical for many outcome-focused achievement situations. For example, a student who wants to pass an important exam, but does not know if he will be able to do so, can hope for success and can at the same time be afraid of failure (see also Folkman & Lazarus, 1985). Finally, if success is perceived as not being attainable and failure to be certain, hope and anxiety are assumed to be replaced by *hopelessness*. Hopelessness is posited to occur whenever a positive achievement outcome cannot be attained or a negative outcome is subjectively certain. As such, hopelessness is experienced both when cognitions focus on the nonattainability of success, and when the focus is on the nonavoidability of failure.

Retrospective Outcome Emotions

For retrospective outcome emotions following subjectively important successes and failures, subjective control as implied by causal attributions of these outcomes is of importance. More specifically, in line with Weiner's (1985) assumptions on attribution-independent emotions, it is assumed that some of the immediate affective reactions to success or failure do not depend on subjective control (*control-independent* emotions), in contrast to emotions

TABLE 2
The Control-Value Theory: Basic Assumptions on Control, Values,
and Achievement Emotions

Object Focus	Appraisals		Emotion
	Value	Control	
<i>Outcome / Prospective</i>	Positive (Success)	High	Anticipatory joy
		Medium	Hope
		Low	Hopelessness
	Negative (Failure)	High	Anticipatory relief
		Medium	Anxiety
		Low	Hopelessness
<i>Outcome / Retrospective</i>	Positive (Success)	Irrelevant	Joy
		Self	Pride
		Other	Gratitude
	Negative (Failure)	Irrelevant	Sadness
		Self	Shame
		Other	Anger
<i>Activity</i>	Positive	High	Enjoyment
	Negative	High	Anger
	Positive/Negative	Low	Frustration
	None	High/Low	Boredom

involving more elaborate, control-dependent cognitive mediation (*control-dependent* emotions). Concerning control-independent emotions, success is posited to induce *joy* and *contentment*, and the nonoccurrence of expected success is posited to induce *disappointment*. Failure is expected to instigate *sadness* and *frustration*, and the nonoccurrence of expected failure is expected to instigate *relief*.

The emotions *pride*, *shame*, *gratitude*, and *anger* are assumed to be control-dependent (Table 2). These emotions are instigated by causal attributions of success and failure implying that the self, other persons, or situational factors produced the achievement outcome. Pride and shame are posited to be induced by attributions of success and failure to the self, and gratitude and anger by attributions to other persons. These assumptions reflect Weiner's (1985) attributional theory of achievement emotions, but there also are differences. Specifically, the controllability of the perceived *causes* of success and failure as addressed by Weiner's theory is not held to be critical for the instigation of outcome-related emotions. Rather, it is the perceived controllability of the *outcome* itself that is posited to determine which emotion is instigated.

As one implication, the antecedents of pride and shame are seen as being symmetrical. Both of these emotions are self-related affects triggered by success and failure that are appraised as being caused by oneself. Both of them can be induced by any self factors that are perceived as influencing achievement outcomes, typical examples being ability (or lack of ability) and

effort (or lack of effort). For example, if a student performs well, and she attributes this performance to her abilities or successful efforts at learning, she will be proud of her accomplishments. Similarly, if she fails an exam and attributes this failure to a perceived lack of abilities, or to insufficient effort at studying, shame about the failure will be experienced.¹

Activity Emotions

Emotions relating to achievement activities are assumed to depend on the perceived controllability of the activity and on its value. If the activity is seen as being controllable and valued positively, *enjoyment* is instigated. For example, if a student is interested in some learning material and feels capable of dealing with this material, he will enjoy studying. Enjoyment of achievement activities can take different shades, including excitement at challenging tasks, as well as more relaxed states when performing pleasant routine activities. If there is controllability, but the activity is negatively valued, *anger* is posited to be experienced. Examples are activities that can be performed, but are subjectively aversive (e.g., because they require much mental or physical effort). In contrast, if the activity is valued, but there is no sufficient control and obstacles inherent in the activity cannot be handled successfully, *frustration* will be experienced.

Finally, if the activity is valued neither positively nor negatively, *boredom* is induced. For example, if demands are too low, as in monotonous routine activities, there may be insufficient challenge and a lack of intrinsic value, thus producing boredom. Conversely, if demands exceed capabilities and cannot be met, it may also be difficult to detect meaning in the activity, thus reducing its value. Furthermore, subjectively devaluing material that is too difficult may serve to cope with the threat implied by high demands. By implication, as a consequence of lack of value, boredom can be experienced under both low- and high-demand conditions.

Multiplicative Relations of Control and Value

The control-value theory implies that appraisals of both control and value are necessary for an achievement emotion to be instigated. More precisely, the

¹ In Weiner's attributional theory, shame is seen as being primarily linked to attributions of failure to lack of ability, whereas attributions to lack of effort are assumed to arouse guilt. In contrast, pride is held to be both ability- and effort-linked (see, e.g., Weiner, 1985, p. 561 ff.). Weiner's theory thus implies cognitive asymmetry of pride and shame. In the control-value theory, successes and failures perceived as being self-caused are assumed to instigate the self-emotions of pride and shame, respectively, including the arousal of shame by failure that is attributed to lack of effort. This assumption seems to be in line with the empirical evidence from attributional research (including some of Weiner's own studies; e.g., Brown & Weiner, 1984). Guilt, on the other hand, is seen to be aroused by violations of moral norms, implying that guilt is expected to be induced by failure when failure avoidance is seen as a moral obligation. In this case, both shame and guilt would be expected to be aroused.

intensity of achievement emotions is assumed to be a multiplicative function of appraisals of controllability, on the one hand, and value, on the other (see Pekrun, 1988, in press a, for formalized versions of this assumption). For most emotions, emotional intensity increases with increasing controllability (in positive emotions) or uncontrollability (in negative emotions), and with increasing subjective value. If one of the two is lacking, the emotion will not be induced.

Positive, pleasant achievement emotions are posited to be a multiplicative function of the perceived controllability and positive values of activities or outcomes. For example, if a student values some learning material and believes she will be able to master it, she will enjoy learning the material. In contrast, if she is not interested in the material or perceives a lack of control over how to learn it, the learning activity will not be enjoyable. Similarly, negative, unpleasant achievement emotions are assumed to be a joint function of perceived lack of controllability and negative values. For example, if a student perceives failure at an upcoming exam to be possible and not sufficiently controllable, and judges the exam to be important because of its consequences for attaining career goals, he will be afraid of the exam. In contrast, if there is no anticipation of failure, or the exam is irrelevant to the student's goals, no anxiety will be experienced.

These assumptions imply that subjective value moderates the effects of perceived control on achievement emotions. More specifically, the theory implies that values influence both the *type* of emotion experienced and its *intensity*. If an activity or outcome is valued positively, as implied by approach goals, positive emotions are assumed to be instigated. If the subjective value of the activity or outcome is negative, as implied by goals to avoid the activity or outcome, negative emotions are thought to be aroused. The intensity of the emotion experienced is posited to be a function of the degree of subjective value, such as the degree of interest in some learning material or the perceived importance of success and failure on an exam. If no value is perceived, implying that the activity or outcome is subjectively irrelevant, no emotion is instigated, with the exception of boredom that is aroused by nonvalued activities.

Subconscious Appraisals and Habitualized Achievement Emotions

In everyday classroom situations, an elaborate processing of control- and value-related cognitions likely is the exception rather than the rule. With repeated experience, appraisals need no longer be the focus of conscious attention. Also, recurring sequences of situational perceptions, appraisals, and emotions can habitualize over time. Habitualized emotions are based on procedural schemes that short-circuit perceptions and emotions, meaning that perceptions alone are sufficient to induce an emotion, without any need

for intervening appraisals (Pekrun, 1988; Reisenzein, 2001). For example, a student who has had many positive experiences in a class can experience anticipatory enjoyment before entering the classroom, without any need for an elaborate processing of expectancies and values relating to attending the class. With habitualized emotions, appraisals can be part of the activation of procedural emotion schemes, but appraisals are an epiphenomenon of emotion induction in this case, rather than its cause. However, whenever new experiences are made that contradict existing schemes, these schemes can be broken up again and be replaced by renewed appraisal processes, such that emotions can be modified and adapted to new situational circumstances.

Empirical Studies on Appraisals and Achievement Emotions

While assumptions for some emotions addressed by the control-value theory have yet to be tested, evidence from a number of sources corroborates many of the predictions for enjoyment, hope, pride, anger, anxiety, shame, hopelessness, and boredom. In our own research, we used a multimethod paradigm including both qualitative and quantitative studies to test assumptions of the theory. Our qualitative data gathered in 11 interview studies using samples of K-12 and higher education students showed that students' reports about their emotions experienced with regard to learning in the classroom and taking exams were systematically connected to their thinking about control and values in these situations (e.g., Pekrun, 1992c; Titz, 2001). In addition to testing assumptions, we also learned from our interview data how to refine our hypotheses. For example, when initially considering boredom, we focused on the assumption that low-demand conditions implying insufficient challenge induce boredom (Csikszentmihalyi, 2000). However, in our participants' reports about boredom, academic settings characterized by very high perceived demands were also reported to instigate boredom (Titz, 2001), motivating us to enlarge our original hypothesis on relations between demands and this emotion.

In much of our quantitative research, we used scales of the *Achievement Emotions Questionnaire* (AEQ) (Pekrun, Goetz, & Perry, 2005) to explore the relations between emotions and subjective control and values. The AEQ is a multidimensional 24-scale instrument assessing students' class-related, learning-related, and exam-related achievement emotions. Emotions measured within these categories include enjoyment, hope, pride, relief, anger, anxiety, shame, hopelessness, and boredom ($\alpha > .80$ for 20 of the 24 scales in the normative investigation reported by Pekrun et al., 2005). In a number of studies, the enjoyment, hope, and pride scales of the AEQ showed positive correlations with students' achievement-related action-control, action-outcome, and overall success expectations, whereas correlations for the anxiety, shame, and hopelessness scales were negative (for overviews of some of these studies, see Pekrun, Goetz, Perry, Kramer, & Hochstadt, 2004; Pekrun

et al., 2002a; Titz, 2001). The scales also revealed consistent relations with indicators of the subjective value of success and failure, including students' achievement approach and avoidance goals (Pekrun, Elliot, & Maier, in press; see Elliot & Pekrun, 2007).

In addition to main effects, we also examined the interactive effects as implied by our assumptions on multiplicative relations. For example, in a study on university students' enjoyment, anxiety, and boredom experienced in statistics courses, we found that perceived control over and value of course achievement significantly interacted in producing these emotions. In line with assumptions, enjoyment was highest when both control and value were high, and anxiety was highest when control was low, but value was high (Pekrun, Barrera, Goetz, & Maier, 2003).

COROLLARIES AND EXTENSIONS OF THE THEORY

In this section, we provide an overview of the implications of the theory regarding the multiplicity of achievement emotions and their more distal individual and social antecedents. Also, we address assumptions of the theory on the effects of emotions on learning and achievement; on reciprocal linkages between antecedents, achievement emotions, and effects; and on the regulation and treatment of achievement emotions. Finally, the relative universality of the functional mechanisms of achievement emotions is discussed.

Multiplicity and Domain Specificity of Achievement Emotions

The control-value theory implies that specific, discrete achievement emotions arise from different combinations of appraisal antecedents and show qualitative differences in terms of their components. By implication, a full account of these emotions presupposes to acknowledge their multiplicity. Furthermore, control-related and value-related variables have been shown to be organized in domain-specific ways (e.g., students' academic self-concepts and interests; Bong, 2001). Therefore, it follows from the assumptions of the theory that the emotions determined by control and values should be domain-specific as well, in contrast to more traditional conceptions regarding achievement emotions as generalized personality traits (e.g., test anxiety; Zeidner, 1998). This can be assumed not only for the emotions experienced by students, but also for teachers' domain-related emotions pertaining to different subjects they teach. For teachers' emotions, evidence on domain specificity still seems to be lacking. Assumptions on the domain specificity of students' emotions, however, were corroborated in recent studies (Goetz, Pekrun, Hall, & Haag, 2006; Goetz, Frenzel, Pekrun, & Hall, in press).

Goals and Beliefs as Antecedents of Achievement Emotions

Since appraisals of control and values are regarded as proximal antecedents of achievement emotions, it follows from the theory that any individual variables that affect these appraisals can influence resulting emotions as well. Two important groups of such variables are individual achievement goals and enduring control and value beliefs (Figure 1, link 2). As to goals, Pekrun, Elliot and Maier (2006) presented a theoretical model and related empirical evidence implying that different achievement goals help to focus attention on specific sets of activity-related and outcome-related appraisals, thus affecting achievement emotions mediated by these appraisals (see Elliot & Pekrun, 2007).

Similarly, control-related beliefs (e.g., self-concepts of ability) and value-related beliefs (e.g., individual interests) can be assumed to affect appraisals and resulting achievement emotions, in addition to physiologically based temperament directly affecting individual propensities to experience certain emotions. For example, if a student holds favorable control beliefs regarding her achievement in an academic domain like mathematics, an activation of these beliefs will lead to appraisals of challenging tasks as being manageable, and to related positive emotions.

Classroom Instruction and Social Environments as Antecedents of Achievement Emotions

In line with assumptions of social-cognitive learning theories, the control-value theory implies that the impact of environments on individual achievement emotions is also largely mediated by control-value appraisals (Figure 1, link 4). By implication, environmental factors affecting students' appraisals should be important for their emotions. Since all of these factors are of immediate practical relevance, they are discussed in the final section on implications for educational practice.

The Effects of Emotions on Learning and Achievement

Of the three dimensions used by the taxonomy of achievement emotions introduced at the outset, the two dimensions of *valence* and *activation* are posited to be most important to describe the performance effects of emotions. Using these two dimensions, achievement emotions can be grouped into four basic categories: *positive activating* emotions, such as enjoyment, hope, and pride; *positive deactivating* emotions, such as relief and relaxation; *negative activating* emotions, like anger, anxiety, and shame; and *negative deactivating* emotions, like boredom or hopelessness (see Table 1). The theory makes the following predictions regarding the effects of these emotions on cognitive resources, motivation, strategy use, self-regulation, and resulting achievement (Figure 1, links 5 and 6; see Pekrun, 1992b; Pekrun et al., 2002a).

Cognitive Resources

Emotions help focus attention on the object of the emotion. Therefore, enlarging assumptions of the resource allocation model put forward by Ellis and Ashbrook (1988), it can be assumed that positive or negative emotions that do not relate to an ongoing achievement activity distract attention away from the activity, so that they reduce cognitive resources available for task purposes and impair performance needing such resources. For example, if a student is angry about failure, or worries about an upcoming exam, she will experience difficulties in concentrating on learning. Positive emotions relating to the activity, on the other hand, are assumed to focus attention on the activity, thus benefiting performance.

In line with these assumptions, we found that students' enjoyment of learning correlated positively with their flow experiences (which imply focusing cognitive resources on learning), and negatively with their task-irrelevant thinking at learning (Pekrun et al., 2002a). In contrast, anxiety, shame, and hopelessness arising from negative achievement outcomes were negatively related to flow experiences and positively to task-irrelevant thinking (Pekrun et al., 2004). We also used experimental procedures to analyze the effects of extra-task emotions on task-related attention, and found that emotional states induced by affective pictures or recollections of critical life events reduced the cognitive resources available for task purposes, as indicated by event-related brain potentials (Meinhardt & Pekrun, 2003). In line with theoretical assumptions, this was true not only for negative emotional states, but also for positive states related to task-irrelevant stimuli.

Interest and Motivation

Positive activating emotions such as enjoyment of learning are assumed to increase interest and strengthen motivation. Negative deactivating emotions, such as hopelessness and boredom, are held to be detrimental for motivation. In contrast, the effects of positive deactivating emotions like relief, as well as negative activating emotions like anger, anxiety, and shame, are posited to be more complex and ambivalent. Failure-related anxiety, for example, can reduce interest and intrinsic motivation, but can also strengthen motivation to invest effort to avoid failure. If a student is afraid of failing an upcoming exam, intrinsic motivation to learn the material will be reduced, while motivation to avoid failure can be strengthened.

In line with these assumptions, we found that students' enjoyment of learning and instruction related positively to their intrinsic and extrinsic motivation, whereas relations for hopelessness and boredom were negative, and relations for anxiety and shame ambivalent (e.g., Pekrun et al., 2002a; Pekrun et al., 2004). The following excerpts from qualitative interviews with college students demonstrate the motivationally ambivalent nature of achievement-related anxiety (Titz, 2001). Being asked about the motivational

impulses triggered by experiencing anxiety before an important university exam, the answers given by three students were: "I'd rather avoided the exam"; "...no motivation anymore"; and "I just wanted it to be over." However, other participants responded: "I want to pass it...I don't want to fail the exam"; "I wanted to solve the test as well as possible"; and "...it [the feeling] has motivated me to see the exam as a challenge." Finally, one student was able to express the ambivalent nature of his anxiety in a succinct way in the following statement: "...you would rather run away, but on the other hand, you want to fulfil your obligations—overall truly ambivalent feelings."

Strategies of Learning and Problem Solving

Mood research has shown that positive affective states tend to facilitate holistic, flexible, and creative ways of solving problems, whereas negative states can facilitate more rigid and analytical ways of thinking (e.g., Isen, 2000). In line with these findings, it is assumed that positive activating emotions help using flexible learning strategies, such as elaboration of learning material, whereas negative activating emotions can facilitate the use of more rigid strategies, such as simple rehearsal. If a student enjoys learning mathematics, for example, it may be easier for her to engage in creative mental modeling of mathematical problems, whereas anger or anxiety can lead her to resort to exercising algorithmic procedures. For deactivating emotions, it is assumed that these emotions are detrimental to any more elaborate processing of task-related information.

In our field studies, we found positive relations for students' enjoyment, hope, and pride, and their use of flexible learning strategies (elaboration and organization of learning material). The evidence for beneficial effects of anger, anxiety, and shame on rehearsal was weaker (Pekrun et al., 2002a). Similarly, a recent study on the emotions experienced by teachers in math classrooms showed that these teachers' enjoyment of teaching related positively to their use of creative teaching methods oriented towards mental modelling of mathematical problems (Frenzel et al., 2006).

Self-Regulation vs. External Regulation of Learning and Problem-Solving

Self-regulation of behavior requires flexible use of meta-cognitive, meta-motivational, and meta-emotional strategies, making it possible to adapt behavior to goals and environmental demands. It is assumed that positive activating emotions, such as enjoyment of learning, enhance self-regulation, whereas negative emotions, such as anxiety or shame, facilitate reliance on external guidance. In line with this assumption, we found that students' enjoyment of learning related positively to their perceived self-regulation of academic

learning, whereas achievement-related anxiety and shame related to perceived external regulation of learning by teachers and parents (Pekrun et al., 2002a; Pekrun et al., 2004).

Academic Achievement

The effects of emotions on achievement are assumed to be a joint product of the four mechanisms described above, and any interactions between these mechanisms and task demands. By implication, the overall effects of emotions on achievement are inevitably complex. For most task conditions, however, it can reasonably be assumed that positive activating emotions, such as activity-related enjoyment, exert positive overall effects, and negative deactivating emotions, such as hopelessness and boredom, exert negative effects. The effects of positive deactivating emotions, such as relaxation, and of negative activating emotions, such as anger, anxiety, and shame, can be assumed to be more complex, because of the ambivalence of the effects of these emotions on motivation and cognitive processing. If a student is able, for example, to use the motivational energy implied by exam-related anxiety to increase his efforts, and if task demands are congruent to a more rigid processing of information as facilitated by anxiety, exam performance can be enhanced instead of being impaired (see Turner & Waugh, 2007, for related assumptions on shame).

Our empirical findings are largely in line with these assumptions. In a number of studies, we consistently found that students' enjoyment, hope, and pride as assessed by scales of the AEQ related positively to their academic achievement, whereas their hopelessness as well as boredom related negatively to achievement (Pekrun et al., 2002a). For anger, anxiety, and shame, overall sample correlations were negative as well, suggesting that negative effects of these emotions outweigh positive effects across individuals. However, as expected, we also found that there are individual students who can profit, in terms of motivation and achievement, from their anxiety. Specifically, in a diary study investigating students' individual trajectories of achievement emotions experienced before and during their final university exams, we found that exam anxiety correlated negatively with achievement-related agency over time in many students, but showed positive correlations in others (Pekrun & Hofmann, 1996).

Feedback Loops of Emotions, Antecedents, and Effects: The Individual and Social Dynamics of Emotion Systems

Emotions are assumed to influence learning, but learning and achievement outcomes are among the antecedents of students' appraisals and emotions, thus implying that emotions, their effects, and their antecedents are linked by reciprocal causation over time within individuals (Figure 1). Furthermore, the relationship between appraisals and emotions is conceived to be bidirectional

as well, with appraisals triggering emotions, and emotions acting on appraisals by mechanisms of emotion-congruent activation of memory networks. Beyond the individual level, the assumptions of the theory imply that teachers' and students' emotions also reciprocally influence each other, implying that their emotions are closely and often inextricably intertwined in classroom settings (also see Meyer & Turner, 2007). Teachers' enjoyment and enthusiasm, for example, can induce enjoyment of classroom instruction in students, and students' enjoyment can in turn enhance teachers' positive affect, one important mechanism being emotional contagion (Hatfield, Cacioppo, & Rapson, 1994) transmitting emotions between teachers and students. Reciprocal causation implies that there can be co-development of emotions in teachers and students that can extend over months and years, and can take beneficial as well as detrimental forms.

In line with perspectives of dynamical systems theory (see Turner & Waugh, 2007), it is assumed that reciprocal causation can take different forms, and can extend over fractions of seconds (e.g., in linkages between appraisals and emotions), days, weeks, months, or years. Positive feedback loops likely are quite typical (e.g., enjoyment of learning and success on exams reciprocally reinforcing each other), but negative feedback loops can also be important (e.g., failure inducing anxiety in a student, and anxiety motivating the student to successfully avoid failure on the next exam).

In our empirical studies, we found evidence for feedback loops within students, and preliminary evidence for relations between teachers' and students' affect (Frenzel et al., 2006). Specifically, in structural equations modeling of longitudinal data on students' academic development from grade five to ten, we found that students' emotions and their achievement were reciprocally linked over the years, implying that academic success and failure were important antecedents of students' emotional development and that their emotions reciprocally affected their academic achievement (e.g., Pekrun, 1992a). Typically, these feedback loops were positive, with success and positive emotions as well as failure and negative emotions reinforcing each other over the years.

Regulation and Treatment of Achievement Emotions

Since emotions, antecedents, and effects are assumed to be reciprocally linked over time, the control-value theory implies that emotions can be regulated and changed by addressing any of the elements involved in these cyclic feedback processes (Figure 1, links 9 to 12). Regulation and treatment of achievement emotions can target the emotion itself (*emotion-oriented* regulation and treatment; e.g., using relaxation techniques or taking drugs); the control and value appraisals underlying emotions (*appraisal-oriented* regulation and treatment; e.g., cognitive restructuring and therapy); the academic competences determining students' agency (*competence-oriented* regulation and treatment; e.g., training of learning skills); and the environment within educational

institutions, including classroom instruction (*design of academic environments*). A more complete analysis of emotion regulation and the treatment of achievement emotions is beyond the scope of this chapter (see Goetz, et al., 2006; Zeidner, 1998; and see below for implications regarding the design of academic environments).

Relative Universality of Achievement Emotions Across Socio-Historical Contexts, Genders, and Individuals

The control-value theory is based on the assumption that general functional mechanisms of human emotions are bound to universal, species-specific characteristics of our mind. In contrast, specific contents of emotions as well as specific values of process parameters (e.g., the intensity of emotions) may be specific to different cultures, genders, and individuals. This assumption implies that the basic structures and causal mechanisms of emotions follow general nomothetic principles, whereas contents, intensity, and duration of emotions can differ.

Concerning gender differences, for example, it follows from the theory that relations between control and value appraisals, on the one hand, and achievement emotions, on the other, should be structurally equivalent for males and females: Emotions depend on control and value appraisals in both genders. However, to the extent that perceived control and academic values differ between the genders, resulting emotional experiences can differ as well. Corroborating this assumption, we found, for example, that the relationships between girls' and boys' control and value appraisal in mathematics, on the one hand, and their mathematics emotions, on the other, were structurally equivalent across genders (Frenzel, Pekrun, Goetz, & vom Hofe, 2006). However, mean scores for perceived control were substantially lower in girls. As a consequence, girls reported less enjoyment in mathematics as well as more anxiety and shame. Corroborating assumptions of the theory, these differences in emotions proved to be mediated by the gender differences of appraisals.

Similar arguments can be made for different countries and cultures. For example, in a cross-cultural comparison of Chinese and German middle school students' achievement emotions, we found structurally equivalent relations of appraisals and emotions. Mean levels of emotions, however, differed between cultures. The Chinese students reported significantly more achievement-related enjoyment, pride, anxiety, and shame and significantly less anger than the German students (Frenzel, Thrash, Pekrun, & Goetz, in press).

IMPLICATIONS FOR EDUCATIONAL PRACTICE

The control-value theory implies that students' and teachers' achievement emotions can be influenced by changing subjective control and values relating

to achievement activities and their outcomes. This can be achieved by shaping the learning environments of students and the occupational environments of teachers in “emotionally sound” ways (Astleitner, 2000). Important features of these environments likely affecting students’ and teachers’ emotions are described in the following sections (Pekrun, in press a, b).

Cognitive Quality of Academic Environments

The cognitive quality of learning environments and the implied task demands are assumed to influence students’ valuing of learning material, as well as their competences and perceived control. Clearly structured, cognitively activating material and challenging task demands that match students’ capabilities likely benefit students’ competences and interest, thus positively affecting their appraisals and emotions. If task demands are too low or too high, boredom can result instead, as argued previously. Similar assumptions can be made for the emotional effects of teachers’ academic environments. For example, if students contribute to a cognitively stimulating classroom environment by asking challenging questions and giving competent answers, teachers’ enjoyment of teaching likely is enhanced.

Motivational Quality of Academic Environments: Induction of Values

By a number of different mechanisms, including both direct verbal messages and more indirect messages conveyed by the behavior of significant others, environments shape students’ and teachers’ interests and values underlying their emotions. For example, matching learning tasks to students’ needs, and occupational tasks to teachers’ needs, is posited to be beneficial. Examples are authentic learning tasks that meet students’ interests, and teaching assignments that meet teachers’ motivation to educate students, instead of spending hours in serving administrative duties. Also, by way of observational learning and emotional contagion, teachers’ and parents’ own enthusiasm can induce enthusiasm in students (see Meyer & Turner, 2007, on teachers’ “emotional scaffolding” of students’ emotions). Conversely, teachers’ enjoyment can be fostered by students’ positive classroom emotions.

Support of Autonomy and Cooperation

To the extent that students are capable and motivated to self-regulate their learning, environments supporting self-regulated learning are held to increase students’ sense of control, valuing of learning, and resulting emotions. Also, cooperative learning can be beneficial, on condition that students are provided with the social competences to make use of collaboration. Similarly, teachers’ perceived control, values, and emotions likely are strongly

influenced by chances for autonomy and cooperation within the faculty of their school.

Goal Structures and Expectations

Institutional goal structures probably exert profound effects on subjective control, values, and emotions of the institution's members (Johnson & Johnson, 1975; Pekrun, in press a). Competitive structures as defined by social-comparison performance goals (Elliot & Pekrun, 2007) imply negative contingencies between different members' chances for success, thus likely reducing perceived control over success in many individuals, and instigating negative emotions, such as anger, anxiety, or hopelessness. Individualistic goal structures pertaining to mastery of goals, as well as cooperative goal structures, probably are more beneficial in terms of mean levels of perceived control. This can be assumed to be true both for the goal structures provided for students in their classrooms and for the occupational goals set for teachers. Goal structures can be influenced by the reference norms used to evaluate students' and teachers' achievements (e.g., social comparison norms vs. criterion-referenced and individual norms).

The expectations of significant others can exert similar effects, on condition that they are adopted by the teachers and students themselves. For example, parents and administrators often expect teachers to have control over students' discipline and classroom learning, but teachers typically have only partial influence over their students' behavior. If teachers take over expectations that are too high, a loss of subjective internal control will be experienced that can trigger feelings of anger and frustration, with burnout and quitting the job being possible long-term consequences (see Sutton, 2007, as well as Liljestrom, Roulston, & deMarrais, 2007).

Feedback and Consequences of Achievement

Feedback of success and failure at learning affects students' outcome-related achievement emotions. Also, feedback shapes the expectancies and perceived values of future performance that determine students' prospective emotions. Similarly, the feedback given by administrators, students, or parents influences teachers' performance-contingent emotions. Information about the controllability and values of performance, as implied, for example, by teachers' messages about the causes of students' performance, are especially critical for ensuing appraisals and emotions pertaining to future performance. Furthermore, contributing to the extrinsic value of achievement, the long-term consequences of achievement are of critical importance. For example, if a student can expect that she will not get employment after high school, irrespective of any academic grades, academic attainment is devalued, thus reducing related emotions as well as achievement-related motivation.

Treatment of Appraisals and Emotions

Appraisal theories like the control-value theory imply that educators can make an attempt to change students' emotions by changing their appraisals. For example, attributional retraining has been proven to be effective in changing students' motivation, and can probably be used to change their emotions as well (Perry & Penner, 1990; Perry, Hall, & Ruthig, 2005). In similar ways, college professors could help students in pre-service teacher education, and instructors in continuing education could help teachers later on, to deal with the affective aspects of their professional development.

Fostering Self-Regulation of Emotions

Finally, educators can assist students in developing regulatory skills enabling them to self-regulate their control and value appraisals, and resulting achievement emotions (Goetz et al., 2006). Similarly, it should prove possible to develop programs helping teachers to enhance their competences for regulating the appraisals and emotions they experience in the classroom and when interacting with colleagues, administrators, and parents.

CONCLUSION

In this chapter, we provided an overview of the assumptions and corollaries of the control-value theory of achievement emotions, as well as some of its implications for educational practice. On a conceptual level, the theory makes an attempt to provide a theoretical framework making it possible to integrate constructs and assumptions from a variety of theoretical approaches to emotions in education and to achievement emotions more generally. Empirically, many facets of the theory have consistently been corroborated in qualitative and quantitative investigations. Other facets, however, still await empirical analysis (the assumptions on activity emotions, for example, have not yet been tested directly in experimental studies). Also, some parts of the theory have been tested in pilot investigations, but the evidence collected so far is too preliminary to warrant firm conclusions (e.g., the assumptions on relations between achievement goals and students' emotions; Pekrun et al., 2006).

Perhaps most importantly, the assumptions provided by the theory on how to design emotionally sound learning environments for students, and occupational environments for teachers, have yet to be tested in empirical intervention studies. There is evidence that educational interventions can reduce students' test anxiety (e.g., Ruthig et al., 2004; Zeidner, 1998, 2007). The control-value theory implies that shaping educational environments in adequate ways can help to change achievement emotions other than anxiety as well. Future research should systematically explore measures to help both students and

teachers to develop adaptive achievement emotions, prevent maladaptive emotions, and use their emotions in productive and healthy ways (Pekrun & Schutz, 2007).

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