



## Measuring students' emotions in the early years: The Achievement Emotions Questionnaire-Elementary School (AEQ-ES)

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### ABSTRACT

This article reports about the development and validation of a measurement instrument assessing elementary school students' achievement emotions (Achievement Emotions Questionnaire-Elementary School, AEQ-ES). Specifically, the instrument assesses students' enjoyment, anxiety, and boredom pertaining to three types of academic settings (i.e., attending class, doing homework, and taking tests and exams). Scale construction was based on Pekrun's (2006) control-value theory of achievement emotions. The instrument was tested using samples from German and American elementary school classrooms. The results of Study 1 (German sample) corroborate the reliability and structural validity of the new emotion measure. Moreover, they show that students' achievement emotions were linked with their control and value appraisals as well as their academic performance, thus supporting the external validity of the measure as well as propositions of Pekrun's (2006) control-value theory of achievement emotions. Study 2 (American sample) corroborated the cross-cultural equivalence of the measure and the generalizability of findings across the German and American samples. Implications for research on achievement emotions and educational practice are discussed.

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Emotions are ubiquitous in achievement settings. Students may feel proud about good grades, worry that they don't understand course material, get angry about a teacher who treats them unfairly, or feel bored when dealing with a topic in which they are not interested. Despite the diversity of emotions students experience in their courses on a daily basis (Pekrun, Goetz, Titz & Perry, 2002), research on different achievement emotions has been slow to emerge (Schutz & Pekrun, 2007). This is especially puzzling because emotions have a large impact on students' motivation, learning, and performance, as well as on their health and well-being (Pekrun, 2006). Specifically, whereas research on emotions in older students has been growing in recent years (Efklides & Volet, 2005; Linnenbrink, 2006; Linnenbrink-Garcia & Pekrun, 2011; Schutz & Pekrun, 2007), empirical evidence on the achievement emotions experienced by elementary school children is largely lacking to date.

One possible reason for the lack of research on elementary students' achievement emotions is the limited number of measurement instruments. Exceptions include instruments assessing elementary school students' achievement anxiety, such as scales on test anxiety (Weinert & Helmke, 1997) and mathematics anxiety (e.g., Grützemann, 2003; Suinn, Taylor, & Edwards, 1988). In contrast,

established measures capturing a range of emotions in addition to anxiety are lacking. Therefore, the primary goal of the present research was to construct an instrument that measures a variety of distinct emotions in elementary school students. Pekrun's control-value theory of achievement emotions (Pekrun, 2000, 2006; Pekrun, Frenzel, Goetz, & Perry, 2007) served as the theoretical framework for constructing and validating the instrument.

### 1. Previous research on elementary students' achievement emotions

Historically, achievement emotion researchers primarily pursued two lines of research: test anxiety studies, and studies on the attributional antecedents of achievement emotions (Hembree, 1988; Seipp, 1991; Zeidner, 1998). Research on test anxiety focused primarily on high school and college students; in contrast, studies investigating this construct in the early elementary school years are scarce. For instance, in Hembree's (1988) comprehensive meta-analysis of research on test anxiety, only one study was listed on 11- and 12-year old students and none on children younger than 11 years of age. Likewise, in a meta-analysis on the relationship between anxiety and achievement in mathematics, studies conducted in the early elementary grades were found to be rare (Ma, 1999).

The second commonly pursued line of emotion research addressed the attributional antecedents of achievement emotions. In his

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attributional theory of achievement emotions, Weiner (1985) proposed that emotions such as pride, shame, guilt, etc., depend on students' causal attributions of success and failure outcomes. Based on Weiner's (1985) theory, Stipek and Gralinski (1991) conducted a study in the elementary school context that investigated gender differences in third graders' pride and shame in mathematics. The results indicated that girls felt less proud about success and were more concerned about public humiliation (i.e., shame) after failure in mathematics than boys.

An additional line of emotions research concerns positive emotions in the elementary school years. Helmke (1993), for example, investigated the development of enjoyment of learning from kindergarten to grade five in mathematics and German. Results from this longitudinal study showed that enjoyment of learning decreased across the elementary school years, but did so while maintaining a relatively high level. In sum, with few exceptions, research on this topic is largely lacking, especially so with regard to studies examining a range of different achievement emotions.

## 2. The control-value theory of achievement emotions

Pekrun's (2006) control-value theory of emotions served as a theoretical framework for the present research. This theory integrates basic principles from attributional theories of achievement emotions (e.g., Weiner, 1985), expectancy-value approaches to emotions (Pekrun, 1992; Turner & Schallert, 2001), theories of perceived control (Patrick, Skinner, & Connell, 1993; Perry, 1991), and models involving the effects of emotions on learning and performance (Fredrickson, 2001; Pekrun et al., 2002; Zeidner, 1998). As part of the theory, Pekrun (2006) proposed a taxonomy that describes emotions along three dimensions: valence (positive vs. negative), level of activation (activating vs. deactivating), and object focus in terms of being related to either achievement activities (e.g., learning) or achievement outcomes (i.e., success and failure). For example, the experience of enjoyment during a specific class may be characterized as a positive, activating, activity-related emotion. In contrast, anxiety when facing an exam is considered a negative, activating, outcome-related emotion.

In his theory, Pekrun (2000, 2006) proposes that control and value appraisals serve as critical antecedents of achievement emotions. Control-related appraisals involve individuals' achievement-related competence beliefs, expectancies and attributions. Value appraisals refer to the perceived value of an activity or outcome (e.g., the perceived importance of success). Perceived controllability and the positive subjective value of achievement activities are expected to evoke positive activity emotions, such as enjoyment of learning, and reduce negative activity emotions, such as boredom and anger. While boredom has traditionally been assumed to be caused by a lack of challenge (Csikszentmihalyi, 1975), more recent studies have found that boredom is indeed related to a low self-concept of ability (Goetz, Pekrun, Hall, & Haag, 2006) and low perceived control (Pekrun, Goetz, Daniels, Stupnisky, & Perry, 2010). The theory further proposes that low perceived controllability and the negative subjective value of failure outcomes elicit negative outcome emotions such as anxiety, hopelessness, or shame. For instance, a student who anticipates failing an important exam and feels incapable of passing it will experience failure-related anxiety (Pekrun, 1992). In sum, the control-value theory posits that control and value appraisals serve as proximal antecedents of specific, discrete achievement emotions.

## 3. Examining elementary school students' specific emotions

### 3.1. Focus on enjoyment, anxiety, and boredom

The present research focused on examining three achievement emotions that are of primary importance in achievement settings, namely, enjoyment, anxiety, and boredom. We analyzed the struc-

tures and achievement outcomes of these emotions with regard to a specific domain (mathematics) and across two cultural contexts. The three emotions were selected because they are frequently experienced in achievement settings (Csikszentmihalyi & Larson, 1987; Helmke, 1993; Pekrun, Goetz, Frenzel, & Perry, 2011; Pekrun et al., 2002). Furthermore, the emotions provide a representation of the major dimensions of Pekrun's (2006) taxonomy of achievement emotions. Specifically, they represent both activity-related emotions (enjoyment and boredom) and outcome-related emotions (anxiety), both positive (enjoyment) and negative emotions (boredom and anxiety), and both activating (enjoyment, anxiety) and deactivating emotions (boredom). Furthermore, achievement emotions can be related to different academic settings, such as attending class, studying, and taking tests and exams. As these settings vary in respect to their functions, demands, and social structures, emotions may likewise differ across these settings. For example, students who enjoy attending class may not necessarily enjoy the challenge of an exam. As a consequence, measurements investigating achievement emotions should distinguish between emotions related to these different academic settings (Pekrun et al., 2011).

### 3.2. Domain specificity of emotions: focus on mathematics

Previous research has shown that control- and value-related constructs such as self-concepts of ability, achievement expectancies, and interest are best examined when considered in specific subject domains (e.g., Bong, 2001; Marsh, 1986). In turn, emotions depending on control and value appraisals should also be considered at the domain-specific level. Empirical evidence supports this proposition in terms of weak between-domain relations of various achievement emotions (see Goetz et al., 2006; Goetz, Frenzel, Pekrun, Hall, & Lüdtke, 2007). As a consequence, in the present research we constructed an instrument that assesses emotions in a domain-specific way; specifically, the questionnaire measured students' emotions in mathematics.

### 3.3. Achievement outcomes

In his control-value theory Pekrun (2006) suggests that positive activating emotions generally improve academic achievement by promoting task-related attention, strengthening motivation, and enhancing use of flexible learning strategies. For instance, enjoying a particular school subject will direct attention toward related tasks, which consequently leads to better student performance. Several studies provide empirical evidence for the positive enjoyment-performance link (e.g., Helmke, 1993; Pekrun et al., 2002). In contrast, negative deactivating emotions such as boredom have been found to impair motivation and self-regulation of learning, leading to shallow information processing and poor student performance (Pekrun et al., 2010). Negative activating emotions such as anxiety may also impair interest and intrinsic motivation; however, they may enhance extrinsic motivation to invest effort and avoid failures. Consequently, the effects of negative activating emotions on achievement outcomes are more variable (see e.g., Pekrun et al., 2002), although the negative impact of these emotions on overall academic achievement are generally believed to outweigh any advantageous effects (Hembree, 1988; Pekrun et al., 2007). Taken together, we hypothesized positive relations of enjoyment with students' mathematics achievement and negative relations for students' boredom and anxiety.

### 3.4. Cultural context

Elementary school students' emotions in mathematics may also differ across different cultural contexts. For example, the German and the American elementary school systems traditionally differ in a number of aspects that may influence students' emotions, the most salient difference being the relative emphasis on *tracking* or *ability*

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