

Entwicklung und Evaluation eines Trainings emotionaler Kompetenzen für

Lehramtsstudierende -

Development and Evaluation of an Emotional Competence Training for Teacher Trainees

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Iris Schelhorn aus

Kulmbach.

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Gutachter (Betreuer): Prof. Dr. Christof Kuhbandner

Gutachter: Prof. (apl.) Dr. Stefan Wüst

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Preamble

To date, researchers agree that emotions in teachers “matter” (Frenzel, Goetz, Stephens, et al., 2009, p. 129), that “emotionally and socially competent teachers set the tone of the classroom” (Jennings & Greenberg, 2009, p. 492), and that “students (...) respond to their teachers’ emotions as part of (their) social-emotional development” (Wang et al., 2019, p. 663). Teacher emotions affect students’ emotions (Frenzel, Goetz, Lüdtke, et al., 2009), students’ wellbeing and emotional distress (Braun et al., 2020), the teacher-student relationship (Chen, 2019), instructional methods (also Chen, 2019), and teachers’ mental health (Chang, 2013). Therefore, researchers widely agree that it is of crucial importance to investigate the nature, antecedents, and consequences of teacher emotions as well as to train teachers’ and pre-service teachers’ emotional competence (EC). This dissertation project that was funded by the German ministry of education and research (BMBF) had the main goal to develop and evaluate an EC-training in pre-service teachers.

In this dissertation, I will therefore provide an overview on the research topic of EC and a proposal for a training structure for an EC-training of pre-service teachers. The theoretical introduction includes definitions of EC and its sub-dimensions as well as related literature. Furthermore, I will introduce specific theoretical frameworks for the development and regulation of teacher emotions and studies evaluating these models. I will also discuss emotion regulation as a potential mediating factor of the association between teacher emotions and the teacher-student relationship. Then, I will present four studies:

- **Study 1:** This study investigated emotion regulation and the teacher-student relationship as predictors for emotional outcome at school in a sample of in-service teachers.

After the first study, I will introduce the theoretical framework for the developed EC-training, which will be evaluated in the following three studies.

- **Study 2:** This experimental laboratory study was conducted to investigate one unit of the EC-training: Effects of empathetic perspective taking as an emotion regulation strategy on pre-service teachers’ anger and aggression.

- **Study 3:** This experimental laboratory study included an experimental manipulation of teacher-student closeness and goal attainment and investigated their effect on emotional outcomes in a sample of pre-service teachers.
- **Study 4:** This study presents a large amount of qualitative data that were generated by the students participating in the EC-training (the corresponding quantitative data will be published elsewhere).

The concluding discussion contains a summary of results and important contributions of this work, its limitations, as well as theoretical considerations for further research and practical implications.

The development and evaluation of an emotional competence training for pre-service teachers

Before I start: Regarding the target group: Pre-service or in-service teachers?

In Germany, teacher education is split into three stages: The first stage, which is attended by pre-service teachers, begins and ends with studying two or more chosen subjects at the university. After having successfully finished their university degree, teachers start their first year of teaching classes at school but also attend by-seminars, thus becoming in-service teachers. One year later, they terminate this second stage and enter the third stage where they are qualified in-service teachers. Consequently, emotions experienced by pre-service teachers and in-service teachers are rarely the same and often occur for different reasons, because these stages are characterized by different learning content, setting, and challenges. For instance, anxiety is assumed to be more prevalent in teacher trainees than in in-service teachers (Frenzel, 2014). Antecedents of in-service teachers' emotions are often student behavior (Chang, 2013) and its appraisals (Frenzel et al., 2020), while emotions in pre-service or in-service teachers in their first year have been shown to mostly be elicited by a lesson's contents (Büssing et al., 2020) but also by pre-service teachers' repeated exposure to feedback and performance tests (Frenzel, 2014). This situation of differing relevance of certain emotions between the target groups now poses the question, which emotions and emotion-related topics should be considered for the development of an EC training for pre-service teachers. There would be reasons to consider emotions occurring in both stages: On the one hand, experiencing mastery of current and actual emotions might enhance pre-service teachers' self-efficacy regarding emotion regulation, which might elevate the probability for progressively dealing with future emotions. On the other hand, the emotions pre-service teachers might experience in their job after leaving university or training might be more relevant in the end, because these are the emotions which they need to be prepared for. After all, as Anttila et al. (2016) stated: "early career teachers experience an 'emotionally loaded reality shock' when they enter the profession" (p. 456). By stating this, the authors point a finger on the gap between teacher education and teachers' professional lives after studying. Therefore, in this work, both groups, pre- and in-service teachers, and their emotions will be

considered, if possible. I will heavily have to rely on literature about in-service teachers because for a long time, the role of emotions in pre-service teachers has been neglected (Ketonen & Lonka, 2012). To date, there are still only a few studies specifically investigating pre-service teachers' emotions. These studies will be included in the theoretical considerations.

Before I start: Regarding emotion definitions

There is a clear consensus among researchers that emotions can be categorized, which means that emotions are not all just one and the same phenomenon but, in some ways, different from one another. However, this is already where the consensus ends. According to Scherer (2005), psychologists classify emotions either by using a discrete or a dimensional approach. One of the oldest discrete approaches is the definition of "basic emotions" (Ekman, 1992) by which an emotion describes a state that is accompanied by visible changes in physiology and facial expressions. According to discrete approaches, emotions are not related to each other via certain dimensions underlying their conceptualization, and cannot be categorized via their characteristic values on these dimensions – which is the basic assumption of dimensional approaches. Dimensional approaches have a long history dating back to Wundt (1905) as cited by Scherer (2005). Russell (1983) first introduced the two-dimensional space model, which is heavily used in psychological research, with the dimensions of valence and arousal, or the one- or two-dimensional model of valence (positive and negative emotions) that is very often used by current emotion regulation researchers without elaborating on reasons for the chosen classification (e.g., Quoidbach et al., 2010; Waugh, 2020). It can be assumed that these models are two-dimensional as well because there are findings demonstrating that associations between positive and negative affect depend on circumstances such as for instance a crisis (Reich et al., 2003). This shows that they are not manifestations of the same underlying scale. Some researchers categorize emotions depending on the cognitions preceding them such as subjective control and value evaluations according to the theory of achievement emotions (Pekrun, 2006). Furthermore, there are former (e.g., Lazarus, 1991) as well as more contemporary (e.g., Scherer, 2005, 2009) researchers emphasizing the necessity of an elaborated and precise view of emotions. This complexity of the emotion definition is reduced in several EC or emotional intelligence (EI) models neglecting the

multidimensionality of the emotion construct and using any selection of emotion words deemed suitable by the developer of the concept. In the explanatory chapter of his concept of EC for clinical patients, for instance, Berking (2017) uses the words “negative emotions”, “fear”, “shame”, “depressive mood” and “guilt” (pp. 17 – 24), without elaborating on the underlying conceptualization of emotions/affective states. This demonstrates how impossible it is to speak of “emotions” and to be entirely conclusive about the concept. In the studies to follow, and in the EC training included in this work, I prefer to use the emotion definition of the component process model (Scherer, 2005) as an “episode of interrelated, synchronized changes in the states of all or most of the five organismic subsystems in response to the evaluation of an external or internal stimulus event as relevant to major concerns of the organism” (p. 697). Thus, emotions will be operationalized by measuring one or – better – several of the emotion components subjective feeling, motor expression, motivational component, (neuro-)physiological component and cognitive component. Consequently, in this work, whenever possible, various emotion measures were applied to ensure convergent validity. If applicable in between-group designs, measures of affective traits such as trait anger were included in the studies.

1. Defining emotional competence

1.1. Emotional competence in teachers

There are two current models giving (partial) definitions of EC in teachers: The first is the prosocial classroom mediational model of Jennings and Greenberg (2009) seeing teachers’ social-emotional competence (SEC) and well-being as predictive of students’ social, emotional, and academic outcomes through the mediators of healthy student-teacher relationships, effective classroom management, and effective implementation of social-emotional learning. The authors furthermore assume that these mediator variables may contribute to a healthy classroom climate and therefore contribute to teachers’ commitment to the profession and the prevention of teachers’ emotional burnout. Jennings and Greenberg (2009) compare their model to the EI model by Salovey and Mayer (1990) declaring that they intentionally preferred the use of a broader model that emphasizes the connection between teacher competencies and student performance and competencies (which the model of EI does not) because this is relevant at school. The SEC-model describes emotionally

competent teachers as teachers with high self-awareness regarding emotions and emotional patterns and as teachers who are able to manage their emotions and “regulate their emotions in healthy ways that facilitate positive classroom outcomes without compromising their health” (Jennings & Greenberg, 2009, p. 495). Furthermore, it emphasizes the importance of the ability to generate enthusiasm and joy to motivate learning. The second component of the model – social competence – refers to the ability to build supportive relationships at school and solve conflicts as well as the conveyance of prosocial values.

Kunter et al. (2013) developed a second influential model of teacher professional competence, which is particularly relevant in Germany. This model includes, in addition to pedagogical content knowledge, two facets that might have some overlap with EC: enthusiasm for teaching and self-regulatory skills. Traditionally, Kunter et al. (2008) define teacher enthusiasm “almost synonymously with enjoyment” (Keller et al., 2016, p. 748). In more recent studies, Kunter et al. (2011; 2013) operationalized enthusiasm as how much a teacher enjoys teaching or how much a teacher enjoys the contents of a subject. This validates the above-mentioned observation of Keller et al. (2016) because in these studies, there was considerable overlap between their designated facet of teacher competencies and enjoyment of teaching or teaching content. In their more recent and holistic view, Keller et al. (2016) defined enthusiasm as a broader construct as the “conjoined occurrence of positive affective experiences, that is, teaching-related enjoyment, and the behavioral expression of these experiences, that is (mostly nonverbal), behaviors of expressiveness” (p. 751). In addition to teacher enthusiasm, the second component of the teacher professional competence model, which is related to EC, are self-regulatory skills. Kunter et al. (2013) measured those with two subscales of the AVEM measurement, originally named work engagement and coping potential (Klusmann et al., 2008). However, the overlap between these three concepts is limited. Therefore, the construct validity of this concept of “self-regulatory skills” could be questioned, or, at least, the theory behind this component would need further elaboration or extension. Assuming that this concept is related to “coping”, Compas et al. (2017) give a short overview definitions of “coping” and note that most define it as a controlled and effortful response to stress. As some emotions such as fear are accompanied by a stress

response, emotion regulation overlaps with coping. Therefore, this component in the teacher professional competence model might also have something to do with EC. In conclusion, both directions of emotion regulation – upregulating teacher enthusiasm or enjoyment as well as downregulating the physiological stress response (e.g., Chrousos, 2009) – that can be connected to unpleasant emotions are seen as relevant teacher competencies in this model.

Still, in both models, in the prosocial classroom mediational model and in the teacher professional competence model, EC appears as either one of two relevant factors (Jennings & Greenberg, 2009) or as a tapped facet (Kunter et al., 2013) that is integrated in the model in the form of upregulating teacher enthusiasm/joy and coping with unpleasant emotions. Definitions of EC in teachers therefore remain still partially inconclusive and relatively vague which is why the definition of EC for an EC training for teachers needs to be developed by drawing on teacher literature but also by considering related literature from general psychological research. I will do this in the subsequent paragraphs, at first, by top-down elaborating on current definitions of EC and emotional intelligence (EI), secondly, by providing a bottom-up summary of literature on EC components.

1.2. Emotional competence in general psychological research

Mayer and Salovey (1993) were the first researchers who became famous for their conceptualization of EI. They also stated that EI “could have been labeled ‘emotional competence’” indicating interchangeability of those two concepts (Mayer & Salovey, 1993, p. 433). Both concepts will therefore be used synonymously. Mayer et al. (2004) defined EI as “the capacity to reason about emotions and of emotions to enhance thinking [including] the abilities to accurately perceive emotions, to access and generate emotions so as to assist thought, to understand emotions and emotional knowledge and to reflectively regulate emotions so as to promote emotional and intellectual growth.” (p.197). When assessing EI, they therefore measured four sub-dimensions: Emotion perception (“perceiving emotions”), emotion knowledge (“understanding emotions”), emotion regulation (“managing emotions”), and emotion use (“facilitating thought using emotion”; Salovey and Mayer, 1990; Mayer et al., 2003). In their most recent review, Mayer et al. (2016) again conceptualized EI as a testable mental ability. They emphasized that an individual’s high EI does not

necessarily correspond with emotionally intelligent behavior, as there are additional factors predicting behavior.

Petrides et al. (2016, p. 2) defined EI as a “representation of the affective aspects of personality” which broadens the concept. As they understood EI, the concept includes affective aspects of well-being, self-control, emotionality, and sociability. These aspects have overlap with previously introduced theories and different sub-dimensions of the model of Salovey and Mayer (1993): Emotionality includes emotion perception and understanding (sub-dimension emotion perception or emotion knowledge); well-being includes the upregulation of pleasant experiences; self-control includes emotion control, stress management, and impulse control; emotionality includes emotion expression (all sub-dimension emotion regulation). Petrides et al. (2016) however also included trait empathy and the capability of having fulfilled social relationships and social awareness, as sub-dimensions of trait EI. Consequently, the broadness of the concept leads to overlaps with concepts others excluded from their conceptualizations of EI. For instance, Rindermann (2009) claimed that the regulation of other people’s emotions is a facet of social and not EC. Therefore, his core model of EC that was developed in an educational context only included the sub-dimensions emotion perception of the self and others, emotion regulation, and emotion expression.

In a recent meta-analysis, MacCann et al. (2020, p. 151) analyzed these two different – rather narrow or rather broad – approaches and spoke of “mixed model” and “ability model theories” of EI. They concluded that, while mixed model approaches include emotion-related abilities, character traits, and motivational elements (“trait EI”), ability models define EI as a cognitive ability with a specific theme, emotions. Both differ – naturally – in the way they have overlap with other constructs but also in their prognostic abilities. MacCann et al. (2020) demonstrated in a meta-analysis with 1,276 effects that EI measured as an ability better predicted academic performance than trait EI. The prediction was better for grades in comparison to test scores and for humanities in comparison to science performance.

Including EI core components derived from ability model theories into an EI model for teachers seems therefore natural. Extending such a model by components of mixed model theories might

however have the advantage that it is then better adapted to the context of teaching. For example, creating and maintaining beneficial teacher-student relationships might be extremely important for teachers because they satisfy the teacher's basic need for social relatedness according to self-determination theory (Deci & Ryan, 2000; Klassen et al., 2012). If these basic needs are not satisfied, negative consequences for experienced emotions and well-being are likely. Therefore, the ability to build beneficial teacher-student relationships might also be predictive for emotional outcome in teachers. Researchers already assumed that emotions and therefore their regulation are an important asset of the teacher-student relationship (Hagenauer et al., 2015). This view emphasizes the importance of investigating the link between teacher-student relationships and emotional outcome, which will be done in one of the studies to follow.

2. Definitions: sub-dimensions of emotional competence

2.1. Emotion perception

Mayer et al. (2016, p. 294) subsumed under the component of emotion perception recognizing emotional thoughts and physical states in the self, perceiving emotions and "emotional content" in the environment including other people, the identification of deceptive or dishonest emotional expressions, the discrimination of accurate vs. inaccurate emotional expressions, context and cultural sensitivity regarding emotional display, and accurate emotion expression. Rindermann (2009) emphasized that emotion perception of the emotions of others is considered a forerunner skill for social competence. Emotion perception research historically had a focus on facial recognition in others, initiated by the cross-cultural studies by Ekman et al. (1969). These studies led to Ekman's (1992) proposal of the five basic emotions happiness, sadness, fear, disgust, and anger which according to the author shared the nine characteristics of distinctive universal signs: Presence in other primates, distinctive physiology, distinctive universals in antecedent events, coherence among emotional response, quick onset, brief duration, automatic appraisal, and unbidden occurrence. Ekman & Cordaro (2011) themselves as well as other researchers (e.g., Jack et al.) changed the number of proposed basic emotions later, which demonstrates that there is no consensus yet on how many basic emotions exist. Ekman (1992, p. 190) already noted regarding the inability of his framework to

differentiate between several pleasant emotions that there might be “distinctive vocal signature[s]” that help identify pleasant emotions acknowledging potential limits of the theory of basic emotions. To date, Schirmer and Adolphs (2017) emphasized in a recent review the importance of the multimodality of emotion expression and perception. The authors concluded in their review that multimodally convergent emotion expressions are recognized faster and more accurately. This is in line with the finding that context considerably influences emotion perception. For instance, Barrett et al. (2011, p. 289) stated that “a face does not speak for itself” and meant that perceived discrete emotional meanings are not dependent on the facial expressions of the observed person (sic!) but rather on the contextual social situation or general behavior (body posture, voice) of this person. Therefore, the definition and consequently the operationalization of emotion perception in psychological studies by mostly letting participants emotionally categorize faces might have its notable limits.

There is one study investigating which emotions teachers’ perceive in their students recently conducted during a period of online schooling due to the COVID-19 pandemic in Chile (Salcedo-Lagos et al., 2021). This study is a pioneers’ study because to my knowledge, there are no comparable studies investigating teachers’ perception of students’ emotions in a real-life or any other setting. Teachers reported to have perceived joy, enthusiasm, interest, curiosity, motivation, awe, happiness, surprise, and anxiety in their students. Apparently, teachers perceived rather pleasant than unpleasant emotions. Beyond the scope of this study, it remains unknown whether these perceptions truly reflected the students’ real emotions and whether the class was influenced by the teachers’ perceptions. Furthermore, reflecting the above-mentioned weakness of this research branch, this study is limited to emotion perception from mainly facial expressions (and voice). In conclusion, there remains a large gap regarding emotion perception in general and in the target group of teachers, even though emotion perception seems highly relevant because misperceptions and misjudgments of students’ emotions could motivate teachers to unfair treatment.

2.2. Emotional awareness

Emotional awareness is usually split into two components: Emotional clarity and attention to emotions (Boden & Thompson, 2016, p. 79), whereby emotional clarity is defined as “the extent to

which people unambiguously identify, label, and characterize their own emotions". The second component of emotional awareness, attention to emotions, is defined as "the extent to which people attend to and value their emotions" (Boden & Thompson, 2016, p. 79). The authors showed that both sub-dimensions are associated with each other but also discriminantly valid. Thompson and Boden (2019) differed between a state and a trait form of emotional awareness because there is evidence that both sub-dimensions temporarily vary. In the same study, state attention and clarity were both associated with higher intensity of negative affect. State clarity was associated with high levels of positive affect. However, the authors also found a quadratic relationship between state attention and positive affect indicating that very high and very low positive affect was associated with high state attention. The authors explained their findings on clarity and attention regarding negative affect assuming that high intense emotions provide clearer signals. They therefore create less ambiguity, and their meanings are easier to interpret. The same is possibly true for very high and very low positive affective states.

Both emotional clarity and attention to emotions have been shown to be dependent on context and contextual cues: Both are positively associated with the presence of people (Thompson & Boden, 2019) which corresponds to the above-mentioned finding that emotion perception is dependent on context and that it becomes more accurate when multiple cues are present (Barrett et al., 2011).

Emotional awareness has been shown to be positively related with active coping behavior in daily life and negatively with negative thinking (Eckland & Berenbaum, 2021). Deficits in clarity of emotions were linked to worse recognition of psychological needs in a study by Dizén et al. (2005). However, it is questionable whether high emotional awareness is always functional: While clarity of emotion was inversely associated with emotional variability (which means switching rapidly between emotional states), attention to emotion has been shown to be positively correlated with affect intensity and variability (Thompson et al., 2009). Therefore, both components of emotional awareness have been shown to be linked to affective instability and, in the case of attention to emotion, a positive correlation has been found. Assuming that conjoint affect intensity and instability can be a bad thing,

this finding could implicate that attention to emotion should not necessarily be trained and maybe even reversed or avoided.

To date, it remains widely unknown how considerably teachers are aware of their emotions as well as the contextual keys and personal characteristics intensifying teachers' emotional experiences in the classrooms. Teachers, when asked, reported to experience a broad variety of emotions in qualitative studies (Anttila et al., 2016; Timoštšuk & Ugaste, 2012). A computational text analysis approach of online forums confirmed this finding (Chen et al., 2020). In quantitative studies, teachers mainly reported the experience of the positively valenced emotions joy and pride (Frenzel, 2014; Keller et al., 2014), of anger (Becker et al., 2015; Burić & Frenzel, 2019; Carson, 2006), and, usually to a considerably lesser degree, anxiety (Frenzel et al., 2015; Frenzel & Götz, 2007). These study results therefore showed that teachers are aware of a broad spectrum of emotions, and that there might be emotions that are of particular interest in the classroom context.

Furthermore, investigations of teachers' emotional clarity and its effects on teachers' well-being, students' levels of emotion clarity and understanding as well as student-teacher relationships and classroom-climate are missing. However, as demonstrated above, the findings regarding the adaptivity of emotional awareness are ambiguous. In EC trainings, it seems important to differentiate between the two facets emotional clarity and attention to emotions. While enhancing emotional clarity should be a designated goal of EC trainings, attention to emotions should be trained with caution and should not necessarily be enhanced. EC trainings so far do not take this into account, instead they formulate that emotional "competencies include self-awareness of emotional states" (e.g., Jennings et al., 2017, p. 2) without further elaborations on the dose or nuanced thinking regarding emotional clarity and attention to emotions.

2.3. Emotion understanding

Emotional clarity has considerable overlap with emotion understanding that comprises the facets of identification of emotions, understanding of changes in emotions, and how circumstances influence emotions (Mayer et al., 2004). In contrast, emotional clarity only concerns emotions of the self, while emotion understanding includes the emotions of others. Therefore, a separate paragraph

for emotion understanding is inserted here. There are other definitions of emotion understanding, for instance, Schlegel and Scherer (2018) give a broad definition as “expertise in the meaning of emotion” (p. 1514). According to Castro et al. (2016), emotion understanding implies knowledge about causes and consequences, content, structure, timing, and functions of emotions as well as knowledge about meaning and usage of emotion language. In a review, Castro et al. (2016) summarized that already in childhood, emotion understanding is linked to prosocial behavior and fewer behavioral problems; in adulthood to empathy, marital satisfaction, and self-esteem. Furthermore, associations between emotion understanding and prosocial interpersonal orientation have also been demonstrated for adults (Schlegel & Scherer, 2018).

Emotion understanding should be a key qualification for teachers because it is essential for “understanding students’ goals, feelings of self-efficacy and problem-solving strategies” (Halberstadt et al., 2018, p. 127). Furthermore, the authors continue based on qualitative study results, that misunderstanding children’s emotions will cause children to distance themselves from the teacher. However, there is a lack of studies empirically testing teachers’ levels of emotion understanding in the classroom, and whether and in what way it could or should be trained. One study explored in a quasi-experimental design the effect of students’ emotional awareness on their performance (Arguedas et al., 2016) whereby the authors also demonstrated that teachers’ awareness of students’ emotions enhanced the quality of teacher feedback.

2.4. Conclusions regarding emotion perception, emotional awareness and emotion understanding, and implications for training

Neither studies with teachers as study subjects nor studies from general psychology led to comprehensive results regarding these three potential components of EC. All three theoretical constructs have some overlap. Emotion perception and emotional awareness both include but are not limited to the identification of emotions in the self. Emotion understanding includes the emotional clarity component of emotional awareness and the full definition of emotion perception. However, there is consent regarding the integration of emotion understanding in definitions of EC as well as its importance for training, which is in line with results from emotion perception and emotional

awareness literature. The only exception would be attention to emotions that is related to affective instability and therefore should be trained only if necessary, for example, for the promotion of emotion understanding.

2.5. Emotion regulation

Among the components of EC, emotion regulation appears to be the widest field. Emotion regulation, most basically stated, “involves an attempt to influence emotions” (Naragon-Gainey et al., 2017, p. 385). The same authors stated that emotions being the target of emotion regulation could be of positive or negative valence and could be emotions of the self or of others. According to Gross (2013), emotion regulation processes involve an activated goal to up- or downregulate the intensity or duration of an emotional response.

2.5.1. Emotion regulation in teachers

Two recent studies (Chang & Taxer, 2020; Taxer & Gross, 2018) have been published investigating teachers’ emotion regulation strategies (ERS) in the framework of the emotion regulation process model of (Gross, 1998, 2015) structuring ERS in teachers. This model stated that emotion regulation takes place at different stages of the emotion generation process and comprises the strategies of situation selection, situation modification, attentional deployment, cognitive change, and response modulation. Situation selection and modification imply a designated goal of experiencing certain emotions by selecting or modifying situations. Attentional deployment refers to deliberately shifting attention to alter emotions. Cognitive change implies an appraisal change in order to influence emotional outcomes. Response modulation refers to altering components of the emotional response (such as behavior, physiology, cognition). Teachers used a variety of emotion regulation strategies to regulate different emotions in a variety of situations (Taxer & Gross, 2018). In this study, expressive suppression (a response-modulation strategy) was the most often used strategy followed by cognitive change, attentional deployment, and situation modification. Teachers also conjunctively used these strategies; especially attentional deployment was often combined with other strategies. Chang and Taxer (2020) investigated teachers’ emotion regulation strategies in response to classroom misbehavior. They found that teachers most often used the response modulation strategy of

suppression. Furthermore, teachers high in trait reappraisal/cognitive change and low in trait suppression showed the lowest levels of anger and emotional exhaustion and the highest levels of enjoyment compared to groups high in either both regulation strategies or low in reappraisal and high in suppression. Zhang et al. (2020) showed in a qualitative study conducted in China, that preschool teachers reported a high diversity and long duration of emotional experiences. As one main result of the study, the applied ERS were categorized into disguising, restraining, self-persuading and releasing emotions.

Studies investigating emotional labor in teachers, which is conceptually related to emotion regulation (Lee et al., 2016), complement these findings. Emotional labor research historically dates back to (Hochschild, 1983). According to Grandey (2000, p. 95), emotional labor describes the process of “managing emotions for a wage”. It is therefore a phenomenon tied to work and describes employees’ efforts to adjust their emotional responses to the display rules of their professional environment. This can be done via faking or hiding, or by dampening or enhancing emotions. In a recent review and meta-analysis, Wang et al. (2019) investigated the consequences of different emotional labor strategies in teachers, deep acting and surface acting, and genuine emotion expression. Surface acting usually comprises hiding and faking emotions, while deep acting refers to cognitively altering emotions to really feel the desired emotional outcome (Hochschild, 1983). Wang et al. (2019) found a negative relationship between surface acting and psychological well-being corresponding with several other findings showing that either faking, hiding, or expressive suppression are usually associated with emotional exhaustion (e.g., Brotheridge & Lee, 2003), and “Burnout” (e.g., Chang, 2013). Deep acting, on the other hand, led to enhanced job performance (Hülshager et al., 2010) and less emotional exhaustion after one year (Philipp & Schüpbach, 2010) in longitudinal studies, which might indicate that deep acting is health-beneficial. Contradicting this assumption, Wang et al. (2019) did not find a positive relationship between deep acting and psychological wellbeing in their meta-analysis. The authors hypothesized that this null effect might be due to the emotional labor costs of deep acting. Even though deep acting lowers emotional dissonance, it might still be strenuous. In a recent study, Lavy and Eshet (2018) investigated in a diary study whether certain emotions predicted

emotional labor strategies. They found that unpleasant emotions were followed by increases in deep and surface acting, while pleasant emotions were followed by less surface acting. Both would be easily explained by the typical display rules of teachers, as teachers often see it as part of their professional task to show rather “positive” than “negative” affect. Lavy and Eshet (2018) also found a declining effect of surface acting on pleasant emotions and an enhancing effect on unpleasant emotions, while deep acting led to an increase in pleasant emotions. They furthermore discovered that deep acting did not have any effect on changes in unpleasant emotions. In an attempt to merge emotion regulation and emotional labor research, Lee et al. (2016) measured emotional labor, emotion regulation, and teacher emotions in German secondary school teachers. They found links between reappraisal and deep acting, but also between reappraisal and suppression. Nevertheless, neither deep acting and reappraisal, nor suppression and surface acting, entirely depict the same concepts. Overall, reappraisal and deep acting were found to be positively associated with enjoyment, while suppression and surface acting were found to be positively associated with the emotions anger, anxiety, and frustration. Furthermore, more emotion-specific research might shed light on the open questions regarding deep acting.

2.5.2. Emotion regulation in general psychology

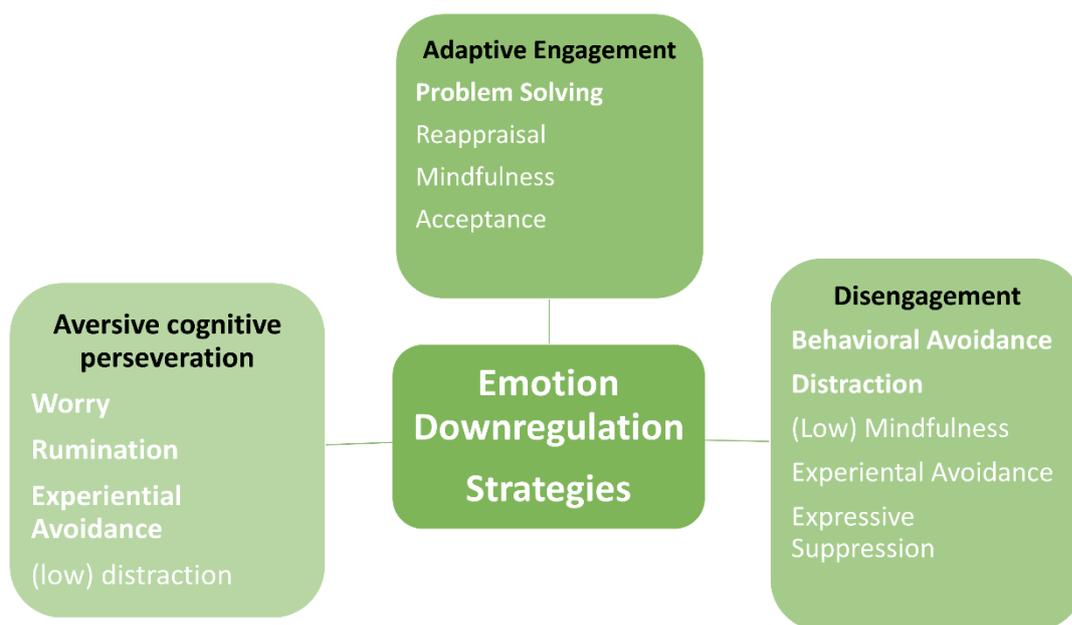
Many insights from the wide field of ERS research have never been conveyed from general psychology to studies with teachers as study subjects. Regarding emotion downregulation strategies, several meta-analyses have been conducted analyzing their structure and effectivity (Aldao et al., 2010; Naragon-Gainey et al., 2017; Webb et al., 2012), and only some of the strategies investigated in these articles also have been specifically investigated in teachers. Emotion upregulation research also has made progress over the last decade, even though studies specifically investigating emotion upregulation in teachers still are extremely rare. Taxer and Gross (2018) investigated both directions (up- and downregulation) in their qualitative analysis on teachers. However, teachers rarely reported on emotion up-regulation processes in the classroom. This might indicate that teachers either do not use them or that they are not aware of them, which would make it an even more important research domain. As emotion up- and downregulation are relevant for EC trainings for (pre-service) teachers, I

will now give an overview of results from general psychology regarding both topics.

Structuring emotion downregulation strategies. Starting with emotion downregulation, Naragon-Gainey et al. (2017, p. 386) stated about the structure of the most influential emotion regulation model by Gross (1998; 2015) that there “is not a strong a priori reason to expect that one’s utilization of emotion regulation strategies necessarily corresponds to groupings based on temporal dynamics.”. In fact, the structure of ERS proposed by Gross has never been empirically validated. Therefore, the model by Naragon-Gainey et al. (2017) will be used here for structuring emotion downregulation strategies. Naragon-Gainey et al. (2017) proposed the structure depicted in Figure 1 for the conceptualization of down-regulation strategies of unpleasant emotions.

Figure 1

Emotion downregulation strategies according to the factor analysis by Naragon-Gainey et al. (2017)



Note. High factor loadings are printed bold. The authors chose this selection of 10 strategies by relying on conceptual work of literature reviews and meta-analyses.

As can be seen, they statistically found one factor that they named adaptive engagement, containing problem solving as a component. Problem solving is usually seen as an adaptive ERS and includes behavioral problem solving and cognitive problem-solving (e.g., self-reflection as measured

by the response styles questionnaire by Nolen-Hoeksema, 1991). It seems important to note here that cognitive reflection is distinct from rumination, which has been widely investigated as an antecedent or stabilizing factor of depressive symptoms, and involves focusing on unpleasant affective symptoms and brooding on their causes and consequences (Johnson & Whisman, 2013). The second component, reappraisal, is a cognitive strategy, and, according to a meta-analysis of Webb et al. (2012), it can be further categorized into reappraising an emotional stimulus (e.g., reinterpreting a situation or an action) or an emotional response (e.g., normalization of an elicited feeling) or reappraising via perspective taking (e.g., objectively taking a third-person perspective). Some researchers (e.g., Webb et al., 2012) therefore see acceptance and mindfulness as cognitive reappraisal strategies because both involve cognitively changing one's evaluation of an emotional response in an accepting or non-judgmental way, while others (e.g., Naragon-Gainey et al., 2017) see both as distinct ERS. However, mindfulness is sometimes operationalized via two components: monitoring and acceptance (e.g., Lindsay & Creswell, 2017). Some researchers also include another cognitive component in conceptualizations of mindfulness, and define it as non-judgmental (e.g., Guendelman et al., 2017). Therefore, as the meta-analyses mentioned above did not select included studies based on only one operationalization of mindfulness in their study designs, mindfulness should be seen as a strategy composed of focusing attention to the present moment, acceptance, and non-judgmental perspective taking in this work. In their structural approach, Naragon-Gainey et al. (2017) found loadings of all three strategies (reappraisal, mindfulness, acceptance) on the same factor, and all three were significantly associated with each other, so it seems, that they share some variance.

Disengagement strategies, the second factor according to Naragon-Gainey et al. (2017), include behavioral avoidance (of situations), distraction (attentional avoidance), and experiential avoidance which means trying not to feel an unpleasant emotion. Low mindfulness on this factor is unsurprising because mindfulness is defined as the contrary of distraction: as paying attention to the present moment and all its facets (Kabat-Zinn, 1994). Expressive suppression involves the active inhibition of the expressive components of an emotion (Chervonsky & Hunt, 2017). Sometimes authors

also include the suppression of cognitions and feelings (e.g., Boehme et al., 2019).

Aversive cognitive perseveration, the third factor, was “characterized by overengagement with negative *cognitions* while [also] rejecting and wanting to avoid negative *emotions and thoughts*” (Naragon-Gainey et al., 2017, p. 410). These negative cognitions seem to be associated with different emotions: while rumination is often associated with depressive affective states (Johnson & Whisman, 2013), worry is associated with anxiety (Goodwin et al., 2017). Furthermore, while experiential avoidance also had a substantial positive loading on this factor, distraction was negatively associated with it.

In addition to these strategies investigated by Naragon-Gainey et al., 2017, I will shortly elaborate on one more strategy because it does not receive any attention in this model, even though content-wise, it is quite distinct from the other strategies: Emotion tolerance. There is a model of EC specifically developed for patients with psychological disorders, mainly focusing on awareness of and regulating unpleasant emotions (Berking, 2014). In this model, emotion tolerance comprises cognitive strategies people apply when they fail to change their emotional state: For instance, by cognitively enhancing their feelings of self-efficacy, remembering that the emotion will pass or by keeping in mind the emotion’s usefulness or function (Berking, 2009). Emotion tolerance is difficult to place within the conceptualizations of emotion regulation because it becomes relevant when downregulation strategies fail, in the very moment, when a person changes the goal from downregulation to tolerance. Therefore, emotion tolerance does not match the definition of emotion regulation given above and might be a separate but neglected facet of emotional intelligence. At the same time, emotion tolerance strategies like enhancing feelings of self-efficacy could also downregulate unpleasant emotions, even if emotion regulation was not the goal in the first place – which then again makes it also an ERS.

Adaptivity of emotion downregulation strategies. A meta-analysis demonstrated the effectiveness of distraction, taking a third person perspective, reappraisal of cognitive response, and stimulus as downregulation strategies for unpleasant emotions (Webb et al., 2012). Regarding suppression, suppression of the emotional response proved effective, while suppression of thoughts and emotional experience did not, and even led to an elevated level of emotion experience (Webb et

al., 2012). Chervonsky and Hunt (2017) also demonstrated links between suppression and negative social and mental health outcomes independent of age, while expression of unpleasant emotions was negatively associated with social outcomes. The authors noted, however, that they only found a very small effect. Ruan et al. (2020) validated the negative effects of suppression in an experience sampling study and found that suppressing negative emotions (keeping them bottled up) at one time point predicted negative emotions at later time points. In another recent study, adapting the framework of Naragon-Gainey et al., (2017), Southward and Cheavens (2020) found that a larger habitual and momentary repertoire of adaptive engagement strategies predicted improved mood and of aversive cognitive perseveration strategies predicted worse mood. Findings were not that clear for disengagement strategies. Here, only a larger momentary repertoire predicted worse mood.

When comparing the strategies reappraisal and acceptance in an experiment with sadness-inducing videos, Troy et al. (2018) replicated the finding that reappraisal was the most effective strategy in reducing emotional experience. However, they found a marginally significant effect showing that acceptance was associated with less dampening of skin conductance levels and that reappraisal came with higher cognitive costs – indicating that participants that had used acceptance had perceived it as an easier applicable strategy and perceived themselves as more successful when using it.

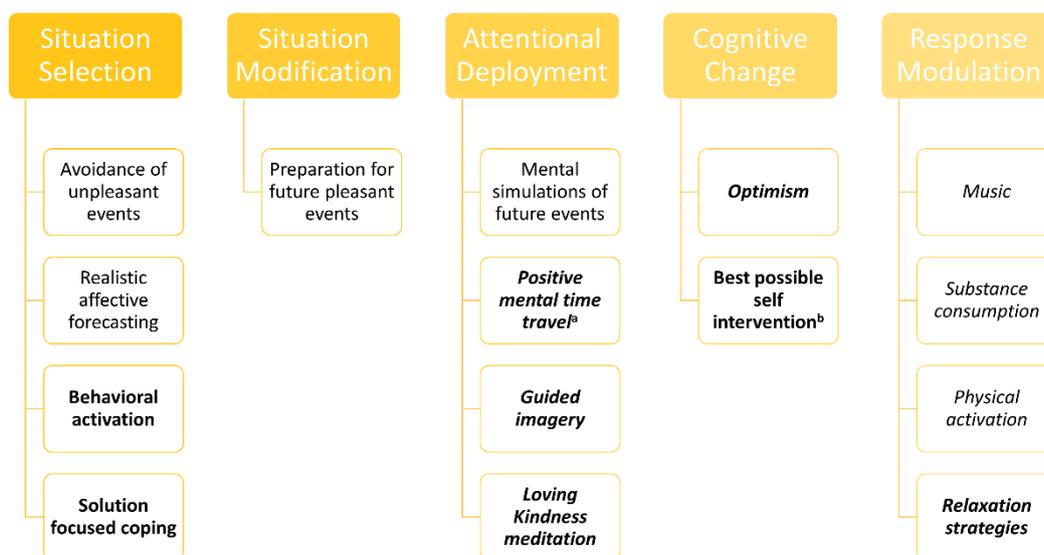
In conclusion, adaptive engagement strategies seem to be rather functional, while aversive cognitive perseveration strategies seem to be rather maladaptive. Disengagement strategies can be both. More precisely, suppression of emotion thoughts and feelings seems to be a widely dysfunctional ERS, while the adaptivity of behavioral suppression/emotion expression seems to depend on the specific emotion. Findings regarding reappraisal strategies highlight their effectivity but also their cognitive costs, while regarding acceptance, rather long- than short-term benefits are to be expected, and rather become apparent in the physiological response and less in emotional experience.

Structure of emotion upregulation strategies. Interest in upregulation strategies of pleasant emotions has grown in the last decade mainly due to the research linking pleasant emotions to higher wellbeing (Diener et al., 2017) and resilience (Fredrickson, 1998; Fredrickson et al., 2003). Quoidbach

et al. (2015) gave an overview of emotion upregulation strategies based on the process model of emotion regulation (Gross, 1998), therefore including the aforementioned strategies of situation selection, modification, attentional deployment, cognitive change, and response modulation. Quoidbach et al. (2015) linked these different categories of strategies to the emotion-eliciting situation(s) and also differentiated whether the ERS was applied before, during, or after an eliciting event (and not to a *point in time during the ER process* as the original model did), and in what way the specific strategies or interventions are linked to a short- or long-term increase in pleasant emotions. An overview of all strategies mentioned in this review is given for strategies before an event in Figure 2, for strategies during an event in Figure 3, and strategies after an event in Figure 4.

Figure 2

Emotion upregulation strategies before an event according to Quoidbach et al. (2015)



Note. Strategies with ascertained short-term increases in pleasant emotions are printed in italic; long-term increases in pleasant emotions are printed bold.

^aThe imagination of positive events that might happen soon (e.g., Quoidbach et al. 2009).

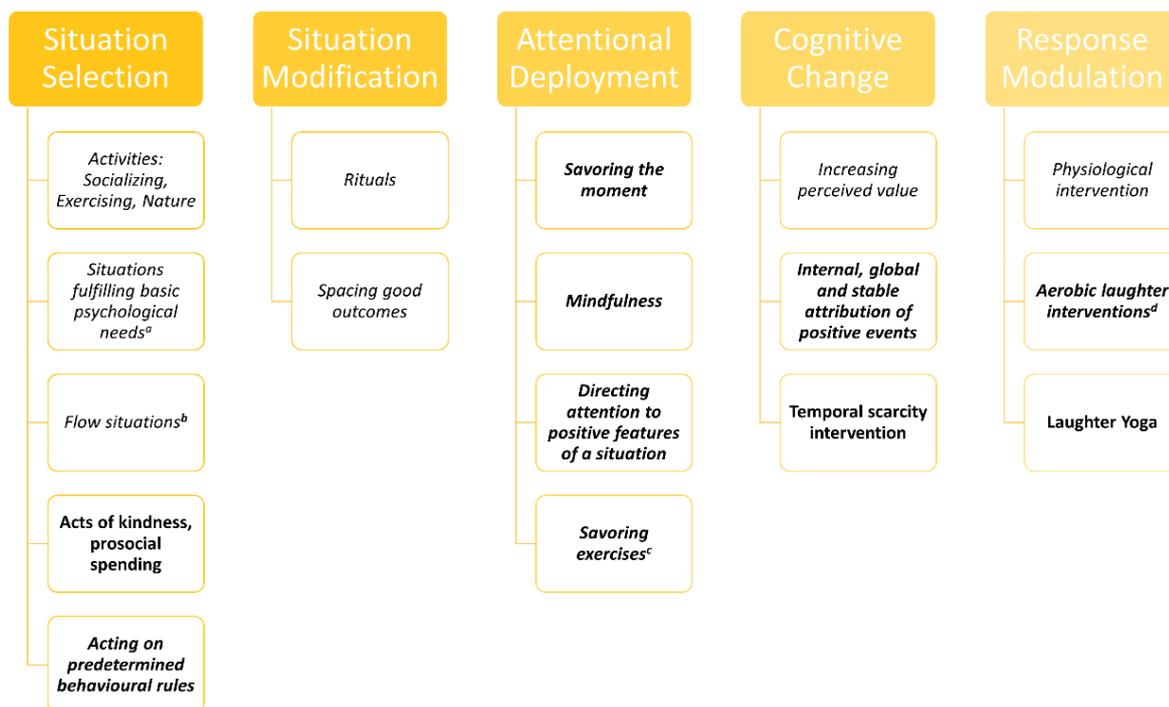
^bOptimistically writing about one's life in the future.

At first sight, Figures 2, 3 and 4 all highlight need for further research regarding situation selection and situation modification. As can be seen, especially assumptions about the effects of

situation modification before an event on emotional outcome are not yet based on empirical research. On the other hand, findings regarding attentional deployment, cognitive change and response modulation are quite clear and differentiated:

Figure 3

Emotion upregulation strategies during an event according to Quoidbach et al., (2015)



Note. Strategies with ascertained short-term increases in pleasant emotions are printed in italic; long-term increases in pleasant emotions are printed bold.

^aaccording to Deci & Ryan (2000) autonomy, competence, relatedness.

^bdefined as situations where a situation's challenges and a person's skills are in perfect balance (Csikszentmihalyi, 1990).

^cSavoring exercises usually include deploying attention to pleasant features of the circumstances during a specific task (e.g., hot shower, 10-minute walk etc.).

^ddescribes an intervention during which one engages in non-humor dependent laughter.

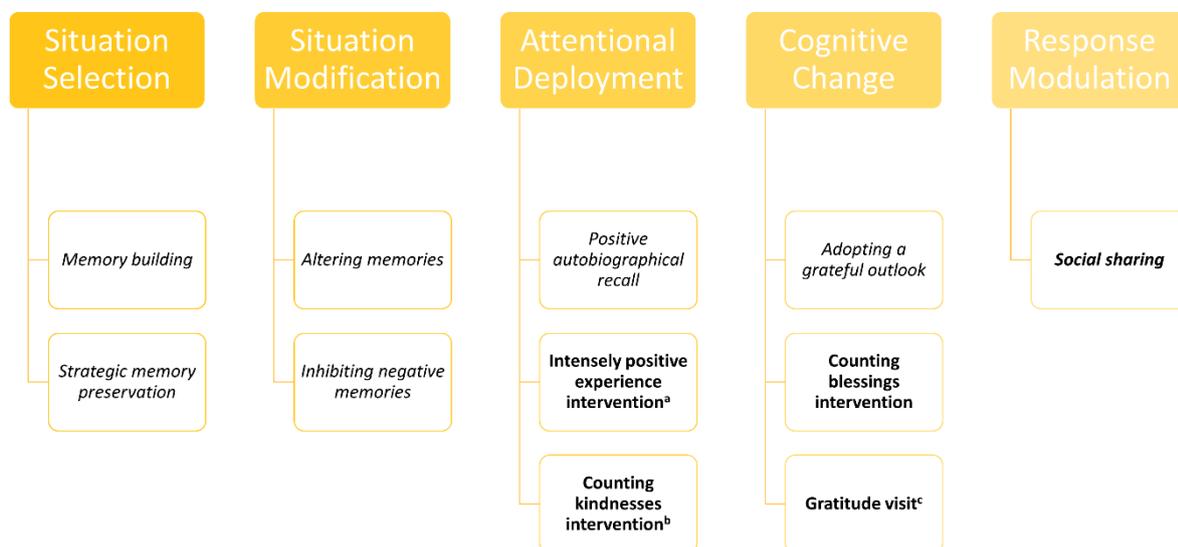
Adaptivity of emotion upregulation strategies. Quoidbach et al. (2015) stated that correct affective forecasting defined as people's predictions of future feelings (Wilson & Gilbert, 2003) could lead to a better selection of situations even though evidence supporting this hypothesis is mainly associative. Due to large studies in clinical psychology, there is considerable evidence showing that

behavioral activation that includes engaging in planned activities consistent with long-term goals increases wellbeing and positive affect in the long run (Dimidjian et al., 2011). Whether the most under-researched strategy – situation modification before an event – leads to substantial increases in pleasant emotions remains to date unknown. Quoidbach et al. (2015) continued that directing attention to pleasant stimuli via imagination and holding favorable expectations about the future before events happen have both beneficial short- and long-term effects as well as cognitive change and several response modulation strategies before an event (see Figure 2).

Figure 3 depicts all the mentioned intervention strategies during an event. While research on situation selection, attentional deployment, cognitive change, and response modulation is widely conclusive and elaborated, again, assumptions regarding the beneficial effects of situation modification strategies during an event still await empirical validation.

Figure 4

Emotion upregulation strategies after an event according to Quoidbach et al. (2015)



Note. Strategies with ascertained short-term increases in pleasant emotions are printed in italic; long-term increases in pleasant emotions are printed bold.

^awriting about peak positive moments each day.

^bkeeping track of acts of kindness.

^cwriting a letter of gratitude to another person.

Strategies that can be applied after a positively valenced event can be seen in Figure 4. Here, there is a lack of evidence for long-term effects regarding situation selection and modification strategies, whereas studies investigating the evidence of attentional deployment and cognitive change strategies have already widely demonstrated their short- and long-term effectiveness.

2.5.3. Conclusions regarding emotion regulation and implications for EC trainings

The presented results mainly from general psychological results are encouraging, even though there is still a large gap in literature regarding findings of emotion upregulation strategies generally and specifically in teachers. Even though the model by Quoidbach et al. (2015) gives a comprehensive overview of recent and relevant research, the authors did not empirically verify the proposed structure of their model. Still, it represents the latest state of the art. Transferring the review of results by Quoidbach et al. (2015) to teachers in a classroom makes clear that several emotion upregulation processes can certainly happen in classrooms – one may think of rituals, well-prepared lessons that inspire interest or enthusiasm, initiations of cooperative projects as preventive methods, which however all imply some implementation effort. Emotion upregulation strategies suitable for quick interventions would be teachers' general savouring or dampening behaviour in response to felt pleasant emotions. However, we do not know whether teachers use these ERS known from general psychology research in a classroom, what might be alternatives, and what their effects might be in a classroom setting. Therefore, regarding emotion upregulation in teachers, future specific research is necessary in order to draw any conclusions.

Regarding emotion downregulation, needs and results are more specific. The presented findings showed that some emotion downregulation strategies are more adaptive than others are and that the adaptivity of some emotion downregulation strategies is dependent on which emotion is experienced. Therefore, it seems important to differ between general and specific effects of emotion downregulation strategies. Specifically regarding (pre-service) teachers, there seems to be a need to investigate downregulation of teacher anger, because this emotion has been found to be important for in-service teachers (Burić & Frenzel, 2019), and because findings regarding the effective

downregulation of anger – particularly in the classroom – are partially inconclusive (Chang & Taxer, 2020; Chervonsky & Hunt, 2017). Anxiety and its downregulation might be specifically investigated in pre-service teachers. In general, it seems important to identify effective ERS that could be adapted from general psychology research in addition to previous research on teachers to broaden the strategy repertoire of teachers and teacher research mainly focusing on deep and surface acting.

2.6. Emotion use

Mayer et al. (2016, p. 294) summarized under the sub-dimension of “facilitating thought using emotion” the abilities to generate emotions for a certain purpose (e.g., relating to another person’s experiences) and to use emotions in order to cognitively profit from their effects (for problem-solving or viewing things from different perspectives). Even though the factor “facilitating” thoughts could not be confirmed in the statistical models according to the authors, emotion use is mentioned here, because it might be of particular relevance for teachers. As teacher emotions correlate with several outcome variables relevant for teachers such as instructional effectiveness, teacher-student relationship, student misbehaviour, and student achievement behaviour (Frenzel, 2014), it seems likely that teachers also use emotions to influence these variables. Qualitative studies support this assumption: Sutton (2004) for instance showed that teachers try to prevent that certain emotions (particularly anger) interfere with their teaching effectiveness or student performance. On the other hand, some teachers reported that they consider the experience of some emotions such as enthusiasm, passion, humour, or happiness beneficial because they can be used to motivate students. Teachers also reported to tune the intensity of their emotions to getting it “just right” for the purposes needed in a classroom context (Sutton, 2004, p. 388), which includes up- and downregulation processes. In a more recent qualitative study, teachers also reported having three instrumental emotion regulation goals (Taxer & Gross, 2018): enhancing effectiveness, being professional, and managing behaviour. Therefore, it might be that emotion use is an essential component of teachers’ EC that has been neglected so far in most quantitative studies.

3. Integrating emotional competence research

Conjointly considering research regarding EC in teachers, EC in general psychology, and

components of EC in teachers and general psychology leads to the following conclusions: Even though there is more than one EC definition, researchers agree that emotion perception, understanding, and regulation are core components of the concept. Broader models add emotion tolerance, emotion use, and interactive skills to their conceptualizations. Regarding emotional awareness, it is important to differentiate between emotional clarity, which is useful and adaptive, and attention to emotions, which could be maladaptive. Therefore, attention to emotions should only be trained if necessary to gain emotional clarity and emotion understanding. Research on emotion perception emphasizes the importance of including social contexts and different types of emotion expression in addition to facial expression. Emotion downregulation is important for teachers, especially with a focus on reducing anger in in-service teachers and anxiety in younger teachers. Less is known about teachers' emotion upregulation strategies, even though results from general psychology would suggest that teachers and classroom dynamics could profit from emotion upregulation training. A rather neglected component in teacher emotion research remains emotion use, even though teachers report its frequent application. Therefore, its further investigation seems crucial. The same applies for the link between the teacher-student interactions and teacher emotions because it is likely that they are intertwined.

4. The present work: Studies

Four studies will be presented in this work to start filling some of these gaps focusing on the importance of characteristics of the teacher-student relationship, on downregulation of anger, and on evaluating an EC training for pre-service teachers. The first two studies aimed at investigating associations between teacher emotions, ERS, and the student-teacher relationship.

- **Study 1:** The first study was conducted with a sample of teachers to determine predictors of the emotions enjoyment, anger, and anxiety in the classroom. This study was designed to answer the question whether the teacher-student relationship and emotion downregulation strategies predict emotional outcome.
- **Study 2:** Second, relating to the results of the first study, one laboratory studies was designed with pre-service teachers as subjects. This study aimed at analyzing an interactive effect of relationship closeness and goal attainment on the subjects' affective outcome.

Following the chronological order of the initial execution of these studies and the subsequent conceptualization of the EC training, the essential content of the training and its structure, and studies 3 and 4 will be presented after studies 1 and 2.

Predictors of teacher emotions – emotion regulation strategies and teacher-student relationship closeness

The following study was conducted in further investigation of predictors of the teacher emotions joy, anger, and anxiety with a focus on self-efficacy, teacher-student relationship closeness, and ERS. According to the reciprocal model of teacher emotions (Frenzel, 2014), the processes influencing teacher emotions are many and complex. Basically, the model states that teachers' perceptions of students' motivation, relational, social-emotional, and achievement behavior will elicit specific teacher emotions via teachers' attributions and appraisals. Recent research therefore focuses on specifying these processes on all ends - specific antecedents, specific appraisals, and specific emotions: Exemplary studies are Becker et al. (2015) who investigated the effects of students' motivation and discipline on teacher emotions with teachers' appraisals as mediators, Frenzel et al. (2020) and Frenzel, Goetz, Stephens, et al. (2009) who found associations between teachers' emotional outcomes and teachers' goal or achievement appraisals, and Jacob et al. (2017) who collected mathematics teachers' criteria for successful teaching.

Antecedents of teacher emotions

To date, while research about the antecedents of some important emotions, such as teacher pride and teacher boredom is still scarce, findings are accumulating for two of the most prevalent emotions, teacher enjoyment and teacher anger (Keller et al., 2014). Teacher enjoyment as the most prevalent emotion reported in the classroom (Becker et al., 2015; Keller et al., 2014) arises when teachers perceive their students as motivated and disciplined, especially when teachers appraise discipline as a relevant goal (Frenzel et al., 2020). Teacher enjoyment also seems to be class-specific (Frenzel et al., 2015) – and therefore might depend on class-specific appraisals (e.g., on whether a teacher perceives a class as motivated). Regarding anger, teachers reported to become angry in a qualitative study, when they perceived students' behavior as blocking their goals, when they evaluated an outcome as unfair, when they perceived a behavior as a threat to their self, or when they felt protective about a student that was badly treated by someone else (Farouk, 2010). Quantitative research confirmed that teacher anger is indeed associated with reported low discipline (Chang &

Davis, 2009; Taxer & Gross, 2018). A recent study of de Ruiter et al. (2020) showed that teachers reacted to disruptive behavior of students with more intensive anger when they had perceived the student as disruptive before the new event happened. This implies that teachers' emotional reactions to specific students rather depend on their labeling of some students as "generally disruptive" than on the context. Apart from these findings, other possibly relevant antecedents such as the teacher-student relationship (Hagenauer & Volet, 2014) and the specific ERS as previously outlined have rarely been investigated. Hagenauer et al. (2015) conducted a study investigating the associations between the teacher-student relationship and emotional outcome and identified the teacher-student relationship as the strongest predictor for joy and anxiety. Perceived discipline in class was confirmed as the most important predictor of teacher anger, too. In the same study, Hagenauer et al. (2015) also found evidence for the predictive value of teachers' self-efficacy beliefs, which Frenzel (2014) had included in her reciprocal model of teacher emotions. However, the exact effects of these three potential predictors, self-efficacy beliefs, the teacher-student relationship, and ERS, on teachers' emotional outcome are not entirely clear yet.

Self-efficacy beliefs

Originating from the ideas of locus of control theory (Rotter, 1966) and social-cognitive learning theory (Bandura, 1977), it is widely acknowledged that individuals have different cognitions about how much control they can exercise over actions and therefore their environment. Derived from these frameworks, teachers' (self-) efficacy beliefs were defined as capability judgements of whether a teacher can bring about desired outcomes in student engagement and learning (Tschannen-Moran & Hoy, 2001). Therefore, self-efficacy beliefs contain information of whether a teacher believes that he or she reaches their professional goals by his or her own means. Including the concept in the framework of emotion theories, Scherer (2009) allocated a person's estimates about self-efficacy to the group of coping potential appraisals which included an individual's beliefs about their own control, power, and adjustment ability. For teachers, Tschannen-Moran and Hoy (2001) defined student engagement and learning as relevant teacher goals whose accomplishment contributes to teachers feeling self-efficacious. Today, it is however acknowledged that good student-teacher relationships

and classroom discipline are important goals and desired outcomes for teachers (Klassen et al., 2012), too. Consequently, teachers' self-efficacy beliefs about their social-emotional capabilities and relationship building as well as their beliefs about their abilities to bring about discipline in class, also matter.

Self-efficacy beliefs in general have long since been linked to positive emotional outcomes – in fact, even further also to positive life outcomes and to teacher wellbeing and student outcomes (Zee & Koomen, 2016). Previous studies have already identified goal conduciveness and coping potential as mediating factors of the effect of class motivation and discipline on enjoyment and anger (Becker et al., 2015). The authors themselves mentioned however the usage of single-item measures for the appraisal dimensions as a limitation of their study. In addition, Hagenauer et al. (2015) found effects of self-efficacy beliefs regarding effective teaching of content on joy. Unexpectedly, they found no effects of self-efficacy in relationship building and classroom-management on either of the three emotions joy, anger, and anxiety. Therefore, in conclusion, one would expect that teachers' self-efficacy beliefs about their influence on student engagement and outcome will have an effect on teachers' emotions, however, regarding student-teacher relationship-building and classroom-management, the results are still inconclusive, and one would rather assume that these effects are emotion- and theme-specific.

Teacher-student relationship

What are the characteristics of a "good" teacher-student relationship? In the framework of attachment theories, closeness and the presence vs. absence of conflict are often seen as the most typical characteristics of a teacher-student relationship (Roorda et al., 2011). One could furthermore assume that distanced relationships between teachers and students rather create mistrust and make it easier for pupils to not care about the teacher and the teacher's feelings, therefore creating more conflict. Close relationships on the other hand might create trust and care for each other and therefore more compliance from students' side. Based on this assumption, it would not be surprising that good relationships to their students are known to be a basic need of teachers and are seen by teachers themselves as more important than their relationships to colleagues (Klassen et al., 2012). Good

teacher-student relationships also seem to decrease reports of problematic behavior by students (Marzano, 2003), are associated with teachers' higher levels of engagement (Klassen et al., 2012), and their positive and negative emotions (Hagenauer et al., 2015). Recent findings by Taxer et al. (2019a) revealed that reported closeness as a facet of the teacher-student relationship was positively associated with teacher enjoyment and negatively with teacher anger. In their models of (social)-emotional competence, Jennings and Greenberg (2009) therefore emphasize the importance of the teacher-student relationship. This study aims to replicate these findings.

ERS and Emotional labor

Surprisingly, the reciprocal model of teacher emotions (Frenzel, 2014) does not take into account ERS as antecedents of teacher emotions, even though by definition they should influence emotional outcome. As outlined above, findings regarding ERS/emotional labor in teachers showed that surface acting has a rather negative impact on psychological well-being (Wang et al., 2019), and suppression is positively associated with emotional exhaustion (Chang & Taxer, 2020). Suppression and the intensity of unpleasant emotions are positively associated in situations involving disruptive behavior in the classroom (Chang & Taxer, 2020). The results regarding deep acting are rather inconclusive (Wang et al., 2019) while reappraisal is rather considered adaptive (Chang & Taxer, 2020). Still, further studies investigating the precise associations between these strategies and emotional outcome are necessary.

The present study

The present study investigated perceived teacher-student relationship, self-efficacy beliefs and ERS as predictors of teacher emotions in the classroom. Thereby, the study focused on predicting enjoyment, anger, and anxiety. We hypothesized that relationship closeness, teacher self-efficacy, and functional emotion regulation (deep acting and cognitive change) as well as dysfunctional emotion regulation in class predict reported enjoyment in class. Furthermore, we hypothesized that high levels of perceived conflict in class, low self-efficacy beliefs, and dysfunctional emotion regulation (surface acting and suppression) in class predict teacher anger. Last, we assumed that indicators of a disrupted teacher-student relationship, low levels of self-efficacy, dysfunctional emotion regulation, and a bad

relationship to class predict teacher anxiety.

Method

Participants

Two hundred and five teachers participated in this study (150 (73.2%) female), aged between 28 and 65 years ($M = 42.39$, $SD = 11.17$), with an average of $M = 13.07$ years of teaching experience ($SD = 10.72$, range 0 – 40 years). According to Schönbrodt and Perugini (2013), small to medium correlations stabilize within a medium-sized corridor and high levels of confidence at a sample size of $n = 121 – 209$ and within a small-sized corridor at a sample size of $n = 275 - 470$. Therefore, the sample size of this study is not ideal, but it is reasonable. At the time of study, all participants of the study were teaching in schools in Germany, most in secondary schools ($n = 88$ in higher-track secondary education, grades 5 – 12/13, $n = 86$ in lower-track secondary education, grades 5 – 9/10), some in primary schools ($n = 6$), vocational schools ($n = 10$), or in mixed schools or a combination of the above-mentioned schools. The recruitment of these teachers was undertaken by students and staff via e-mails, flyers, and personal approach of school staff.

Measures

Emotions

Enjoyment, anger, and anxiety were assessed with the Teacher Emotion Scales (TES; Frenzel et al., 2016) which consists of 12 items, four for each discrete emotion: Happiness, fun, joy, and looking forward to giving classes for enjoyment; being angry, being annoyed, fury, and frustration for anger; being nervous, worry, concern, and being anxious for anxiety. Participants were asked whether they experienced the specific emotional states in class on a five-point Likert scale (1 = *strongly disagree*; 5 = *strongly agree*). The items were presented in mixed order when the questionnaire was presented. Cronbach's α s were good to very good with .92 for joy, .87 for anger, and .81 for anxiety.

Teacher-student relationship

Teachers' perceptions of their relationship with class were investigated with a questionnaire derived from Klassen et al. (2012) that is based on two relationship dimensions according to attachment theory, conflict, and closeness, and has a third scale for a general evaluation of perceived

relationship quality. All 12 items are answered on a seven-point Likert scale (1 = very bad/not at all; 7 = very good/very much). There are four items for the general scale (e.g., "How would you describe your relationship to this class?"). From the conflict scale, four items were chosen: "Would you prefer not teaching this class?", "Do you regularly have conflicts in this class?", "Do you feel rejected by this class?", and "Do you and this class have a conflicted relationship?" One item was not used because of its overlap with the construct of the emotion anger ("Are you usually annoyed by this class?"). Also, from the closeness scale, one item was not included in the score ("Do you like this class?") as it refers to a feeling rather than to the description of the relationship. The used four items were: "Do you feel related with this class?", "Can you rely on this class?", "Do you feel respected by this class?", and "Can you trust this class?" For the analyses, we used a composite score consisting of all items, Cronbach's $\alpha = .92$.

Emotion regulation

Two common strategies of emotion regulation were investigated, cognitive reappraisal and suppression, derived from the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003; German version: Abler & Kessler, 2009). Each of the two subscales reappraisal ("When I want to feel more positive emotions, I change what I think about.") and suppression ("I keep my emotions to myself.") consists of four items that are answered on a seven-point Likert scale (1 = *strongly disagree*; 7 = *strongly agree*). The suppression scale had acceptable internal consistency, Cronbach's $\alpha = .70$, the reappraisal scale good internal consistency, Cronbach's $\alpha = .88$.

Emotional labor

Faking, hiding, and deep acting were assessed using the revised version of the Emotional Labor Scale (ELS; Brotheridge & Lee, 2003; Lee & Brotheridge, 2011). It consists of nine items representing the subscales deep acting ("I make an effort to actually feel the emotions that I need to display to others."), Cronbach's $\alpha = .82$, faking ("I pretend to have emotions, that I don't really have."), Cronbach's $\alpha = .78$, and hiding ("I hide my true feelings about a situation."), Cronbach's $\alpha = .67$. Items were translated into German and answered on a five-point Likert scale (1 = *never*; 5 = *very often*).

Teacher self-efficacy

Teacher self-efficacy was measured with a short form of the Teachers' Sense of Efficacy Scale (TSES; Tschannen-Moran & Hoy, 2001). The scale originally consists of 24 items that can be answered on a seven-point Likert scale (1 = *nothing*; 7 = *a great deal*) forming three sub-dimensions: Instructional strategies (e.g., "To what extent can you craft good questions for your students?"), student engagement (e.g., "How much can you do to help your students value learning?") and classroom management (e.g., "How much can you do to control disruptive behavior in the classroom?"). For this questionnaire, 11 items were selected that were considered the most relevant for study purposes. Instructional strategies therefore included three questions about successful content-related teacher-student interactions, student engagement included four questions about motivationally challenging situations demanding social engagement with pupils and the four classroom management questions were all related to disruptive student behavior as it is known to play a crucial role in eliciting negative teacher emotions (Chang & Taxer, 2020). The general mean included all items, Cronbach's $\alpha = .84$.

Comparisons

All general measures were assessed with the same questionnaires, just without reference to the class. Attachment style was measured with a German translation of the Vulnerable Attachment Style Questionnaire (VASQ; Bifulco et al., 2003). This instrument consists of 22 items that can be added to two subscale scores: attachment insecurity (12 items) and proximity seeking (10 items). Items can be answered on five-point Likert scales (1 = *don't agree*; 5 = *totally agree*).

Procedure and Analysis

The bunch of questionnaires was distributed to schools either via students or via postal service. The class teachers were instructed to refer to, was chosen by a certain lesson (which was the same for all subjects depending on a teacher's schedule: "think about the class that you usually attend to every Tuesday, first lesson"). Teachers were instructed to fill in the part that referred to this class all in one. Teachers filled in two more parts about two different classes to assess whether the effects of context specificity also applied to this sample. Afterwards, demographic data and some basic general data (general attachment, general emotion regulation, and general emotion transmission) were collected.

All participating teachers had to fill in and return the questionnaires within three weeks.

Pearson's r was used for calculating correlations. To analyze emotional outcome separately, three forced entry multiple regressions were calculated, one for each of the emotions anger, enjoyment, and anxiety. All regression models included in the first step self-efficacy, teacher-student relationship, and suppression as known predictors in the first model and in a more exploratory fashion all remaining emotion regulation and emotional labor strategies in a second step. Bootstrapping was applied when the assumptions of homoscedasticity and/or the assumption of a normal distribution of residuals was/were violated. Mediation analyses were calculated investigating the effect of the teacher-student relationship on emotional outcome via ERS using the Process Tool for IBM SPSS statistics by Andrew F. Hayes (2012).

Results

Descriptive Results

Mean emotion ratings reported were $M = 4.03$ ($SD = 0.85$) for enjoyment, $M = 2.12$ ($SD = 0.90$) for anger, and $M = 1.53$ ($SD = 0.67$) for anxiety, respectively. These findings are in line with previous findings from Keller (2014) with relatively high levels of enjoyment. Correlations between emotions were quite substantial with $r = -.72$ ($p < .001$) for enjoyment and anger, $r = -.67$ ($p < .001$) for enjoyment and anxiety, $r = .66$ ($p < .001$) for anger and anxiety. Attachment styles were lowly but significantly correlated with emotions in the expected directions: insecure attachment style had correlations of $r = -.18$ ($p = .010$) with enjoyment, $r = .16$ ($p = .025$) with anger, $r = .26$ ($p < .001$) with anxiety. Proximity seeking had also low but significant correlations with anger, $r = .15$ ($p = .033$) and with anxiety, $r = .15$ ($p = .035$). As expected, the global score of attachment styles was also negatively correlated with perceptions of global relationship quality, $r = -.23$ ($p = .001$), when precisely looking at the subscales, it can be said that this was mostly due to correlations between perceived relationship quality and insecure attachment style. Proximity seeking only yielded significant results with the conflict scale ($r = .14$, $p = .046$). There were medium correlations between ERS used in a specific class and generally used ERS with $r = .58$ ($p < .001$) for reappraisal and $r = .42$ ($p < .001$) for suppression. This underlines the importance of class specificity and therefore context dependence of ERS. The high correlations

between emotions could be interpreted as a hint for person specificity when it comes to the experience of emotions in general (Frenzel et al., 2015). The correlation with the insecure attachment style indicates the validity of the used construct for measuring relationship quality.

An analysis of the within-measure correlations and the correlations between related constructs yielded the following results: Correlations within the teacher-student relationship measurement were substantial: $r = .79$ ($p < .001$) for relationship quality and closeness, $r = -.64$ ($p < .001$) for relationship goodness and conflict, $r = -.59$ ($p < .001$) for relationship closeness and conflict. Furthermore, the associations between ERS and emotional labor were investigated, as previous research had shown that there are overlaps between these constructs (Lee et al., 2016). In this sample, hiding (EL) yielded substantial associations with most other scales, it was correlated with suppression ($r = .42$, $p < .001$), faking ($r = .61$, $p < .001$) and reappraisal ($r = .23$, $p < .001$). Further analyses revealed a substantial correlation between the ERQ scales of $r = .42$, $p < .001$, original correlations of the scales are not reported in the article by Gross and John (2003). Suppression also correlated with faking, $r = .27$ ($p < .001$). No further correlations were found.

Enjoyment

A funnel-shaped cloud of the partial plot of residuals for teacher-student relationship and faking indicated a violation of the assumption of homoscedasticity and the P-P-plot of residuals, which can both be found in Appendix 1a, indicated a violation of the assumption of normally distributed residuals (Field, 2018). Therefore, bootstrapping with bias accelerated confidence intervals with 1000 bootstrap samples was applied. Assumptions of multicollinearity have been met (all $VIF < 1.85$, all tolerance statistics $> .54$), although some predictors showed substantial significant correlations as depicted in Table 1. The first model which included the variables self-efficacy, the teacher-student relationship, and suppression significantly predicted the outcome variable enjoyment, change in $F(3,189) = 135.76$, $p < .001$. The model accounted for 68% of the variance in the outcome variable enjoyment with student-teacher relationship being the only significant predictor. The second model including further ERS descriptively slightly improved the first model, however the change was not significant, $F(4,185) = 1.93$, $p = .107$. All β - values can be seen in Table 2.

Table 1*Intercorrelations of predictors with enjoyment as outcome variable*

Variable	Descriptives		Intercorrelations (<i>r</i>)						
	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
Model 1									
Enjoyment (1)	4.02	0.83	---						
Self-efficacy (2)	5.11	0.71	.36*	---					
Student-teacher-relationship (3)	5.96	0.89	.83*	.40*	---				
Suppression (4)	2.82	0.97	-.17*	-.14*	-.25*	---			
Model 2									
Reappraisal (5)	3.65	1.21	.07	-.01	.01	.40*	---		
Deep acting (6)	3.45	0.97	.21*	.22*	.24*	-.04	.02	---	
Faking (7)	1.87	0.71	-.15*	-.22*	-.24*	.27*	.08	-.09	---
Hiding (8)	2.35	0.68	-.33*	-.25*	-.25*	.35*	.23*	-.13*	.60*

Note. Mean (*M*) and standard deviations (*SD*) for enjoyment as outcome variable and predictors' intercorrelations (Pearson's *r*): Significant correlations (*r*'s) are indicated * = $p < .05$.

Table 2*Regression coefficients for predictors of enjoyment*

Variable	Regression coefficients enjoyment			
	<i>b</i>	<i>SE B</i>	β	<i>p</i>
Model 1				
Constant	-.92 (-1.69, -.20)	.38		.018*
Self-efficacy	.05 (-.06, .15)	.05	.04	.369
Student-teacher-relationship	.77 (.69, .86)	.04	.82	.001*
Suppression	.04 (-.03, .10)	.04	.05	.274
Corrected R^2		.68		
Model 2				
Constant	-.84 (-1.72, .02)	.44		.058
Self-efficacy	.05 (-.06, .16)	.05	.04	.369
Student-teacher-relationship	.75 (.66, .83)	.05	.80	.001*
Suppression	.02 (-.06, .09)	.04	.02	.641
Reappraisal	.05 (-.02, .12)	.04	.07	.164
Deep acting	.01 (-.06, .07)	.04	.01	.863
Faking	.14 (.00, .28)	.07	.12	.038*
Hiding	-.15 (-.29, -.01)	.07	-.12	.032*
ΔR^2		.01		

Note. Regression coefficients *b* after bootstrap and standardized β -values. Confidence intervals and standard errors based on 1000 bootstrap samples, 95% bias corrected and accelerated confidence intervals reported in parentheses, * = $p < .05$.

Bootstrapped mediational analysis revealed that even though suppression, $F(1,201) = 14.77$, $p < .001$, $\beta = -.26$, deep acting, $F(1,192) = 11.10$, $p = .001$, $\beta = .23$, and hiding, $F(1,192) = 34.22$, $p < .001$, $\beta = -.38$, all significantly predicted the teacher-student relationship, no mediation effects regarding the effect on enjoyment could be found, all $p > .191$. The mediation effect for hiding reached marginal significance, $b = -.428$, 95% BCa CI $[-.59, -.26]$, $p = .083$. Cognitive change had no impact on the teacher-student relationship. Faking also predicted the teacher-student relationship, $F(1,199) = 13.18$, $p < .001$, $\beta = -.25$, and there was a significant indirect effect of faking on enjoyment through the teacher-student relationship, $b = -.254$, 95% BCa CI $[-.43, -.09]$, $p = .029$. In the mediational analysis, no direct effect of faking on enjoyment could be found.

Anger

Assumptions of homoscedasticity, normally distributed residuals, and multicollinearity have been met (all $VIF < 1.85$, all tolerance statistics $> .54$) for the model of anger (see Appendix 1b), although some predictors showed substantial significant correlations, as can be seen in Table 3.

Table 3

Intercorrelations of predictors with anger and anxiety as outcome variables

Variable	Descriptives		Intercorrelations (r)	
	M	SD	1	2
Model 1				
Anger (1)	2.12	0.90	---	---
Anxiety (2)	1.53	0.66	---	---
Self-efficacy (3)	5.11	0.71	-.24*	-.37*
Student-teacher-relationship (4)	5.96	0.89	-.76*	-.70*
Suppression (5)	2.82	0.97	.04	.23*
Model 2				
Reappraisal (6)	3.65	1.21	-.09	.04
Deep acting (7)	3.45	0.97	-.20	-.17*
Faking (8)	1.87	0.71	.20*	.27*
Hiding (9)	2.35	0.68	.31*	.35*

Note. Mean (M) and standard deviations (SD) for anger as outcome

variable and predictors' intercorrelations (Pearson's r): Significant

correlations (r 's) are indicated * = $p < .05$.

The model including self-efficacy, the student-teacher-relationship, and suppression as predictors significantly predicted the outcome variable reported anger, change in $F(3,189) = 98.90$, $p < .001$, accounting for 61% of the variance. As can be seen in Table 4, there were two significant predictors, the student-teacher relationship and suppression. The second model did not improve the prediction, $F(4,185) = 1.93$, $p = .107$. Bootstrapped mediational analysis for anger revealed no significant effects, all $p > .177$.

Table 4

Regression coefficients for predictors of anger

Variable	Regression coefficients anger			
	<i>b</i>	<i>SE B</i>	β	<i>p</i>
Model 1				
Constant	7.12 (6.33, 7.91)	.40		<.001*
Self-efficacy	.09 (-.04, .17)	.06	.07	.174
Student-teacher-relationship	-.84 (-.95, -.74)	.05	-.83	<.001*
Suppression	-.14 (-.23, -.06)	.04	-.15	.001*
Corrected R^2		.61		
Model 2				
Constant	7.12 (6.33, 7.91)	.40		<.001*
Self-efficacy	.07 (-.04, .21)	.06	.08	.106
Student-teacher-relationship	-.81 (-.92, -.70)	.05	-.80	<.001*
Suppression	-.15 (-.25, -.05)	.05	-.16	.003*
Reappraisal	-.03 (-.10, .05)	.05	.07	.440
Deep acting	-.02 (-.10, .08)	.04	-.02	.709
Faking	.02 (-.13, .16)	.07	.01	.841
Hiding	.12 (-.05, .28)	.08	.09	.156
ΔR^2		.01		

Note. Regression coefficients *b* and standardized β -values. 95% confidence intervals in parentheses, * = $p < .05$.

Anxiety

A funnel-shaped cloud of the partial plot of residuals for the self-efficacy, the teacher-student relationship and the faking scales indicated a violation of the assumption of homoscedasticity, and the P-P-plot of residuals also indicated a violation of the assumption of normally distributed residuals (Field, 2018) for the model of anxiety (Appendix 1c). Therefore, results after bootstrapping with bias accelerated confidence intervals with 1000 bootstrap samples are presented. Assumptions of

multicollinearity have been met (all *VIF* < 1.86, all tolerance statistics > .54). Correlations between anxiety and predictor variables are depicted in Table 3.

The first regression model significantly predicted the outcome variable reported anxiety, change in $F(3,188) = 62.80, p < .001$, accounting for 49% of the variance in the outcome variable. As depicted in Table 5, the model yielded two relevant predictors: However, the only significant predictor was global quality of the teacher-student relationship, the β -values for self-efficacy did not reach the threshold of significance, neither in the original ($p = .057$), nor in the bootstrapped model ($p = .077$). The second model did not add any additional predictive power, change in $F(4,184) = 0.69, p = .599$. Bootstrapped mediational analysis revealed no indirect effects for cognitive change, deep acting, faking, and hiding. The indirect effect for suppression on anxiety through the teacher-student relationship reached marginal significance, $b = .16, 95\% \text{BCa CI } [.07, .26], p = .062$, even though no direct effect of suppression on reported levels of anxiety could be found.

Table 5

Regression coefficients for predictors of anxiety

Variable	Regression coefficients anxiety			
	<i>b</i>	<i>SE B</i>	β	<i>p</i>
Model 1				
Constant	4.80 (4.13, 5.54)	.37		.001*
Self-efficacy	-.10 (-.21, .00)	.06	-.11	.077
Student-teacher-relationship	-.48 (-.56, -.39)	.04	-.64	<.001*
Suppression	.04 (-.04, .11)	.04	.05	.332
Corrected R^2		.49		
Model 2				
Constant	4.80 (3.68, 5.41)	.37		.001*
Self-efficacy	-.09 (-.21, .02)	.06	-.10	.109
Student-teacher-relationship	-.47 (-.56, -.38)	.05	-.63	.001*
Suppression	.01 (-.07, .09)	.04	.02	.790
Reappraisal	.01 (-.05, .07)	.03	.02	.751
Deep acting	.01 (-.06, .08)	.04	.02	.753
Faking	.06 (-.07, .19)	.06	.06	.322
Hiding	.04 (-.10, .17)	.06	.04	.516
ΔR^2		.01		

Note. Regression coefficients *b* and standardized β -values. 95% confidence intervals in

parentheses, * = $p < .05$.

Discussion

In this study, we intended to investigate three important predictors of teachers' emotional experiences in the classroom. We hypothesized that teachers' estimates of their own self-efficacy, the teacher-student relationship, and ERS would predict experienced enjoyment, anger, and anxiety. The teacher-student relationship emerged as the dominant and most important predictor, while ERS and self-efficacy only showed rather small, emotion-specific, and insignificant effects. However, we also found a significant moderate correlation between self-efficacy and the teacher-student relationship, as well as between most ERS (cognitive reappraisal being the only exception) and the teacher-student relationship.

Teacher-student relationship

The data strongly supported the hypothesis about the predictive value of perceived teacher-student relationship quality and emotional outcome. The perceived teacher-student relationship in one class was a significant and strong predictor for the experience of enjoyment, anger, and anxiety in this class, particularly strong for anger and enjoyment. Results were in the expected directions: Perceived good relationship quality was associated with more intense enjoyment and less intense anger and anxiety. Teachers seem to emotionally thrive in environments where they have close and good relationships to their students and few conflicts. These findings emphasize the importance of the teacher-student relationship for teachers' emotional experience very clearly, replicating previous findings regarding teacher anger and enjoyment (Hagenauer et al., 2015; Taxer & Gross, 2018). Furthermore, this study extends previous findings and demonstrates a relevant association with reported anxiety. The overwhelming strength of predictive value, especially in comparison with the other predictors is in line with previous research assuming that a good relationship to their students is a basic need for teachers (Klassen et al., 2012), and underestimated in its protective value when satisfied, generating enjoyment, but also in its destructive value when unsatisfied, generating especially anger. This finding regarding teacher-student relationship quality might be partially explanative for the effectiveness of the SEC-training by Jennings et al. (2017) because that training had a focus on improving teachers' relationship qualities. They did however not investigate variables of

emotional outcome. In our study, the teacher-student relationship was the only reliably strong predictor in all three models. The effects of the other predictors were emotion-specific and less pronounced.

Self-efficacy

Self-efficacy, even though it was entered in every model first, did not significantly predict any emotional outcome variable, even though the beta-value in the model for anxiety was substantial, it did not reach significance. This is an unexpected finding. Researchers demonstrated that teachers' self-efficacy beliefs alter their behavior in the way that teachers with high self-efficacy beliefs are more enthusiastic and committed than teachers with low self-efficacy beliefs (Skaalvik & Skaalvik, 2007). Furthermore, teacher self-efficacy is related to job satisfaction (Klassen & Chiu, 2010). It is also assumed that a person with high self-efficacy beliefs will rather often engage in certain activities and experience mastery and corresponding emotions that come with it. However, what are the emotions that go along with mastery? Being precise regarding emotion vocabulary could answer why we found no direct link between self-efficacy and enjoyment: Maybe a more relevant emotion would be pride, which is associated with a cognitive appraisal of mastery of a situation (Tong, 2015), and to disappointment which is related to failure. For instance, Grossman and Oplatka (2021, p. 210) explored disappointment in teachers in a qualitative study and quoted a teacher, saying: "after you let disappointment sink in, thoughts of failure arise." Regarding anxiety, self-efficacy almost reached significance as a predictor. This would be in line with a substantial amount of previous clinical and non-clinical research showing that (psychopathological) anxiety is related to external locus of control and low self-efficacy beliefs (Hovenkamp-Hermelink et al., 2019; Ng & Lovibond, 2020). So, maybe self-efficacy has predictive value regarding the experience of anxiety as an outcome variable, but our sample was too small to find a significant effect.

ERS

Regarding ERS, this study shows a heterogeneous pattern. There was a negative association between suppression and anger – meaning, the more suppression, the less anger. At first glance, this seems to be contradictory to previous findings showing that low levels of suppression are associated

with low levels of anger (Chang & Taxer, 2020). However, it might be that the relationship between suppression as an ERS and anger is complex: A teacher who does not experience anger does not need to suppress it (= low anger → low suppression). However, a teacher experiencing anger who does not suppress, but instead expresses it, might experience even more anger (= low suppression → high anger), because anger expression can generate anger and damage relationships and therefore make conflict more likely (Chervonsky & Hunt, 2017). Furthermore, as mentioned before, emotion regulation research differentiates between the expression/suppression of thoughts, feelings, and motor expression of emotions. Functionality of these strategies is strategy-specific and especially with regard to anger, the inhibition of anger expression (not thoughts or feelings) might be functional in the long term (= high suppression → low anger), especially in a classroom context where display rules do not allow teachers to express their anger, particularly when it is strong (Schutz et al., 2007; Zembylas, 2005).

Further effects of the emotion regulation and the emotional labor scales were almost non-existent or not as predicted. In this study, neither cognitive reappraisal, nor faking or hiding had any effect on the outcome variables. There were two exceptions: In the second model for enjoyment, faking and hiding were relevant and significant predictors, however, the predictive power of the model did not improve. The finding that hiding positive emotions diminishes them would be in line with previous research (e.g., Quoidbach et al., 2015). In addition, the finding that faking positive emotions enhances them in the short term would be in line with the assumptions of facial feedback hypothesis (Davis et al., 2009). Supporting these previous results, there was a mediation effect of faking on enjoyment through the teacher-student relationship, indicating that faking influenced enjoyment as emotional outcome through the teacher-student relationship.

Limitations

Overall, the non-significance of the emotion regulation predictors, which were mostly correlated in the hypothesized directions with the outcome variables, could be due to their shared variance with the main predictor. Deep acting, faking, and suppression were all inter-correlated and mostly correlated to the outcome variables in the predicted direction. It is likely that certain ERS such

as deep acting generate closeness, which was a component of the teacher-student relationship measure as well as faking and suppression might create distance. They would then influence emotional outcome indirectly via the student-teacher relationship. However, these very specific interrelations can only be guessed at from the regression model in this study because the teacher-student relationship was measured as a broader concept. Furthermore, longitudinal studies investigating teachers' ERS for a longer period would be necessary to be able to first specify the direction of the detected associations and to investigate long-term effects.

Findings were overall surprising where ERS according to the ERQ were concerned, which is why the usefulness of the questionnaire should be considered. First, the scales of the ERQ do not differ between emotions, not even between negative or positive emotions. This might be an important differentiation, because suppression can be adaptive in specific contexts regarding some (negative) emotions, while suppression of positive emotions is very rarely functional. Second, as we had distinct emotions as outcome, an emotion regulation questionnaire should be more specific regarding targeted emotions. Neither context-strategy-fits nor emotion-strategy-fits are always the same, but flexible (Bonanno & Burton, 2013). The ERQ might therefore even prove invalid as soon as specific emotions in specific contexts are measured. Third, the original theoretical model underlying the ERQ by Gross and John (2003) also has received recent criticism that it has never been statistically proven (Naragon-Gainey et al., 2017), so it can be questioned that it measures emotion regulation in a sufficient way.

Conclusion

In conclusion, as this study cannot account for any direction of effect, it might rather be seen as a preliminary analysis for further longitudinal study designs. It strengthens the assumption that the teacher-student relationship is an influential factor for teachers' emotional life. It weakly supports some previous findings on hiding and faking enjoyment in the classroom which might in the case of faking influence the relationship between teachers and students, and therefore also indirectly the emotional outcome. The role of emotion regulation and its importance within the whole framework remain however widely unclear, apart from the negative relationship of suppression and anger, which should be further investigated in the future. A new conceptual framework for emotion regulation in

the classroom or its meaningful integration into the reciprocal model of teacher emotions and its associations with teacher-student relationships would be useful. Furthermore, the development of diagnostically specific questionnaires regarding ERS in teachers seems necessary. Specific, qualitative, and quantitative, short- and long-term research about teacher ERS and emotional outcome is still needed.

The influence of the teacher-student relationship closeness and students' goal attainment on emotional outcome in pre-service teachers: A randomized controlled laboratory study

As demonstrated in the study above, the teacher-student relationship is an important predictor of emotional outcome in teachers. Within the framework of self-determination-theory (Deci & Ryan, 2000), researchers argued that relatedness to their students is a basic need of teachers, therefore fosters motivation, and has an impact on teachers' emotions and cognitions (e.g., Klassen et al., 2012; Milatz et al., 2015). Teachers themselves emphasized in self-reports that the relationships to their students is the most important part of their work (Shann, 1998). Studies then demonstrated that the teacher-student relationship has an impact on teacher engagement and felt emotions (Klassen et al., 2012). Taxer et al. (2019b) showed that the teacher-student relationship even prevents teachers from feelings of emotional exhaustion by generating enjoyment and decreasing anger. Vice versa, high levels of conflict in the teacher-student relationship are associated with teachers' self-reported depressive symptoms and low self-efficacy (Hamre et al., 2008).

Teacher-student relationship closeness

Relationship closeness is a facet of the teacher-student relationship and refers to the "degree of warmth and positive affect between the teacher and the child, as well as how comfortable the child is approaching the teacher" (Sabol & Pianta, 2012, p. 215). In the framework of attachment theory, relationship closeness is often seen as the interpersonal component of the teacher-student relationship in contrast to the professional dimension of the relationship (Hagenauer & Volet, 2014). Teacher-student relationship closeness as rated by teachers seems to be moderately consistent over time (Blacher et al., 2009; Jerome et al., 2009). Students seem to benefit from close student-teacher-relationships in multiple ways, they achieve better grades (Pianta & Stuhlman, 2004) and social skills (Crosnoe et al., 2004) and are more engaged (Quin, 2016). Furthermore, closer teacher-student relationships have been shown to buffer negative outcomes such as school avoidance or anxiety (Arbeau et al., 2010). On the teacher's side, teachers feeling highly connected with their students reported fewer depressive symptoms (Milatz et al., 2015). It is therefore likely that high levels of closeness between teachers and students have an influence on teachers' emotions, even though this

has not been experimentally investigated yet.

Teachers' goals and cognitive appraisals of goal attainment

Besides developing and fostering close teacher-student relationships, facilitating effective learning experiences is an important goal for teachers (Mansfield & Beltman, 2014; Rüplich & Urhahne, 2015). Therefore, it is important for teachers to see their students perform well, which seems to have direct consequences on teachers' emotional outcome: Several studies confirmed this link between student achievement and pleasant teacher emotions (for an overview, see Frenzel, 2014). Vice versa, negative emotions such as anger can also be caused by students' failure, particularly when it can be attributed to student behavior (Prawat et al., 1983). However, Frenzel, Goetz, Stephens, et al. (2009) argued that not only the situational outcome itself triggers emotions in teachers, but that appraisals influence the process of emotion elicitation. Two influential appraisals are goal relevance and goal conduciveness of a situation (Scherer, 2009), meaning whether a situational outcome is considered important for the person's goals and whether it facilitates or prevents goal attainment. Becker et al. (2015) showed that the goal conduciveness appraisal mediated the association between situational and emotional outcome (anger/enjoyment) in a sample of teachers.

Closeness and goal attainment as predictors of emotional outcome in teachers

Less is known about the importance of the goal attainment appraisal for teachers, even though it is likely that both, teachers' goal attainment and the teacher-student relationship closeness have an impact on teacher emotions. Goal attainment appraisals are known to co-occur with several positive (Tong, 2015) and negative emotions (Tong, 2010). Goal attainment appraisals are highly relevant in school because school often is about reaching goals, not just for the students, but also for the teachers. Therefore, it can be assumed that both closeness as a facet of the teacher-student relationship and goal attainment appraisals are associated with emotional outcome.

The present study

This study poses the question on whether closeness in the teacher-student relationship alters pre-service teachers' emotional reactions towards their students' goal attainment (success vs. failure) in an experimentally manipulated design. We expected an interaction between teacher-student

closeness and goal attainment, in the way that high closeness and high goal attainment would lead to more intense pleasant emotions and low closeness and high goal attainment would lead to lower levels of pleasant emotions. Furthermore, it was expected that high closeness and low goal attainment would lead to more intense unpleasant emotions and low closeness and low goal attainment to lower levels of unpleasant emotions. Thus, we confronted a sample of pre-service teachers with a virtual class made up of some high achieving and low achieving students, some of them encouraging a close teacher-student relationship, others not. We then investigated the effects of these within-subject manipulations on affective outcome.

Method

Participants

Sixty-three pre-service teachers participated in this study, 19 to 34 years old ($M = 22.22$, $SD = 2.50$), 55 female (87.3%). Post-hoc power analysis that was conducted with G*Power (Faul et al., 2007) for dependent means (t -tests, two-tailed, $\alpha = .05$) suggested a power of 80% for small effects (Cohen's $d = 0.36$). The cultural-ethnic background of the sample was quite homogeneous with 61 (96.8%) participants reporting German as their native language. 35 (55.6%) participants were studying for an educational degree for teaching in primary school, 11 (17.4%) for teaching in secondary school, and 13 (20.6%) for teaching in high school. Most of the participants entered a high school degree as highest graduation (59, 92.1%), only 4 (6.4%) already had a higher university degree. The recruitment of participants took place in lectures for pre-service teachers via flyers and emails.

Design

The experiment was conducted in a laboratory setting within one session. Differences in emotional outcome were measured within subjects using a 2 x 2 x 4 repeated-measures' design with the factors within-subjects factors closeness (close vs. distant), goal attainment (attained vs. not attained), and time (first to fourth cycle). Gender of the stimuli (pictures of students) was counterbalanced.

Stimuli

Classroom

To develop a realistic scenario, participants were instructed to imagine entering their profession as a teacher and were confronted with one of the computer-generated versions of the class depicted in Figure 7. The assignment of pupils' pictures to the relevant spots was counterbalanced regarding pair of desk neighbor. To prevent gender effects, male subjects were only confronted with male stimuli and female subjects only with the girls' pictures. The children's pictures were collected by students and staff and only used when informed consent by parents and child was given. Then, we chose the depicted photographs out of a pool of pictures according to size, guessed age and posture. We also paid extra attention to choosing faces with similar emotion expression to avoid variance caused by emotional transmission, which happens in classrooms (Frenzel et al., 2018). Figure 7 depicts one of the classrooms with selected students. "Close" spots were the two at the bottom left; "distant" spots the two at the top left side. The girl at the bottom right side always occupied the only fixed spot. For feedback on the pupils' grades, the pupil was depicted at his or her seat in the classroom and the grade as well as the comment was depicted next to him or her.

Figure 7

Classroom with "close" students at the bottom left and "distant" students at the top left



Closeness induction procedure

Closeness usually "refers to warmth and affection" (Milatz et al., 2014, p. 357). However, studies measuring reported teacher-student relationship closeness usually measure its influence on

student outcomes and not its influence on teacher outcome. Therefore, it is unknown what characteristics of students make teachers feel close to them. Good teacher-student relationships are characterized by security (Milatz et al., 2014) and therefore trust which might encourage students to be more open about themselves. Therefore, the information given to the participants about their students was either personal information (about their favorite activities, nickname, and relationship to their siblings) in the close condition or neutral information (size, age, parents' profession, and way to school) in the distant condition. Furthermore, we manipulated physical closeness between participant and pupil (first or last row). To verify the validity of this procedure, we also measured participants' felt closeness to students after the induction.

Goal attainment manipulation

As mentioned before, students' performance and its appraisal by teachers directly influences teachers' emotional outcomes (Frenzel, 2014). Therefore, we used photographs of potential students' exam grades to manipulate teachers' goal attainment appraisals. There were always two students who stably achieved very good grades (goal attained) and two students who stably achieved rather bad grades (goal failed). An exemplary feedback of a student's achievement was: "Previously, Laura has been quite a good student in your subject. However, in the latest exam, Laura has received the following grade." Then the picture depicting the bad grade was shown. Later during the school year, the underachieving student's grade was compared to the average grades in the class: "In comparison to the rest of the class, Laura has achieved a very bad grade." Then again, the photograph of the grade was inserted. All stimuli and instructions can be found in Appendix 2.

Measures

Closeness

Closeness was measured using a self-other overlap depiction adapted from Gino and Galinsky (2012) and Gächter et al. (2015). Five illustrations of minimally to almost fully overlapping circles were presented, and the participants had to choose the one that best described his or her relationship to the student that was depicted above. The picture of the student was always presented at its previous spot to not interfere with the closeness induction. Furthermore, at the end of the experiment, we

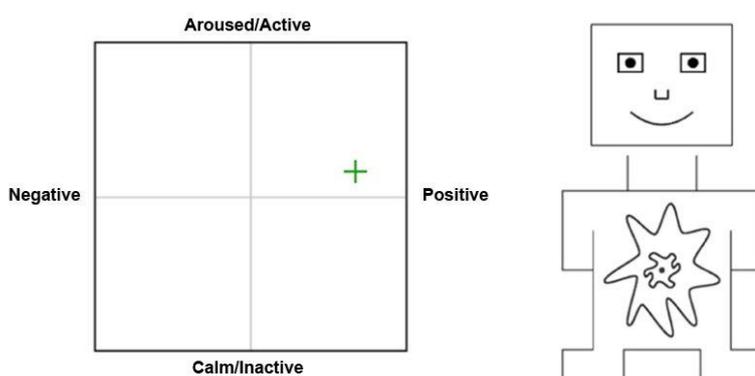
included a small control questionnaire comprising three questions that were answered on an eight-point Likert scale from 0 = *not at all* to 7 = *extremely*. “How much do you like the depicted pupil?” “How related do you feel to the depicted pupil?” “How likeable is the depicted pupil from your point of view?” Two of those questions were adapted from the German teacher-student relationship scale by Klassen et al. (2012). We did not use the other two questions of this scale, because they were content-wise not suitable to our study. Instead, we inserted a question about sympathy and similarity. The internal consistency of the scale was acceptable, Cronbach’s $\alpha = .75$.

Affective State

We measured participants' affective state with an affect-grid theoretically derived from the circumplex model of affect (Russell, 1980) displaying arousal and valence as two orthogonal scales. ‘Arousal’ and ‘valence’ were plotted on the axes of a diagram. The participants were asked to indicate their current feelings on the grid via a stick figure as can be seen in Figure 8. The responses were then coded on two response scales for valence and arousal ranging from 0 to 10.

Figure 8

Affect grid and stick man mirroring the chosen state of valence and arousal



Empathy

As correlations between the teacher-student relationship and empathy have been documented in qualitative (e.g., McGrath & Van Bergen, 2019) as well as quantitative studies (e.g., Barr, 2011), we also let participants fill in a German version of the interpersonal reactivity index (IRI;

Davis, 1983), the Saarbrücker Persönlichkeitsfragebogen (Paulus, 2006), to take its influence on closeness ratings into account. This questionnaire operationalizes empathy on four scales: perspective taking, fantasy, empathic concern, and personal distress. Each scale comprises four items and can be answered on a five-point Likert scale from 1 = *never* to 5 = *always*.

Procedure and Analysis

After giving informed consent and inserting demographic variables in a paper-pencil procedure, the experiment was started via the software E-PRIME. Then, the class was introduced, and the participants were instructed to carefully read the information regarding the personal or neutral information about their pupils. Afterwards, to generate results that are more reliable, the following block was repeated four times: At first, an important and exclusive class activity was presented (such as an excursion or baking waffles) for storytelling. Second, the participants were informed about the latest test results of the class by means of presenting an overview of grades. Third, individual grades were feedbacked for four pupils (Closeness x Goal Attainment). Fourth, the affect grid was presented. At the “end of the school year”, participants had to rate their feelings of closeness regarding each of the four pupils.

The data was analyzed using a 2 x 2 x 4 repeated-measures' ANOVA with the within-subject factors Closeness (close vs. distant), Goal Attainment (attained vs. not attained), and Point in Time. We expected an interaction effect of Closeness and Goal Attainment on valence: We hypothesized that pupils perceived as close with high scores would elicit high valence ratings and pupils perceived as close with low scores would elicit low valence ratings, while vice versa pupils perceived as distant would elicit lower valence ratings independent of condition. For comparisons of means, Bonferroni-adjusted post-hoc tests were calculated. As we had no directed hypothesis for arousal ratings, an exploratory 2 x 2 x 4 repeated-measures' ANOVA with the identical factors was conducted. Furthermore, associations between Goal Attainment and the relatedness questionnaires were also explored.

Results

Preliminary analyses

Closeness induction

Dependent *t*-tests revealed hardly any differences between conditions on any measure of closeness, as can be seen in Table 7. Furthermore, regarding relatedness, the participants reported to feel more related towards the students depicted as distant. Therefore, it can be concluded that at least no explicit closeness induction had happened.

Empathy

There were small but significant correlations between empathy ratings and liking ($r_{pb} = .30, p = .019$), sympathy ($r_{pb} = .26, p = .038$), and relatedness ($r_{pb} = .28, p = .029$). No correlation was found between empathy and total valence ($p = .406$) or arousal ratings ($p = .371$). The empathy score was therefore not included in the main analysis.

Table 7

Mean differences in closeness scales at the end of experiment between close and distant stimuli

Variable	M_{diff}	SD	T	p
Self-other overlap (neg)	-0.05 (-0.31, 0.22)	1.05	-0.36	.721
Self-other overlap (pos)	0.11 (-0.14, 0.36)	0.99	0.90	.374
Liking (neg)	0.06 (-0.31, 0.43)	1.47	0.34	.733
Liking (pos)	0.16 (-0.15, 0.47)	1.23	1.02	.311
Sympathy (neg)	0.21 (-0.22, 0.63)	1.68	1.00	.332
Sympathy (pos)	0.35 (-0.01, 0.71)	1.44	1.93	.059
Relatedness (neg)	0.05 (-0.36, 0.45)	1.61	0.24	.815
Relatedness (pos)	0.49 (-0.10, 0.89)	1.55	2.49	.016*
Similarity (neg)	-0.23 (-0.68, 0.22)	0.22	-1.03	.309
Similarity (pos)	0.41 (-0.12, 0.94)	0.27	1.56	.125

Note. Mean differences between close and distant stimuli and 95%

confidence intervals in parentheses, * = $p < .05$. Results are separated for

pupils receiving neg = negative feedback (low goal attainment) and pupils

receiving pos = positive feedback (high goal attainment).

Main analysis – Valence ratings

Descriptive statistics of the valence ratings are displayed in Table 8. Figure 9 gives an overview of valence ratings over the course of time. The 2 (close vs. distant) x 2 (goal attained vs. goal

failed) x 4 (points in time) repeated measures' ANOVA on valence revealed an interaction effect Closeness X Goal Attainment, $F(1,62) = 11.02$, $p = .002$, $\eta_p^2 = .15$. Figure 9 shows that the effect was not as our hypothesis predicted: Averaged across time, pictures from the close condition in combination with failure led to higher valence than pictures from the distant condition in combination with failure. Bonferroni-adjusted post-hoc testing confirmed this effect, $F(1,62) = 8.95$, $p = .004$, $\eta_p^2 = .13$. Vice versa, when the goal was attained, there was no difference between pictures from the distant condition and pictures from the close condition, $F(1,62) = 3.59$, $p = .063$, $\eta_p^2 = .06$.

Table 8

Means (M) and standard deviations (SD) of valence ratings over time separated for conditions

Variable		Goal Attained		Goal Failed	
Closeness	Time	M	SD	M	SD
Close	1	7.84	0.94	3.24	1.40
	2	7.65	1.07	2.57	1.34
	3	7.37	0.92	2.56	1.12
	4	8.22	1.02	1.94	1.31
Distant	1	7.92	0.77	2.67	.332
	2	7.95	0.89	2.63	.059
	3	7.25	0.88	2.38	.815
	4	8.37	0.79	1.86	.125

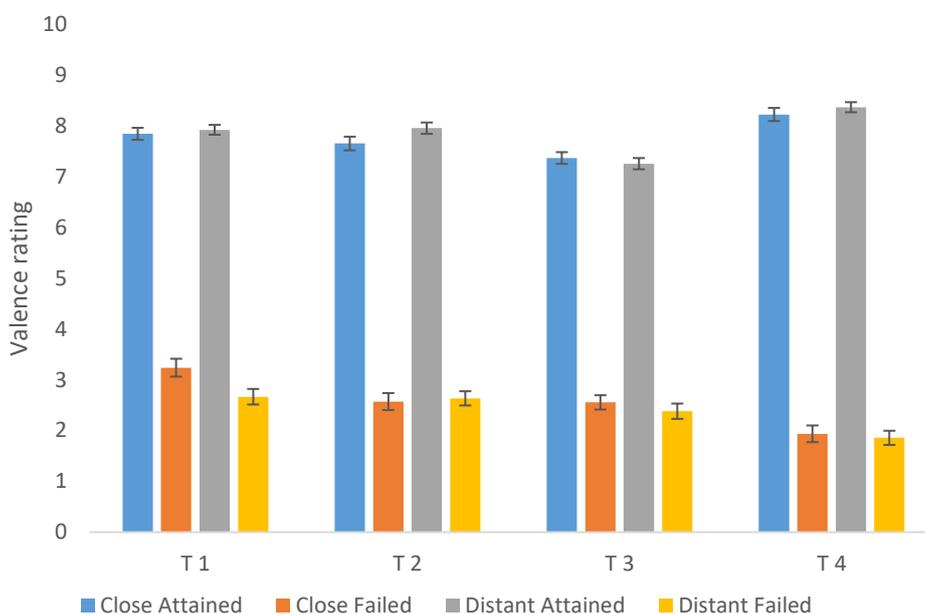
The three-way interaction Closeness X Goal Attainment X Time was not significant, $F(3,186) = 2.22$, $p < .087$. However, two of the three contrast tests of the three-way interaction were significant: The comparison between the first and the third assessment, $F(1,62) = 7.04$, $p = .010$, $\eta_p^2 = .10$, and the comparison between the first and the last assessment, $F(1,62) = 7.04$, $p = .046$, $\eta_p^2 = .06$, indicating that the third and the last assessment slightly differed from the first one, while the second did not.

We found significant effects for the interactions Closeness X Time, $F(3,186) = 5.04$, $p < .002$, $\eta_p^2 = .08$, and Goal Attainment X Time, $F(3,186) = 43.29$, $p < .001$, $\eta_p^2 = .41$. Regarding the interaction Closeness X Time, this one reflected that overall, there was a slightly stronger but not continuous decrease in valence ratings over time in the close condition in comparison to the distant condition. The post-hoc tests revealed that in the close condition, there was no difference between the assessment of time point 2 vs. time point 3 and 4 and between time points 3 and 4. On the other hand, in the distant condition, there was no difference between time point 1 and time points 2 and 4, and between

time point 2 and 4. All other comparisons were significant (all $p < .005$). Contrast tests were significant between time point 1 and time point 2, $F(1,62) = 10.41$, $p = .002$, $\eta_p^2 = .14$, and time point 1 and time point 4, $F(1,62) = 88.23$, $p = .037$, $\eta_p^2 = .07$. In summary, it can be said that this pattern of the interaction Closeness X Time did not reveal any trends and is therefore widely inconclusive.

Figure 9

Means and standard errors for valence ratings over Time (T) in response to distant and close stimuli after failed versus successful goal attainment



Regarding the interaction Goal attainment X Time, post-hoc tests revealed that when the goal was attained, there were no differences between the first and the second assessment. When the goal was not attained, there were no differences between the second and third assessment. All other comparisons were significant (all $p < .008$). However, only one contrast test between time point 1 and time point 4 was significant, $F(1,62) = 88.23$, $p < .001$, $\eta_p^2 = .59$. This shows that with repeated failures, the valence ratings continually dropped over time. At the last rating – when failure or success was final, there was an increase in valence ratings from first to last measurement in the successful condition and a decrease in valence ratings from first to last measurement in the unsuccessful condition.

The main effect of Goal Attainment was particularly strong (see Figure 9), $F(1,72) = 910.79$, p

< .001, $\eta_p^2 = .94$, reflecting higher valence ratings in response to goal attainment than in response to failure. There was also a main effect of Time, $F(3,186) = 22.01$, $p < .001$, $\eta_p^2 = .26$. No further effects were significant.

Exploratory analysis – Arousal ratings

Regarding arousal ratings, the repeated measures' ANOVA did not reveal an interaction effect Closeness X Goal Attainment, $F(1,62) = 3.51$, $p = .066$. The three-way interaction Closeness X Goal Attainment X Time, $F(3,186) = 1.21$, $p = .309$, as well as the interaction Goal Attainment X Time, $F(3,186) = 2.05$, $p = .109$, were not significant. There was, however, a significant interaction, Closeness X Time, $F(3,186) = 2.72$, $p = .046$, $\eta_p^2 = .04$, which did not reveal any meaningful patterns. Furthermore, there were main effects of Goal Attainment, $F(1,62) = 27.62$, $p < .001$, $\eta_p^2 = .31$, indicating higher levels of arousal in response to students' success than in response to students' failure, and Time, $F(3,186) = 6.76$, $p < .001$, $\eta_p^2 = .10$. The main effect of Closeness was not significant, $F(1,62) = 2.80$, $p = .099$.

Exploratory analysis – Differences in closeness scales depending on goal attainment condition

Last, we calculated dependent *t*-tests to compare means on closeness scales for pupils who had attained their goals and those who had failed them. Mean differences and significance values can be found in Table 9. All were significant indicating that teachers felt closer, more related, more similar, and more sympathetic towards students who had attained the goal. They also liked these pupils more.

Table 9

Mean differences on closeness scales separated by goal attainment condition

Scale	$M_{diff} (pos-neg)$	SE	T	p
Circles	0.71 (0.40, 1.03)	.16	4.52	<.001*
Similarity	1.08 (0.69, 1.47)	.20	5.48	<.001*
Liking	0.52 (0.23, 0.82)	.15	3.57	.001*
Relatedness	0.71 (-0.10, 0.67)	.18	4.03	<.001*
Sympathy	0.53 (0.20, 0.84)	.15	3.56	.001

Note. 95% confidence intervals in parentheses, * = $p < .05$.

Discussion

The goal of this study was to investigate whether induced closeness between student and teacher in a fictitious classroom moderates teachers' emotional responses to goal attainment. We

expected an interaction effect between goal attainment and closeness in the way that more closeness causes more intense emotional reactions in either direction. We did not find this pattern, instead, in contrast to our hypotheses, we observed an interaction effect of goal attainment and closeness on valence, whereby induced closeness seemed to slightly buffer negative affect after failure. However, this effect was neither stable nor strong and could therefore be an artefact. The general pattern of results showed substantial interaction of goal attainment and time, indicating that with accumulations of failure or success, valence ratings became more pronounced in either direction with the largest difference at the last point in time. Furthermore, we found a large impact of goal attainment on valence ratings.

Contribution to the field

This study demonstrated in a laboratory setting that fictitious students' performance substantially influenced pre-service teachers' valence ratings. This effect shall be noted here due to its striking size, even though this study's main goal was not to find this effect. An effect of goal attainment in the form of student performance on emotional outcome would be in line with previous results within the classroom demonstrating this association (e.g., Frenzel, Goetz, Stephens, et al., 2009). This study extends this finding by allowing causal interpretations because we chose an experimental and highly standardized setting. We used pre-service teachers with teaching experience as study subjects, which ensures the generalizability of these results to other subjects of the same target group.

The interaction effect between goal attainment and closeness on valence ratings, which we found in this study, must be interpreted with care, as we cannot be entirely sure that the closeness induction was successful. On the contrary, the explicit closeness measures did not reveal any effect, which indicates that the closeness induction – if it happened – did not last until the end of the study. It is possible that the closeness induction was successful in the beginning for the first point in time, which could then have produced the interaction effect. On the other hand, it is also possible that it was a false positive effect. Thus, we should be very careful in interpreting it. We found that when students had failed, induced closeness seemed to slightly buffer the negative emotional response of the participants to their student's failure, because it proved to be less negative than the participants'

response to the failing distant students. In the successful condition, no differences between close and distant condition were found. Generalizing this hypothesis, this could mean that a closer teacher-student relationship leads to less negative emotional responses of teachers to students' failures. Or – the other way round – when students fail and the teacher-student relationship is distant, this might lead to even stronger feelings of negativity because the teacher does not know how to approach these students.

Exploratory results

The exploratory analysis on arousal ratings revealed a main effect of goal attainment, indicating higher arousal levels when the goal was attained. This could be a hint on the nature of the discrete emotions that were elicited: According to Scherer's (2005) semantic space for emotions, positively valenced emotions that are accompanied by a medium or higher level of arousal would be delight, excitement, elation, and joy. The second exploratory finding was very interesting: We found that our manipulation led to remarkable differences in the self-report questionnaires assessing sympathy, closeness, and relatedness at the end of the session. Students who had achieved the designated goal of good grades received higher ratings in closeness, relatedness, similarity, and sympathy. An association between the teacher-student relationship and student performance has previously been demonstrated (Fan, 2012). On the one hand, our results are alarming because transferred to a classroom context they would predict worse teacher-student relationships for underachieving students. On the other hand, these results again demonstrate that the teacher-student relationship is important and that teachers should be taught these results in order to be aware of them when interacting with students.

Limitations

Methodologically, it seems likely that our attempted closeness induction did not work, as we found no higher values in the closeness scales at the end of the experiment. Interestingly, we still found an interaction. Therefore, it is also possible that the closeness induction did implicitly work. Considering these results, it seems important for future studies to improve closeness induction in laboratory settings. Milatz et al. (2014) formulated that in good teacher-student relationships the

student “accepts the teacher as an important emotional and cognitive resource” (p. 358). Maybe this definition could be used for future closeness inductions in the way that fictitious students thank the teacher for support and feedback and tell that they value his or her guidance. Furthermore, in a study design like ours, a more stable closeness induction could possibly be achieved by focusing more often on closeness induction between trials. As we only provided an induction via personal vs. neutral information at the beginning of the study, the effect might have faded over time indicating that the pure simulation of physical distance for upholding the manipulation was not enough.

Conclusion

Conclusions from this study need to be drawn cautiously due to the likely failure of the closeness induction. Still, we might have found a hint that the closeness induction slightly altered negative emotional outcome in response to student failure. Again, this would emphasize the importance of the teacher-student relationship. It would be interesting to know what would happen if the closeness induction was stronger and more successful and whether this would make the effect vanish or whether it would strengthen it. Furthermore, it would be interesting to know whether the main effect of goal attainment would remain strong if the strength of the closeness induction changed. Therefore, investing in laboratory studies with pre-service teachers like this one seems important and promising.

5. Summary of study results

The results of the first study highlighted the importance of the student-teacher relationship in predicting emotional outcome and the specificity of effects of ERS. The results of the second study, however, did not find any associations between relationship closeness and emotional outcome but rather effects of goal attainment and the hint of an interaction. Thus, in combination, these two studies were partially inconclusive and should therefore rather be seen as preliminary studies contributing to research investigating links between the teacher-student relationship and emotional outcome. Their results were used for the development of the EC training concept insofar that the student-teacher relationship was included in discussions about teacher roles and goals, and that the specificity of certain ERS (e.g., faking and suppression) and their links to emotional outcome were highlighted in the EC training.

6. Training emotional competence

In general, there is evidence that EI can be trained. A recent meta-analysis (Hodzic et al., 2017) found a medium-sized effect of $d = 0.51$ for the effectiveness of trainings in treatment-control studies, with a clearly stronger effect for those trainings based on the ability-model theory ($d = 0.60$ vs. $d = 0.31$). However, the authors noted that their study results could be biased by publication bias and that the true effect should be at $d = 0.46$. A second meta-analysis revealed also a medium-sized effect ($d = 0.45$) for treatment-control studies in organizational settings (Mattingly & Kraiger, 2019). This meta-analysis revealed that treatment effects did not differ between trainings based on either one of the before-mentioned conceptualizations of mixed models or ability models. In their limitations, the authors mentioned the small sample size for a meta-analysis, and that many of the studies only included measures of self-report estimations of EC and not all of them ability measures. Therefore, the effect could be rather due to people's perception of their increases in EC and not to actual better performance in ability tests. Therefore, the results of this meta-analysis need to be interpreted with caution. EC trainings with or for teachers are still a relatively new phenomenon and there are no meta-analytic studies. However, Jennings et al. (2017; 2019) developed an SEC training for teachers based on their afore-mentioned model and proved its short- and long-term effectiveness in a randomized

controlled trial with a US-American teacher sample.

Regarding sub-components of EC such as emotion perception, EC trainings usually cover the identification, labeling, and characterization of emotions. They do so with considerable effect, as the meta-analysis of Hodzic et al. (2017) found the largest effect of training on the dimension of emotion understanding ($d = 0.69$) in the Mayer-Salovey-Caruso-Emotional-Intelligence-Test (MSCEIT; Mayer et al., 2002). This effect could be interpreted as a knowledge gain in the specific domain of emotions, because emotion understanding is associated with crystallized intelligence (MacCann et al., 2014). Emotion understanding had a stronger effect on academic performance than emotion perception or facilitation (MacCann et al., 2014).

In a meta-analysis on the effectiveness of person perception trainings, Blanch-Hartigan et al. (2012) mentioned a wide research gap regarding randomized controlled trials on basic emotion recognition trainings. They only found studies with within-subject designs without control groups, indicating significantly higher emotion recognition accuracy. One recent study with healthy participants including a control-group, however, found improvements in emotion recognition abilities after training (Geßler et al., 2021).

Regarding emotion regulation training, there is considerable evidence for its effectiveness (see Cohen & Ochsner, 2018, for an overview). Specifically, this review mentions attentional deployment and cognitive change as strategies for emotion downregulation: Training attentional deployment away from negative stimuli is effective in downregulating fear and anxiety. Cognitive reappraisal trainings are generally very effective and mitigate declines in marital quality as well as increase consiliatory behaviour. Training positive interventions is also effective in upregulating positive affect (e.g., Quidbach et al., 2015).

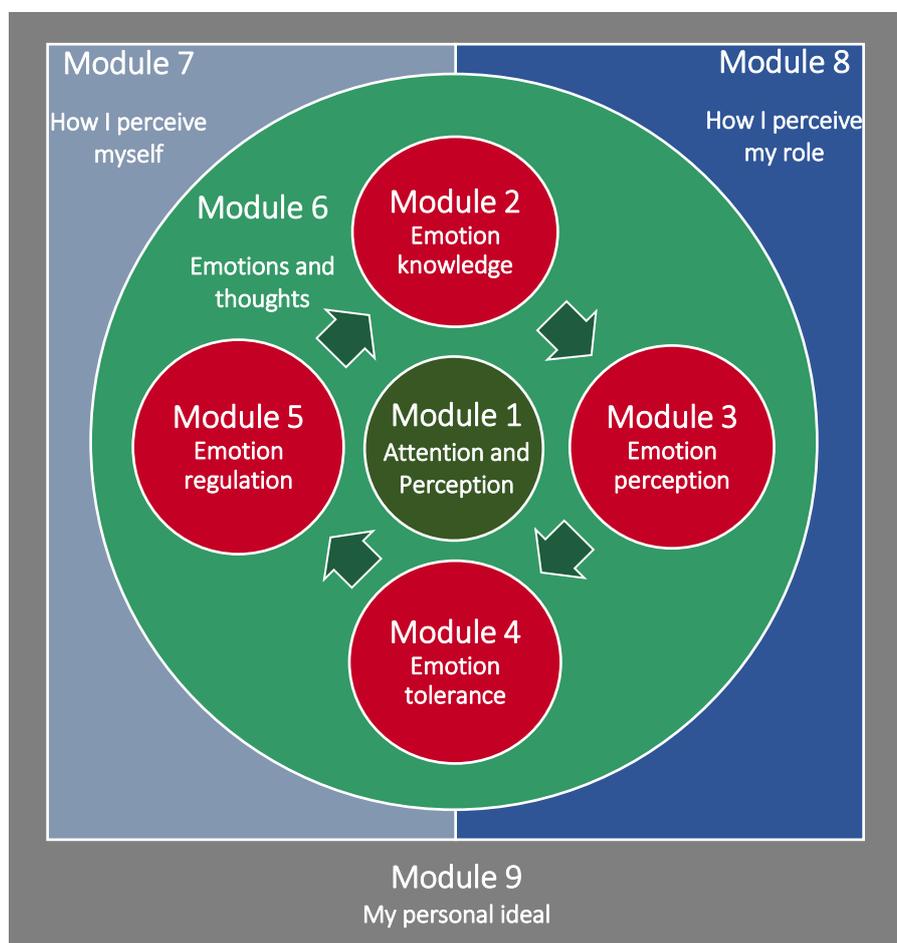
In conclusion, the few existing EC trainings in teachers are effective so far. For the components emotion perception, emotion understanding, and emotion regulation, there is general evidence that they can be successfully trained in the general population. Several meta-analyses provided evidence that EC trainings are effective in general with slight advantages of trainings with a very specific conceptualization of EC.

7. Conceptualizing emotional competence for a pre-service teacher training

Considering the results of the first two studies and the literature previously introduced, a concept for an EC training for pre-service teachers was developed. For its conceptualization, it seemed important to include the core components of EI models because the meta-analysis on EI (Hodzic et al., 2017) clearly demonstrated their relevance and an effectiveness of their training. Our training specifically included emotion recognition and awareness parts that already proved effective in former trainings (Jennings et al., 2017), but to a lesser degree (due to the findings regarding emotion awareness). Our training had a focus on emotion knowledge in order to enhance emotion understanding and on ERS, as previous trainings involving control groups did not explicitly focus on these. We included emotion downregulation as well as emotion upregulation strategies. Last, we also included conceptual discussions about teacher roles, goals, values, and meaning of being a teacher comparable to Kemeny et al. (2012) who also included conceptual discussions about life meaning and values. We deemed it relevant to include these because of our chosen trainee group of pre-service teachers. Reflecting about the future job could bring about insights regarding these students' preferences and on their choice to become a teacher. In the teaching profession, studies in Germany have demonstrated that few pre-service teachers still choose this profession as a fall-back career without much intrinsic career value (e.g., Scheller, Isleib & Sommer, 2013). This can be problematic because teachers with rather extrinsic career motives are often less inclined to develop teaching competencies and therefore perform worse as a teacher (Rothland, 2014). Over time, it then becomes more likely that those teachers experience stress symptoms or depressive symptoms and are therefore more vulnerable to attrition (Rothland, 2014). From an emotion regulation perspective, this could also be seen as a unit involving affective forecasting and situation selection (Will I be happy in my future job, with the demands and roles that it brings?). An overview of the training content is displayed in Figure 10.

Figure 10

Overview of the training units, translated from Schelhorn & Kuhbandner (2021)



Two studies were conducted in order to evaluate the effectiveness of the training as a whole (**Study 4**) and one to evaluate a specific anger regulation unit (**Study 3**). Quantitative data regarding the training evaluation will be published elsewhere (Schelhorn, et al., 2021, under review). The results of the quantitative analysis supported our hypothesis of the effectiveness of the training regarding emotion regulation competencies. No effects could be found on emotion understanding and emotion awareness. Mixed effects were found for emotion knowledge. The mostly qualitative results of this study will be presented in **study 4**.

- **Study 3:** The third study investigated perspective taking as an emotion downregulation strategy for pre-service teachers' anger. In a randomized controlled trial, a perspective taking

condition was compared to a neutral writing condition and superior effects of the perspective taking group were expected. In this study, no effects were found and methodological issues regarding the induction of anger will need to be addressed in future studies.

- **Study 4:** In the fourth study, the results of the mostly qualitative evaluation of the EC training for pre-service teachers will be presented – at the time of writing this work, the quantitative study results have been submitted elsewhere for peer-review and publication (Schelhorn et al., 2021, under review). The main goal and contribution of this study was the development of a model for pre-service teachers' ERS. The study results furthermore include correlational analyses between specific strategy use and attentional focus and emotional outcome, an ample analysis of qualitative data regarding the application of specific strategies, and correlations between their reported as well as otherwise measured effectiveness.

With the eyes of the student: Is perspective-taking a suitable cognitive anger-regulation strategy?**A randomized controlled trial in a laboratory setting with pre-service teachers.**

Teachers should be specifically educated in the way on how to deal with teacher anger, because teachers frequently experience anger (e.g., Chang, 2013; Frenzel, 2014), and because teacher anger has negative consequences on classroom climate (Klassen et al., 2012) and teacher health (Taxer & Frenzel, 2015). In addition, anger makes people punitive, changes risk perception and attributions of causality, and makes aggressive behavior more likely (Litvak et al., 2010). Transferred to a classroom context, high levels of teacher anger could therefore influence teachers' perceptive and judging abilities which are both highly relevant in a classroom. Not only could this instill fear and insecurity in students, but it could also lead to misjudgments and unfair and unjustified treatment in the classroom. Furthermore, anger reduces perspective taking (Yip & Schweitzer, 2019), which could make angry teachers less empathetic with their students. Angry individuals have an attentional interpretation bias towards threat: Individuals high in trait (Honk et al., 2001) as well as state anger (Wenzel & Jordan, 2005) have attentional biases towards angry faces, which in a classroom could make teachers focus more on angry students than on neutral or happy students. Last, anger reduces trustfulness and receptivity to advice (Gino & Schweitzer, 2008) and inhibits ethical decision making and sensemaking (Klityte et al., 2013). Both could also influence important decisional processes preceding for instance punishments or conflict mediations of teachers in a classroom.

Thus, emotionally competent teachers should be able to create an environment where anger-eliciting stimuli which can be controlled by the teacher should be controlled in the best possible way. However, as teachers mostly experience anger in uncontrollable situations that cannot (or only partially) be prevented by the teacher such as student misbehavior or school reforms, teachers should also be equipped with response-focused ERS (Gross, 1998; Gross, 2013). Response-focused ERS comprise ER strategies that can be applied when an emotion has already been elicited (and not beforehand). Among those, cognitive reappraisal is the most promising strategy. Cognitive reappraisal or cognitive change is defined as "changing the interpretation of a situation so as to alter its emotional impact" (Webb et al., 2012, p. 776). In this meta-analysis, three strategies of cognitive reappraisal were

introduced: Reinterpreting the situation, reinterpreting the reaction, and taking a third person's perspective. The meta-analysis found medium-sized positive effects on negative affect for all three. Regarding anger specifically, one study conducted in Israel investigating discrete emotions also found beneficial effects of cognitive reappraisal compared to suppression on subsequent anger related to peace policies in the Israeli-Palestinian conflict (Halperin et al., 2013). Fast cognitive reappraisal, ideally before an emotion is elicited, could be especially beneficial with regard to anger, because alternative response-focused anger regulation strategies such as anger suppression and expression have rather negative effects: While anger expression negatively impacted social outcomes (Chervonsky & Hunt, 2017), anger suppression negatively influenced physiological outcomes, elevated levels of anger experience, and alleviated endurance in a frustrating task (Szasz et al., 2011). Furthermore, anger experiential and expressive suppression amplified pain (Quartana & Burns, 2007).

Regarding the specific target group of this study, teachers, suppression was shown to be negatively linked to teachers' mental health (Donker et al., 2020). It is likely that the abovementioned results from general psychology apply for teachers; however, studies investigating specifically cognitive reappraisal in response to anger in teachers are still scarce. Correlational studies generally support the finding that suppression is associated with worse mental health in teachers (Yin et al., 2016), while reappraisal and deep acting which has some overlap with reappraisal (Lee et al., 2016) are not (Barber et al., 2011). Chang and Taxer (2020) specifically investigated teacher anger and frustration showing that especially in response to student misbehavior, teachers often used attentional deployment or suppression as an ERS. In a second study, Chang and Taxer (2020) also demonstrated that in consequence of suppression, teachers more often reported to experience anger, emotional exhaustion, and feeling challenged than teachers who more frequently used the strategy of cognitive change.

The present study

In this study, we therefore investigated whether a short cognitive change training with pre-service teachers would reduce their anger towards disturbing students to expand the literature by a randomized controlled experimental study. We hypothesized that the group practicing taking on the

student's perspective would be more successful in reducing their anger in comparison to a group that was instructed to describe the situation.

Method

Participants

Our targeted sample size ($N = 82$) was based on a power analysis (Faul et al., 2007) with 41 per group to have sufficient power (0.95, $\alpha = 0.05$) to detect small-to-medium sized effects ($f = 0.18$). Eighty-three teacher trainees studying for their university degree participated in this study. Four had to be excluded due to technical problems. The 79 students that finally took part in the study were between 18 and 28 years old ($M = 22.00$, $SD = 2.04$), 8 of them were male and 71 female. Thirty-nine students (49.4%) reported to study for primary school teachers' degree, 12 (15.2%) for secondary school, 13 (16.5%) for middle school, and 15 (19.0%) for high school. Nine participants reported to have attended a social-emotional skills training before. Participants received 15 Euro for full participation.

Design

The two groups received two different interventions (perspective taking vs. detailed description) during the study and were then compared via a $2 \times 2 \times 2$ repeated-measures design with the within-subject-factors Session (training session vs. follow-up session) and Point in Time (pre vs. post anger induction) and Group (intervention group vs. comparison group) as between-subject-factor. The study was conducted in the laboratory, the interval between the two sessions comprised six to eight days.

Video Stimuli

During the experiment, we presented three videos found on you-tube which have been recorded during real classrooms situations. The first video showed a male teenager student sitting in one of the back rows in the classroom throwing paper balls towards the teacher and laughing. No dialogue between teacher and student took place. The duration time of the video was 20 seconds. In the second video, which was presented for one minute and 44 seconds, an approximately 18 years old male student refused to participate in an exam. He started a discussion with the teacher in charge,

complaining about the exam questions, threatening to leave the class or to invoke his “power” as class representative and continue to impede progress. He also challenged the teacher’s right to give out grades. He did all of this in a loud voice, in a gesticulating and provoking manner. The third video showed a male 16-years old student intentionally letting his drinking bottle fall from his table. Consequently, teacher and student engaged in a discussion about whose fault it was that the drinking bottle fell. During this discussion, the student let provoking information slip into the argument like that he is bored, that he doesn’t enjoy the class, and that he’s thirsty. In the end, the teacher allowed him to drink, which the student did very slowly, presumably trying to further provoke the teacher. The streaming time of that video during the experiment was three minutes.

Intervention

The perspective taking intervention took place after the participants had watched the first video. We chose perspective taking as the most promising strategy for training: Shifts of perspective as a cognitive ERS seem to be generally very effective in reducing negative affect (Webb et al., 2012), in this meta-analysis, the strategy of taking a third-person perspective was even the most effective cognitive ERS. In our study, the experimental group was instructed to take on the perspective of someone (either student or parent) who behaved in an aggressive way towards a colleague to elicit anger. Participants of this group were informed about perspective taking as an effective emotion regulation strategy as it would have been in the training and instructed to practice perspective taking during the scenarios. The other group was informed about the importance of “detailed analysis” and instructed to reproduce details of the given situations as accurately as possible. Both groups received the same scenarios.

The scenarios consisted of four fictive situations that theoretically could take place in every school context. The storyteller was in every case a fictive colleague that had just encountered the difficult situation. The scenarios were presented on the computer screens written as monologues of the fictive colleagues (approx. 200 words). In the first case, the colleague described a student in his class who behaved in a very unmotivated and ignorant way and became insulting during an interaction with the teacher. (“...He said that the lessons I give are too boring for him to pay attention. And that I

am too fat to be looked at.....”) The second scenario consisted of an interaction between a teacher and two parents. This time, the colleague complained that she had to wait long until both parents were present. During the described interaction, the mother accused the teacher of not taking enough time for her child and therefore being an incompetent teacher. The colleague of the third scenario reported an incident where a student bumped into him and made all his utensils fall and then continued running without apologizing or helping the teacher collect his things. In the last case, the colleague complained about a female student behaving in a very avoidant and refusing way ignoring her. After having read a vignette, participants received a sheet of paper with either the instruction to “*write down the situational details as accurately as possible*” or the instruction to take the student’s perspective (“*How can the situation be interpreted? Try to adopt the perspective of the student: What could have been his/her motives to behave in that way? What emotions could have led to such behavior?*”). The full text of the scenarios and instructions can be found in Appendix 3.

Measures

Trait anger

The German version of the State-Trait-Anger-Expression-Inventory-2 (STAXI-2: Spielberger, 1999; German version: Rohrman et al., 2013) is frequently in use as a measure of anger as it is an instrument of good reliability with all internal reliability coefficients above .73 and all retest-reliability coefficients between .62 and .81 and high concurrent, face, predictive, and construct validity (Schamborg et al., 2015). We only used the STAXI-T to measure trait anger as a control variable. This scale includes 10 items, asking after the participant’s usual reactions to anger provoking situations. Participants indicate by responding on a four-point Likert scale (1 = “rarely”, 4= “frequently”) how often they feel or react in certain ways. To divert attention from the purpose of the study, we included 18 self-descriptive distractor items (e.g., “I am a very structured person.” or “I am easily impressed.”). The reliability in our study was good, Cronbach’s $\alpha = .81$.

Emotional state

In order to measure emotional state, participants were asked several times to fill in the ASTS (Dalbert, 1992) scale with 19 items, each describing a unique momentary emotional state. Participants

responded to items using a seven-point Likert scale (1="not at all", 7="very strong"). State anger was derived from the mean of three different items: "I am feeling angry.", "I am feeling annoyed.", "I am feeling furious.", all Cronbach's $\alpha > .91$.

Punishment score

Anger on the emotional level can lead to an inclination in aggressive or retaliating behavior (Frijda, 1986). We therefore used the students' willingness to punish the offending student as a measure for aggressive behavior at the end of the experiment, like other researchers measuring aggression on a behavioral level (e.g., Taylor, 1967). At the end of the experiment, participants could assign the student to an amount between 0 and 50 "social hours".

Manipulation check perspective taking

Participants were asked after the experiment whether from their point of view, they had done anything during the experiment to regulate their emotions. They were asked for six different ERS, whether they had or hadn't used them: Cognitive restructuring ("*I have tried to appraise the situation differently.*"), expressive suppression ("*I have not let my emotions show in my facial expression and gestures.*"), perspective taking ("*I have adopted the student's perspective.*"), attentional deployment ("*I haven't paid attention to the video, instead watching my surroundings.*"), and suppression ("*I have suppressed my emotions.*").

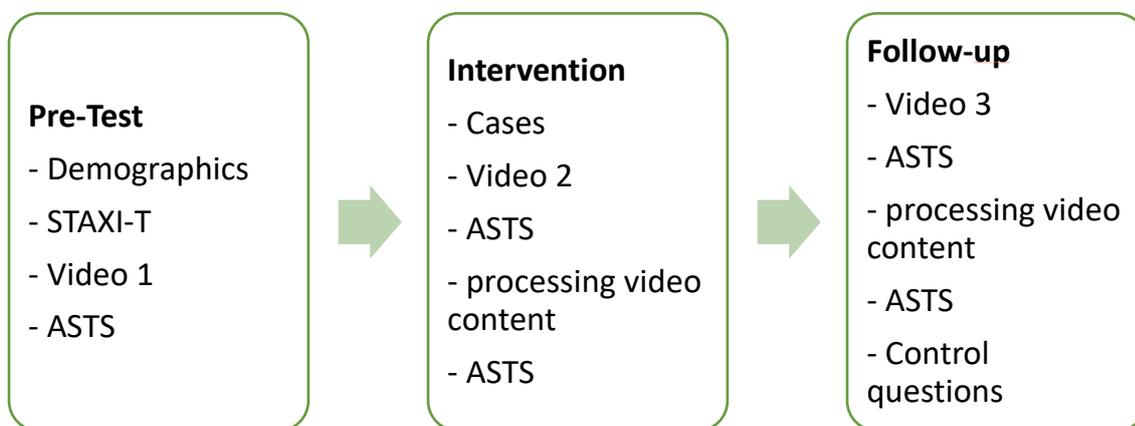
Procedure and Analysis

E-Prime 2.0.10.356 (Psychology Software Tools, Sharpsburg, USA) was used for stimulus generation and recording. To establish a slightly different context, the experimenters were intentionally changed between sessions but not within sessions, meaning session one was always conducted by the first experimenter, session two was always carried out by the second experimenter. As can be seen in Figure 11, in the beginning of the first session, the participants were asked to fill in the informed consent form, the demographic questionnaire, and the STAXI-T. Then, the experiment was started on the computer screen. Participants were welcomed and instructed to put on the headphones and to watch the first video. Afterwards, they were instructed to retrospectively rate their emotional state while watching the video on the ASTS scale which was presented on the computer

screen. After having filled in that questionnaire, participants were randomly assigned to one of the two groups and the intervention started as described above. At the end of the first session, the second video was introduced followed by one ASTS scale again retrospectively referenced to their emotions while watching the video. Then, they were instructed to fill in the sheet of paper by elaborating on the video exactly as they had done before during the intervention (the instruction here was to “*do as you have done before*”). Concluding the session, the ASTS had to be filled in again but this time participants were asked about their current state. During the second session, after the welcome slide and the instruction to put on headphones, participants of both groups were presented with the last video and both ASTS questionnaires again. Finally, they were asked about possible intervention strategies for the situation in the video and about the hours of social work they would assign the student to if they had to. All participants received a monetary allowance of 15 Euro.

Figure 11

Experimental Procedure



SPSS 22 was used for data analysis. We used planned contrasts for the 2 x 2 x 2 repeated measures' analysis of between group differences in anger ratings and the hours given as punishment with group affiliation as between-subject factor, session (training session vs. follow-up session), and time (pre vs. post anger induction) as within-subject factors. Whenever the variances were inhomogeneous, the Levene Correction was applied. To determine differences in the amount of

perspective taking between groups, a *t*-test was administered for the comparison of the encoded qualitative data and a χ^2 -test for the data obtained by the participants' self-reports.

Results

Manipulation check

According to the participants' self-reports, 32 out of 39 participants in the intervention group and 26 out of 35 in the description group stated to have adopted the student's perspective. The one-tailed χ^2 -test revealed no significance, $\chi^2(1, 74) = 0.66, p = .418$. The induced anger level during the video was moderate for the second ($M = 4.53, SD = 1.52$) and the third video during follow-up ($M = 4.28, SD = 1.34$).

A priori tests

The *t*-test comparing both groups in terms of trait anger did not reveal any between group differences ($p = .709$). The groups did also not differ from each other in their self-reported anger after having watched the first video ($p = .706$). Therefore, it is safe to assume that these factors can be ignored. Descriptive statistics of the main analysis are displayed in Table 10.

Table 10

Descriptive statistics for the repeated measures' ANOVA

Point in Time	Perspective taking group		Detailed description group	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Before 2 nd video	4.15	1.70	4.49	1.65
After 2 nd video	3.44	1.56	3.89	1.79
Before 3 rd video (FU)	3.81	1.60	4.38	1.30
After 3 rd video (FU)	2.59	1.58	2.95	1.55

Note. Means (*M*) and standard deviations (*SD*) of anger levels before and

after the second video and at follow-up (FU) separated by groups.

Intervention effects

The planned contrast Group x Time revealed no effect for the comparison of the second and the last video, $F(1,77) = 0.10, p = .749, \eta^2 < .01$, nor did the planned contrast Group x Session, $F(1,77) = 0.32, p = .858, \eta^2 < .01$. There were main effects of Time, $F(1,77) = 49.19, p < .001, \eta^2 = .39$, and Session, $F(1,77) = 24.21, p < .001, \eta^2 = .24$, indicating lower anger levels in the follow-up session and

lower anger levels after interventions compared to directly after the video. The independent *t*-test between groups on the number of social hours did not reveal any effect ($p = .546$).

Discussion

This study revealed no effect of a perspective taking intervention in comparison to a detailed description condition on anger regulation. However, we also found no effect in our manipulation check on self-reported perspective taking, indicating that the intervention partially failed. By designing this study, we attempted to validate isolated training content whose effectivity no previous studies have demonstrated yet, to gain insights into the neglected research area of anger-regulation in (pre-service) teachers. We did this by creating a randomized controlled trial and an extensive training with four different situations, testing a sample of pre-service teachers for short- and long-term effects. Content-wise, studies like this one are needed to separate effective from ineffective training content and to clarify processes of emotion regulation in specific emotions as well as in the target population of teachers. Even though we found no effects of our unit, perspective taking remains important for anger regulation, as in addition to the previously mentioned results of Mohr et al. (2007), recent research showed in a row of studies that anger reduced perspective taking in comparison to several other affective states, especially when anger was accompanied by high levels of arousal (Yip & Schweitzer, 2019). Therefore, the null effect of this study should not necessarily lead to the fast conclusion that anger regulation in teachers is not possible via perspective taking, but instead the more important question might be whether we targeted the essential mechanism or whether we applied sufficient time for training.

Limitations

The null effect of this study could be due to methodological limitations, as one of our manipulation checks revealed no differences between groups. According to our control variable, asking participants whether they had taken the depicted students' perspective, most participants in both groups answered yes. Therefore, it seems that many pre-service teachers felt as if they had applied some kind of perspective taking independent of instructions. Consequently, taking the student's perspective could have attenuated anger, but in *both* groups. In further studies, it therefore seems

necessary to put stronger guidance on the thoughts of the control group and their strategies. This could be done by guiding their focus towards their own rights, needs, and wishes. As for instance, Zitek and Jordan (2021) demonstrated that people high in psychological entitlement often react to unfortunate situations with anger, this might keep anger at a more stable level in the control group. Furthermore, this would draw participants' attention away from the students' needs. As a second improvement, researchers could use the ERS of acceptance to stabilize the anger experience, because acceptance in the short run increased unpleasant affective states (Boehme et al., 2019).

Furthermore, the anger induction in our study was only moderately successful. Anger is difficult to create in artificial settings (Joseph et al., 2020, p. 368); however, it might be possible to optimize anger induction. Autobiographical recall could be more effective than using videos of strangers: Joseph et al. (2020) claim in their meta-analysis on emotion induction that "the stimuli [...] for anger need to be personal [...] to induce the intended emotion". We originally decided against autobiographical recall because we assumed that pre-service teachers might not have enough experience with classes to have accumulated enough anger-eliciting memories of teacher-student-interactions. This still is a valid argument, considering that even though teachers report to frequently experience anger, they do so only to a limited extent (Frenzel, 2014) and mostly in response to student misbehavior (Chang & Taxer, 2020). It might however be more prudent to conduct this study with teachers instead of pre-service teachers or only include pre-service teachers who already have a certain amount of teaching experience, which might enable the use of autobiographical recall for anger induction.

In addition, emotion regulation in this study could also be due to small, but apparent, labelling effects. We applied the ASTS directly after the video, which consisted of statements about the inner emotional state. So, by filling in this questionnaire, all participants labelled their emotions as labelling is defined as the "linguistic processing of the emotions that arise in a certain situation" (Moyal et al., 2014, p. 1). Even though labelling as an anger regulation strategy has to my knowledge never been studied, there are hints that labelling diminishes physiological reactions, at least regarding fear (Moyal et al., 2014). To avoid this, an alternative to autobiographical recall for anger induction would be to

validate anger inducing scenarios specifically designed for teachers and pre-service teachers. The first ASTS measurement could then be applied before the anger induction starts and used as a pre-measurement. No retrospective anger measurement would then be necessary.

Conclusion

In conclusion, the question whether perspective taking as an ERS in pre-service teachers can be trained and used to downregulate anger remains unanswered and should be further investigated. Due to the methodological limitations, theoretical conclusions from this study can only be drawn to a limited extent. In future studies, methodological improvements such as validating scenarios for anger induction in teachers or the use of autobiographical recall as the method of choice for anger induction and psychophysiological measures for validating anger induction to prevent labelling should be applied in order to ensure sufficient anger induction and maintenance in the comparison group. Furthermore, a stricter protocol should be applied in the comparison group to limit disruptions and confounding variables. In a way, this study also reflects how little we know about anger induction and regulation in (pre-service) teachers. It therefore highlights the importance of further knowledge gain regarding cognitive or other anger regulation strategies in teachers.

Evaluating a training of emotional competence for pre-service teachers: A mixed-methods study

The last study that will be presented here had two major goals: The first goal was to collect a large amount of qualitative data about ERS used by pre-service teachers because there is still a large gap in the literature giving information about the ERS teachers mainly use (Taxer & Gross, 2018). Secondly, we investigated whether the use of these strategies changed after participation in an EC training for pre-service teachers.

Over the last decade, training teachers' EC has become a field of growing interest for researchers: Researchers and practitioners developed and evaluated EC trainings for teachers (e.g., Hen & Sharabi-Nov, 2014), the most actual and probably most prominent being the social-emotional competence training of (Jennings et al., 2017; 2019). There is also one (mindfulness-based) training program for pre-service teachers (Garner et al., 2018) and another "contemplative/emotion" training that has been conducted with teachers (Kemeny et al., 2012). While meta-analyses demonstrated that EC trainings are generally efficacious in increasing EC (Hodzic et al., 2017; Mattingly & Kraiger, 2019), the designated long-term goals of trainings for teachers usually are the improvement of the teacher-student relationship (e.g., Hen & Sharabi-Nov, 2014; Jennings et al., 2017) and often the reduction of negative emotions provoked by teacher stress (e.g., Garner et al., 2018; Kemeny et al., 2012). It is assumed that consequently personally, socially, and economically relevant burdens such as teacher mental illness and teacher attrition could be prevented (Chang, 2009, 2013; Mérida-López & Extremera, 2017).

Content-wise, the trainings of Jennings et al. (2017; 2019) and Kemeny et al. (2012) as well as the training of pre-service teachers by Garner et al. (2018) had a strong focus on mindfulness. The training of Hen and Sharabi-Nov (2014) was based on the EI model of Mayer et al. (2000) and therefore more in line with narrower definitions of EC. All trainings had the designated goals to improve awareness of feelings of the self and others and reported effectiveness of their interventions: The results of the training of (Jennings et al., 2017; 2019) revealed small to medium significant effects supporting the hypotheses for several self-report measures: adaptive emotion regulation, mindfulness, psychological distress, and time urgency. The results were more inclusive for the rather

objective measure of coded classroom interactions; effects were only found for positive climate and teacher sensitivity (2 out of 10 categories). Non- or marginal significance was discovered for the other coded classroom interaction categories and the self-report measures of positive affect and teaching efficacy. Reported effects were stable over time for self-report measures, however, the classroom interaction categories were not measured again. In terms of the application of ERS, the program proved to be effective especially for individuals with high stress baseline levels.

Kemeny et al. (2012) reported a decline of depressive symptoms in their training group with a large effect size and a reduction of trait negative affect, trait anxiety, and rumination over time only in the training group. Simultaneously, a higher level of mindfulness was reported, in line with the hypotheses of the authors. Results of the psychophysiological data were inconclusive, even though the authors found effects of meditation time on diastolic and systolic blood pressure and respiratory sinus arrhythmia and significant Time x Group interactions for both blood pressure measurements. Descriptively, most effects were in line with the hypotheses of the authors, however, post-hoc tests did not reveal any meaningful significance and/or effects. In the lexical decision tasks, when primed with a compassion stimulus, the training group was significantly faster in recognizing compassion-related words. Furthermore, the training group improved in recognizing emotional faces. No changes in hostile behavior or contempt toward the intimate partner could be found in the training group and no emotion regulation measurements were applied.

The study of Hen and Sharabi-Nov (2014) lacked fundamental quality criteria such as a comparison group and detailed descriptions of the sample's demographics. Furthermore, some therefore especially important statistical parameters like effect sizes were not reported. Nevertheless, the study is mentioned here because of its unique focus on EI. The authors reported a significant difference for every EI dimension and for the combined EI self-report measure. For the combined empathy index, no difference was found.

Garner et al. (2018) investigated the effects of EI training on pre-service teachers. They found evidence for their hypotheses concerning mindfulness with an $\eta^2=.22$. The ANCOVAs for EC including teaching experience as a covariate revealed several interactions, the training proved to be more

effective for teachers with teaching experience and for those in the training group ($\eta^2=0.06-0.12$). Last, a not expected larger increase in negative display rules for the training group emerged as well as an expected increase in the predicted cognitive cost children would experience due to aggressive behavior.

Given this overview and the above-mentioned definitions of EC, a lack of high-quality studies precisely focusing on training EC becomes obvious. Still, some conclusions can be drawn from former studies: In terms of content, awareness training seemed to be highly effective in improving mindfulness (Garner et al., 2018; Jennings et al., 2017). Interestingly, a focus on awareness training in all training contents (awareness, emotions, interactions) also improved a bunch of variables beyond mindfulness (Jennings et al., 2017), among them reported distress. In the study of Hen and Sharabi-Nov (2014) with a focus on awareness, effects on EC measures have been found. As mentioned, however, these results need to be interpreted with care because certain quality criteria have not been met in this study. Despite this issue, they however support the hypothesis that awareness and mindfulness-based training somehow influences emotion regulation without extended emotion regulation training. The results of Garner et al. (2018) support the hypothesis of a very small extra value of their additional emotion regulation training (especially regarding the main effects of time that were not primarily of interest in the study but have been reported). The results are mixed as to whether trainings with a focus on awareness have an impact on interactions and/or interactive behavior. Jennings et al. (2017) found only small effects here and only for a few variables, Hen and Sharabi-Nov (2014) found none. Kemeny et al. (2012) reported effects on the lexical decision task regarding compassionate words, however, their training involved specific compassion training.

Results regarding training effects of specific emotion regulation training on specific emotion regulation competencies remain widely unclear. For instance, Jennings et al. (2017) applied one emotion regulation questionnaire measuring just two ERS, reappraisal and suppression. Garner et al. (2018) found one significant interaction out of four regarding an increase in self-reported emotion management in the mindfulness and emotion regulation training group and no effect in a mindfulness comparison group. This indicated that the participants who had received emotion regulation training

thought that their ability to regulate emotions had increased. However, no ability measure was applied. In conclusion, even though they are in some parts similar, the mentioned awareness/emotion/EC trainings are heterogeneous in how they define the construct to be trained and measured.

This might be due to the general degrees of freedom that research usually offers, however, it might also be because there is still need of a precise definition of EC in teachers. There are many unanswered questions regarding teacher emotions, appraisals, and regulation strategies: For instance, Chang (2009) mentioned that the appraisal processes that precede teacher emotions are still largely unclear or unknown as well as the processes involved in teacher emotion regulation. Ten years later, first studies emerged precisely investigating teacher ERS: Taxer and Gross (2018) and Chang and Taxer (2020). In between, there have been studies about emotional labor of teachers, however, these included mostly the two narrowly defined strategies of emotion management (“surface acting” and “deep acting”) which show only partial overlap with traditional ERS (Lee et al., 2016).

Taxer and Gross (2018) and Chang and Taxer (2020) investigated teachers’ use of ERS based on the framework of the process model of emotion regulation by Gross (1998). However, it is possible that studies based on Gross’ process model despite their partially qualitative design overlook certain facets of teachers’ emotion regulation because this model was not specifically designed for this target group.

Therefore, in the present study, no pre-given framework was applied to investigate teacher ERS. Instead, pre-service teachers participating in an EC training were put into emotion inducing situations and asked to write down their feelings and ERS. Strategies were then coded bottom-up thereby generating a structural model of teacher ERS.

Method

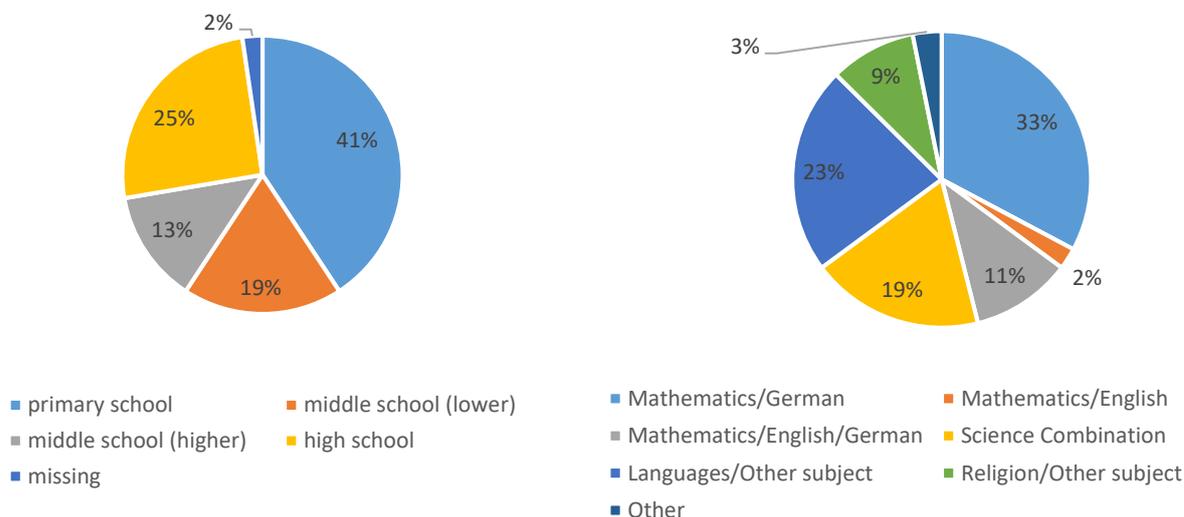
Participants

All students including the EC training as a seminar of their study degree curriculum at the University of Regensburg became voluntarily participants of the study. In the seminar description, students were already informed about the voluntary participation in the study. The comparison group

was recruited separately. The final sample consisted of 115 participants with a mean number of semesters of $M = 5.51$ ($SD = 2.48$; $range = 1$ to 13 semesters) and a mean number of teaching lessons of $M = 15.68$ ($SD = 41.12$; $range = 0$ to 400 hours). Participants were between 18 and 28 years old ($M = 22.17$, $SD = 2.15$), 21 (18.3%) of them were male and 92 (80.0%) female, 2 (1.7%) unknown. The sample was ethnically quite homogeneous with 100 (87.0%) German native speakers and 11 (9.6%) with a different linguistic background, 4 (3.5%) unknown. As depicted in Figure 12, participants were distributed across different educational degrees courses (German education system) and reported to study different combinations of subjects (Figure 12, right hand side). All students received the usual seminar credit points for their degrees when they participated in the training. Participants of the comparison group were compensated with 15 € for taking part in the videotaped standardized role-plays twice and filling in demographic data.

Figure 12

Demographics of the pre-service teacher sample school type



Note. The left diagram shows the school type, the right diagram depicts the subject combination.

Design

In this study, a mixed method design was applied. A qualitative bottom-up coding procedure

was used for categorizing ERS reported by the study participants. Then, to detect between-group differences in usage frequencies, χ^2 -tests were administered. A 2 x 2 repeated measures' design with the within-subjects factor Point in Time (pre-post training) and the between-subjects factor Group (Intervention vs. Comparison Group) was used to investigate the trainings' effects on strategy selection and reported effectiveness.

Intervention

An overview of the training units, which were conceptually derived from the modules depicted in Figure 10, is presented in Figure 13. The intervention program included theoretical input about attention and perception, one mindfulness exercise and one loving kindness meditation, theoretical input and reflective exercises about personality, personal needs, emotions, and thoughts and their biological, psychological, and behavioral consequences (day 1). Psychoeducational parts about emotions were based on Scherer's (2005, 2009) emotion component model. On the first day, participants received a folder including one informational sheet in the form of a "toolbox" about the most important practical seminar content. The second day included reporting and discussing emotional reactions after watching emotion-inducing film clips and interactive standardized role-plays. Each participant completed two vignette-based role-plays in the role of a teacher. One of the two role-plays was recorded on camera and discussed in the group after watching the video. Participants received the DVDs including their videos of the role-plays at the end of the training. After the role-plays, a short input including two exercises about emotion tolerance followed (day 3). Afterwards, emotion regulation was theoretically introduced as a concept based on emotion regulation theories by Gross (1998, 2005), Berking (2015), and Quoidbach et al. (2010). Then, two practical training units followed comprising strategy training on cognitive change (attribution techniques and perspective taking). At the end of the third day, participants received a CD with a recorded short-form version of progressive muscle relaxation on it. The fourth day started with a reflection unit about participants' own teaching goals and ideals, which was followed by a conceptual discussion about teacher roles and challenges. In its complete form, the training was delivered in 24 hrs, mostly over three, three and a half, or four weeks or in a blocked version of four days. One day of training contained 6 training hours.

Trainings were delivered by one psychological or educational trainer with a degree involving five years study in psychology or education. Trainings started at the beginning of semester either in October or in April.

Figure 13

Overview of training units

Unit	Awareness training	Emotional competence	Classroom as context	Goal setting
Contents	Attention and perception	Emotion knowledge	How I perceive myself	My personal ideal
		Emotion perception	How I perceive my role	
		Emotion tolerance		
		Emotion regulation		

Measures

Standardized role-plays

For measuring in-situation emotions and their regulation, three role-plays were developed. They were based on reports from real schoolteachers and furthermore, feedbacked and further developed by department students and staff. The actors were students working at the department who learned the text by heart, rehearsed the role-plays at least once before training, and always used the same text regardless of the students' answers. Actors inserted short answers like "well" or "ok" when they were asked questions in order to appear realistic. Participants were assigned to the role-plays by content of their study degree for content-related reasons: Primary school teachers took part in a different role-play than secondary school teachers. Role-plays took place simultaneously. In the role-play for primary school teachers, an upset mother intended to send her child to a higher education school against the teacher's recommendation, attacking and insulting the teacher making him or her responsible for the child's performance. The role-play for secondary school was about a pupil who had shown aggressive behavior towards other children and been reprimanded. His mother visited the

teacher and vehemently defended her son. She accused the teacher of being responsible and incompetent. The last role-play involved an extremely bored father who had been invited by the teacher to talk about his child. The father did not show any interest at all in the teacher's questions and ideas ignoring potential problems and not engaging in a conversation with the teacher. All study participants absolved this role-play. We ensured that study participants had no contact to the actors otherwise. All role-plays were videotaped by another student from the department.

Role-play self-report measure

To measure participants' affective and cognitive outcome before and after the role-plays, a self-designed questionnaire containing fifteen items was used. It included several emotion ratings ("How...do you feel on a scale between 0 and 10 with 0 meaning "not at all" and 10 meaning "extremely"?") regarding the emotion insecurity and its corresponding physiological response, nervousness, before the role-plays. Emotional state regarding pretest, during and after role-play, was measured for the emotions insecurity, helplessness, and anger with corresponding questions. Participants were also asked to write down their thoughts on control, self-esteem, own capabilities, and guilt before and after the role-play. After the role-play, participants also filled in further open questions about their attentional focus during the role-play and how they had expressed the emotions anger, insecurity, or helplessness. Further questions about ERS were included: They asked about information, which ERS the participants had applied, how effective they considered them, and which alternative ERS they would use now after the role-play. Questions eleven and twelve invited participants to reflect on their in-situation behavior. The last questions asked on a seven-point Likert scale how realistic participants found the situation and how close the content of the role-play was to a real-world scenario (0 = *not at all* to 6 = *extremely*). There was one last item, asking whether the participants wanted to report anything else.

Evaluation

Evaluations of the training content took place after each of the four training blocks where training participants reported on seven-point Likert scales (1 = *not at all* to 7 = *very much*) how helpful they found the submodules and separate exercises, how satisfied they were with them and with the

training as a whole, and how familiar they felt with the group. Last, participants were asked whether they would recommend the training to others on a five-point Likert scale (1 = *not at all* to 5 = *definitely*).

Procedure and Analysis

Data collection took part over four semesters in 2 years' time, investigating participants of six courses. Due to limited resources, data for the comparison group was collected separately in the second year. All participants of the training group gave their informed consent on participation in the study on the course's preliminary introduction, all participants of the comparison group at the beginning of the study. Then, all filled in the demographics first. Standardized videotaped role-plays that served study and not training purposes were held on the first day and in the afternoon after the last training unit, with the time of about three and a half (out of four) training sessions in between. Each participant took part in the designated role-play for primary or secondary school and filled in the questionnaires before and afterwards. A group of participants usually needed for the completion of one session of standardized role-plays approximately one and a half hours. All participants received written information about the role-play situation before and at least ten minutes time for preparation. Then, they were guided into the room where the actor and camera student waited by the student coordinating the study. At the post-test, approximately four weeks later, all participants took part in the role-play already known to them for a second time and additionally in the third role-play that was yet unknown to everyone, in order to investigate generalization effects. Questionnaires were filled in before the first role-play, once in-between the two role-plays, and then a third time after the last role-play. Whenever the standardized role-plays used for study purposes took place in the training group, the trainers were not present.

Statistical analysis

SPSS 25 was used for all quantitative analyses. ERS, thoughts concerning control, self-esteem, abilities, and guilt and focus of attention were coded bottom-up. Based on three coders' ratings, code systems were developed without any pre-given framework. Disagreements between raters were solved in discussion with the first author. Following a procedure suggested by Siegel & Castellan (1988), Fleiss' *Kappa* coefficients were calculated in order to determine inter-coder reliability and the code

systems were repeatedly improved until all 75 *Kappas* for all role-plays of the first 113 participants reached at least a “substantial” value (*Kappa* > .60) according to Landis and Koch (1977). 88% of the *Kappas* reached “almost perfect” scores between .81 and 1.00, the lowest score was *Kappa* = .70. With regard to content, the codes concerning “thoughts about self-esteem” and “thoughts about control” had the lowest interrater-reliabilities, whereas all codes about ERS and “thoughts about guilt” had constant high interrater-reliabilities. Based on the code-system, a theoretical model of emotion regulation repertoire is presented as well as pre-post changes before and after training.

Results

Evaluation

Evaluation revealed mean ratings of overall satisfaction with the training of $M = 6.27$ ($SD = 0.65$) and mean ratings of familiarity with the group of $M = 6.06$ ($SD = 0.61$). Most training participants reported, they would recommend the training, $M = 4.65$ ($SD = 0.64$). Mean satisfaction ratings for the modules are displayed in Table 11. Most of the specific exercises had average ratings between $M = 5.00$ and $M = 6.00$. Worst ratings received the emotion diary $M = 3.79$ ($SD = 1.74$) and the exercise “mind reading” from the submodule emotion perception in others, $M = 4.92$ ($SD = 1.20$). All role-plays received particularly high ratings (see Table 12), as well as the theoretical input about emotion regulation parts including reattribution training ($M = 6.09$, $SD = 0.78$) and the reflective exercise including discussion “my favorite teacher” ($M = 6.04$, $SD = 1.00$).

Table 11

Evaluation scores

Content	<i>M (SD)</i>
Introduction	5.88 (0.79)
Awareness & Mindfulness	5.71 (0.83)
Emotion knowledge & perception	6.12 (0.62)
Emotion tolerance & regulation	5.93 (0.57)
Goals, roles, ideals	36.20 (4.94)

Note. Means (*M*) and standard deviations (*SDs*) for a seven-point Likert scale (1 to

7).

Table 12*Evaluation scores for role-play units*

Role-play	<i>M</i> (<i>SD</i>)
Emotion components	5.13 (0.83)
Emotion perception with video feedback	6.14 (0.95)
Emotion expression	6.14 (0.96)

Note. Means (*M*) and standard deviations (*SDs*) on a seven-

point Likert scale (1 to 7).

Role-play quality checks. Paired *t*-tests revealed that both role-plays presented at the beginning of the training were effective in inducing feelings of anger and partially helplessness, however, the effects of the primary school role-play were considerably larger, as displayed in Table 13. Insecurity descriptively decreased from before to the retrospective rating after in both role-plays, but significantly only in the primary school role-play.

Table 13*Emotion induction via role-plays*

Emotion	Role-play primary school				Role-play secondary school			
	<i>M</i> (<i>SE</i>) T(b)	T(d)	<i>p</i>	<i>d</i>	<i>M</i> (<i>SE</i>) T(b)	T(d)	<i>p</i>	<i>d</i>
Anger	0.07 (.24)	3.46 (.41)	<.001*	0.97	0.72 (.20)	2.11 (.30)	<.001*	0.62
Helplessness	3.00 (.34)	4.72 (.41)	<.001*	0.54	2.16 (.28)	2.80 (.36)	.094	0.21
Insecurity	5.18 (.33)	3.70 (.39)	.002*	0.47	4.12 (.32)	3.88 (.35)	.462	0.09

Note. Mean (*M*) and standard error (*SE*) on the three emotions' self-report rating for the target

points in time before (T(b)) and during (T(d)) the role-plays: Significant comparisons are

indicated * = $p < .05$, and effect sizes (Cohen's *d*) are displayed.

All three role-plays were rated as considerably close to a real-world scenario, with $M = 1.66$ ($SD = 0.96$) for the primary school role-play, $M = 1.74$ ($SD = 1.27$) for the secondary school role-play, and $M = 1.90$ ($SD = 1.09$) for the third role-play on a seven-point Likert scale starting from 0 = *extremely*. For all three role-plays, participants rated their contents as close to a real-world scenario, $M = 1.74$ ($SD = 1.13$), $M = 1.62$ ($SD = 1.27$), $M = 1.60$ ($SD = 0.94$), also on a seven-point Likert scale starting from 0 = *extremely*. No further significant pre-post differences were found.

Emotion regulation categories emerging from the coding procedure and frequencies of their use

As can be seen in Table 14, 11 categories with specific content emerged from the coding procedure. There were two rest categories, separated into one category with identifiable content in the way that the coder precisely understood the answer, however, decided that it was not related to ERS in any way, the second category included all answers with non-identifiable content meaning that the coder did not understand what the participant had meant when writing. Both categories had in common that the coder could not see any relationship between the comment and either ERS or the target emotion. Table 15 depicts the frequencies of reported ERS separated by emotions at the first time-point directly after the first role-play and gives therefore an overview of ERS that pre-service teachers generally use. In this table, another rest category appears with always a solid number of participants that did not fill in the question. This category always includes those who did not respond to the emotion induction in the first place: In case of anger, three quarters of the participants ($n = 30$) in this category reported to have not felt anger at all, one third ($n = 11$) for helplessness, and less than 10% ($n = 2$) for insecurity, respectively.

Before training, regarding the application of ERS no differences between the two groups were found for anger, $\chi^2(9)=8.62$, $p=.473$ and $\chi^2(10)=13.19$, $p=.213$ (alternatives), for helplessness, $\chi^2(8)=10.58$, $p=.226$ and $\chi^2(10)=17.31$, $p=.068$ (alternatives), and for insecurity, $\chi^2(9)=10.66$, $p=.300$. The parameter for alternative strategies in response to insecurity was significant $\chi^2(10)=20.16$, $p=.028$, probably because there were a lot more values missing in the training group while the control group reported more physiological and focusing content strategies.

Table 14*Categories of reported emotion regulation strategies after inductive coding*

Category	Themes	Example
Disengagement	Surface acting Expressive suppression Emotion suppression Resignation Situational avoidance Denial Offenses	"I smiled even though I was angry" "I didn't show my insecurity" "Not go via emotions" "I can't change anything anyway" "It's just a game" "My feelings didn't change" "It's just an idiotic setting"
Explicit cognitive intervention	Goal focus Self-encouragement Perspective taking Self-esteem enhancement Not taking things personally Focusing on benefits Re-attribution Cognitive reduction of importance	"My goal is to help my student" "I try my best, that's all I can do" "The mother is just unable to cope" "I believe I can do this" "This is not meant as an offense" "I do this for training" "This isn't my fault" "Being successful here is not of meaningful importance"
Explicit physiological intervention	Calming down Breathing Gestures Enhancing presence Eye contact Voice	„I need to stay calm" "I just take a deep breath" "I play with my hair" "I open up my chest" "I make eye contact" "I control my voice and speak quietly"
Focusing content and talking techniques	Being objective Staying factly Argumenting Reporting facts Talking techniques Describing interaction	"Focusing on the pupil's achievements" "Did not react to her emotionality" "Thinking about reasons" "Elaborating on specific situations" "Mirroring" "She realized, I was insecure"
Other problem solving, Reflection	Reflection Offering help Empathetic goal change	"Realizing criticism" "Trying to regulate her emotions" "Trying to find a compromise"
Social regulation	Colleagues Authority Other people	"Talk to colleagues" "Talk to headmaster" "Talk to school psychologist"
Attention change	Diversion	"I shifted my attentional focus away"
Other	Identifiable content	"Not showing remorse"
Other (useless)	Non-identifiable content	"Improvising"

Note. All text examples were taken from the role-play for primary school teachers and

translated from German. The participants formulated these answers as a reply to the

following open question: Which ERS did you use in order to regulate the emotions of anger,

helplessness and insecurity?

Table 15

Frequencies of emotion regulation strategies (before training/testing).

ER strategy	Emotion					
	Anger		Helplessness		Insecurity	
	<i>Used</i>	<i>Alternative</i>	<i>Used</i>	<i>Alternative</i>	<i>Used</i>	<i>Alternative</i>
Disengagement	13 (11.3%)	4 (3.5%)	8 (7.0%)	3 (2.6%)	13 (11.3%)	4 (3.5%)
Explicit cognitive intervention	9 (7.8%)	10 (8.7%)	13 (11.3%)	9 (7.8%)	15 (13.0%)	8 (7.0%)
Explicit physiological intervention	19 (16.5%)	17 (14.8%)	7 (6.1%)	7 (6.1%)	21 (18.3%)	15 (13.0%)
Focusing content and/or talking techniques	7 (6.1%)	8 (7.0%)	31 (27.0%)	24 (20.9%)	18 (15.7%)	16 (13.9%)
Problem solving, reflection	4 (3.5%)	4 (3.5%)	0 (0%)	1 (0.9%)	0 (0%)	2 (1.7%)
Social regulation	1 (0.9%)	1 (0.9%)	2 (1.7%)	10 (8.7%)	2 (1.7%)	2 (1.7%)
Attention Shift	0 (0%)	0 (0%)	0 (0.0%)	0 (0.0%)	1 (0.9%)	0 (0.0%)
Combination	16 (13.9%)	16 (13.9%)	16 (13.9%)	9 (7.8%)	13 (11.3%)	10 (8.7%)
Other (identifiable)	4 (3.5%)	7 (6.1%)	2 (1.7%)	4 (3.5%)	7 (6.1%)	4 (3.5%)
Other (useless)	1 (0.9%)	1 (0.9%)	1 (0.9%)	1 (0.9%)	3 (2.6%)	1 (0.9%)
Missing	41 (35.7%)	45 (39.1%)	35 (30.4%)	43 (37.4%)	22 (19.1%)	39 (33.9%)
Repetition		2 (1.1%)		4 (3.5%)		14 (12.2%)

Note. Frequencies of ERS according to the final coding system directly after the first role-play.

Participants were asked about the strategy they used (Used) and about alternative strategies coming to their minds afterwards (alternative). When strategies that were reported as an alternative fell into the same category as the strategy used (repetition), they were coded as missing.

Effectiveness of emotion regulation strategies

The first measure of effectiveness of the applied ERS was the difference between reported intensity of emotion during the first role-play and after, the other participants' self-report on perceived effectiveness of the used strategy. Data for which the strategy was missing or unidentifiable was excluded from this analysis. Means and standard deviations of intensity differences for all three emotions and strategies are reported in Table 16. For anger, an explicit physiological intervention was descriptively the most successful intervention while on average an explicit cognitive intervention, disengagement, and focusing content did not make a difference at all. Table 16 also shows that the

general estimates for the effectiveness of strategies are in average “medium effective” or “very effective” while the actual reported differences in emotionality during and after the role-play are often very small. Therefore, descriptively, it seems that the effectiveness of the strategies was overestimated, especially for disengagement and focusing content. For helplessness, all strategies were effective with disengagement being the most effective strategy (when social regulation is ignored due to the low number of participants) followed by focusing content. All strategies were in average estimated as reasonably effective. For insecurity, descriptively, disengagement again proved to be the most effective short-term strategy. The effectiveness estimates were plausible except for the cognitive intervention estimate, which was in average very high compared to the actual reduction in intensity of insecurity.

Table 16*Effectiveness of ERS*

ER-Strategy	Emotion											
	Anger				Helplessness				Insecurity			
	Intensity difference (<i>n</i> = 53) <i>M</i> (<i>SD</i>)	<i>n</i>	Estimation (<i>n</i> = 51) <i>M</i> (<i>SD</i>)	<i>n</i>	Intensity difference (<i>n</i> = 60) <i>M</i> (<i>SD</i>)	<i>n</i>	Estimation (<i>n</i> = 61) <i>M</i> (<i>SD</i>)	<i>n</i>	Intensity difference (<i>n</i> = 69) <i>M</i> (<i>SD</i>)	<i>n</i>	Estimation (<i>n</i> = 68) <i>M</i> (<i>SD</i>)	<i>n</i>
Disengagement	0.54 (2.40)	13	7.31 (2.56)	13	2.75 (3.06)	8	5.50 (2.51)	8	2.15 (2.48)	13	5.73 (1.74)	11
Explicit cognitive intervention	-0.56 (3.05)	9	5.33 (3.43)	9	1.69 (2.10)	13	6.08 (3.04)	13	0.53 (1.73)	15	7.73 (1.98)	15
Explicit physiological intervention	1.58 (2.46)	19	6.89 (3.16)	19	1.00 (0.82)	7	4.14 (1.21)	7	1.14 (2.52)	21	5.71 (3.10)	21
Focusing content and/or talking techniques	-0.57 (1.13)	7	7.57 (3.64)	7	1.80 (2.17)	30	5.29 (2.85)	31	1.18 (1.78)	17	5.83 (2.60)	18
Problem solving, reflection	1.50 (2.38)	4	1.33 (2.31)	3	---	---	---	---	---	---	---	---
Social regulation	-3.00 (-)	1	---	---	3.00 (1.41)	2	4.50 (2.12)	2	2.5 (0.71)	2	6.00 (1.41)	2
Attention Shift	---	---	---	---	---	---	---	---	2.00 (-)	1	6.00 (-)	1

Note. Means (*M*) and standard deviations (*SD*) for differences in reported emotion intensity during and after the first role-play and for the estimations of effectivity of the chosen strategy (answered on a scale from 0 = not effective at all to 10 = extremely effective) separated by ERS.

Higher values in intensity differences indicate stronger decline in emotion intensity (and therefore more effective regulation).

Descriptive analysis of within group changes in ERS use before and after training

Tables 17 - 19 depict the percental difference between ERS used before and after training or after four weeks' time (comparison group). Overall, no large obvious differences can be seen. With regard to anger, explicit cognitive interventions seem to have been used more often at the later point in time in both groups and, in the comparison group additionally explicit physiological interventions. Those also might have increased in the comparison group in reaction to feelings of helplessness, while the use of focusing content techniques decreased in both groups. The comparison group also might have used less combinations at the second role-play and more identifiable other strategies. Regarding insecurity, the overall use of strategies seemed to have remained relatively stable over time in both groups.

Table 17

Within-group changes separated by group in used and alternative ERS for anger

ER strategy	Anger			
	Training (n = 52)		Control (n = 59)	
	Used	Alt.	Used	Alt.
Disengagement	- 3%	---	-3.4%	-1.7%
Explicit cognitive intervention	+5.7%	+2.5%	+5.1%	+8.4%
Explicit physiological intervention	-2.8%	-7.1%	+6.8%	+6.8%
Focusing content and/or talking techniques	-2.8%	0%	+1.7%	-3.4%
Problem solving, reflection	-2.8%	-1.4%	-1.7%	-5.1%
Social regulation	-1.4%	-1.4%	---	---
Attention Shift	---	---	---	---
Combination	+1.4%	+1.4%	-1.7%	-5.1%
Other (identifiable)	-1.4%	-1.4%	---	-5.1%
Other (useless)	-1.4%	0%	+1.7%	+1.7%
Missing	+4.2%	+2.9%	-8.5%	+6.8%

Note. Percental changes in used and alternative (alt.) ERS from pre- to post-test after the role-play separated by group for anger. When strategies that were reported as an alternative fell into the same category as the strategy used (repetition), they were coded as missing.

Table 18

Within-group changes separated by group in used and alternative ERS for helplessness

ER strategy	Helplessness			
	Training (n = 52)		Control (n =59)	
	<i>Used</i>	<i>Alt.</i>	<i>Used</i>	<i>Alt.</i>
Disengagement	-2.8%	-1.4%	+3.4%	-1.7%
Explicit cognitive intervention	-2.8%	+5.7%	0%	-1.7%
Explicit physiological intervention	-1.4%	+2.8%	+10.2%	+3.4%
Focusing content and/or talking techniques	-1.4%	-9.9%	-6.8%	-3.4%
Problem solving, reflection	---	+1.4%	---	-5.1%
Social regulation	---	-2.8%	-3.4%	---
Attention Change	---	+1.4%	---	+1.7%
Combination	-4.3%	-5.7%	-10.2%	0%
Other (identifiable)	+1.4%	---	+11.9%	-1.7%
Other (useless)	+1.4%	---	-1.7%	0%
Missing	+7.0%	+1.4%	-3.4%	+5.1%

Note. Percental changes in used and alternative (alt.) ERS from pre- to post-test after the role-

play separated by group for helplessness. When strategies that were reported as an

alternative fell into the same category as the strategy used (repetition), they were coded as

missing.

Table 19

Within-group changes separated by group in used and alternative ERS for insecurity

ER strategy	Insecurity			
	Training (n = 52)		Control (n =59)	
	<i>Used</i>	<i>Alt.</i>	<i>Used</i>	<i>Alt.</i>
Disengagement	-5.7%	+2.8%	+3.4%	-1.7%
Explicit cognitive intervention	+4.3%	-2.8%	0%	+5.1%
Explicit physiological intervention	-1.4%	-1.4%	0%	-6.7%
Focusing content and/or talking techniques	-1.4%	-4.3%	0%	-3.3%
Problem solving, reflection	---	0%	+3.4%	-1.7%
Social regulation	-1.4%	-2.8%	+5.1%	---
Attention Shift	---	---	+1.7%	0%
Combination	+2.9%	0%	-1.7%	-1.6%
Other (identifiable)	0%	-1.4%	-6.8%	+5.1%
Other (useless)	-1.4%	---	-3.4%	-1.7%
Missing	+2.9%	+7.1%	0%	0%

Note. Percental changes in used and alternative (alt.) ERS from pre- to post-test after the role-

play separated by group for insecurity. When alternative strategies fell into the same category

as the strategy used (repetition), they were coded as missing.

Tables 20, 21 and 22 depict the applied strategies in the role-plays before (Table 20) and after training in the known (Table 21) and in the new (Table 22) role-play. Regarding pre-test, overall, the control group reported more cognitive and physiological interventions and focusing content strategies with regard to all three emotions. Regarding disengagement strategies, the pattern, if there was any, seemed slightly vice versa. At post-test, in response to the known role-play, the training group seemed to have used slightly less disengagement strategies when confronted with anger or helplessness than the control group and did not consider these strategies as an alternative anymore. However, the control group still reported more cognitive and physiological interventions and focusing content strategies with regard to all three emotions. There were also a lot more missing values in the training group than in the control group.

In response to the new role-play at post-test, the control group reported to have applied more disengagement strategies, explicit cognitive interventions more often, as well as physiological interventions, focusing content (problem-solving), and combinations of strategies in response to anger elicitation than the training group. Regarding helplessness, the control group applied more often cognitive strategies and focusing content strategies. Regarding insecurity, a similar pattern emerged such as the one observed in response to anger. The training group, again, had more missing values.

Therefore, regarding qualitative training effects, these results hint that maybe the training group stopped listing disengagement strategies as an alternative after training. No increase in the use of alternative regulation strategies could be found.

Table 20

Frequencies of used and alternative ERS separated by group (pre)

ER-Strategy	Anger				Helplessness				Insecurity			
	Training (n = 56)		Control (n = 59)		Training (n = 56)		Control (n = 59)		Training (n = 56)		Control (n = 59)	
	Used	Alt	Used	Alt	Used	Alt	Used	Alt	Used	Alt	Used	Alt
Disengagement	6 (8.5)	---	7 (11.9)	4 (6.8)	5 (7.0)	1 (1.4)	3 (5.1)	2 (3.4)	8 (11.3)	---	5 (8.5)	4 (6.8)
Explicit cognitive intervention	3 (4.2)	4 (5.6)	6 (10.2)	6 (10.2)	5 (7.0)	3 (4.2)	8 (13.6)	6 (10.2)	5 (7.0)	3 (4.2)	10 (16.9)	5 (8.5)
Explicit physiological intervention	9 (12.7)	7 (9.9)	10 (16.9)	10 (16.9)	5 (7.0)	1 (1.4)	2 (3.4)	6 (10.2)	9 (12.7)	4 (5.6)	12 (20.3)	11 (18.6)
Focusing content and/or talking techniques	2 (2.8)	3 (4.2)	5 (8.5)	5 (8.5)	11 (15.5)	11 (15.5)	20 (33.9)	13 (22.0)	9 (12.7)	6 (8.5)	9 (15.3)	10 (16.9)
Problem solving, reflection	2 (2.8)	1 (1.4)	2 (3.4)	3 (5.1)	---	---	---	1 (1.7)	---	---	---	2 (3.4)
Social regulation	1 (1.4)	1 (1.4)	---	---	---	3 (4.2)	2 (3.4)	7 (11.9)	1 (1.4)	2 (2.8)	1 (1.7)	---
Attention Shift	---	---	---	---	---	---	---	---	---	---	1 (1.7)	---
Combination	7 (9.9)	8 (11.3)	9 (15.3)	8 (13.6)	7 (9.9)	7 (9.9)	9 (15.3)	2 (3.4)	4 (5.6)	4 (5.6)	9 (15.3)	6 (10.2)
Other (identifiable)	4 (5.6)	3 (4.2)	---	4 (6.8)	1 (1.4)	1 (1.4)	1 (1.7)	3 (5.1)	3 (4.2)	2 (2.8)	4 (6.8)	2 (3.4)
Other (useless)	1 (1.4)	1 (1.4)	---	---	---	---	1 (1.7)	1 (1.7)	1 (1.4)	---	2 (3.4)	1 (1.7)
Missing	21 (29.6)	28 (39.4)	20 (33.9)	19 (32.2)	22 (31.0)	29 (40.8)	13 (22.0)	18 (30.5)	16 (22.5)	27 (38.0)	6 (10.2)	18 (30.5)

Note. Absolute frequencies of reported used and alternative (alt.) ERS for training and comparison group post training in the new role-play. Relative

frequencies % in brackets.

Table 21

Frequencies of used and alternative ERS separated by group (post) in response to the known role-play

ER-Strategy	Anger				Helplessness				Insecurity			
	Training (n = 55)		Control (n = 59)		Training (n = 55)		Control (n = 59)		Training (n = 55)		Control (n = 59)	
	<i>Used</i>	<i>Alt</i>	<i>Used</i>	<i>Alt</i>	<i>Used</i>	<i>Alt</i>	<i>Used</i>	<i>Alt</i>	<i>Used</i>	<i>Alt</i>	<i>Used</i>	<i>Alt</i>
Disengagement	4 (5.6)	---	5 (8.5)	3 (5.1)	3 (4.2)	---	5 (8.5)	3 (5.1)	4 (5.6)	2 (2.8)	7 (11.9)	3 (5.1)
Explicit cognitive intervention	7 (9.9)	6 (8.5)	9 (15.3)	11 (18.6)	3 (4.2)	7 (9.9)	8 (13.6)	7 (11.9)	8 (11.3)	1 (1.4)	10 (16.9)	8 (13.6)
Explicit physiological intervention	7 (9.9)	2 (2.8)	14 (23.7)	14 (23.7)	4 (5.6)	3 (4.2)	8 (13.6)	8 (13.6)	8 (11.3)	3 (4.2)	12 (20.3)	7 (11.9)
Focusing content and/or talking techniques	---	3 (4.2)	6 (10.2)	3 (5.1)	10 (14.1)	4 (5.6)	16 (27.1)	11 (18.6)	7 (9.9)	3 (4.2)	9 (15.3)	8 (13.6)
Problem solving, reflection	---	---	1 (1.7)	---	---	1 (1.4)	---	1 (1.7)	---	---	2 (3.4)	1 (1.7)
Social regulation	---	---	---	---	---	1 (1.4)	---	4 (6.8)	---	---	4 (6.8)	3 (5.1)
Attention Change	---	1 (1.4)	---	---	---	1 (1.4)	---	1 (1.7)	---	---	1 (1.7)	---
Combination	8 (11.3)	9 (12.7)	8 (13.6)	5 (8.5)	4 (5.6)	3 (4.2)	3 (5.1)	2 (3.4)	6 (8.5)	4 (5.6)	8 (13.6)	4 (6.8)
Other (identifiable)	3 (4.2)	2 (2.8)	---	1 (1.7)	2 (2.8)	---	8 (13.6)	2 (3.4)	3 (4.2)	1 (1.4)	---	---
Other (useless)	---	1 (1.4)	1 (1.7)	1 (1.7)	1 (1.4)	---	---	1 (1.7)	---	---	---	---
Missing	24 (33.8)	31 (43.7)	15 (25.4)	17 (28.8)	20 (28.2)	29 (40.8)	11 (18.6)	19 (32.2)	14 (19.7)	41 (57.8)	6 (10.2)	20 (33.9)

Note. Absolute frequencies of reported used and alternative (alt.) ERS for training and comparison group post training in the new role-play. Relative

frequencies % in brackets.

Table 22

Frequencies of used and alternative ERS separated by group (post) when confronted with a new role-play

ER-Strategy	Anger				Helplessness				Insecurity			
	Training (n = 54)		Control (n = 59)		Training (n = 52)		Control (n = 59)		Training (n = 51)		Control (n = 59)	
	<i>Used</i>	<i>Alt</i>	<i>Used</i>	<i>Alt</i>	<i>Used</i>	<i>Alt</i>	<i>Used</i>	<i>Alt</i>	<i>Used</i>	<i>Alt</i>	<i>Used</i>	<i>Alt</i>
Disengagement	6 (8.5)	---	7 (11.9)	4 (6.8)	5 (7.0)	1 (1.4)	3 (5.1)	2 (3.4)	8 (11.3)	---	5 (8.5)	4 (6.8)
Explicit cognitive intervention	3 (4.2)	4 (5.6)	6 (10.2)	6 (10.2)	5 (7.0)	3 (4.2)	8 (13.6)	6 (10.2)	5 (7.0)	3 (4.2)	10 (16.9)	5 (8.5)
Explicit physiological intervention	9 (12.7)	7 (9.9)	10 (16.9)	10 (16.9)	5 (7.0)	1 (1.4)	2 (3.4)	6 (10.2)	9 (12.7)	4 (5.6)	12 (20.3)	11 (18.6)
Focusing content and/or talking techniques	2 (2.8)	3 (4.2)	5 (8.5)	5 (8.5)	11 (15.5)	11 (15.5)	20 (33.9)	13 (22.0)	9 (12.7)	6 (8.5)	9 (15.3)	10 (16.9)
Problem solving, reflection	2 (2.8)	1 (1.4)	2 (3.4)	3 (5.1)	---	---	---	1 (1.7)	---	---	---	2 (3.4)
Social regulation	---	1 (1.4)	---	---	---	3 (4.2)	2 (3.4)	7 (11.9)	1 (1.4)	2 (2.8)	1 (1.7)	---
Attention Shift	---	---	---	---	---	---	---	---	---	---	1 (1.7)	---
Combination	7 (9.9)	8 (11.3)	9 (15.3)	8 (13.6)	7 (9.9)	7 (9.9)	9 (15.3)	2 (3.4)	4 (5.6)	4 (5.6)	9 (15.3)	6 (10.2)
Other (identifiable)	4 (5.6)	3 (4.2)	---	4 (6.8)	1 (1.4)	1 (1.4)	1 (1.7)	3 (5.1)	3 (4.2)	2 (2.8)	4 (6.8)	2 (3.4)
Other (useless)	---	1 (1.4)	---	---	---	---	1 (1.7)	1 (1.7)	1 (1.4)	---	2 (3.4)	1 (1.7)
Missing	21 (29.6)	28 (39.4)	20 (33.9)	19 (32.2)	22 (31.0)	29 (40.8)	13 (22.0)	18 (30.5)	16 (22.5)	27 (38.0)	6 (10.2)	18 (30.5)

Note. Absolute frequencies of reported used and alternative (alt.) ERS for training and comparison group pre-training. Relative frequencies % in brackets.

Between-group differences post-training

After training, when confronted with a new role-play, there were significant differences between groups for anger, $\chi^2(8)=15.49$, $p=.050$ and $\chi^2(9)=18.42$, $p=.031$ (alternatives), for helplessness, $\chi^2(8)=17.85$, $p=.022$, and for insecurity, $\chi^2(10)=20.46$, $p=.025$ and $\chi^2(9)=25.22$, $p=.003$ (alternatives) for the known role-play. The test for alternative strategies in response to helplessness was not significant: $\chi^2(11)=19.57$, $p=.052$. Furthermore, there were significant differences between group regarding applied strategies during the new role-play: $\chi^2(8)=21.63$, $p=.006$ and $\chi^2(9)=17.49$, $p=.042$ (alternatives) for anger, $\chi^2(9)=26.54$, $p=.002$ and $\chi^2(9)=20.40$, $p=.016$ (alternatives) for helplessness, and $\chi^2(11)=21.15$, $p=.032$ for insecurity. The test for alternative strategies (insecurity) was not significant: $\chi^2(8)=11.29$, $p=.186$.

Summary of results for changes in applied emotion regulation strategies

In conclusion, these results suggest that there were between group differences after training in applied ERS, which were not there in the beginning. While the comparison group applied more adaptive strategies at post-test such as physiological change after anger induction or focusing content to decrease helplessness, and several strategies to decrease insecurity, the intervention group seemed to have just given up and inserted less strategies, therefore there were more missing values. As this result could be statistically validated by χ^2 -tests, it can be considered reliable.

Furthermore, there were obvious differences between preferred strategies in response to specific emotions: Physiological interventions were used most often in response to anger and focusing content was used most often in response to helplessness. Regarding insecurity, several and different strategies were applied. Last, it is possible that the application of ERS changed in the training group in the way that the use of disengagement strategies decreased while the use of cognitive strategies increased after training.

Emotion expression, attention, and thoughts

Pearson correlations were calculated to see whether there were associations between self-

reported emotion expression in gestures and facial expression and z-standardized¹ emotion intensity ratings. Correlations were fairly high for all three emotions, for anger during role-play $r(115) = .53, p < .001$; for anger afterwards $r(116) = .19, p < .001$; for helplessness during role-play $r(115) = .53, p < .001$; for helplessness afterwards $r(116) = .38, p < .001$; for insecurity during role-play $r(115) = .52, p < .001$; for insecurity afterwards $r(116) = .40, p < .001$. This indicates a parallel increase of intensity of reported emotion expression and emotion intensity, independent of emotion. For associations between attention focus (self, other or both) and z-standardized intensity of emotions, Spearman correlations were calculated for all three emotions, revealing one significant positive correlation between helplessness afterwards and attention focus, $r(101) = .22, p = .026$, indicating that the more participants had their attentional focus on the other person, the more helpless they felt afterwards. The thoughts concerning control, self-esteem, abilities, and guilt were all inter-correlated and in the expected directions, therefore at least partially validating the coding system. Interestingly, there was a correlation between thoughts about control and anger intensity during role-play, $r_{sp}(98) = .22, p = .029$, indicating that the more a person thought she was in control, the angrier she felt. Thoughts about self-esteem were negatively associated with intensity of helplessness, $r_{sp}(101) = -.21, p = .032$, and intensity of insecurity, $r_{sp}(101) = -.30, p = .002$, indicating that the lower participants thought about their self-esteem, the more intense were reported feelings of insecurity and helplessness. Thoughts about abilities and guilt were both negatively correlated with reported insecurity, $r_{sp}(107) = -.23, p = .019$ for abilities and $r_{sp}(101) = .22, p = .026$ for guilt, indicating that the higher participants estimated their abilities, the less insecure they felt and the more participants thought they were guilty, the more insecure they felt.

Discussion

This large mixed method analysis was conducted to get an insight into ERS pre-service teachers

¹ For the joint analyses of role-plays 1 and 2, emotion ratings were z-standardized as the mean differences between emotion intensities were significant.

spontaneously use when confronted with unpleasant emotions (anger, helplessness, and insecurity) and the estimated and actual effectiveness of these strategies. Furthermore, descriptive changes in frequencies of applied ERS before and after an EC training were investigated. Last, associations between cognitions, emotion expression and attentional focus and reported emotion intensity were analyzed.

Contribution to a model of emotional competence in (pre-service) teachers

In line with the results of Chang and Taxer (2020) and Taxer and Gross (2018), we found that pre-service teachers use a variety of ERS to downregulate acute unpleasant emotions. This study also revealed gaps on both sides – pre-service teachers seemed to be unaware (even after training) of several ERS like for example labeling (Moyal et al., 2014) or cognitive strategies like restructuring the response to the stimulus or taking a third-person perspective (Webb et al., 2012), because they did not report to use these strategies. Vice versa, as hypothesized, there seemed to be a gap in scientific research regarding specific ERS pre-service teachers widely use such as physiological interventions or certain cognitive responses that are not traditionally listed in the way the participants phrased it in emotion regulation research (e.g., self-encouragement, self-esteem enhancement, or not taking things personally). Furthermore, in this study we found specific associations between certain emotions and certain cognitions as well as certain emotions and a certain attentional focus, which underlines the argument in favor of bottom-up-development of a model of EC that is specifically adapted to the teaching context.

Use and effectiveness of ERS

Regarding anger, physiological and cognitive strategies, or a strategy combination were the most often used followed by disengagement strategies and focusing content/talking techniques. In response to helplessness, participants reported to mostly have used focusing content/talking techniques, combined strategies, and cognitive interventions, followed by physiological interventions and disengagement strategies. Insecurity was most often followed by physiological interventions, a combination of strategies, focusing content/talking techniques, cognitive interventions, and disengagement strategies. The

strategies of attentional shift, social regulation, and other problem-solving strategies were less often reported over all three emotions. However, attentional shift is often applied conjointly with other strategies (Taxer & Gross, 2018), therefore it is possible, that several of the coded combinations included an attentional shift. Still, it can be concluded from the results of this study, that attentional shift is rarely used as an isolated strategy or not recognized as an ERS and therefore not mentioned. Also, in comparison with the results of the study of Taxer and Gross (2018), we did not find that suppression (or any other disengagement strategy) was the most often used strategy. Therefore, it might be that pre-service teachers are either not aware of their disengagement strategies or do not recognize them as ERS.

While the category “disengagement” which we found in this study is comparable to the same construct known in the literature (e.g., Naragon-Gainey et al., 2017), as well as focusing content or talking techniques can be seen as a problem-solving strategy (e.g., Naragon-Gainey et al., 2017), attentional shift is similar to attentional deployment (e.g., Webb et al., 2012), but was applied in our study as a response-focused strategy. The cognitive strategies were very heterogeneous and cannot necessarily be compared to other operationalizations of cognitive change. Some – like a change in attributional style (Hu et al., 2015), perspective taking (Webb et al., 2012), change of emotional stimulus (Webb et al., 2012), or cognitive reduction of importance or shifting goal focus (Scherer & Moors, 2019) are well-known strategies in the ER-literature. Others, like self-encouragement, self-esteem enhancement, and not taking things personally cannot be easily categorized and might be either tied to a specific emotion (e.g., self-esteem enhancement when a person feels insecure) or especially relevant in the school context (e.g., not taking things personally). Physiological interventions seem to be a very important short-term strategy, which is why models of teacher ERS should include these strategies and further research should investigate their nature and effectiveness. In this study, especially regarding anger, participants reported a high effectiveness of a physiological intervention. In response to helplessness and insecurity, interestingly, disengagement strategies proved to be most effective in the short term. This is in line with

results showing that suppression can lead to a decline in emotional experience in the short term (Biehl et al., 2019). The effectiveness of most strategies was overestimated when the reported estimates of effectiveness and actual decline in reported emotion intensity were compared. And several applied strategies had no reported effect, even when participants thought there was one.

Differences and changes in frequencies of applied strategies

In the beginning, frequencies of reported ERS were the same in both groups. After training, the comparison group constantly reported the application of more ERS, especially of those that are considered adaptive such as cognitive, physiological, and problem-solving interventions. Regarding between group differences at any point in time, it seemed that the control group reacted quite flexible to the given situations, however, this pattern was not statistically tested. Training did not change this pattern, on the contrary, at the test post-training, the differences were statistically significant supposedly due to a higher number of missing values in the training group and the application of adaptive strategies in the control group. Descriptively, regarding the training group, it seemed that they applied less disengagement strategies post training. This result is in line with the result of the quantitative study that even though we found improvements in emotion regulation in the training group, the effect was very small (Schelhorn et al., under review). It is possible that particular students choose to participate in EC-training and training participants might rather be students struggling with emotion regulation. Therefore, participants of the training might have been a particular challenging group. It might have been that it was easier for this group to inhibit dysfunctional ERS than to learn the application of adaptive strategies in a very short period.

Further descriptive results were as follows: Regarding anger, there was a shift in frequencies pre-post towards a more frequent application of physiological and cognitive strategies in the control group, a shift that was found in the training group as well, but only for cognitive strategies. However, the training group had spent some time training perspective taking in response to anger, therefore they might have

been prepared to apply this strategy. Furthermore, there was an overall shift in both groups towards less focusing content and talking techniques in response to helplessness. This might have happened, because at the second point in time, participants might already have realized that the role-plays had been standardized and that they could not change their outcome. Therefore, it would have been adaptive to rather choose cognitive or strategies other than problem solving techniques as the situation itself was uncontrollable (Troy et al., 2013). In response to insecurity, no obvious changes in strategy application were found. In summary, after this qualitative analysis, it can be said, that there were fewer changes than expected after training. If there was a training effect in the expected direction, it could only slightly be seen in participants' vocabulary when describing the ERS they used in response to unpleasant emotions and in an unguided format.

Associations between cognitions, emotion expression and attentional focus

Correlational analysis between emotion expression and emotion intensity revealed that the more intense participants felt an emotion, the more they thought they expressed it. This would be in line with both, component process models assuming that emotion induction changes motor and facial expression (Scherer, 2009), but also with facial feedback hypothesis assuming that motor expression of emotions increases emotion intensity (for a review of literature, see Coles et al., 2019). Shifting the attentional focus on an unsolvable problem (the dialogue partner) correlated with intensity of helplessness, which makes attentional deployment a good candidate for an ERS in response to helplessness. Cognitions of low self-esteem were negatively associated with feelings of helplessness and insecurity, cognitions of low abilities and high guiltiness with feelings of insecurity. Cognitions of high control were correlated with higher intensities of anger. Previous researchers who also found this association assumed that high controllability estimates instill anger (Berkowitz & Harmon-Jones, 2004; Wranik & Scherer, 2010). As our analysis was only correlational, the direction of the effect remains unclear. However, these results give an insight in the interrelatedness of pre-service teachers' thoughts and emotions and encourage further research

investigating the directions of these specific emotion-cognition-links.

Limitations

As this study provides mostly qualitative and descriptive results, they should be interpreted with care. Whether the training changed the application of ERS remained widely unclear. It might be important to note here, that training participants did these role-plays directly after training, usually at the end of a full training session. Therefore, participants of the training group might have lost motivation or been tired – more so than the comparison group that only had to take part in a maximum of one and a half hours of paid experiment. Therefore, role-plays in a different setting at a later point in time or with a comparison group that had also taken part in a seminar possibly would have been more conclusive. Furthermore, the role-plays had only been validated in the way that the trainers themselves and students had taken part in them before in the role of the teacher. All reported emotion induction, however, the results of this study suggest, that the role-plays induced slightly different emotions and in statistically significant different intensities – or it might be that primary school education students reacted in a different way than secondary school education students.

Content-wise, there were two major flaws: First, there was a substantial number of students who had been immune to the emotion induction and who didn't report any ERS. Therefore, a lot of essential information remained in the dark, because it might be that these students had been very successful in regulating their emotions but had either no explicit access to the strategy they used or no suitable space or vocabulary to describe it. Therefore, in future studies, the questionnaire we used should be adapted to fill this gap. Second, the category of cognitive strategies remained very heterogeneous and unstructured, and it is unclear whether all the mentioned strategies belong into the same category. As already mentioned above, contents of this category are partially distinct from existing definitions and categorizations of cognitive reappraisal or cognitive change.

Implications and future directions

In conclusion, this study comes to the general conclusion that pre-service teachers use a variety of ERS in response to elicited unpleasant emotional states. This study also shows that there are gaps in pre-service teachers' knowledge about ERS on the one hand, but also gaps in scientific research regarding ERS pre-service teachers use on the other. Alternatively, there might be a big difference in wording between scientific and common language. This gives researchers and teachers alike the challenging task to investigate teacher-psychologist-communication, so that researchers can precisely determine which ERS teachers use and which are when effective.

Even though many questions on how to do effective EC trainings for (pre-service) teachers remain still widely unclear, several hypotheses can be derived from the results regarding training effects and between-group differences: First, the EC training did not fundamentally change applied ERS in the training group. If the group learned anything applicable about emotion regulation, then to inhibit disengagement strategies. Therefore, future trainings should focus more on practicing the application of newly learned adaptive strategies. Second, there were preferences of certain strategies succeeding certain emotions: For instance, physiological interventions in response to anger and focusing content and talking techniques/problem solving in response to helplessness. Therefore, the emotion-strategy-fit seems to be important. Third, learning to inhibit dysfunctional ERS might be easier and faster for pre-service teachers than learning to apply functional ERS. Trainings should therefore invest more time in the application of newly learned strategies.

Last, this study also hints that it seems important to further analyze cognitive ERS and attentional focus of (pre-service) teachers because this study showed that several of them are closely linked to elicited emotions. For instance, thoughts about control were associated with elicited anger, thoughts about self-esteem, abilities and guilt were associated with insecurity, and self-esteem as well as attentional focus were associated with helplessness.

8. General discussion

8.1. Summary of results

Four studies have been presented throughout this work. **Study 1** aimed at investigating predictors of teacher emotions in class and found a convincing effect of the teacher-student relationship as an overall important predictor for all three measured emotions: Enjoyment, anger, and anxiety. The predictive power of the included ERS was not as predicted: We found a significant negative association regarding anger levels and suppression and no further effects of any measured ERS on the emotions anger and anxiety. We found hints in the form of marginally significant predictors of the dampening effect of hiding and the enhancing effect of faking regarding enjoyment. Interestingly, mediational analysis revealed an indirect effect of faking on enjoyment through the teacher-student relationship.

Study 2, which was conducted in a laboratory setting, measured the effects of goal attainment (student performance) and relationship closeness on reported affective state. We found an interaction effect of closeness and goal attainment, indicating that there were differences in valence ratings between close and distant students in the condition when the goal was not attained and no differences when the goal was attained. When the goal was attained, valence ratings were higher in the close condition. This might be a hint that closeness between teachers and students could buffer negative affect. However, it must be mentioned here that we cannot be sure that the closeness induction had worked. Furthermore, there was a very substantial main effect of students' goal attainment on affective state which is – despite the significant interaction – mentioned here due to its large size: Affect ratings were higher, when the goal was attained. Last, the exploratory analysis revealed higher ratings in closeness and sympathy scales at the end of the study for students who had attained their goals.

In **study 3**, pre-service teachers were tested in a randomized and controlled laboratory setting investigating the effectiveness of perspective taking in comparison to a detailed description intervention as a downregulation strategy for teacher anger. In this study, no effects of the intervention could be found.

The main effects of time and session were significant for both conditions, indicating that maybe effective anger regulation took place in both conditions. In this study, the anger induction did not fully work and both groups reported to have used perspective taking as a strategy to regulate anger which made it difficult to differentiate the groups. In further studies like this one, methodology regarding the anger induction and intervention should be improved.

Study 4 contained a mixed method analysis of a data set investigating pre-service teachers who had taken part in the EC training. These were compared to a control group. We found in that study, that pre-service teachers used a variety of ERS and that several applied ERS were emotion-specific. While physiological interventions were mostly used for the downregulation of anger and insecurity, attempts of problem solving were more often used to regulate helplessness and insecurity. Participants generally seemed to overestimate the effectivity of the applied strategies when regulating anger, especially regarding problem solving (focusing content) and disengagement strategies. Interestingly, for helplessness and insecurity, disengagement strategies descriptively proved to be the most effective, while the effectivity of cognitive strategies was overestimated. If there have been any effects of the EC training on applied ERS, those were reflected in the decrease of the application of disengagement strategies, while the use of to-be-learned strategies remained stable over time. Last, we observed specific emotion-cognition links between anger intensity and thoughts of being in control, high intensity of insecurity and thoughts of low self-esteem, low ability, and high guiltiness as well as high intensity of helplessness and thoughts of low self-esteem and strong attentional focus at the source of the problem (the dialogue partner).

8.2. Conclusions for concepts of (pre-service) teacher EC trainings

8.2.1. Training content

Training (pre-service) teachers' ERS. Regarding specific ERS that should or should not be taught to (pre-service) teachers, the findings of the presented studies were inconclusive. First, we found strategy

use as well as relevant cognitions to be emotion-specific (study 1 and study 4), which is an important finding. Several emotion researchers separate emotions in “positive” and “negative” ones (Watson et al., 1988), accordingly emotion regulation researchers often speak of the up- and downregulation of “positive” and “negative” emotions (e.g., Gross). However, Scherer (2005) or Tong (2015) already demonstrated that processes of emotion generation are multifaceted and often include emotion-specific appraisals that cannot be separated by valence category only. In line with these theories, the findings of study 4 demonstrated very specific cognition-emotion links within a cluster of emotions that are all considered rather unpleasant. In the first study with a sample of teachers, the links between measured ERS and emotional outcome were also emotion-specific. Therefore, to be able to decide which ERS should be taught to (pre-service) teachers, precise research would be needed to determine adaptivity of specific ERS including specific sets of cognitions to regulate specific emotions. Second, considering the null effects of study 3 investigating taking a student’s perspective as an anger regulation strategy, it is important to note that there is no guarantee that effective ERS according to general psychology are also effective ERS for teachers. Due to its null effects, this study also highlights that it is important to think about general research practices regarding the development and evaluation of EC-trainings for (pre-service) teachers. It emphasizes the importance of validating training content in laboratory and experimental studies to separate effective from ineffective training parts in applied studies. In the laboratory setting, we did not find evidence of effectiveness of this separate training unit, even though the training was effective in improving emotion regulation (Schelhorn et al., under review).

Upregulating pleasant emotions. We included a pleasant emotional state as outcome variable in study 1 and study 2. As we found significant associations between faking and hiding and reported enjoyment, it seems important to include psychoeducation about the regulation of pleasant emotions as well as alternative up-regulation strategy practice into EC-trainings. For instance, the concept of dampening and savoring strategies by Quoidbach et al. (2010) includes four rather dysfunctional and four

alternative ERS for the upregulation of pleasant emotions that could be easily taught. In study 2, pleasant emotional outcome could be easily induced by pre-service teachers' goal attainment (student performance). This is contradictory to findings from Frenzel et al. (2020) who found no associations between students' goal attainment and teachers' emotions in their field study with in-service teachers. Our laboratory results contrast these findings and might imply, that if placed into a context with a strong focus on student outcome, it could be likely that teacher emotions also strongly depend on it. Consequently, it seems important that teachers generate environments where there are other sources for pleasant emotions and goal attainment, if they don't want to emotionally depend on their students' outcomes.

Downregulating anger. Study 1, study 3 and study 4 investigated anger regulation in teachers because it is an important topic (Burić & Frenzel, 2019). In study 1, we investigated an in-service teacher sample and found that lower suppression was associated with higher levels of anger. These results would be in line with the results of Chervonsky and Hunt (2017) showing in their meta-analysis, that anger expression was associated with negative outcomes. Teachers' aggressive techniques have also been found to be associated with higher levels of disruption in class, and the expression of anger in the form of yelling has been found to elicit several unpleasant emotions in students (Sutton & Wheatley, 2003). Consequently, high anger expression might pose a threat to close teacher-student relationships. In conclusion, there are multiple reasons why expressing anger is at odds with display rules in the context of teaching (Liljestrom et al., 2007). A study from emotional labor research complements these findings: In adverse teaching conditions with high emotional challenges, teachers with higher (sic!) emotional intelligence used surface acting (and therefore hiding which is closely linked to suppression) more frequently – without negative consequences for their psychological wellbeing (Karim & Weisz, 2011). It would therefore be plausible to conclude from these findings that expressive suppression of teacher anger is a good thing. However, several other studies showed that lower suppression in teachers can be

associated with lower levels of anger (see Lee et al., 2016, for an overview), while reappraisal and acceptance seemed to foster perseverance during a frustrating task (Szasz et al., 2011). Chang and Taxer (2020) showed that combined low suppression and reappraisal led to higher levels of anger than combined low or high suppression and high reappraisal. However, the sample size of that study was very small. To explain the heterogeneity of these findings, theories of emotion regulation flexibility might be helpful proposing that the adaptivity of emotions and ERS depend on the context (Bonanno & Burton, 2013) and both might also depend on the emotion: For instance, Boehme et al. (2019) showed that suppression of sadness or anxiety can be unhealthy and dysfunctional, however, as demonstrated above regarding anger, findings are still inconclusive.

Given the current state of knowledge, null findings regarding anger regulation such as the ones from study 1 and study 3 would be expected. In our regression analyses, we did not find any further associations between the measured ERS and anger outcome of in-service teachers. We also did not find effects of a perspective taking intervention designed to downregulate elicited anger. However, due to its methodological limitations, we cannot use this study's results as a clear argument against the usage of taking the student's perspective. Studies like this one should be methodologically improved regarding anger induction method and selection of materials for the comparison groups as well as include a control group not taking part in any intervention. Combined with the study's strengths such as the standardized and randomized experimental setting, targeting the relevant group of pre-service teachers, and using scenes close to real-world scenarios, cognitive anger regulation in teachers should be further investigated.

Considering the results of our study 4, the variety of ERS in response to anger applied by teachers is larger than pre-given frameworks would allow. For instance, the most often reported strategy, a physiological intervention, has received little research attention. Therefore, the development of emotion-specific measuring instruments based on validated ERS structures adapted to the context of teaching seems necessary. Like our study 1, most studies regarding cognitive ERS in teachers are correlative studies

conducted with either the ERQ measuring reappraisal and suppression or the emotional labor scales of Brotheridge and Lee (2003) or Diefendorff et al. (2005) measuring deep and surface acting. Both questionnaires are not emotion-specific. Furthermore, the ERQ measures only one facet of cognitive change, namely cognitive reappraisal of a situation – which is not even the most effective cognitive emotion downregulation strategy: According to the meta-analysis by Webb et al. (2012), this would be taking a third person perspective. The emotional labor measuring instruments (Brotheridge & Lee, 2003; Diefendorff et al., 2005) depict by definition a construct that is slightly different from emotion regulation.

Emotion-cognition links. We found specific correlations between reported thoughts and certain emotions in the study with the sample of pre-service teachers that took part in the EC training (study 4): Again, potentially relevant for downregulating anger, we found that higher intensity of anger during the role-play was associated with higher estimates of being in control. This finding replicates previous findings in other target groups showing that next to cognitions of goal relevance and goal conduciveness, cognitions regarding controllability of a situation are relevant for anger (Wranik & Scherer, 2010). The authors also elaborated on the possible mechanism and assumed that persons who think that they were in control in a situation that did not go as planned will automatically direct anger towards the responsible person. Applying this to our study, this would mean when participants (falsely) thought that they were in control in the role-play situations that were meant to go wrong, anger against themselves would arise – due to a misjudgment of environment controllability. The concept of context sensitivity as a facet of emotion regulation flexibility includes this way of cognitively estimating a context's controllability (Bonanno & Burton, 2013). This theory states that context sensitivity and therefore correct controllability estimates are necessary to adaptively regulate emotions. Therefore, regarding the application of cognitive ERS in response to anger, teachers should be trained to correctly estimate controllability of the contexts they find themselves in. Especially those teachers experiencing high levels of anger should investigate whether they regularly overestimate the controllability of contexts. If they found this to be true, it might

be possible to cognitively intervene by learning how to reappraise a situation's controllability.

Regarding helplessness, we found a link between an attentional focus on the other person (in that case, the parent) and thoughts of low self-esteem and higher intensity of helplessness. Derived from these findings, one could hypothesize that disengagement strategies like deploying attentional focus rather to the self or to both dialogue partners could downregulate helplessness in the short term in a situation where problem solving does not seem possible. This would also be in line with our qualitative finding that disengagement strategies seemed to be effective in downregulating helplessness. Higher levels of insecurity were correlated with thoughts of less self-esteem, higher guilt, and lower abilities. So, even though the causality of these associations is not clear, this finding is an argument for specific cognitive interventions, in more detail: If a (pre-service) teacher reports to very often experience insecurity, it might be useful to analyze and reappraise cognitions referring to self-esteem, guilt, and abilities.

8.2.2. Training setting and schedule

At first, regarding training schedule, the findings of the studies presented in this work are thought-inspiring. The qualitative results of study 4 showed that a four-day training containing one and a half days emotion regulation practice was not enough for improving pre-service teachers' emotion regulation vocabulary and considerably changing their applied ERS. Instead, the very slight changes provoked by our training in ERS application rather hint that the training participants would have needed more time, a different methodology, different contents, or different spacing. It might therefore be better if training sessions are more spaced out and if between-session supervision is given, comparable to the training by Jennings et al. (2017; 2019). When other training parts cannot be shortened and if it is true that the ERS part needs more time, this would mean, that the training needs to be prolonged or stretched over a longer period. Another option would be to separate EC-training for pre-service teachers into two courses, one training focusing on emotion perception, emotion awareness, and emotion understanding and transfer these components in training to classroom situations and interactions. The second training could then

focus on ERS and train these by practicing relevant classroom situations and interactions, including the student-teacher relationship due to its importance. Including the relevant context is essential according to the framework of emotion regulation flexibility (Bonanno & Burton, 2013) proposing that the ability to respond adequately in different contexts is more important for adaptive emotion regulation than just a broad repertoire or knowing one single “adaptive” strategy (Aldao et al., 2015).

8.3. Findings on the importance of the teacher-student relationship

Study 1 demonstrated strong links between the teacher-student relationship and emotional outcomes, in study 2, an interaction between goal attainment (student performance) and manipulated closeness predicted valence ratings. The results of these studies support the idea to include the teacher-student relationship in EC trainings, as also proposed by Jennings and Greenberg (2009), for two reasons: We found that the teacher-student relationship and teachers’ emotional outcome (joy, anger, anxiety) are not separable from each other which corresponds to the findings from Hagenauer et al. (2015) who also found associations between teacher emotions in class and the teacher-student relationship. From study 2, one could derive the hypothesis that induced closeness between student and teacher buffers pre-service teachers’ negative emotional reactions in response to their students’ failure. This insight is new and should be further investigated: Similar studies should find out whether this effect gets stronger and can be replicated with a more successful closeness induction. Furthermore, it would be interesting to shed light on the mechanism behind it: Does the failure of one goal such as the development and success of the learner become less important when another goal such as the feeling of being related to the student is attained? Or does a closer teacher-student relationship make it harder to be at odds with a student, no matter how bad his or her performance is? Last, including improvements of the teacher-student relationship as a goal in EC-trainings could have another advantage: It could motivate students to take part and deeply engage in EC-trainings as they are then more goal-congruent. Among the three investigated emotions, we only found one significant indirect effect of faking on enjoyment through the

teacher-student relationship. This effect corresponds with findings demonstrating that faking unfelt emotions can have negative effects on relationships (Chervonsky & Hunt, 2017) which can then influence emotional outcome.

8.4. General limitations

8.4.1. Research focus

The presented studies on training EC or its facets only covered a very small area in the field of EC in (pre-service) teachers. Study variables were chosen depending on relevance of research topic such as anger regulation in teachers (Burić & Frenzel, 2019) and on the relevance of certain emotions for teachers such as enjoyment, anxiety, and anger (Keller et al., 2014). Furthermore, facets of EC were mostly chosen depending on the availability of measurements with the one exception being the self-developed questionnaire used in the training evaluation study: Consequently, as there are several standardized measures operationalizing emotional labor and ERS compared to a negligible – or non-existent number of self-report questionnaires operationalizing emotional awareness, emotion understanding, or emotion use. Therefore, regarding specific aspects of EC, the studies in this work provide very specific results about mainly one aspect of EC – emotion regulation of various emotional states. Vice versa, other facets of EC – emotion perception, emotion understanding, emotional awareness, and emotion use have been widely neglected. These aspects therefore remain under-researched. Also, the studies' results cannot provide further knowledge regarding EC trainings scheduling and setting, as quite a larger amount of randomized controlled training studies would be necessary to determine specific effects.

8.4.2. Emotion spectrum

The presented studies had a focus on several emotions whose investigation is common in teachers such as anger and enjoyment. The selection of emotions we chose for our training and the studies was based on literature from Keller et al. (2014) and Becker et al. (2015) showing that anger was an important emotion in the way that it was often reported by teachers. We also chose insecurity/anxiety and

helplessness as these might be important emotions for younger teachers (e.g., Anttila et al., 2016). However, these emotions still only depict a tiny bit of the relevant emotions. Especially when evaluating the training, we only measured the downregulation of challenging emotional states and did not include enjoyment or other pleasant emotions in our analysis of in-situation emotions. Consequently, the studies conducted provide a knowledge gain regarding anger, anxiety, helplessness, insecurity, and enjoyment, while other emotions have been neglected.

8.4.3. Emotion measurement

A common flaw amongst teacher emotion studies is the use of mainly correlational and self-report measures. In present studies, researchers have also conducted diary studies (Frenzel et al., 2015). Despite the retrospective measurement, measuring emotional states with diaries is a more reliable method than using just one self-report measure as it relies not only on one emotional state measurement but on several. Experience sampling method during lessons was also used in several studies which might be more ecologically valid (Carson, 2006). In the four studies reported in this work, we used various methods. However, even though we mainly measured induced and therefore very likely valid in-situation emotions in three studies, we also used only self-report measures prone to be biased.

8.5. Implications and future perspectives

8.5.1. Practical implications

The quantitative study evaluating the introduced EC training demonstrated its effectiveness in improving emotion regulation (Schelhorn et al., under review) and qualitative data might hint what was learned: less using suppression as an ERS. Therefore, we know from previous EC studies that emotion awareness training is important and now, we additionally know that the reduction of rather dysfunctional ERS can be trained in in-service (Jennings et al., 2017) and pre-service teachers. Less clear is how an increase in adaptive strategies can be successfully implemented in EC trainings in pre-service teachers. The exact conceptualizations for effective EC training units teaching adaptive ERS for pre-service teachers

need further investigation. Still, emotion up- and downregulation strategies should be included in EC trainings. Teaching teachers to experience and express their pleasant emotions would be profitable for both students and teachers, possibly through the student-teacher-relationship. Teachers that are vulnerable to emotional exhaustion or those at risk to experience affective disorders should be able to upregulate their pleasant emotions because it is known that the experience of pleasant emotions can buffer the experience of negative effect (Fredrickson, 1998; Fredrickson & Levenson, 1998). Last, teachers should be very specifically taught in how to deal with enthusiasm, its up-regulation, and expression – without faking it because teacher enthusiasm is considered an important teacher emotion (Keller et al., 2016) and included in professional teacher competence models (Kunter et al., 2013). Regarding emotion downregulation, cognitive strategies should be discussed considering their specific importance for specific emotions. Emotion suppression and expression and their distinct consequences should also be included, differentiating between specific emotions keeping also in mind that the adaptivity of ERS is context-bound. Emotion use and the connection between emotional outcome and the teacher-student relationship should not be ignored but included in (pre-service) teacher EC trainings.

8.5.2. Future perspectives - Research focus

EC components. More research is needed investigating all aspects of EC and their training in (pre-service) teachers. Especially the EC facets emotion understanding and emotion use in teachers should be further investigated in the classroom to understand their importance and value for teachers. Regarding emotion use, the context classroom could be very specific, which is why an easy transfer from general psychology research might not be very useful. In this field, qualitative studies might be necessary to determine facets, goals, and adaptivity of emotion use in teachers.

Further ERS. Teacher anger and its regulation still need more research attention as findings are inconclusive. While there are several findings regarding the negative effects of anger expression (Chervonsky & Hunt, 2017) and the negative impact of surface acting and anger suppression on mental

health (Keller et al., 2014), the exact to-be-learned strategies are still missing, whether it is labeling (Moyal et al., 2014), deep acting (Hochschild, 2010), or a certain cognitive change strategy (Webb et al., 2012), or maybe just the whole bunch. Almost the same observation can be made for upregulation strategies. Even if the importance of pleasant emotions such as enjoyment (Keller et al., 2014) or enthusiasm (Keller et al., 2016; Kunter et al., 2011) is clear and emphasized by our studies, it is not clear how and if successful teachers upregulate those – we just found that faking can dampen emotional outcome through the teacher-student relationship. Looping back to the process model of emotion regulation (Gross, 1998), situation selection and modification as antecedent-focused ERS have not been manipulated or specifically trained in studies in order to investigate their effects. To date, it has only been found that teachers also use these strategies (Taxer & Gross, 2018).

Emotion regulation flexibility. Bonanno and Burton (2013) framed the concept of emotion regulation flexibility based on the assumption that a rigid emotion regulation will always fail so long as the contexts changes – no matter what ERS is used. In a study, Troy et al. (2013) demonstrated that a mainly adaptive strategy such as cognitive change failed its purpose when a person was in controllable circumstances, because it prevented the in the designated situation more adaptive ERS of problem solving. Aldao et al. (2015) stated that emotion regulation flexibility is adaptive because the environment is in constant flux. The same might apply for the school context. As teachers find themselves in a variety of emotion eliciting situations in their professional lives, the strategies they need might be as diverse. It is also likely that mainly those teachers succeed who can adjust their used strategies to the given context. Bonanno and Burton (2013) included three facets in their model of emotion regulation flexibility: repertoire, defined as the number of known strategies, context sensitivity referring to correct estimations of the environmental characteristics, and feedback meaning the active processing of environmental cues to be able to stop, change, or maintain certain ERS. Transferred to a teacher's professional environment, this would mean that training emotion regulation repertoire and highlighting specific strategies is

insufficient. Instead, it seems more relevant to discuss specific context-strategy-fits. Looping back to the beginning of this discussion section - when reaching the conclusion that the adaptivity of strategies might be emotion-specific, it seems necessary to add this third component and speak of context-emotion-strategy-fits.

Further emotions. Further emotions relevant in the school context would be teacher pride (Keller et al., 2014) or disappointment (Grossman & Oplatka, 2021), teacher boredom (Audrin & Hascoët, 2021; Goetz et al., 2015), 2021) and teacher enthusiasm (Keller et al., 2016). A mixed-method study investigating many teachers in several studies that was conducted for the development of a questionnaire of teacher emotions included hopelessness and fatigue, because these two emotions had been mentioned very often by teachers in the qualitative interviews of the first studies (Burić et al., 2018). Interest and liking which could also be important in the student-teacher relationship have not gained much attention so far. Broadening research on pleasant teacher emotions would be important because joy as well as pride regularly appear in the classroom context (Becker et al., 2015; Keller et al., 2014) and studies investigating emotional transmission processes (Frenzel et al., 2018; Frenzel, Goetz, Lüdtke, et al., 2009) within the classroom demonstrated that both students and teachers alike seem to benefit from pleasant emotions.

Emotion measurement. Even though the most modern approach to measuring teacher emotions is to observe teachers' real-time emotions and not as before retrospective self-reports or qualitative interviews which could be easily biased, there are still no studies validating these data with either physiological data, face-reading software, or with third-person ratings and therefore more objective measures. This, however, might be important because several studies demonstrated that faking and hiding emotions due to display rules is common among teachers (e.g., Taxer & Frenzel, 2015). In this study, Taxer and Frenzel (2015) revealed that teachers rather express positively than negatively valenced emotions, that they suppress the expression of both but more often negatively valenced emotions. The authors concluded that these results are in line with prior research demonstrating that faking positive

while hiding negative and all in all not showing too strong emotions are the most common display rules regarding emotions in teachers. Specifically, on average teachers reported to hide disliking, anger, disappointment, and anxiety most often (and on the other hand, report to fake enthusiasm, happiness, and liking most often). These findings are crucial for teacher emotion research as they could also mean that studies using teacher self-reports on their emotions might be biased insofar as that teachers also might report more “desired” emotions.

8.6. Conclusion

The four studies presented here highlight the importance of training and researching EC in (pre-service) teachers for two reasons: The results of the presented studies confirm the influenceability of teachers’ emotions and their most important predictors that can be trained and influenced by the teachers themselves – such as the student-teacher relationship. They also highlight the emotion-specificity of the adaptiveness of ERS in (pre-service) teachers and in some way also how little we know about ERS regarding certain (pre-service) teacher emotions, particularly teacher anger. All this considered, future EC-trainings that succeed in targeting all components of EC and enhance emotional outcome via an increase in EC teachers’ ability to develop strong and fulfilling relationships with their students, have a great potential to influence teacher emotions and consequently their effectiveness and well-being. At the same time, this work also shows how little we still know about emotion regulation in teachers. While associative predictions partially confirmed previous results, the experimental designs revealed new insights and unexpected null effects. Therefore, this work hopefully encourages further standardized laboratory research simulating real-world scenarios to ensure more standardized conditions including objective and differentiated emotion-measures. It hopefully encourages researchers to keep investigating specific teacher emotions and most suitable ERS. Last, it hopefully provides a basis for the development of further EC trainings for (pre-service) teachers.

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