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REGULAR ARTICLE

Implicit Beliefs about Teaching Ability, Teacher Emotions, and Teaching Satisfaction

Ma. Jenina N. Nalipay[1] · Imelu G. Mordeno[2] · J-roel B. Semilla[2] · Cherry E. Frondozo[1]

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Abstract Although there are studies that link both implicit beliefs and emotions with well-being, most of these studies have been conducted in a domain-general context. The aim of this study was to contextualize these findings in the teaching context by examining the role of implicit beliefs about teaching ability in teacher emotions and satisfaction. This study draws on two theories of emotions: appraisal theories of emotion and broaden-and-build theory of positive emotions in order to understand the roles of cognition (i.e., implicit beliefs about teaching ability: incremental and entity beliefs) and emotions (i.e., teacher emotions: enjoyment, anger, and anxiety) in teaching satisfaction. Using data from a sample of 413 Filipino pre-service teachers, results of structural equation modeling provided support for a model of incremental beliefs about teaching ability predicting teaching satisfaction through teacher emotion of enjoyment. The findings of the study underscore the important role of implicit beliefs about the malleability of teaching ability and positive emotions toward the teaching experience in pre-service teachers' teaching satisfaction.

Keywords Implicit beliefs · Emotions · Teaching satisfaction · Well-being

✉ Ma. Jenina N. Nalipay
jmjnalipay@eduhk.hk

[1] Department of Curriculum and Instruction, Education University of Hong Kong, 10 Lo Ping Rd, Ting Kok, Tai Po, New Territories, Hong Kong, SAR, China

[2] Mindanao State University – Iligan Institute of Technology, Iligan City, Philippines

Teaching satisfaction is a domain-specific dimension of subjective well-being that involves a match between what teachers want from teaching and what they perceive teaching offers or entails (Ho and Au 2006). During pre-service training, teaching satisfaction is vital in pre-service teachers' decision to pursue a teaching career (Hennessy and Lynch 2017; Horvath et al. 2018). Indeed pre-service teachers who are more satisfied with their teaching experiences are more likely to have stronger intention to enter into the teaching profession. Moreover, teaching satisfaction contributes to pre-service teachers' identity formation and teaching engagement (Horvath et al. 2018).

Teaching satisfaction was also found to substantially influence teachers' choice to stay in the teaching profession (Buchanan et al. 2013; Cockburn 2000; Meyer 2016). One of the main reasons for teacher turnover is dissatisfaction with their work and teachers who find satisfaction are more likely to remain in the teaching profession (Hong 2012; Ingersoll 2001). The emphasis on teaching satisfaction as one of the key precursors to the decision to be a teacher is important in light of the increasing attrition and global shortage of teachers (Sutcher et al. 2016).

As teaching satisfaction involves a composite judgment of one's work cognitive and affective components of teacher's work experiences must be taken into account (Ho and Au 2006). A number of studies have examined various cognitive and affective factors related to teaching satisfaction. Among the factors found to be associated with teaching satisfaction are self-efficacy autonomy and engagement (Skaalvik and Skaalvik 2014) as well as emotional labor and emotional intelligence (Yin 2015). Negative relationships of teaching satisfaction with psychological distress and teaching stress have also been found (Ho and Au 2006). However, the specific roles of cognitions and emotions as predictors of teaching

satisfaction are yet to be examined. The current study focuses on specific cognitions (i.e., implicit beliefs about teaching ability) and emotions (i.e., teacher emotions) and their roles in teaching satisfaction in a sample of pre-service teachers.

Implicit Beliefs about Teaching Ability and Teaching Satisfaction

Implicit beliefs (or mindsets) are assumptions individuals hold regarding the malleability or fixedness of personal attributes (e.g., ability). Entity beliefs (or fixed mindset) refer to the assumption that a certain personal attribute is a fixed, non-malleable entity that is not amenable to modifications. On the other hand, incremental beliefs (or growth mindset) pertain to the assumption that a personal attribute is malleable, and that it can be changed and developed (Dweck 1986, 2006; Dweck et al. 1995).

It is possible for individuals to have entity beliefs on some attributes and incremental beliefs on others. These implicit beliefs provide a framework for one's perceptions, thoughts, feelings, and actions in a specific domain; thus, when studying implicit beliefs, it is important to consider the attribute or domain in question (Dweck et al. 1995). Much of the existing research on implicit beliefs have focused on students' implicit beliefs about intelligence and how they influence their learning goals, self-perceptions, and academic achievement (Ablard 2002; Ablard and Mills 1996; Blackwell et al. 2007). Studies on implicit theories of ability have involved mainly student samples, and there is a dearth of studies on how implicit theories of ability influence individuals in specific work contexts, such as the teaching profession. This study focuses on implicit beliefs about one's teaching ability. Fives and Buehl (2008) interviewed 110 pre-service teachers regarding their implicit beliefs about teaching ability and found that teachers believe that teaching ability is either: (1) innate or inborn talent; (2) partly innate or requires inborn talent that needs polishing; (3) innate for some but learned for others; (4) a calling or God-given gift; or (5) learned. In addition, teachers who believed that teaching ability is learned perceived classroom management and using effective pedagogical strategies as essential teaching knowledge compared to teachers who perceived teaching ability as an inborn talent (Fives and Buehl 2008). However, it remains a question on how these implicit beliefs on teaching ability are related teaching satisfaction, which is the focus of the present study. In this study, we are interested in pre-service teachers' implicit beliefs about teaching ability and how it is associated with teaching satisfaction through teacher emotions. Although the relationship between implicit beliefs about teaching ability and teaching satisfaction has not yet been directly investigated, findings of past studies on implicit beliefs have been fairly consistent in showing that incremental beliefs enhance well-being (e.g., Howell et al. 2016; Van Tongeren and Burnette 2018), while entity beliefs diminish well-being (e.g., De Castella et al. 2013; King 2017).

Teachers who hold incremental views about their ability tend to have higher self-efficacy (Leroy et al. 2007). Meanwhile, teachers with high self-efficacy, specifically with classroom management and in the use of instructional strategies, were found to exhibit greater satisfaction with their jobs (Klassen and Chiu 2010). Moreover, individuals with incremental views about intelligence are more likely to use mastery-oriented strategies and less likely to employ helpless strategies. The use of mastery-oriented strategies has been found to increase the likelihood of achieving one's goals and performing one's work more effectively and thus experiencing more satisfaction with one's work (Janssen and Van Yperen 2004). These findings suggest that implicit beliefs about teaching ability are associated with teaching satisfaction. Specifically, incremental beliefs predict higher teaching satisfaction, while entity beliefs predict lower teaching satisfaction.

Teacher Emotions and Teaching Satisfaction

Emotions pervade every aspect of the teaching and learning process (Pintrich et al. 1991). For instance, teachers' positive (e.g., enjoyment, happiness) and negative emotions (e.g., anger, anxiety) are associated with the following: teaching quality (Frenzel et al. 2015), ways of coping (Chang 2013), students' emotions (Becker et al. 2014), giving of grades (Brackett et al. 2013), and emotional bonding with students (Frenzel et al. 2009a, b; Hagenauer et al. 2015), with positive emotions predicting better outcomes. Likewise, it has been linked with student motivation (Frenzel et al. 2009a, b), self-concept (Lohbeck et al. 2018), teacher's experiences of change (Saunders 2013), teaching instructional behaviors (Becker et al. 2014), and professional identity (Lee et al. 2013).

Frenzel et al. (2016) identified three of the most pertinent discrete emotions to be considered in the context of teaching experiences. These are enjoyment, anger, and anxiety. These emotions were selected on the basis of their relevance and frequency. Enjoyment has been the most commonly reported positive emotion; anger has been the most commonly mentioned negative emotion; and anxiety has received considerable research interest in the teaching context. Moreover, these three emotions are clearly distinct from each other in terms of their componential definition, appraisal patterns, subjective phenomenology, and they can easily be understood even by laypersons.

Despite the progress in teacher emotions research, there are few studies that link teacher emotions with teachers' well-being (e.g., Brouwers and Tomic 2000; Frenzel et al. 2016; Taxer and Frenzel 2015), specifically teaching satisfaction. Nevertheless, the relationship between emotions and well-being has been well established in the wider context. For instance, emotions are viewed as an antecedent of well-being. Broaden-and-build theory (Fredrickson 1998, 2001; Fredrickson and Joiner 2002) posits that positive emotions broaden attention and build resources that enhance one's well-being, while negative emotions narrow attention and debilitate one's capacity to foster resources, which decreases one's well-being. Thus, we propose that positive teacher emotion of enjoyment would predict higher teaching satisfaction, while negative teacher emotions of anger and anxiety would predict lower teaching satisfaction.

Implicit Beliefs About Teaching Ability and Teacher Emotions

The relationship between implicit beliefs and emotions has been well supported in literature. Incremental theorists are more likely to experience positive emotions such as happiness and excitement, as they are less likely to be affected by failure and are more likely to recognize their progress toward their goals (Burnette et al. 2013; Carver 2004; Carver and Scheier 1990). On the other hand, learners who endorse entity theories are more prone to experience negative emotions such as anger, anxiety, shame, hopelessness, and boredom, as they tend to attribute their failure to personal incompetence (King 2017; King and Dela Rosa 2019; King et al. 2012). The lack of control that entity beliefs entail could be associated with the experience of negative affect (Ommundsen et al. 2005).

While the relationship of implicit beliefs and emotions in the teaching domain has not been explored yet, findings from studies in the domain general context point to the idea of positive relationships between incremental beliefs about teaching ability and positive teacher emotions of enjoyment; and entity beliefs about teaching ability and negative teacher emotions of anger and anxiety. Meanwhile, negative associations are expected between entity beliefs about teaching ability and positive teacher emotion of enjoyment; and incremental beliefs about teaching ability and negative teacher emotions of anger and anxiety.

The Current Study

The aim of this study was to examine the relationships among implicit beliefs about teaching ability, teacher emotions, and teaching satisfaction. This information could contribute to the extant literature on teaching satisfaction since studies that include cognitive and affective predictors of teaching satisfaction usually examine their roles separately. Theoretically, while it is proposed that teaching satisfaction is a composite of one's cognitions and emotions regarding the teaching experience (Ho and Au 2006), how teaching-related cognitive and affective components (particularly, implicit beliefs about teaching ability and teacher emotions) are related to each other and their specific roles in determining teaching satisfaction are still not yet clear. In order to have a better understanding of the relationships among implicit beliefs about teaching ability, teacher emotions, and teaching satisfaction, we draw on existing theories explaining how cognitions and emotions are associated with each other, and how they contribute to well-being. The following sections describe the proposed models of implicit beliefs about teaching ability and teacher emotions as predictors of teaching satisfaction based on the appraisal theories of emotion (Moors et al. 2013) and broaden-and-build theory of positive emotions (Fredrickson 1998, 2001; Fredrickson and Joiner 2002).

Model 1: Indirect Effect of Implicit Beliefs about Teaching Ability on Teaching Satisfaction through Teacher Emotions

Appraisal theories of emotion (see Moors et al. 2013) posit emotions as adaptive responses reflective of one's appraisal of experiences significant for one's well-being. It views emotions as response patterns that result from appraisal processes using information from events in a person's context, and one's concerns, history, and other sensitivities that lead to changes in various components, including cognitive, motivational, somatic, motor, and affective components, among others. Since implicit beliefs consist of core assumptions from which an individual views the world, defines reality, and assigns meaning to events (Dweck et al. 1995), it could play a significant role in the appraisal process. Indeed, implicit beliefs serve as a framework for one's perceptions, thoughts, feelings, and actions in a particular domain, which guides one's judgments and reactions (Dweck et al. 1995), and thus, could determine one's emotions toward that domain.

The emotions that result from an individual's appraisal, in turn, could influence one's well-being. Broaden-and-build theory of positive emotions (Fredrickson 1998, 2001; Fredrickson and Joiner 2002) posits that the form and function of positive and negative emotions that follow from one's assessment of personal meaning are distinct and complementary. While negative emotions narrow an individual's momentary thought-action repertoire, positive emotions broaden an individual's momentary though-action repertoire that can build an individual's enduring

personal resources. Moreover, positive emotions loosen the hold that negative emotions gain by undoing the narrowed psychological and physiological preparation for specific action. Indeed, positive emotions are associated with flourishing mental health (Fredrickson and Losada 2005) and well-being (Barrett-Cheetham et al. 2016).

In accordance with the contentions of the appraisal theories of emotion and broaden-and-build theory of positive emotions as well as findings in the literature, we propose a model of teaching satisfaction predicted by implicit beliefs about teaching ability through teacher emotions. Specifically, we hypothesize that incremental beliefs about teaching ability would be positively related to teaching satisfaction through increased positive teacher emotion of enjoyment, and decreased negative teacher emotions of anger and anxiety (model 1A). Moreover, we also postulate that entity beliefs about teaching ability would be negatively related to teaching satisfaction through decreased positive teacher emotion of enjoyment and increased negative teacher emotions of anger and anxiety (model 1B).

Model 2: Indirect Effect of Teacher Emotions on Teaching Satisfaction through Implicit Beliefs About Teaching Ability

Appraisal theories acknowledge that the emotion process is continuous and recursive, such that the emotions that result from the appraisal process could influence changes in emotion components (e.g., motivational, physiological), which then influence subsequent appraisals (Moors et al. 2013). Thus, emotions may also predict implicit beliefs. This is also consistent with the broaden-and-build theory of positive emotions (Fredrickson 1998, 2001; Fredrickson and Joiner 2002), since incremental beliefs which focus on malleability of human attributes, could be a result of a widened thought-action repertoire due to positive emotions; and entity beliefs which focus on fixedness, could be a consequence of a narrowed thought-action repertoire due to negative emotions.

Thus, we also present a model of teaching satisfaction predicted by teacher emotions through implicit beliefs about teaching ability. In line with the previously discussed theories and literature, in this model we hypothesized higher levels of positive teacher emotion of enjoyment, and lower levels of negative teacher emotions of anger and anxiety would be associated with higher levels teaching satisfaction through incremental beliefs about teaching ability (model 2A); and lower levels of positive teacher emotion of enjoyment, and higher levels of negative teacher emotions of anger and anxiety would be associated with lower levels teaching satisfaction through entity beliefs about teaching ability (model 2B).

In summary, the four proposed models represent the contentions of the appraisal theories of emotions and broaden-and-build theory of positive emotions applied in the context of teaching: that incremental beliefs predict higher teacher satisfaction through increased positive emotions and decreased negative emotions; that entity beliefs predict lower teaching satisfaction through increased negative emotions and decreased positive emotions; and that the relationships between implicit beliefs about teaching ability and teacher emotions are reciprocal. By testing these four models, we intend to provide clarity on which contentions of these theories apply in specific cognitions (i.e., implicit beliefs about teaching ability) and emotions (i.e., teacher emotions) in the teaching context.

Method

Participants and Procedures

The sample was composed of 413 pre-service teachers; 16.46% (n = 68) were males and 83.29% (n = 344) were females, with a mean age of 22 (SD = 4.62) years old. The pre-service teachers came from four tertiary schools in a sub-urban city in the Philippines. They were in the final year of teacher education program and were about to take the licensure examination for teachers. Pre-service teachers are education students who are immersed in the real world of teaching before graduating in order to gain an understanding of what it takes to be an educator.

Letters inviting pre-service teachers to participate in the study were sent to different colleges and universities that offer teacher education programs. Upon approval of the respective school authorities, test administration schedules were coordinated. Prior to test administration, informed consent was sought from all the participants. The rights of the participants and the instructions of the tests were explained, and the participants were encouraged to ask questions in order to ensure the validity of their responses. The study has been approved by an institutional ethics review committee, and all applicable ethical standards have been followed during the course of the study.

Measures

Implicit beliefs about teaching ability were measured using a 12-item modified scale adapted from the Revised Conception of Natural Athletic Ability Questionnaire (CNAAQ-2; Biddle et al. 2003). Since the instrument was originally intended to measure beliefs about sports ability (Biddle et al. 2003), its items were modified in order to capture the implicit beliefs about teaching ability and some

Table 1 Reliability, means, standard deviations, and correlations

	α	Mean	*SD*	1	2	3	4	5	6	7
1. Entity-stable	0.69	9.54	2.23							
2. Entity-gift	0.69	9.77	2.42	0.60**						
3. Incremental-improvement	0.78	12.19	2.08	0.06	0.18**					
4. Incremental-learning	0.80	12.24	2.17	0.07	0.23**	0.82**				
5. Enjoyment	0.88	30.10	4.27	0.07	0.15**	0.28**	0.29**			
6. Anxiety	0.89	23.83	5.84	0.36**	0.25**	− 0.14**	− 0.09	0.01		
7. Anger	0.92	19.08	6.98	0.32**	0.18**	− 0.27**	− 0.23**	− 0.10*	0.70**	
8. Teaching satisfaction	0.85	18.23	3.76	− 0.01	0.08	0.10*	0.12*	0.51**	− 0.11*	− 0.10*

α Cronbach's alpha; *$p < 0.05$; **$p < 0.01$; $N = 413$

words were changed to fit the context of teaching. For example, "You have a certain level of ability in *sport* and you cannot really do much to change that level" was changed to "You have a certain level of ability in *teaching* and you cannot really do much to change that level." This scale has two higher-order factors: *entity beliefs*, wherein teaching ability is viewed as stable (e.g., "It is difficult to change how good I am at teaching.") and as a gift (e.g., "To be good at teaching, I need to be born with the basic qualities which allow me success."); and *incremental beliefs*, wherein it is believed that teaching ability can be developed through learning (e.g., "I need to learn and to work hard to be good at teaching.") and that it is open to improvement (e.g., "In teaching, if I work hard at it, I will always get better."). The items are rated on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). In this study, this scale has a Cronbach's alpha of 0.81 and reliability rho coefficient of 0.86.

Teacher emotions were assessed using the Emotions Questionnaire for Teachers (Frenzel et al. 2016). It has 12 items measuring emotions most salient among teachers, including enjoyment (e.g., "I enjoy teaching these students."); anger (e.g., "I often feel annoyed while teaching these students."); and anxiety (e.g., "I feel tense and nervous while teaching these students."). The items are rated on a 4-point Likert scale (1 = *strongly disagree* to 4 = *strongly agree*). In this study, this scale has a Cronbach's alpha of 0.84 and reliability rho coefficient of 0.91.

Teaching satisfaction was measured using the Teaching Satisfaction Scale (Ho and Au 2006). It has five items measuring job satisfaction among teachers (e.g., "In most ways, being a teacher is close to my ideal."). The items are rated on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). In this study, this scale has a Cronbach's alpha of 0.85.

All measures were administered in English. The participants were Filipino-English bilinguals, and with their level of education, they were expected to have sufficient English language competency in order to understand and answer the items in the questionnaires. The items in the scales are general enough that they can be meaningfully answered by teachers and that they reflect the teachers' own implicit beliefs about teaching ability, teacher emotions, and teaching satisfaction, regardless of the subjects they are teaching. All the scales have adequate internal consistency based on the data from the current sample (see Table 1).

Data Analysis

Confirmatory factor analyses (CFA) were conducted in order to ensure the validity of the measures prior to testing the structural models. In order to test the goodness of fit of the models, the data were analyzed using structural equation modeling (SEM) with test of indirect effects and using robust maximum likelihood estimator. Bootstrap was performed to 5000 resamples. The following conventional fit indices were used in evaluating goodness of fit: Satorra-Bentler chi-square ($S\text{-}B\chi^2$); comparative fit index (CFI) and Tucker–Lewis index (TLI) (values above 0.90 were interpreted as adequate fit and values above 0.95 were regarded as good fit); and root mean square error of approximation (RMSEA) (values lower than 0.08 were interpreted as adequate fit and values lower than 0.06 were regarded as good fit) (Beauducel and Wittmann 2005). The data were analyzed using Mplus 7.11 (Muthén and Muthén 2013). Moreover, in evaluating the scale's internal consistency, we computed for the Cronbach's alpha and reliability Rho coefficient. Rho coefficient provides a good estimate of composite reliability in SEM with multiple factors (Byrne 2010).

The following models predicting teaching satisfaction as dependent variable were tested: model 1A has incremental beliefs about teaching ability (indicators: improvement and learning) as independent variable and teacher emotions (enjoyment, anxiety, and anger) as mediators; in model 1B, the independent variable is entity beliefs about teaching ability (indicators: stable and gift) and mediators are

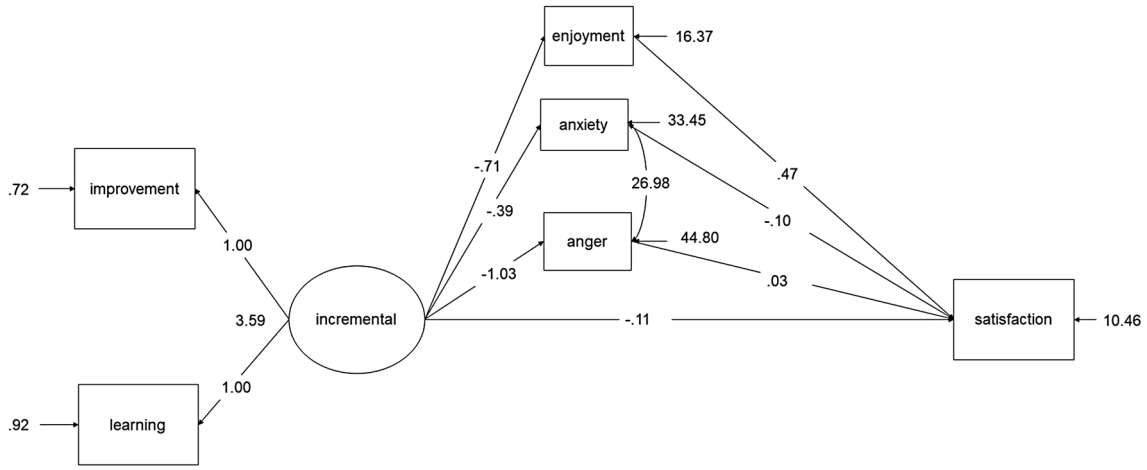

Fig. 1 Indirect effect of incremental beliefs about teaching ability on teaching satisfaction through teacher emotions (model 1A). Note: all coefficients are unstandardized

teacher emotions (enjoyment, anxiety, and anger). For model 2A, the independent variables are teacher emotions (enjoyment, anxiety, and anger), while the mediator is incremental beliefs about teaching ability (indicators: improvement and learning); and in model 2B, the independent variables are teacher emotions (enjoyment, anxiety, and anger); and the mediator is entity beliefs about teaching ability (indicators: stable and gift). Negative teacher emotions of anxiety and anger were correlated, and there are no correlated errors in all models.

Results

Results of Descriptive Statistics

The means, standard deviations, and correlations of the study variables can be found in Table 1. Both entity beliefs about teaching ability (stable and gift) correlated positively with negative teacher emotions of anxiety and anger, while entity-gift beliefs correlated positively with enjoyment. None of the entity beliefs were related to teaching satisfaction. In terms of incremental beliefs about teaching ability (improvement and learning), incremental-improvement beliefs correlated positively with enjoyment, and negatively with anxiety and anger. Incremental-learning beliefs correlated positively with enjoyment, and negatively with anger. Both incremental beliefs were positively associated with teaching satisfaction.

Results of CFA

The following are the fit indices for the measure of the two-factor implicit beliefs about teaching ability: $S\text{-}B\chi^2$ (53, $N = 413$) = 128.51, $p < 0.001$, CFI = 0.95, TLI = 0.93, RMSEA = 0.06, 90% CI [0.05, 0.07]. For the three-factor teacher emotions, the fit indices are: $S\text{-}B\chi^2$ (51, $N = 413$) = 138.88, $p < 0.001$, CFI = 0.96, TLI = 0.95, RMSEA = 0.07, 90% CI [0.05, 0.08]; while for the one-factor teaching satisfaction: $S\text{-}B\chi^2$ (5, $N = 413$) = 13.91, $p = 0.016$, CFI = 0.99, TLI = 0.97, RMSEA = 0.07, 90% CI [0.03, 0.10]. The results indicate that all measures have adequate fit to the data.

Results of SEM and Test of Indirect Effect

Results of SEM showed that model 1A, in which incremental beliefs about teaching ability predict teaching satisfaction through teacher emotions, has good fit to the data with $S\text{-}B\chi^2$ (5, $N = 413$) = 6.11, $p = 0.295$, CFI = 0.99, TLI = 0.99, RMSEA = 0.02, 90% CI [0.01, 0.08] (see Fig. 1). Significant indirect effect of incremental beliefs about teaching ability through enjoyment was also found (see Table 2). Model 1B, in which entity beliefs about teaching ability predict teaching satisfaction through teacher emotions, has good fit based on CFI and adequate fit based on TLI; however, the cut-off value for model fit based on RMSEA was not met, $S\text{-}B\chi^2$ (5, $N = 413$) = 17.55, $p = 0.004$, CFI = 0.98, TLI = 0.94, RMSEA = 0.08, 90% CI [0.04, 0.12] (see Fig. 2). Table 3 shows the result of test of indirect effect for model 1B.

Model 2A, wherein teacher emotions predict teaching satisfaction through incremental beliefs about teaching, has good fit based on CFI and TLI, and adequate fit based on RMSEA, $S\text{-}B\chi^2$ (5, $N = 413$) = 12.06, $p = 0.034$, CFI = 0.99, TLI = 0.97, RMSEA = 0.06, 90% CI [0.02, 0.10] (see Fig. 3). No indirect effect of teacher emotions on teaching satisfaction through incremental beliefs about

Table 2 Indirect effect of incremental beliefs about teaching ability on teaching satisfaction through teacher emotions (model 1A)

IV	MV	DV	Effect of IV on M	Effect of M on DV	Direct effect	Total indirect effect	Total effect	Indirect effect	SE	95% CI	
										LL	UL
Incremental	Enjoyment	TS	0.71**	0.47**	− 0.11	0.34**	0.24*	**0.33**	0.07	0.22	0.44
	Anxiety		− 0.39*	− 0.10*				0.04	0.02	0.00	0.07
	Anger		− 1.03**	0.03				− 0.03	0.04	− 0.08	0.03

All coefficients are unstandardized; $^{**}p < 0.01$, $^{*}p < 0.05$; boldface indicates significant indirect effect

IV independent variable, *MV* mediating variable, *DV* dependent variable, *SE* standard error, *LL* lower limit, *UL* upper limit, *CI* confidence interval, *TS* teaching satisfaction. $N = 413$

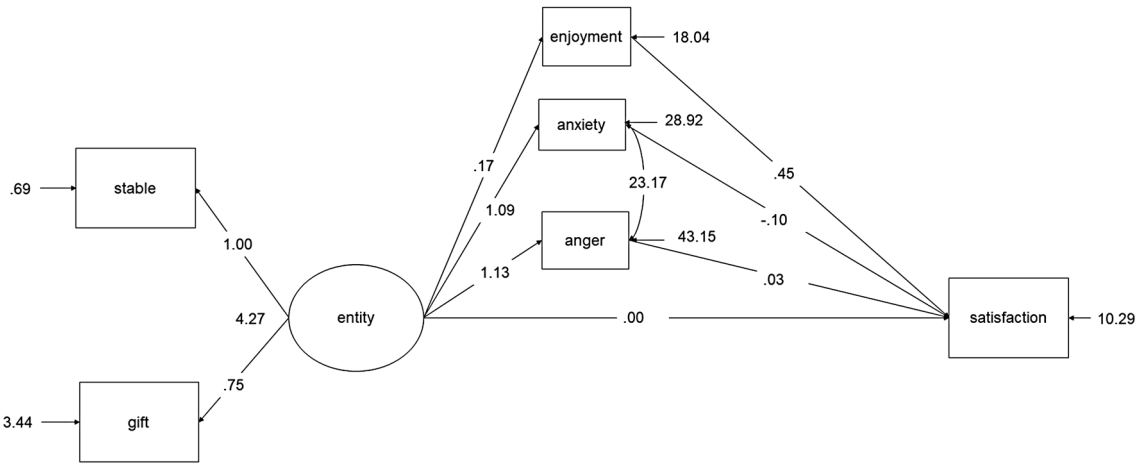

Fig. 2 Indirect effect of entity beliefs about teaching ability on teaching satisfaction through teacher emotions (model 1B). Note: all coefficients are unstandardized

Table 3 Indirect effect of entity beliefs about teaching ability on teaching satisfaction through teacher emotions (model 1B)

IV	MV	DV	Effect of IV on M	Effect of M on DV	Direct effect	Total indirect effect	Total effect	Indirect effect	SE	95% CI	
										LL	UL
Entity	Enjoyment	TS	0.17	0.45**	0.00	0.01	0.01	0.08	0.05	0.00	0.16
	Anxiety		1.09**	− 0.10*				− **0.11**	0.05	− 0.19	− 0.03
	Anger		1.13**	0.03				0.04	0.04	− 0.02	0.10

IV independent variable, *MV* mediating variable, *DV* dependent variable, *SE* standard error, *LL* lower limit, *UL* upper limit, *CI* confidence interval, *TS* teaching satisfaction. $N = 413$

All coefficients are unstandardized; $^{**}p < 0.01$, $^{*}p < 0.05$; boldface indicates significant indirect effect

teaching ability was found (see Table 4). Model 2B, wherein teacher emotions predict teaching satisfaction through entity beliefs about teaching ability, has good fit based on CFI, and adequate fit based on TLI and RMSEA, $S\text{-}B\chi^2$ (5, $N = 413$) = 16.19, $p = 0.006$, CFI = 0.97, TLI = 0.92, RMSEA = 0.07, 90% CI [0.04, 0.12] (see Fig. 4). Likewise, no indirect effect of teacher emotions on teaching satisfaction through entity beliefs about teaching ability was found (see Table 5).

To summarize the results of SEM and tests of indirect effects, the model in which incremental beliefs about teaching ability predict teaching satisfaction through teacher emotions (model 1A) was partially supported as it had good fit to the data and significant indirect effect through positive teacher emotion of enjoyment, but not negative emotions of anger and anxiety, was found. However, the findings failed to provide support to the other models. The indirect effect of entity beliefs on teaching satisfaction through teacher emotions (model 1B) failed to meet

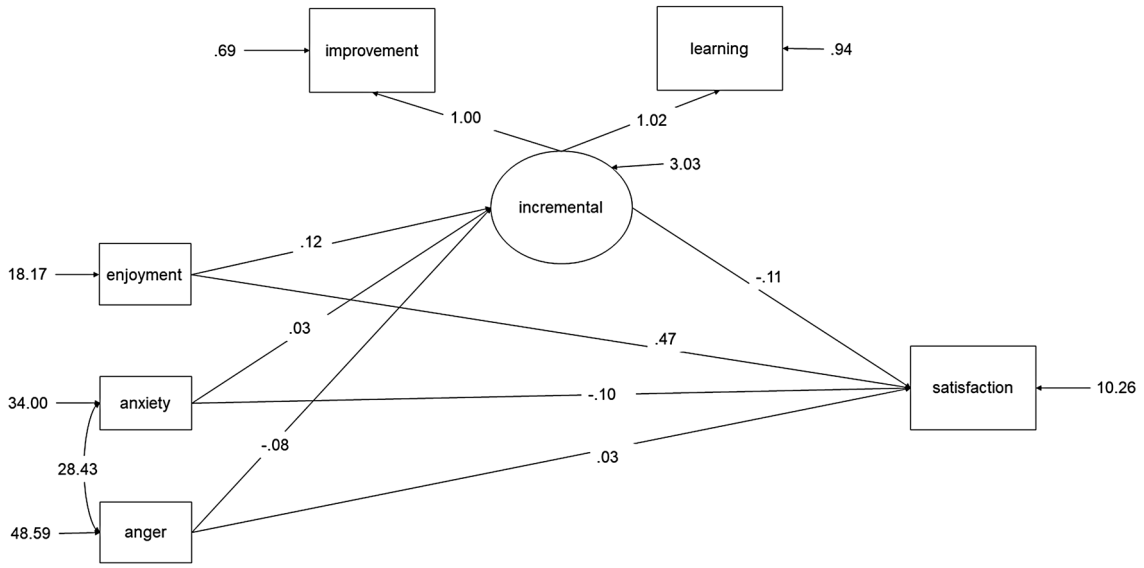

Fig. 3 Indirect effect of teacher emotions on teaching satisfaction through incremental beliefs about teaching ability (model 2A). Note: all coefficients are unstandardized

Table 4 Indirect effect of teacher emotions on teaching satisfaction through incremental beliefs about teaching ability (model 2A)

IV	MV	DV	Effect of IV on M	Effect of M on DV	Direct Effect	Total Indirect effect	Total effect	Indirect effect	SE	95% CI	
										LL	UL
Enjoyment	Incremental	TS	0.12**	− 0.11	0.47**	− 0.01	0.45**	− 0.01	0.01	− 0.03	0.01
Anxiety			0.03		− 0.10*	0.00	− 0.10*	0.00	0.00	− 0.01	0.00
Anger			− 0.08**		0.03	0.01	0.03	0.01	0.01	− 0.01	0.02

All coefficients are unstandardized; $^{**}p < 0.01$, $^{*}p < 0.05$

IV independent variable, *MV* mediating variable, *DV* dependent variable, *SE* standard error, *LL* lower limit, *UL* upper limit, *CI* confidence interval, *TS* teaching satisfaction. $N = 413$

adequate fit on some criteria; and the no significant indirect effects of teacher emotions on teaching satisfaction through implicit beliefs about teaching ability (models 2A and 2B) were found despite having good fit, indicating that reciprocal relationships between implicit beliefs about teaching ability and teacher emotions were not supported.

Discussion

The study examined the relationship of implicit beliefs about teaching ability (i.e., incremental and entity beliefs) and teacher emotions (i.e., enjoyment, anger, and anxiety) as predictors of teaching satisfaction in a sample of preservice teachers. Four models which pertain to the contentions of the appraisal theories of emotions and broaden-and-build theory of positive emotions were tested: incremental beliefs about teaching ability predicting teaching satisfaction through teacher emotions (model 1A); entity beliefs about teaching ability predicting teaching satisfaction through teacher emotions (model 1B); teacher emotions predicting teaching satisfaction through incremental beliefs about teaching ability (model 2A); and teacher emotions predicting teaching satisfaction through entity beliefs about teaching ability (model 2B).

Results of SEM showed that model 1A was partially supported as it had good fit to the data and indirect effect of incremental beliefs about teaching ability on teaching satisfaction through positive emotion of enjoyment, but not negative emotions of anger and anxiety, was found. The other models, however, were not supported as model 1B did not meet some of the goodness-of-fit criteria, and the proposed indirect effects of teacher emotions on teaching satisfaction through implicit beliefs were not significant in models 2A and 2B even though it had good fit, which means that the relationships between implicit beliefs about teaching ability and teacher emotions were not reciprocal.

The finding that incremental beliefs about teaching ability are associated with teaching satisfaction through positive teacher emotion of enjoyment indicates that pre-

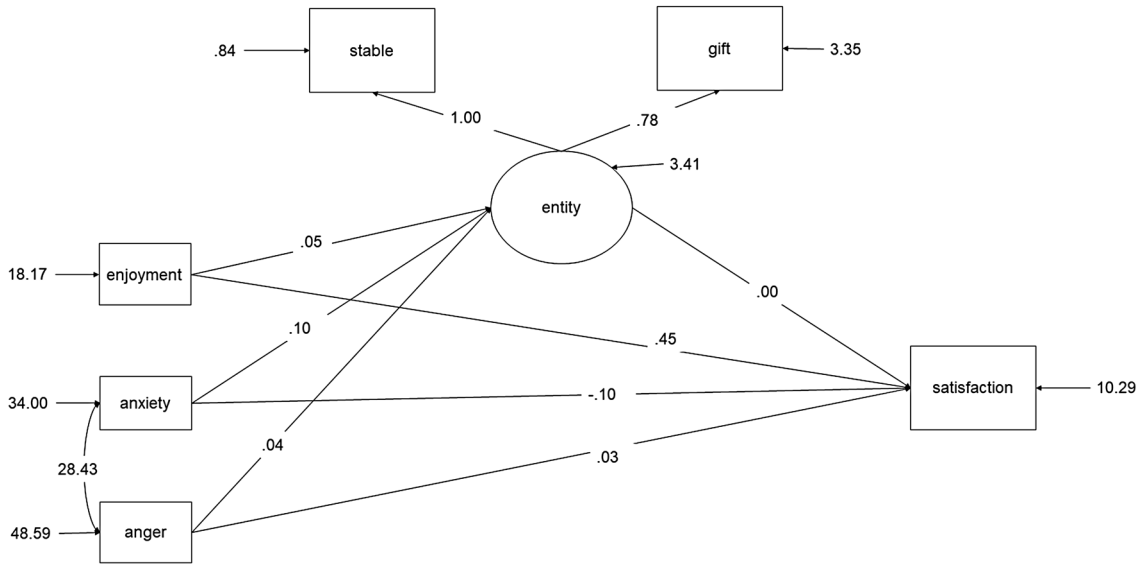

Fig. 4 Indirect effect of teacher emotions on teaching satisfaction through entity beliefs about teaching ability (model 2B). Note: all coefficients are unstandardized

Table 5 Indirect effect of teacher emotions on teaching satisfaction through entity beliefs about teaching ability (model 2B)

IV	MV	DV	Effect of IV on M	Effect of M on DV	Direct effect	Total indirect effect	Total effect	Indirect effect	SE	95% CI	
										LL	UL
Enjoyment	Entity	TS	0.05*	0.00	0.45**	0.00	0.45**	0.00	0.01	− 0.01	0.01
Anxiety			0.10**		− 0.10*	0.00	− 0.10*	0.00	0.01	− 0.02	0.02
Anger			0.04*		0.03	0.00	0.03	0.00	0.01	− 0.01	0.01

All coefficients are unstandardized; $^{**}p < 0.01$, $^{*}p < 0.05$

IV independent variable, *MV* mediating variable, *DV* dependent variable, *SE* standard error, *LL* lower limit, *UL* upper limit, *CI* confidence interval, *TS* teaching satisfaction. $N = 413$

service teachers who believe that they can develop and improve their teaching ability are more likely to enjoy their teaching experience, which in turn, contributes to their well-being in the context of teaching. This finding is consistent with results from previous studies in which individuals who hold incremental beliefs about certain attributes are more likely to experience positive emotions (Burnette et al. 2013; Carver 2004; Carver and Scheier 1990) and that positive emotions are associated with teachers' well-being (Brouwers and Tomic 2000; Frenzel et al. 2016; Taxer and Frenzel 2015).

This result could be understood in light of the appraisal theories of emotion (Moors et al. 2013) and broaden-and-build theory of positive emotions (Fredrickson 1998, 2001; Fredrickson and Joiner 2002). Pre-service teachers with incremental beliefs about their teaching ability have a core assumption that teaching ability can be developed through learning and that it is open for improvement (Dweck 1986, 2006; Dweck et al. 1995). These assumptions could lead them to interpret and provide meaning to their teaching experiences in such ways that lead to positive emotions. For example, having incremental beliefs about teaching ability could make it less likely to interpret a bad teaching performance as a failure since it can be improved and developed through learning. On the other hand, a good teaching performance could be interpreted as a progress toward goal achievement, which could give rise to positive emotions (Burnette et al. 2013; Carver 2004; Carver and Scheier 1990). The positive emotions that result from the appraisal of the teaching experience guided by incremental beliefs about teaching ability could facilitate pre-service teachers in acquiring more resources that could enhance their well-being in the teaching context. Among the resources related to positive emotions that could increase teaching satisfaction are better quality of teaching (Frenzel et al. 2015), more positive relationships with students (Frenzel et al. 2009a, b; Hagenauer et al. 2015), more positive self-concept (Lohbeck et al. 2018), and professional identity (Lee et al. 2013).

Consistent with the broaden-and-build theory of positive emotions, the indirect effect of implicit beliefs about teaching ability, specifically incremental beliefs, on teaching satisfaction through teacher emotion of enjoyment but not anger and anxiety could be indicative of the predominant and unique role of positive emotions in promoting well-being that cannot be attained merely through decreased negative emotions (Fredrickson 2004). However, the findings only partially provided support for the appraisal theory of emotions and broaden-and-build theory of positive emotions as both theories suggested the reciprocal relationships between cognitions and emotions (Fredrickson 1998, 2001; Fredrickson and Joiner 2002; Moors et al. 2013) yet the models in which teacher emotions predict teaching satisfaction through implicit beliefs about teaching ability (models 2A and 2B) were not supported. It is possible that models of well-being in the teaching context predicted by emotions through cognitions involve different specific emotions and cognitions or mechanisms.

The situational orientation theory could also help in further understanding the findings. This theory posits that motivational dispositions play a role in behaviors in certain learning contexts (Lehtinen et al. 1995). Individuals with task-oriented motivational disposition view tasks as achievable, which lead to more exploration and deeper thinking, and feedback is regarded as opportunities to refine existing strategies to accomplish the task at hand. On the other hand, individuals with ego-defensive motivational disposition do not see themselves as capable of accomplishing the task at all, and their poor self-efficacy hinder them from focusing on their work, and feedback leads to self-blaming (Lehtinen et al. 1995). Hence, teachers who have task-oriented disposition toward teaching may also have incremental beliefs about teaching ability, which may contribute to their positive teaching emotions like enjoyment, and in turn, in their teaching satisfaction, whereas teachers with ego-defensive disposition may have a more fixed mindset about their teaching ability and may experience more anxiety, helplessness, and other negative emotions that are non-contributory to their teaching satisfaction.

The findings of the study have theoretical and practical implications. Theoretically, it provided partial support to the applicability of appraisal theories of emotion and broaden-and-build theory of positive emotions in the context of teaching. The findings that incremental beliefs about teaching ability (but not entity beliefs) are associated with teaching satisfaction through positive teacher emotion of enjoyment (but not negative teacher emotions of anger and anxiety) suggest that having core assumptions that predisposes one to view teaching ability as an attribute that can be learned and improved could increase positive emotions that enhance well-being in the teaching context. Moreover, it also demonstrated that an increase in positive emotions, and not merely a decrease in negative ones, could facilitate teaching satisfaction, underscoring the assertion of broaden-and-build theory on the importance and uniqueness of positive emotions.

In terms of practice, the findings of the study could inform the design of interventions that could enhance the well-being of pre-service teachers. Teaching satisfaction has been found to be an important factor affecting pre-service teachers' decision to enter and remain in the teaching profession (Hong 2012; Horvath et al. 2018; Ingersoll 2001). Since cognitions and emotions are relatively more malleable than other factors affecting teaching satisfaction (e.g., demographic factors or institutional policies), an understanding of the role of implicit beliefs about teaching ability and teacher emotions could contribute to the development of cost-effective and practical interventions for pre-service teachers. Findings suggest that focusing on increasing the positive teacher emotions rather than merely decreasing the negative ones could enhance pre-service teachers' teaching satisfaction. This could be done through promoting incremental beliefs about teaching ability that predispose them to appraise their teaching experiences in ways that could increase their positive emotions. Cognitive reappraisal techniques have been found to be associated with higher life satisfaction and positive emotions in daily life (Haga et al. 2009; John and Gross 2004). Indeed, the supervision of pre-service teachers should not only aim to develop their teaching skills but their emotion regulation as well.

We acknowledge that the study as some limitations. First, the participants of the study are pre-service teachers, who are technically still students, having their first experience of immersion in the actual teaching profession. Thus, its findings might not necessarily apply to in-service teachers and teachers who have been in the profession for quite some time. However, despite the differences in the experiences and responses between pre-service and in-service teachers, the findings of the study could still somehow provide a picture of the possible relationships of the variables among in-service teachers. Second, the use of self-report makes the participants' responses prone to certain biases inherent to this method (e.g., social desirability). Lastly, the study employed a cross-sectional design, which makes it difficult to infer causal or temporal relations among the variables. It is suggested that future studies consider other methods such as experimental or longitudinal designs in order to confirm and add more evidence to the findings of the current study. Nonetheless, the findings of the study provided information that could aid in understanding how cognitive (i.e., implicit beliefs about teaching ability) and emotional (i.e., teacher emotions)

factors contribute to well-being (i.e., teaching satisfaction) of pre-service teachers.

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