Decision-Making in Teaching Processes and the Role of Mood: A Study with Preservice Teachers in Germany

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The internship that preservice teachers complete early in the course of their studies paves the way for their transition from the role of student to that of teacher. It gives them a first opportunity to apply theoretical knowledge and develop practical skills, especially to improve their decision-making competences in the three-part process of teaching: planning a lesson, teaching it, and reflecting on the teaching performance (PTR). The present study addresses two research questions. First, to what extent do preservice teachers perceive themselves to be more competent in PTR after their initial teaching internship? Second, to what extent does the individual mood correlate with any reported improvement? 592 preservice teachers participated in the study. Using latent change score modelling, we found learning gains in all three dimensions of PTR. In addition, the results show that negative mood predicts processes of planning and reflecting following the internship, but has no effect on the actual teaching of the lesson.

Keywords: initial teacher education, internship, decision making, mood, PTR.

Introduction

When preservice teachers complete their first internship, they are provided with numerous opportunities to apply theoretical knowledge and develop practical teaching skills (Kreis & Staub, 2013; Westerman, 1991;

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Yinger, 1980) in a processual manner and in a real classroom setting. This first contact with professional practice is decisive in whether they will continue with their studies and become teachers.

The first-time teaching in the internship is a sensitive situation that can be a successful or a difficult experience. Some preservice teachers may succeed in applying theoretical knowledge, in making effective lesson planning decisions, and in responding and adapting to students' needs, class characteristics, and contextual factors—all without losing sight of their instructional goals. These experiences may result in a positive affect and they feel active, enthusiastic and proud. Others may not be capable of making crucial planning decisions ahead of time and may end up diverging significantly from their lesson plan. Faced with the constant risk of failure and high pressure to act, they may struggle to meet the various demands facing them (e.g., achieving learning goals, meeting deadlines, and dealing with heterogeneous student populations). They perceive their first teaching experiences as complicated and stressful and end up feeling upset, distressed or ashamed. It can be assumed that affective components have a decisive effect on early teaching experiences and individual learning gains in areas such as planning, teaching, and reflecting on one's own lessons (Lloyd, 2019).

A previous empirical study addressed the question of the extent to which emotionally stressful factors (e.g., the assessment of a wrong decision in the teaching process or negative mood) influence the perception of one's own teaching competences (Kumschick et al., 2020). It was shown that a higher negative mood is related to significantly lower teaching competences among preservice teachers. However, it should be noted that teaching competences and mood were only measured once (after the first internship), which limits the study's explanatory power. Additionally, only negative mood was investigated. The aim of the present study is to address these limitations. Thus, we report results from a longitudinal study (comprising a pre-post test) which examined the influence of negative and positive mood on teaching competences with a focus on the subjective perspective of preservice teachers.

Decision-Making in the Context of Teaching

For more than 40 years, researchers have suggested that decision-making plays a vital role in the context of teaching (Bishop, 1976; Bolster, 1983; Lloyd, 2019; Yinger, 1980). Teaching is a highly complex activity involving a decision process that begins as teachers *plan* and *reflect* their lessons and continues during the communicative phase in their *moment-to-moment interactions* with students (Bishop, 1976). Bolster (1983) states that skills in decision-making improve as teachers acquire experience. He emphasizes that teaching practice is more important than knowledge of educational theory. Furthermore, Lloyd (2019) argues that affective factors during real-world decision-making of novice teachers have a decisive influence on teaching quality and it is imperative to research them. He states that decision-making is a process of reasoning, during which teachers have to make use of their pedagogical knowledge while taking into account the students' abilities and motivation. This process is also affected by institutional pressures and practical teaching context factors (i.e., available time and resources) combined with a personal, affective influence (e.g., stress levels and

confidence) (Lloyd, 2019). This builds on Yinger's (1980) research who conceptualized planning, teaching, and reflecting (PTR) as a three-part process which is driven by specific decisions. Yinger (1980) distinguishes between different functions that the various phases of the decision-making process serve. Whereas decisions in the planning and reflecting phases are made in the absence of immediate pressure to act (and with adequate time to consider different options), decisions in the classroom setting during the teaching phase are made under both time pressure and pressure to act. The three phases of PTR are described in detail below.

Lesson *planning* is a conscious and actively controlled mental process in which the teacher considers key aspects of lesson content. The lesson is structured by developing images, statements, questions and tasks and the corresponding teaching materials are produced (Mccutcheon & Milner, 2002; Morine-Dershimer, 1979). Planning lessons means deciding ahead of time what learning goals should be met and making decisions with regard to realizing an interesting start of a lesson. It also means making decisions about adequate time-slots for the different activities during the lesson. Thus, teachers need to break down lessons into appropriate and feasible segments and set these within a temporal framework, making sure that they design a coordinated, well-sequenced series of lesson activities where new content builds on prior knowledge in a step-by-step process. After this phase is completed, the decisions are put to the practical test in the classroom context (Yinger, 1980).

Teaching a lesson is a much more complex process than lesson planning and requires high cognitive flexibility and the capacity to adapt lesson plans to the situation at hand. According to Yinger (1980), this means examining decisions while under pressure to act, evaluating them in a context-specific manner, and potentially changing course in favor of a different decision. Leinhardt and Greeno (1986) refer to this process as "the making of rapid on-line decisions" (p. 75). This means that even if teachers implement a lesson plan, in the classroom they always have some freedom of choice and autonomy of decision.

Reflecting on teaching performance is the evaluation of the lesson as taught in the classroom. In this phase of "reflection-after-events" (Boud, 2001), the lesson plan serves as a blueprint and point of comparison for the lesson as it was taught under real-world conditions. The aim is to identify deviations from the plan and to classify decisions made in the classroom setting as either effective or ineffective. *Reflecting* can either be output-oriented, with a focus on evaluating whether the initial instructional goals were achieved, or process-oriented (Kiper, 2012), addressing mainly procedural aspects for which one examines and "evaluates the efficacy of a solution" (Ophardt & Thiel, 2013). Based on this evaluation, teachers make further decisions for future lessons. Yet, there is a fundamental problem of uncertainty regarding evaluations and interpretations (Iwers-Stelljes & Luca, 2008) that is endemic to the teaching profession and that is much more pronounced in beginning teachers.

As described above, the PTR competences are essentially characterized by decisions and evaluative judgments. Moreover, it is highly plausible that complex sequences of decisions pose a major challenge for novices due to their lack of experience (Funke & Holt, 2006). This challenge becomes even more demanding

when one considers that these decisions determine the experience of success or failure and are thus accompanied by affective variables, such as positive and negative mood.

Moods and Decisions

There is relative consensus in the literature that *mood* differs in three respects from *emotion*: arousal, duration, and cause (Schmidt-Atzert, 1996). Emotions are stimulus-triggered by a situation (cause), they are marked by strong arousal, and tend to be relatively short-lived. Moods, in contrast, are longer-term background signals with less intense arousal and they are less specific and lacking in stimulus or causal reference. *Mood* is a dichotomous construct, typically described as being of either positive or negative valence.

A number of studies have shown that decisions and the respective cognitive processes—regulation and attention, information recall, and the processing, evaluation, and interpretation of situations—are influenced by *mood* (Parkinson et al., 1996; Wyer Jr. et al., 1999). In the context of teaching, the demands put on PTR are quite complex. Rather than making decisions in isolation, teachers have to connect mutually interdependent decisions to form a coherent strategy in order to learn and constantly improve their professional teaching practice. Funke and Holt (2006) not only show that mood can have a decisive influence on these complex sequences of evaluations and decisions—particularly in the case of novices, who have less experience-based knowledge to draw on—but also note the lack of studies addressing the interaction between affect and cognition in the context of these processes. The present study takes an affect-as-information approach in studying mood, positing that a person's mood affects their ability to make judgments and decisions (Schwarz & Clore, 1983).

Positive and negative affects impact decisions and performance in different ways. According to the broaden-and-build theory, positive emotions lead to a wider scope of attention, thus increasing the range of the current action and thought repertoire; negative emotions, on the other hand, narrow the scope of attention and foster rather local or detailed processing (Fredrickson, 1998, 2001). Compared to individuals in a negative mood, those in a positive mood are said to be more creative, more flexible in their choices and more easily show exploratory behaviour by not consequently following rule-based logic (De Vries et al., 2012). Decisions are made faster, are driven by heuristics, yet information processing tends to be less precise and there is a tendency to avoid risks (Blanchette & Richards, 2010; De Vries et al., 2012). In line with these findings, people in a negative mood make more careful decisions and increase analytical processing compared to those in a good mood (Au et al., 2003). However, negative mood has also been found to foster less advantageous decisions in an IOWA gambling task—a task that assesses realistic decision-making behaviour under high-uncertainty conditions (Wemm & Wulfert, 2017).

To what extent these findings apply to the three-part decision-making process of professional teaching remains unclear. Our rationale is that positive mood widens the thought-action repertoire and thus boosts cognitive flexibility, which is needed for successful *teaching*. *Planning* and *reflection*, on the other hand, seem to profit more from a negative than from a positive mood, considering the beneficial effects it has on analytical

thinking. However, given the complexity of these decision-making processes and the ensuing need to integrate single steps of analytical planning and evaluation into creative, global processing strategies, *planning* and *reflection* should likewise show a positive relationship with positive mood. Although teaching competences are based on decisions, to our knowledge, no other studies have addressed the issue of mood and decision-making within the teaching profession. Therefore, the aim of the present study is to address this research gap.

The Current Study

The current study had two main objectives. First, to investigate the effects of the initial teaching internship on PTR and second, to investigate the relationship between mood and preservice teachers' self-reported increase in PTR. For this purpose, we used a sample of preservice teachers at a secondary school level studying at the Freie Universität Berlin. They were asked to assess their PTR competences before (Time 1) and after (Time 2) the internship phase and to rate their mood (Time 2) using the Positive and Negative Affective Schedule (Krohne et al., 1996; Watson et al., 1988).

All participants were enrolled in a three-year bachelor's degree program, which is typically followed by a two-year master's program. The coursework was organized into modules covering two academic subjects as well as general and subject-specific pedagogy (Pfitzner-Eden, 2016). An important part of the first academic year is the teaching internship. During that phase, preservice teachers have the chance to observe and reflect on instructional practices in the classroom. The main purpose of this internship is to give preservice teachers a realistic impression of the demands of their profession and allow them to critically reflect on these demands and to adjust. The internship lasts an average of six weeks and covers 90 hours of teaching in secondary and middle school classrooms. Preservice teachers apply to a school of their choice and are mentored by an experienced teacher. After the internship phase, they write a mandatory report on their practical experiences and continue their bachelor's degree coursework at the university.

The present study was conducted at the Freie Universität Berlin within the research project *Know How to Teach* (K2teach) as part of a broader evaluation process. The evaluation aims at supporting future teachers in the practical phases of their training. It measures baseline knowledge and learning gains in basic professional teaching processes in internship phases to study the extent to which these phases constitute an effective contribution to professionalization in PTR. Based on previously reported findings, we postulated three hypotheses:

- H1: Increased PTR Hypothesis: After their initial teaching internship, preservice teachers report to be significantly more competent in PTR.

- H2: Negative Mood Influence Hypothesis: There is a significant negative relationship between a negative mood and preservice teachers' self-reported increase in PTR.

- H3: Positive Mood Influence Hypothesis: There is a significant positive relationship between positive mood and preservice teachers' self-reported increase in PTR.

Methods

Participants and Procedure

In total, the sample comprised 592 beginning preservice teachers. Data were collected before the students completed the internship (Time 1; $N = 447$) and after the students completed the internship (Time 2; $N = 309$). Sample characteristics at Time 1 and Time 2 are shown in Table I. At Time 1, beginning preservice teachers ranged in age from 17 to 52 years (58.2% female), at Time 2 from 18 to 54 years (53.7% female). Beginning teachers were studying to teach a broad range of academic subjects including German, mathematics, history, English, political science, physics, computer science, music, and chemistry. On average, they spent 6.70 hours on active teaching during the internship phase. Data were obtained on a voluntary basis using paper-and-pencil self-administered questionnaires. Before data collection, all participants gave their informed consent.

Table I. Longitudinal sample description

	T1	T1 & T2	T1 not T2	T2
N	447	164	283	309
Female	58.2 %	62.2 %	62.6 %	53.7 %
Mean Age in years (*SD*)	21.9 (5.00)	21.1 (4.46)	22.3 (5.24)	23.3 (5.54)
Mean PTR Planning (*SD*)	2.44 (0.53)	2.39 (0.53)	2.47 (0.53)	2.74 (0.45)
Mean PTR Teaching (*SD*)	2.45 (0.57)	2.39 (0.56)	2.49 (0.57)	2.60 (0.47)
Mean PTR Reflecting (*SD*)	2.54 (0.56)	2.49 (0.58)	2.57 (0.54)	2.75 (0.46)
Mean PANAS positive (*SD*)				3.41 (0.66)
Mean PANAS negative (*SD*)				1.81 (0.65)

Note. T1 = Time 1; T2 = Time 2; *SD* = standard deviation; PTR = planning, teaching, and reflecting; PANAS = Positive and Negative Affective Schedule.

Sample Attrition

Of the 610 beginning preservice teachers who were eligible for participation in the study, 447 completed the questionnaires at Time 1 (response rate of 73.3%). This response rate is well in line with previously reported ones for preservice teachers (e.g., 76% and 84% in Garvis et al., 2012 and Pfitzner-Eden, 2016, respectively). At Time 2 (beginning of the second academic year after completing the internship), 309 preservice teachers provided data, 164 of whom had also participated at Time 1 (retention rate of 36.7%). Although the retention rate is disappointing to some extent, it corresponds with the overall retention rate for beginning teachers reported in Pfitzner-Eden (2016) (32%) who recruited different samples from the same university as in the present study.

The descriptive statistics for the longitudinal sample are shown in Table I. In order to assess the attrition bias, we compared Time 1 data on preservice teachers participating at Time 1 and Time 2 with data on those who participated only at Time 1 (Table I, columns 2 and 3). With respect to PTR variables, there were

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no significant differences in *planning*: $t(336) = 1.67$, $p = .10$; *teaching*: $t(339.8) = 1.86$, $p = .06$; or *reflecting*: $t(323.4) = 1.50$, $p = .13$. Also, we found no difference by gender, $t(343.7) = 1.18$, $p = .24$. However, older participants were more likely to drop out between Time 1 and Time 2 than younger participants, $t(380.8) = 2.71$, $p < .01$.

Measures

We used the PTR-scale (Kumschick et al., 2020) to assess the preservice teachers' competences in planning, teaching, and reflecting at Time 1 and Time 2, and the German version of the Positive and Negative Affect Schedule (PANAS; Krohne et al., 1996) at Time 2 to assess the *positive* and *negative* mood of the preservice teachers during the time span that covered their six-week internship.

The PTR scale consists of three subscales measuring *planning, teaching,* and *reflecting*. For each subscale, participants were asked to rate their capability on a four-point scale ranging from 1 (*not capable*) to 4 (*very capable*). Each subscale starts with "*How capable do you currently feel of...*" followed, for instance, by "*... making adequate decisions regarding time management during the course of the lesson?*" (*planning*), "*...adequately responding to unforeseen deviations from the lesson plan?*" (*teaching*), and "*... using and developing new action strategies based on self-reflected weaknesses during teaching?*" (*reflecting*). The PTR scale comprises 24 items in total (*planning*: 8 items, *teaching*: 6 items, *reflecting*: 10 items). Its three-factor structure was established in a previous pilot study with 287 preservice teachers, $\chi2 = 451.72$, $df = 227$, $CFI = .958$, $TLI = .953$, $RMSEA = 0.59$ (Kumschick et al., 2020), $\chi2 = 318.32$, $df = 180$, $CFI = .921$, $TLI = .904$, $RMSEA = 0.49$ (see Brown, 2015; Hu & Bentler, 1999; McDonald & Ho, 2002).

The PANAS consists of two subscales assessing the *positive* as well as the *negative* affective state. On a five-point scale ranging from 1 ("*not at all*") to 5 ("*extremely*"), participants indicate their affective state during the last six months (i.e., the time span in which the internship took place) by rating 10 positive words describing positive affect (e.g., "*active*", "*enthusiastic*", "*proud*") as well as 10 negative words describing negative affect (e.g., "*upset*", "*distressed*", "*ashamed*"). Internal consistency for both, PTR and PANAS is acceptable to high (Time 1: PTR .84 - .90; Time 2: PTR .77 - .85; PANAS .84 - .85; Blanz, 2015).

Data Analysis

In order to examine the change in PTR during the internship phase and the influence of mood on this change, we analyzed longitudinal data using latent change score modelling. Latent change score models (LCSM) are an extension of the classical structural equation approach in which the change (growth or decline) in latent scores from Time 1 to Time 2 is modelled as a latent factor plus the initial status of the latent factor at Time 1 (see Geiser et al., 2010; Kievit et al., 2018; McArdle, 2009). Compared to more traditional analytical approaches (e.g., repeated measures ANOVA), LCSM make it possible to test for true (i.e., corrected for measurement error) inter-individual differences in intra-individual change and to simultaneously test several causal hypotheses across a set of variables (e.g., Geiser et al., 2010; Kievit et al., 2018; Steyer et al., 1997).

In the present paper, we first modelled three multiple indicator LCSM as described by Kievit et al. (2018), one for each of the dimension of PTR (see Figure 1 for an example of the models). To reduce the number of estimated model parameters and model complexity, observed scores for *planning, teaching,* and *reflecting* at Time 1 and Time 2 as well as *positive* and *negative* PANAS items from Time 2 were each transformed to latent variables by averaging every third item to one indicator (see Litalien et al., 2013, and Pfitzner-Eden, 2016, for a similar procedure). Thus, every latent construct (each of the three dimensions of PTR at Time 1 and Time 2 and each of the two dimensions of PANAS at Time 2) was measured by three indicators, as recommended by Little et al. (2002). In a next step, we assessed measurement invariance across time for all three PTR models. Establishing measurement invariance is a requirement for LCSM testing as it indicates whether the subscales of the PTR are comparable across time in structure and consistently measure the same construct at Time 1 and Time 2 (Geiser, 2010; Kievit et al., 2018; Steyer et al., 1997). To do this, we sequentially tested the equality of factor structure (configural invariance), the equality of factor structure and factor loadings (metric invariance), as well as the equality of factor structure, factor loadings, and indicator intercepts across time (scalar invariance, see Brown, 2015; Geiser, 2010). Model fits were compared using chi-square difference tests for nested models. As can be seen in Table II, all three PTR models demonstrated the required (partial) scalar invariance (insignificant chi-square difference). Partial measurement invariance, as shown by the LCSM for *planning,* still allows for a reasonable interpretation of the results since parameters of the second indicator are invariant over time (parameters of the first indicator are fixed to set the scale of the latent factors; parameters of the third indicator are freely estimated; see Byrne et al., 1989; Geiser et al., 2010). Finally, after establishing measurement invariance and assessing model fits of the PTR models, we assessed whether the two dimensions of the PANAS reliably predicted changes in *planning, teaching,* and *reflecting* by regressing the latent variables of the *positive* and *negative* PANAS on the latent change score for each of the PTR dimensions.

All analyses were conducted using the *lavaan* (version 0.6-2; see Rosseel, 2012) and the *ltm* package (version 1.1-1; see Rizopoulos, 2006) implemented in RStudio (version 1.1.456; see R Core Team, 2018). Missing data were handled using a full information maximum likelihood approach (FIML; see Steyer et al., 2000). The scripts for setting up the LCSM were adapted from the multiple univariate indicator LCSM script as well as the bivariate LCSM script provided by Kievit et al. (2018; Open Science Framework https://osf.io/4bpmq/files/). In all models, the first indicator was used to set the scale of the latent factor. Additionally, we allowed for correlated residual errors across time only when this was supported by a favorable chi-square difference test compared to the configural model without correlated errors.
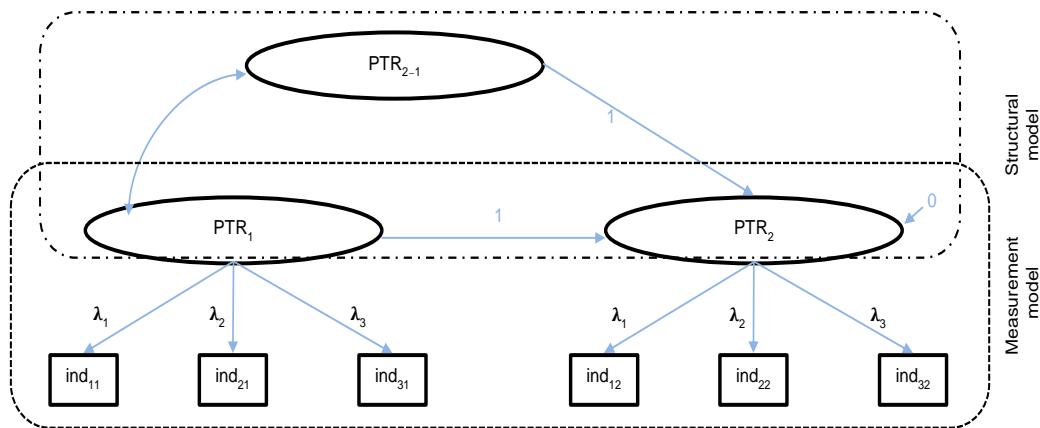
Figure 1. Exemplar of the specification of the latent change score model for *planning, teaching, and reflecting processes* (PTR). In each of the three models, two identical constructs are measured at two time points. Each latent construct has three indicators (ind) with the first subscript referring to the number of the indicator and the second to the measurement time. λ_1 denotes the invariant factor loading of indicator 1, λ_2 that of indicator 2 and λ_3 that of indicator 3. Correlated error variables are not shown.

To assess model fit, we used multiple indicators. We report chi-square tests even if known to be highly overpowered and often of little practical value (Bollen, 1989). Therefore, we based our model evaluations primarily on the root mean square error of approximation (RMSEA), which adjusts for sample size and model parsimony and describes the extent to which a model fits the population, as well as the comparative fit index (CFI), which compares the model fit of the specified model to a more restricted independence model. Moreover, we report the Tucker-Lewis index (TLI), which falls into the same category as the CFI but also considers model complexity. As an absolute index of model fit, we also report the standardized root mean square (SRMR). We consider the model fit acceptable when the following criteria are met: RMSEA $\leq$ .08; CFI and TLI $\geq$ .95; and SRMR $\leq$ .08 (Brown, 2015; Hu & Bentler, 1999; McDonald & Ho, 2002).

Results

Latent Change Score Models of PTR

Goodness-of-fit indices for the three latent change score PTR models are presented in Table II (*planning*: partial invariance; *teaching* and *reflecting*: equal indicator intercepts). Fit indices for the PTR models with PANAS predicting the changes in the three PTR dimensions are given in Table III. All PTR models showed a very good fit, with all RMSEAs/SRMRs < .046 and CFIs/TLIs > .993. Likewise, the models using both dimensions of the PANAS to predict changes in PTR showed very good model fits, all RMSEAs/SRMRs < .044, all CFIs/TLIs > .983.

In line with our expectations, all three dimensions of PTR showed significant gains over time (see Table IV for unstandardized means, variances, and correlations of the LCSM) with all ps < .001. Furthermore, all variances of the change factors were significant (ps < .001), indicating reliable individual differences in PTR gains. These individual differences in PTR were already present before the internship phase as implied by the significant variances of the latent PTR variables at Time 1 (ps < .001).

Table II. Model fits for longitudinal invariance testing of planning, teaching and reflecting (PTR)

	χ^2	df	χ^2_{diff}	Δdf	RMSEA [90% CI]	SRMR	CFI	TLI
Planning								
Equal form	10.3	8			.022 [.000, .057]	.031	.997	.995
Equal factor loadings	14.2	10	4.05	2	.027 [.000, .056]	.044	.995	.993
Equal indicator intercepts	28.3*	12	14.9***	2	.048 [.025, .071]	.054	.981	.977
Partial invariance[a]	17.1	11	3.03	1	.031 [.000, .058]	.046	.993	.990
Teaching								
Equal form[b]	2.02	5			.000 [.000, .034]	.017	1.00	1.01
Equal factor loadings	6.88	7	5.43	2	.000 [.000, .052]	.027	1.00	1.00
Equal indicator intercepts	8.78	9	1.90	2	.000 [.000, .047]	.030	1.00	1.00
Reflecting								
Equal form	9.68	8			.019 [.000, .055]	.030	.999	.998
Equal factor loadings	12.4	10	2.71	2	.020 [.000, .051]	.031	.998	.997
Equal indicator intercepts	15.2	12	2.85	2	.021 [.000, .049]	.032	.998	.997

Note. RMSEA = root mean square error of approximation; CI = confidence interval; SRMR = standardized root mean square residual; CFI = comparative fit index; TLI = Tucker-Lewis index.
[a]intercepts of third indicator are freely estimated. [b]basic model includes correlated measurement errors across time
* $p < .05$. *** $p < .001$.

Table III. Model fit indices for the latent change score models of planning, teaching and reflecting and the Positive and Negative Affective Schedule (PANAS)

	χ^2	df	RMSEA [90% CI]	SRMR	CFI	TLI
PTR Planning & PANAS	48.7	51	.000 [.000, .025]	.042	1.00	1.00
PTR Teaching & PANAS	56.3	49	.016 [.000, .033]	.037	.996	.995
PTR Reflecting & PANAS	83.6*	52	.032 [.018, .044]	.044	.986	.983

Note. RMSEA = root mean square error of approximation; CI = confidence interval; SRMR = standardized root mean square residual; CFI = comparative fit index; TLI = Tucker-Lewis index. PTR = planning, teaching, and reflecting. PANAS = Positive and Negative Affective Schedule.
* $p < .05$.

Table IV. Unstandardized means, variances and correlations of the latent variables for the latent change score models of planning, teaching and reflecting processes (PTR)

	Latent Variable at T1	Change (T2 – T1)
Planning		
Means	2.410	0.275***
Variances	0.239***	0.200***
Change (T2 – T1)	-0.662***	1.00
Teaching		
Means	2.588	0.148***
Variances	0.247***	0.230***
Change (T2 – T1)	-0.665***	1.00
Reflecting		
Means	2.603	0.293***
Variances	0.247***	0.216***
Change (T2 – T1)	-0.678***	1.00

*** $p < .001$.

Mood Predicting Changes in PTR

Figure 2 depicts an example of a structural model of PANAS predicting latent changes in PTR with standardized path coefficients for each of the three models, *planning* (top numbers)*, teaching* (middle numbers), and *reflecting* (bottom numbers). Contrary to our expectations, positive mood did not predict latent changes in any of the three dimensions of PTR (all ps > .073), and no significant result was found for negative

mood and *teaching* ($z = -1.29$, $p = .20$, $R^2 = .02$). However, as hypothesized negative mood significantly predicted latent changes for *planning* and *reflecting* ($z = -2.22$, $p < .05$, $R^2 = .06$ and $z = -3.29$, $p < .01$, $R^2 = .08$; respectively). The expected negative relationship between negative PANAS scores and these two PTR dimensions implies that the more negative the mood the smaller the increase in PTR from T1 to T2 and vice versa.
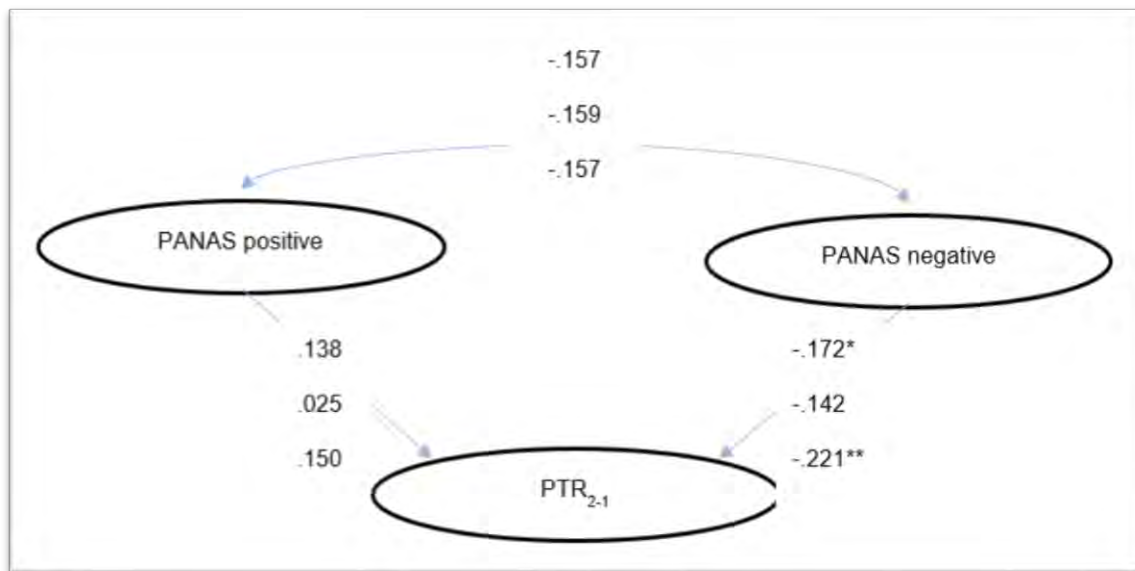

Figure 2. Structural model of the latent change score models with positive mood (PANAS positive) and negative mood (PANAS negative) predicting the change in *planning, teaching and reflecting processes* (PTR). Given are standardized path coefficients referring to *planning* (upper number), *teaching* (middle number), and *reflection* (bottom number). To improve readability, correlations with PTR levels at Time 1 are omitted.

* $p < .05$. ** $p < .01$.

Discussion

The internship that preservice teachers complete in the first year of their university studies offers them their first chance to step out of the role of the student and have an experience as a teacher by planning a lesson, teaching a lesson, and reflecting on and evaluating these experiences. The aim of the present study was to investigate how decision-making in these PTR processes profits from the internship and how mood affects these changes. After the completion of their internship, the preservice teachers reported a significant increase in PTR competences. This is plausible in light of the fact that mentors often discuss preservice teachers' planning decisions with them and reflect with them on their teaching (H1 confirmed).

In addition, this study has partially confirmed previous findings on the influence of negative mood on professional decisions (see Kumschick et al., 2020). With the exception of *teaching*, changes in PTR competences were significantly affected by negative mood (H2 partially confirmed). The increase in *planning* and *reflecting* competences was smaller for those preservice teachers who rated their mood more negatively. This is in line with the results of Kavanagh & Bower (1985), who were able to prove experimentally that people

with a negative mood rated their self-efficacy significantly lower than people in a neutral or positive mood. However, teaching in the classroom was not affected by negative mood. We can only speculate about the reasons for this result. An explanation may be the fact that planning and reflecting are primarily *intra*-individual activities whereas teaching a lesson is predominantly an *inter*-individual issue. In the classroom, preservice teachers are forced (or have the opportunity) to act and to change conditions with regard to practicability just in time. It might be that this direct interaction with the learners—faced with rapid-online-decisions made under pressure—takes the attention away from the negative mood. Therefore, a negative mood possibly does not play a vital role during this communicative teaching phase.

In contrast to our expectations, positive mood did not correlate with any changes of the three PTR processes—neither positively nor negatively (H3 not confirmed). Our predictions were partly based on the broaden-and-build theory. However, to make reliable assumptions about the broadening effect of positive emotions, they should rather be compared to results from neutral affects instead of those from negative ones (e.g., Fredrickson & Branigan, 2005). Accordingly, previous research has shown, that when teaching a lesson in the classroom, a relatively neutral mood is more beneficial than a positive mood (De Dreu et al., 2008; Kavanagh & Bower, 1985). Given that a positive mood prompts more speeded and heuristic decision-making (e.g., Isen et al., 1987), it may be conceivable that this decision-making strategy is not the optimal one when it comes to planning, teaching and reflecting a lesson. More specifically, it may be more practical not to intervene immediately when minor disruptions occur in the classroom or when students are asked to formulate their own contributions to a discussion. Furthermore, positive emotions compared to negative ones are often considered to be less extreme (Alves et al., 2017) and might therefore impact decision-making less than negative emotions.

The present study has some limitations. For instance, PTR processes were measured by means of self-assessments and not by using an objective test (e.g., observer in classroom, and monitoring of planning and reflections processes- to see, how the self-report is related to more objective measurements). Future studies should collect additional and more objective data as well as external assessment in order to better support the findings and to rule out biases due to control beliefs or self-efficacy expectations. Furthermore, this study measured only positive and negative but not neutral mood. It is entirely plausible that a neutral mood leads to better decisions in situations characterized by high pressure to act than a positive mood. Further studies should therefore address these limitations (e.g., by studying nonlinear relationships between mood and learning).

In conclusion, the present study is the first to have examined the relationship between mood and decision-making processes in the context of professional learning in preservice teachers and to interpret the findings based on theoretical framework. The results imply that training programs for preservice teachers should focus particularly on negative mood as it significantly impacts the increase in PTR competences and thus the future success in becoming a teacher. The present analyses suggest that it is not only important to research declarative and procedural knowledge as well as personality variables (i.e., professional self-concept, professional satisfaction, self-efficacy expectations) during the first-time teaching in the internship but also to

address emotional conditions as intervening variables to make preservice teacher training more successful. It is a new and exciting area of research that requires the pursuit of further studies.

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References

Alves, H., Koch, A., & Unkelbach, C. (2017). Why Good Is More Alike Than Bad: Processing Implications. *Trends in Cognitive Sciences*, *21*(2), 69–79. https://doi.org/10.1016/j.tics.2016.12.006

Au, K., Chan, F., Wang, D., & Vertinsky, I. (2003). Mood in foreign exchange trading: Cognitive processes and performance. *Organizational Behavior and Human Decision Processes*, *91*(2), 322–338. https://doi.org/10.1016/S0749-5978(02)00510-1

Bishop, A. J. (1976). Decision-Making, the Intervening Variable. *Educational Studies in Mathematics*, *7*(1/2), 41–47. https://doi.org/10.1007/BF00144357.

Blanchette, I., & Richards, A. (2010). The influence of affect on higher level cognition: A review of research on interpretation, judgement, decision making and reasoning. *Cognition and Emotion*, *24*(4), 561–595. https://doi.org/10.1080/02699930903132496

Blanz, M. (Ed.). (2015). *Forschungsmethoden und Statistik für die Soziale Arbeit: Grundlagen und Anwendungen*. Kohlhammer Verlag.

Bollen, K. A. (1989). *Structural equations with latent variables*. John Wiley & Sons. https://onlinelibrary.wiley.com/doi/book/10.1002/9781118619179

Bolster, A. S. Jr. (1983). Toward a More Effective Model of Research on Teaching. *Harvard Educational Review*, *53*(3), 294–308. https://doi.org/10.17763/haer.53.3.0105420v41776340

Boud, D. (2001). Using journal writing to enhance reflective practice. *New Directions for Adult and Continuing Education*, *90*, 9–18. https://doi.org/10.1002/ace.16

Brown, T. A. (2015). *Confirmatory factor analysis for applied research* (2nd ed.). Guilford Publications.

Byrne, B. M., Shavelson, R. J., & Muthén, B. (1989). Testing for the equivalence of factor covariance and mean structures: The issue of partial measurement invariance. *Psychological Bulletin*, *105*(3), 456–466. https://doi.org/10.1037/0033-2909.105.3.456

De Dreu, C. K. W., Baas, M., & Nijstad, B. A. (2008). Hedonic tone and activation level in the mood-creativity link: Toward a dual pathway to creativity model. *Journal of Personality and Social Psychology*, *94*(5), 739–756. https://doi.org/10.1037/0022-3514.94.5.739

De Vries, M., Holland, R. W., Corneille, O., Rondeel, E., & Witteman, C. L. M. (2012). Mood effects on dominated choices: Positive mood induces departures from logical rules. *Journal of Behavioral Decision Making*, *25*(1), 74–81. https://doi.org/10.1002/bdm.716

Fredrickson, B. L. (1998). What Good Are Positive Emotions? *Review of General Psychology*, *2*(3), 300–
319. https://doi.org/10.1037/1089-2680.2.3.300

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build
theory of positive emotions. *American Psychologist*, *56*(3), 218–226.

Funke, J., & Holt, D. (2006). Zur Rationalität von Emotionen beim Problemlösen: Eine psychologische
Perspektive. *Kluges Entscheiden. Disziplinäre Grundlagen Und Interdisziplinäre Verknüpfungen*,
77–90.

Garvis, S., Pendergast, D., & Keogh, J. (2012). Changes in teacher self-efficacy in the first year of primary
school teacher education study. In F. Rizvi (Ed.), *World Universities Forum (WUF)* (pp. 87–95).
Common Ground Publishing.

Geiser, C. (2010). *Datenanalyse mit Mplus*. VS Verlag für Sozialwissenschaften, Springer.

Geiser, C., Eid, M., Nussbeck, F. W., Courvoisier, D. S., & Cole, D. A. (2010). Analyzing true change in
longitudinal multitrait-multimethod studies: Application of a multimethod change model to
depression and anxiety in children. *Developmental Psychology*, *46*(1), 29–45.
https://doi.org/10.1037/a0017888

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional
criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–
55. https://doi.org/10.1080/10705519909540118

Isen, A. M., Daubman, K. A., & Nowicki, G. P. (1987). Positive affect facilitates creative problem solving.
Journal of Personality and Social Psychology, *52*(6), 1122–1131. https://doi.org/10.1037/0022-
3514.52.6.1122

Iwers-Stelljes, T. A., & Luca, R. (2008). Ein Ansatz zur Förderung von Reflexionskompetenz: Fallarbeit in 7
Schritten. *Gruppendynamik Und Organisationsberatung*, *39*(4), 429–442.
https://doi.org/10.1007/s11612-008-0037-8

Kavanagh, D. J., & Bower, G. H. (1985). Mood and self-efficacy: Impact of joy and sadness on perceived
capabilities. *Cognitive Therapy and Research*, *9*(5), 507–525. https://doi.org/10.1007/BF01173005

Kievit, R. A., Brandmaier, A. M., Ziegler, G., Van Harmelen, A.-L., de Mooij, S. M., Moutoussis, M.,
Goodyer, I. M., Bullmore, E., Jones, P. B., Fonagy, P., the NSPN Consortium, Lindenberger, U., &
Dolan, R. J. (2018). Developmental cognitive neuroscience using latent change score models: A
tutorial and applications. *Developmental Cognitive Neuroscience*, *33*, 99–117.
https://doi.org/10.1016/j.dcn.2017.11.007

Kiper, H. (2012). *Unterrichtsentwicklung*. Kohlhammer Verlag.

Kreis, A., & Staub, F. C. (2013). Kollegiales Unterrichtscoaching. In A. Bartz, M. Dammann, S. G. Huber,
T. Klieme, C. Kloft, & M. Schreiner (Eds.), *PraxisWissen SchulLeitung* (33rd ed., Vol. 3, pp. 1–13).
Wolters Kluver.

Krohne, H. W., Egloff, B., Kohlmann, C.-W., & Tausch, A. (1996). Untersuchungen mit einer deutschen

Version der 'Positive and Negative Affect Schedule'(PANAS). *Diagnostica*, *42*(2), 139–156.

Kumschick, I. R., Böhnke, A., & Thiel, F. (2020). Welche Rolle spielen die Verarbeitung von Unterrichtsfehlern und die negative Stimmung für die subjektiv wahrgenommene Unterrichtskompetenz im Praxissemester? In I. Ulrich, & A. Gröschner (Eds.), *Praxissemester im Lehramtsstudium in Deutschland: Wirkungen auf Studierende* (Edition ZfE, Vol. 9, pp. 243-264). Springer VS, Wiesbaden.

Leinhardt, G., & Greeno, J. G. (1986). The cognitive skill of teaching. *Journal of Educational Psychology*, *78*(2), 75–95. https://doi.org/10.1037/0022-0663.78.2.75

Litalien, D., Lüdtke, O., Parker, P., & Trautwein, U. (2013). Different pathways, same effects: Autonomous goal regulation is associated with subjective well-being during the post-school transition. *Motivation and Emotion*, *37*(3), 444–456. https://doi.org/10.1007/s11031-012-9328-z

Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling*, *9*(2), 151–173. https://doi.org/10.1207/S15328007SEM0902_1

Lloyd, C. A. (2019). Exploring the real-world decision-making of novice and experienced teachers. *Journal of Further and Higher Education*, *43*(2), 166–182. https://doi.org/10.1080/0309877X.2017.1357070

McArdle, J. J. (2009). Latent variable modeling of differences and changes with longitudinal data. *Annual Review of Psychology*, *60*, 577–605. https://doi.org/10.1146/annurev.psych.60.110707.163612

Mccutcheon, G., & Milner, H. R. (2002). A Contemporary Study of Teacher Planning in a High School English Class. *Teachers and Teaching*, *8*(1), 81–94. https://doi.org/10.1080/13540600120110583

McDonald, R. P., & Ho, M.-H. R. (2002). Principles and practice in reporting structural equation analyses. *Psychological Methods*, *7*(1), 64–82. https://doi.org/10.1037/1082-989X.7.1.64

Morine-Dershimer, G. (1979). *Teacher Plan and Classroom Reality: The South Bay Study, Part IV. Research Series No. 60*. https://eric.ed.gov/?id=ED191796

Ophardt, D., & Thiel, F. (2013). *Klassenmanagement: ein Handbuch für Studium und Praxis*. Kohlhammer.

Parkinson, B., Totterdell, P., Briner, R. B., & Reynolds, S. A. (1996). *Changing Moods: The Psychology of Mood and Mood Regulation*. Longman. https://ueaeprints.uea.ac.uk/14584/

Pfitzner-Eden, F. (2016). I feel less confident so I quit? Do true changes in teacher self-efficacy predict changes in preservice teachers' intention to quit their teaching degree? *Teaching and Teacher Education*, *55*, 240–254. https://doi.org/10.1016/j.tate.2016.01.018

R Core Team. (2018). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. r-project.org

Rizopoulos, D. (2006). ltm: An R package for latent variable modeling and item response theory analyses. *Journal of Statistical Software*, *17*(5), 1–25.

Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling and more. Version 0.5–12 (BETA). *Journal of Statistical Software*, *48*(2), 1–36. https://doi.org/10.18637/jss.v048.i02

Schmidt-Atzert, L. (1996). *Lehrbuch der Emotionspsychologie*. Kohlhammer Verlag.

Schwarz, N., & Clore, G. L. (1983). Mood, misattribution, and judgments of well-being: Informative and directive functions of affective states. *Journal of Personality and Social Psychology*, *45*(3), 513–523. https://doi.org/10.1037/0022-3514.45.3.513

Steyer, R., Eid, M., & Schwenkmezger, P. (1997). Modeling true intraindividual change: True change as a latent variable. *Methods of Psychological Research Online*, *2*(1), 21–33.

Steyer, R., Partchev, I., & Shanahan, M. J. (2000). Modeling true intraindividual change in structural equation models: The case of poverty and children's psychosocial adjustment. In T. D. Little, K. U. Schnabel, & J. Baumert (Eds.), *Modeling longitudinal and multilevel data* (pp. 103–119). Lawrence Erlbaum Associates Inc.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, *54*(6), 1063–1070. https://doi.org/10.1037/0022-3514.54.6.1063

Wemm, S. E., & Wulfert, E. (2017). Effects of Acute Stress on Decision Making. *Applied Psychophysiology and Biofeedback*, *42*(1), 1–12. https://doi.org/10.1007/s10484-016-9347-8

Westerman, D. A. (1991). Expert and novice teacher decision making. *Journal of Teacher Education*, *42*(4), 292–305. https://doi.org/10.1177/002248719104200407

Wyer Jr., R. S., Clore, G. L., & Isbell, L. M. (1999). Affect and information processing. In M. P. Zanner (Ed.), *Advances in experimental social psychology* (Vol. 31, pp. 1–77). Elsevier. doi.org/10.1016/S0065-2601(08)60271-3

Yinger, R. J. (1980). A study of teacher planning. *The Elementary School Journal*, *80*(3), 107–127. https://doi.org/10.1086/461181