Using Epistemic Emotions to Support Canadian Pre-service Teachers Learning about Classroom Assessment

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Abstract:

Students feel epistemic emotions like surprise or frustration when they encounter content that conflicts with their beliefs or previous knowledge in a way that can facilitate or hinder learning. Pre-service teachers may find that professional perspectives on assessment conflict with their previous knowledge of assessment, creating epistemic emotions. The purpose of this research was to evaluate how frustration, curiosity, and surprise felt during two learning experiences related to self-reported learning of assessment and application to practice. N=205 pre-service teachers consented for their responses to questions associated with two learning activities to be analyzed. Participants reported experiencing moderate levels of curiosity in both activities, but one garnered more frustration and the other more surprise. Frustration was negatively associated with self-reported learning and application. Whereas, curiosity and surprise had statistically significant positive associations with the outcomes. We discuss the role of epistemic emotions in learning about assessment and offer recommendations for instructors.

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Using Epistemic Emotions to Support Canadian Pre-service Teachers' Learning about Classroom Assessment

Although classroom assessment is a core professional competency for teachers, it is a skillset that pre-service teachers find particularly challenging in terms of both content learning and practical application (Brown & Harris, 2016; Nichols & Varier, 2021; Popham, 2003). While both researchers and educators have a vested interest in supporting pre-service teachers in learning about assessment there is relatively little agreement on how precisely to do that (DeLuca et al., 2013). In developing a response to this problem, we focused on two elements of assessment that are well-recognized in the literature but rarely leveraged in helping pre-service teachers learn about classroom assessment: namely emotions and praxis.

Assessment is recognized as an emotional process for both students and teachers (Ferguson et al., 2012; Schutz & Davis, 2000; Vogl & Pekrun, 2016). Despite this recognition, emotion is rarely intentionally addressed when pre-service teachers learn about classroom assessment. Given that pre-service teachers are simultaneously students and teachers (Daniels et al., 2020; Edwards, 2021) their emotional experience of assessment may be particularly salient. More precisely, when learning about classroom assessment as a professional practice pre-service teachers may experience epistemic emotions such as frustration, curiosity, and surprise in response to potential conflict between the professional content and their personal histories of classroom assessment (Pekrun et al., 2017). Research, however, is largely silent on this perspective, making it an open question how pre-service teachers' learning about classroom assessment is facilitated or hindered by epistemic emotions.

In addition to managing their current and past emotions about classroom assessment, pre-service teachers report difficulty in translating what they learn into practice (Mertler, 2009).

Researchers and instructors similarly recognize that it is critical for learning about assessment in theory to be intentionally connected to practice (DeLuca et al., 2013), a pairing known as praxis. Unfortunately, classroom assessment can be particularly difficult to practice authentically in an assessment course for at least two reasons: First, although students may have a chance to create assessments, creation oftentimes remains separate from having those assessments completed by students, undertaking grading, providing feedback, and applying professional judgment. Second, as pre-service teachers create assessments as the assessors, they oftentimes remain the assessee as well thereby creating a tension in their products. It is possible that providing intentional opportunities for pre-service teachers to work through the theory-practice divide could also enhance their learning in this content area.

Despite their potential, the pairing of pre-service teachers' epistemic emotions with opportunities for praxis in the domain of classroom assessment has rarely been considered empirically (see Edwards, 2021 for an exception). Thus, the purpose of the current research was to evaluate how the epistemic emotions of frustration, curiosity, and surprise related to self-reported course learning and application to practice. In order to do this, we created two learning experiences that would elicit epistemic emotions while providing pre-service teachers with opportunities for praxis. The learning experiences were embedded in a required course on classroom assessment for secondary school pre-service teachers and thus represent a novel pedagogical approach.

Literature Review

Emotional Aspects of Assessment

Assessment is a ubiquitous part of the lives of both students and teachers. For students, researchers have long recognized that test-taking has an emotional element including feelings of

joy, hope, pride, relief, anger, anxiety, shame, and hopelessness in test-taking (Pekrun et al., 2004; Vogl & Pekrun, 2016). These emotions have many significant associations with student learning outcomes such as effort, self-regulation, self-efficacy, and achievement (Pekrun et al., 2004). Similarly, a substantial body of literature reveals the critical role of teacher emotions in terms of relationships, burnout, goals, and wellbeing (e.g., Frenzel et al., 2021). Despite this, relatively speaking, researchers appear to have neglected teachers' emotions in regards to classroom assessment specifically. This may be because globally classroom assessment is a mandated responsibility (UNESCO, 2019) thereby implying an expectation that when teachers engage in classroom assessment it is a professional activity more so than an emotional one. The limited research that exists specific to teachers' emotions in regards to classroom assessment suggests otherwise (Steinberg, 2008; Looney et al., 2018).

Ferguson and colleagues (2012) showed that elements of assessment such as grading and report cards remain a significant stressor in grade school teachers' workload and are associated with self-reported anxiety and depression. Grading and feedback seem to be particularly emotion-laden at all levels of schooling. For example, Yu and colleagues (2021) interviewed 27 college instructors about providing feedback on English language learners' writing and collected samples of teaching materials including writing and feedback. They found that 10 of the 27 instructors reported only pleasant emotions such as joy, cheerfulness, and relief; whereas, the majority recalled both pleasant and unpleasant emotions including anger, disappointment, and fear (2021). Through interviews with English language secondary teachers in Singapore, Loh and Liew (2016) found that teachers described emotions such as stress, exhaustion, and depletion in response to the emotional labor associated with grading essays. Using grounded theory with seven college instructors, Stough and Emmer (1998) found that instructors "mask" their

emotions as an intentional strategy to appear calm when dealing with students in difficult feedback sessions and to "avoid revealing their own frustrations, irritations, anxiety, or unhappiness" (p. 355) with students' performance on assessments.

Turning our attention to pre-service teachers further complicates the emotional elements of the assessment experience because they are simultaneously students and teachers. Uniquely, pre-service teachers are evaluated by assessments at the same time that they are learning to create assessments and such conflicting experiences of assessment are poised to elicit epistemic emotions (Muis et al., 2015a). Previous research has shown that this student-teacher tension has important distinctions for pre-service teachers' motivation and learning (Daniels et al. 2020). Building on similar logic, Edwards (2021) interviewed eight secondary level pre-service teachers who were concurrently building assessments for students and being assessed on those assessments as students themselves. As an assessor, participants reported negative emotions when needing to give low or failing grades such as scared, worried, unkind, and uncaring. Participants also reported tension between their desire to support student success and guilt for making decisions like giving hints that could be considered contrary to good assessment practice. Many of these feelings were rooted in pre-service teachers' own assessment experiences as students - a reality that Brown (2004) formalized through the Conceptions of Assessment (COA) framework and survey. Brown identifies four categories of conceptions of assessment: supporting learning, holding students accountable, holding schools accountable, and being irrelevant. Research using the COA (Brown, 2004; Daniels & Poth, 2017) has revealed various points of tension amongst these conceptions; however, the emotions created when pre-service teachers' conceptions of assessment conflict with their learning about assessment has not been explored.

Epistemic Emotions

Epistemic emotions are defined as "emotions that result from information-oriented appraisals (i.e., the cognitive component of an emotion) about the alignment or misalignment between new information and existing beliefs, existing knowledge structures, or recently processed information" (Muis et al., 2018, p. 171). In a foundational paper, Pekrun and colleagues (2019) suggest there are seven main epistemic emotions which they designed a self-report questionnaire to measure: surprise, curiosity, enjoyment, confusion, anxiety, frustration, and boredom. In their validation study, all epistemic emotions with the exception of boredom had positive correlations with a variety of learning strategies including rehearsal, critical thinking, elaboration, and metacognitive self-regulation (2019). These findings represent an important distinction between achievement emotions more generally (Pekrun, 2006) and epistemic emotions experienced in response to conflicting information. Specifically, negative epistemic emotions appear to have a possible positive function in supporting learning (D'Mello et al., 2014); whereas, negative achievement emotions such as shame, guilt, or hopelessness do not (Pekrun, 2006).

Epistemic emotions have been shown to impact knowledge exploration and learning particularly in response to conflicting content (Vogl et al., 2019). For example, Muis, Pekrun and colleagues (2015a) conducted two studies to examine the role of epistemic emotions in college students' learning about climate change as emotion-laden content. After assessing students' prior knowledge, participants read two pairs of conflicting texts on the causes and effects of climate change and then completed various self-report measures of epistemic emotions and studying behaviors they used while engaged with the texts. Finally, participants completed a "test" to measure their learning of the content. They found that metacognitive self-regulation was

positively predicted by curiosity, enjoyment, and confusion. Critical thinking was positively predicted by curiosity and anxiety and negatively predicted by surprise. Elaboration study strategies were positively predicted by curiosity and enjoyment. Enjoyment also positively predicted rehearsal strategies. In turn, critical thinking and elaboration both positively predicted achievement; whereas metacognitive self-regulation revealed a negative association. Other studies have found similar results, particularly for the benefit of curiosity (e.g., Muis et al., 2015b; Pekrun et al., 2017; Vogl et al., 2020).

To date there is no research on pre-service teachers' epistemic emotions in response to learning about classroom assessment even though the content of assessment courses may conflict with their student-perspectives and personal experiences of assessment. Three epistemic emotions seem particularly relevant. First, we recognize that pre-service teachers may experience frustration as they encounter classroom assessment practices including grading that are complex and subject to emotions and bias (Brackett et al., 2013; Guskey & Link, 2019). Classroom assessment is a content area that often does not have "one right way" and that ongoing challenge, particularly, while being graded as a student, has been theorized to elicit frustration (Pekrun et al., 2019). Second, we are interested in ways to prompt pre-service teachers' curiosity about classroom assessment. Shin and Kim (2019) suggest that curiosity helps motivate people to look for new or missing information. In regards to classroom assessment, a professional requirement that can be quite expansive, we see curiosity as creating an opportunity for praxis by expanding pre-service teachers' thinking beyond the boundaries of the course requirements. Finally, we believe that pre-service teachers may experience surprise as they encounter unexpected content in the area of classroom assessment leading to cognitive incongruity (Pekrun et al. 2019). For example, students may be surprised to learn how relevant measurement theory is to real

assessment practices, that all assessment contains error, and that there are predictable ways to minimize testwiseness. Moreover, we were not only interested in how these epistemic emotions relate to pre-service teachers' learning of course content but to their self-reported application to practice.

Theory-Practice Divide

The practice of assessment in Canada is directed by the *Principles for Fair Assessment* (Rogers, 1993) which establishes broad guidelines for both teacher-made classroom-based assessments and provincially regulated standardized assessments. Additionally, teachers are accountable to their provincially mandated teaching standards related to assessment practices, which in the case of this study is Alberta Education (2022). However, the extent to which courses on classroom assessment offered during pre-service teacher education are guided by these documents varies across provinces within Canada nevermind across countries. At the moment, there is no pre-established curriculum for pre-service teacher education courses in Canada, meaning that the content taught may be misaligned from the professional standards (DeLuca & Klinger, 2010). Oftentimes assessment courses teach pre-service teachers about the purposes of summative and formative assessment, assessment design, measurement theory, interpretation, models of feedback, and principles of equity and fairness (Darling-Hammond & Baratz-Snowden, 2007; DeLuca et al., 2013; Edwards, 2017). However, according to DeLuca and Klinger (2010) practical skills in report card writing, modifying assessments for exceptionalities, and using grading software are desired by pre-service teachers but rarely taught despite their ubiquity in teachers' daily assessment practice.

In addition to choosing assessment content for pre-service teacher education, it is important to consider relevant research, theories, and pedagogical approaches to teaching about

assessment (Nichols & Varier, 2021). Darling-Hammond and colleagues (2005) describe student teaching, microteaching, performances, written and video case methods, and practitioner inquiry as the dominant pedagogies of teacher education. For assessment specifically, DeLuca and colleagues (2013) sought to understand "the pedagogical conditions that facilitate learning about assessment" (p. 129) by collecting data from three open-ended questionnaires circulated to pre-service teachers enrolled in a classroom assessment course. Based on a thematic analysis, they reported four pedagogical approaches that students found most supportive of their learning: perspective-building conversations; praxis by connecting theory to practice; modeling by practicing what is preached; and critical reflection and planning for learning. Many of these approaches occur quite naturally during teaching practicums which may help explain why pre-service teachers overwhelmingly report their practicum placement as the main context for becoming confident about assessment skills even if they had a stand-alone assessment course (DeLuca & Klinger, 2010).

Despite research regularly showing teaching field placements as particularly relevant to pre-service teachers' training generally (Darling-Hammond et al., 2005) and assessment skills specifically (DeLuca & Klinger, 2010), practicum placements are labor-intensive, costly, and time consuming, making them difficult to enact. Thus, other options must be sought within individual courses to maximize the use of the pedagogies identified by DeLuca and colleagues (2013). One option is for pre-service teachers to explicitly practice skills during pre-service teacher education. In a classroom assessment course, this is a good option because students can build assessments, practice scoring, and give grades and feedback to peers. Another option is to allow pre-service teachers to learn from in-service teachers as guest speakers, which has been shown to help them make theory-to-practice connections (Hemphill & Hemphill, 2007). For

example, Wearmouth et al. (2004) found that postgraduate Special Education professionals valued the additional content provided by a guest speaker in terms of exploring controversial topics, although they experienced some self-consciousness that reduced their active engagement. Analyzing discussion posts of bilingual pre-service teachers with an expert, Ostorga and Farruggio (2013) found evidence of deep learning particularly in regards to trying to explain contradictions between theory and practice. To date, however, none of these types of pedagogical decisions related to teaching about classroom assessment have been paired with epistemic emotions.

The Current Study

The purpose of the current research was to evaluate how two classroom assessment learning experiences were associated with self-reported course learning and application to practice by eliciting pre-service teachers' epistemic emotions. As shown in Figure 1, the research was guided by the notions that pre-service teachers' existing beliefs about assessment may conflict with the content they are taught about assessment thereby giving rise to epistemic emotions, which, in turn, may be associated with their learning and application to practice. We focused on two research questions: What levels of epistemic emotions of frustration, curiosity, and surprise did pre-service teachers feel in response to each learning experience? How do frustration, curiosity, and surprise relate to pre-service teachers' self-reported learning of course content and application to practice? Based on existing findings in the literature reviewed above, we hypothesized that curiosity and surprise will have positive associations with these outcomes and frustration have negative associations.

Method

We used a correlational survey design to collect self-report data from pre-service teachers attached to two separate learning experiences.

Procedure

Data were collected from students enrolled in a required Bachelor of Education undergraduate course on classroom assessment that was delivered asynchronously during the Fall semester of 2021 at a university in Alberta, Canada. All students in these sections were enrolled in the secondary route programming meaning that they were training to be junior or high school teachers (grades 7-12, approximate ages of future students 12-17). Students represented all major and minor curricular areas including but not limited to academic subjects such as math, science, language, and social studies and electives such as art, trades, fashion, and technology. The course consisted of 11 topics that involved watching lecture videos, watching a topic-specific Teacher Talk video, and then completing an Application Activity that was scored every week using a holistic rubric. The data for this study were collected as part of the larger Application Activities in Topics 10 and 11 that involved answering broadly topic-related likert questions, making written reflections, and expressing opinions. Because each Application Activity was bigger than the specific research questions addressed in this study, we used a selection of items from the larger survey that were designed to measure students' epistemic emotions and outcome variables related to learning of course content and application to practice (see Measures section). We obtained ethics approval from the institutional review board and students indicated their consent for their responses to be used for research purposes after they completed the activity for the course. In other words, completion of the course-based Application Activity did not automatically assume students' consent to research.

Participants

There were a total of 284 undergraduate students registered in the course of whom 205 consented for their data to be used for research purposes beyond the course requirements. We take this as an indication that students understood that their coursework was separate from the research. Of these, 151 completed both surveys, 31 completed only Topic 10, and 23 completed only Topic 11, thus the sample sizes differ for the subsequent analyses. Participants indicated their gender: 80 identified as men, 118 identified as women, six identified as non-binary, and one preferred not to report. In order to retain non-binary participants we did not control for gender in any analyses. The participants were between the ages of 19 and 43, with a mean age of 26 (*SD* = 5.04). The sample was predominantly White (63%) and the three next largest groups were Chinese (6%), South Asian (6%), and mixed ethnicity (6%). Four percent of the sample identified as Indigenous Peoples.

Materials

Taken from the larger course-based Application Activities, the materials pertinent to this study are the two learning experiences themselves as pedagogical tools (i.e., Teacher Talk videos and the Grading Activity) and the survey items used to measure students' epistemic emotions and self-reported outcomes. These are described in detail next.

Learning Experiences

Although students' responses to the Teacher Talk videos were measured during Topic 10, pre-service teachers engaged with the videos on a topic-by-topic basis with the pedagogical intention of making the connection between course content and practice more explicit. To create these videos, the principal instructor interviewed in-service teachers over Zoom(c) about the course content on classroom assessment. Invited teachers were given a list of the 11 course topics and asked to select one or more on which they would like to speak. The instructor

explained that the purpose of each interview was to allow pre-service teachers to hear in-service teachers talk about the topics related to classroom assessment as tangible elements of their work. By extension, in-service teachers were told there were “no right answers”" and that it was fine if their perspectives and opinions diverged from the content in the course. After conducting seven interviews with teachers, the instructor decided there was sufficient coverage to create a video for each topic, edited the footage, organized them by content, and matched video segments with the most relevant course topic. A summary of the videos and instructions to students explaining their role in the course generally and in Topic 10 specifically are presented in Figure 2. The videos had a positive overall tone and teachers easily spoke to every course topic and acknowledged the real role of each topic to the profession of teaching.

The second learning experience was a “Grading Activity” with the pedagogical intention to allow students to practice assigning grades to fictitious students. The principal instructor created a fictitious gradebook that contained scores on various assessments for six hypothetical school-aged student. Pre-service teachers were provided with scores on graded homework, exams, attendance, and participation. Scores were designed to be somewhat ambiguous and create the need for pre-service teachers to use professional judgment that may contradict with their personal beliefs related to assessment. For example, one hypothetical student (Avery) clearly did not have to work very hard to earn high scores while one hypothetical student (Vinudi) performed well on homework but not exams. Pre-service teachers were instructed to assign a letter grade based on the school board guidelines for converting percentages to final grades (Exemplary A = 80-100%, Proficient B = 65-79%; Adequate C = 50-64%; Limited D = 0-49%) and then write a comment to the student and reflect on their learning from the task. The

fictitious gradebook and related materials along with the instructions to students are presented in Figure 3. The comments were not analyzed as part of this report.

Survey Questions

All survey questions were embedded into the larger Application Activities and were not expanded on in the instructional videos. In other words, the single items were presented at face value and no teaching was provided on epistemic emotions or praxis. We collected demographic information including age, gender, and ethnicity as described in the participants section on both Topics. For the Teacher Talks, on Topic 10 we asked participants to indicate categorically how many of the Teacher Talks videos they watched over the course of the 9-week semester: (4) every one, (3) almost all of them, (2) a few, (1) just one. Next, to measure epistemic emotions we used single items asking pre-service teachers to indicate their levels of frustration, curiosity, and surprise in response to the Teacher Talk videos holistically on five-point scales. To measure course learning and application to practice, we wrote two single items directly pertinent to the Teacher Talks. The wording of the course learning item was "I learned more in my class because of the Teacher Talk videos" and the wording of the application to practice item was "The Teacher Talk videos helped bridge the theory of assessment with practice in the real classroom."

For the Grading Activity, on Topic 11, pre-service teachers again indicated their levels of frustration, curiosity, and surprise in response to specific activity and completed two outcome items. The wording of the course learning item was "I am confident about the grades I assigned to each student" and the wording of the application to practice item was "This activity helped me develop professional judgment."

Plan for Analysis

We conducted our analyses in two steps. First, we examined descriptive statistics, including the number of videos watched, and used paired-samples *t*-tests to compare the epistemic emotions reported between the two learning experiences. Second, we ran correlations followed by two separate path models in which students' feelings of frustration, curiosity, and surprise in response to each learning experience were the predictors of the respective learning and application to practice outcomes. All analyses were run in Jeffreys's Amazing Statistics Program (JASP; 2022) and the output is freely available at https://osf.io/jepxd.

Results

Descriptives and *t*-tests

The vast majority of pre-service teachers watched more than one Teacher Talk video. The exact distribution is presented in Figure 4. The descriptive statistics for all survey items are presented in Table 1. Participants scored above the scale midpoint on the two application-to-practice outcomes and the course learning item based on the Teacher Talks. Participants reported low levels of frustration in response to Teacher Talks with a truncated range that never used the strongest response indicator (i.e., 5 strongly agree). Surprise also showed a truncated range with no participants indicating they strongly disagreed with feeling surprised by the Teacher Talk videos. Skewness and kurtosis indicate some variation from a normal distribution that rarely approached 1.0; however, all items had significant Shapiro-Wilk coefficients (range .65 to .87, ps < .001). To compensate for non-normality, we used a robust maximum likelihood to estimate the model.

Statistically significant differences emerged in the epistemic emotions elicited by each learning experience. Students felt less frustrated, t (147) = -8.26, p < .001, Cohen's d = -.68, and curious, t (147) = -2.21, p = .03, Cohen's d = -.18, about the Teacher Talk videos than the

Grading Activity. In contrast, students felt more surprise in the Teacher Talk videos than the Grading Activity, t (145) = 5.06, $p < .001$, Cohen's $d = .42$.

Correlations and Path Models

Correlations were largely in the expected directions, providing some evidence of validity for the single item measures despite lack of indicators of internal consistency (Table 2). Surprise and curiosity were positively correlated with each other at levels similar to other studies (e.g., Pekrun et al., 2019). Although some previous research has shown positive correlations with frustration and surprise, we found both negative and positive correlations depending on the activity. In terms of outcomes, frustration during Teacher Talks was negatively correlated with both the learning and application outcome, whereas curiosity and surprise were positively correlated. For the Grading Activity, the correlations were more varied. Frustration was negatively correlated with both outcomes, but curiosity was only positively correlated with application to practice. Surprise was not related to either outcome. There were small positive correlations amongst the Teacher Talk videos and the Grading Activity suggesting the emotions were somewhat similarly evoked. Also, there was a positive significant correlation between the two measures of application to practice. Based on the significant zero-order correlations which suggested no concern for multicollinearity, we proceeded to the path analyses.

The path analyses for the Teacher Talk videos showed that all three epistemic emotions were predictive of pre-service teachers' self-reported course learning and application to practice (Table 3). Specifically, frustration was negatively associated with learning and application, whereas both curiosity and surprise had positive associations. For the Grading Activity, frustration showed uniformly negative associations with learning and application. Curiosity had a positive association with application to practice but was unrelated to the course learning item.

There were no statistically significant effects for surprise in response to the Grading Activity on either outcome. See Figures 5 and 6 for path diagrams.

Discussion

The purpose of this study was to explore how epistemic emotions are elicited in response to two learning experiences in the context of an initial teacher education course on classroom assessment and associated with pre-service teachers self-reported learning and application to practice. The main results showed that epistemic emotions were experienced differently for each activity but had largely uniform associations with pre-service teachers' self-reported course learning and application to practice. We offer several implications for instructors of classroom assessment before discussing limitations of this research and directions for future research.

Levels of Epistemic Emotions

On average pre-service teachers reported levels of all three epistemic emotions that were near the midpoint of the five-point scale. In other words, pre-service teachers as a group did not report particularly strong or weak epistemic emotions in response to either of the learning activities. This finding aligns with existing research with epistemic emotions. For example, Muis et al., (2015a) reported surprise $M = 2.86$, $SD = 1.09$ and curiosity $M = 3.36$, $SD = 0.76$, Muis et al., (2015b) listed curiosity $M = 3.00$, $SD = .91$ and frustration as $M = 1.34$, $SD = .31$, and Muis et al. (2021) report surprise $M = 2.51$, $SD = .95$, curiosity $M = 3.30$, $SD = .92$, and frustration $M = 1.76$, $SD = .86$. The means from the current sample are quite similar to these and raise the question of the ideal level of epistemic emotions. Arguel and colleagues (2018) addressed this topic in regards to confusion and proposed that each student has an individual "zone of optimal confusion" within which instructors may need to help students through self-regulation strategies and feedback to maximize learning. To date, most of the research, including ours, created

learning opportunities that generated moderate levels of epistemic emotions. It is an open question whether high levels of epistemic emotions would result in a reinforcement of previous beliefs, as has been noted by Trevors and colleagues (2016) in relation to identity, or if it would further facilitate conceptual change. Given the consistent moderate levels of epistemic emotions elicited by tasks in the existing research, it may pose a challenge for researchers to craft learning experiences or prompts that would elicit more intense levels of epistemic emotions if that were deemed desirable. These moderator effects are nonetheless important to consider in future research.

When comparing between the two learning activities, pre-service teachers reported more frustration and curiosity in response to the Grading Activity than the Teacher Talks and more surprise in response to the Teacher Teacher talks than the Grading Activity. To help explain these differences, we consider important pedagogical elements of the activities themselves that may be generalized to other activities. First, Teacher Talks highlighted practicing teachers' perspectives on assessment in hopes to leverage opportunities for pre-service teachers to connect theory to practice even if teachers' stories conflicted with pre-service teachers' beliefs. For example, teachers were plainly speaking about topics like reliability and validity, item assessment, and equity even though these are often viewed as less relevant topics by pre-service teachers (DeLuca & Klinger, 2010). Alternatively, teachers talked about elements of assessment itself that may have surprised pre-service teachers, such as one teacher expressing her favor of standardized tests. In short, the videos provided opportunities for pre-service teachers to be surprised both in terms of agreement and disagreement with the course and their own conceptions of assessment.

Second, the two activities differed in the extent to which they were attached to students' graded performance in the assessment course. The Teacher Talk videos were a weekly required course component that supported learning but were not linked to students' graded work; whereas, completion of the Grading Activity was scored and the content was subsequently tested during students' final exam as evidence of practicing relevant skills. Although both were required course components, the difference in grades attached to each activity may have an important role in the elevated levels of curiosity and frustration pre-service teachers experienced. In short, it is possible students were less frustrated by Teacher Talks because they were ungraded, meaning they did not necessarily have to resolve potentially conflicting information. Much of the existing work on epistemic emotions uses experimental designs with random assignment to some sort of learning activity designed to prompt epistemic emotions such as a refutation text (e.g., Muis et al., 2015a). Although this maximizes control and allows causal inferences, it removes the natural element of needing to "learn" the content for some future graded assessment. In some ways, our design unintentionally compared ungraded to graded learning activities and found important differences. The Grading Activity was both more likely to elicit curiosity which would support extension of learning and frustration which could have hindered learning. This balance within a learning activity that is ultimately attached to students' grades introduces an important ethical and pragmatic consideration for future research to consider.

Associations with Learning and Application

Across the two activities, frustration had the most consistent effect being negatively associated with self-reported content learning and application to practice in both activities. This aligns with previous research suggesting that frustration results when confusion cannot be resolved (Nerantzaki et al., 2021). Although the Grading Activity as a practice of skills provoked

more frustration than the Teacher Talk videos, both activities had overall low levels of frustration which nonetheless exerted negative effects on self-reported outcomes. While we could predict that the Grading Activity might bring out feelings of frustration, the Teacher Talks were designed without any intention to elicit frustration. This raises important considerations for instructors because even seemingly benign instructional activities may frustrate students with negative implications for their learning and application to practice.

Surprise and curiosity brought about through the Teacher Talk videos functioned as we expected: both emotions were positively associated with both content learning and application to practice. Curiosity during the Grading Activity was also positively associated with application to practice. This positive pattern of results has been consistently demonstrated in the literature in relation to a number of meta-cognitive strategies and learning outcomes (Muis et al., 2015b; Pekrun et al., 2017; Vogl et al., 2020). Although these are self-reported outcomes, the results for application to practice is particularly novel and suggests that the epistemic emotions of surprise and curiosity may be a beneficial way to consider bridging the theory-practice divide with which pre-service teachers struggle. Vogl and colleagues (2020) found similar results with curiosity positively predicting both self-reported motivation to further explore a topic and actual exploratory behavior operationalized as clicking a button for more information. Future research needs to continue to embed epistemic emotions into real learning situations and consider behavioral indications of learning as well.

Implications

The results of this study suggest that indeed the content related to learning about classroom assessment can elicit epistemic emotions in pre-service teachers. As a field, teaching about classroom assessment has not been considered as explicitly emotional, therefore our

research makes an important contribution by identifying potential for epistemic emotions to support learning and praxis. Although the two activities were designed with epistemic emotions in mind, insomuch as the content presented in assessment courses through lecture, readings, or other class activities conflicts with pre-service teachers' beliefs, it is likely that epistemic emotions will be experienced.

Based on this, we offer three implications for instructors of classroom assessment. First, instructors of classroom assessment need to recognize the potential emotional elements of the content that they teach. By extension, they should not only expect but welcome students' emotions - both positive and negative. Even at low levels, accepting negative emotions is a constant recommendation in self-determination (Reeve, 2016) theory in order to create classrooms where students can more intrinsically engage with the content. Second, instructors of classroom assessment should critically evaluate how the content presented during their teaching or in the materials such as textbooks they choose to use may reinforce or conflict with students' beliefs about assessment. To do this, instructors of classroom assessment will need to understand the conceptions of assessment that ~~all~~ students bring to their learning (Brown, 2004; Daniels & Poth, 2017). To facilitate this, instructors of classroom assessment could use existing survey tools such as Brown's (2004) Conceptions of Assessment to give students tangible indicators of their beliefs and a starting point for personal reflection. In jurisdictions where teaching of assessment is becoming inclusive of Indigenous, critical, social-cultural, or justice perspectives (Brown & Harris, 2016; Cardinal et al., 2022; Mayorga & Picower, 2019; Rasooli et al., 2019), instructors will additionally need to attend to students' possible emotional discomfort as Western practices are challenged and rethought. Third, instructors may need to help students identify their epistemic emotions and work through them. This would be particularly true for frustration which

had negative associations with both outcomes. However, it may also be beneficial to identify instances of curiosity and help pre-service teachers understand how to allow their curiosity to generate further exploration. Helping pre-service teachers understand how epistemic emotions interact with their own learning can also build their awareness of using epistemic emotions in their own future teaching of complex content. In all instances, it will be important for instructors to consider the ethical parameters of deliberately provoking epistemic emotions and to be prepared to intentionally support students.

Limitations and Future Research

Despite these implications, the results presented herein should be considered in light of three limitations. First, typically surprise, curiosity, and confusion are considered the most basic of epistemic emotions (Nerantzaki et al., 2021). We however, measured frustration rather than confusion. Frustration is listed as one of the seven main epistemic emotions (Pekrun et al., 2017) and is theorized to occur when confusion remains unresolved (Nerantzaki et al., 2021). Thus, our omission of confusion leaves a gap in understanding as to the role of confusion in classroom assessment content learning or application to practice. Because conflicting information can elicit a range of epistemic emotions, researchers need to think carefully about which emotions are most likely to be linked to each learning activity and to collect a range of epistemic emotions and outcomes.

Second, we considered the relationship between both learning experiences and epistemic emotions holistically, meaning that we are unable to identify whether there were specific points in the Teacher Talk videos or specific aspects of the Grading Activity that elicited epistemic emotions. Better knowing where and when the activities elicited frustration as opposed to curiosity, for example, will be an important step in helping instructors design activities. In future

research, this could be accomplished through think-aloud sessions (Leighton, 2017) with participants to understand when an epistemic emotion is elicited or through the addition of physiological measures of emotions such as eye tracker which has been used successfully in other contexts (e.g., Pengnate, 2019). Likewise, researchers will need to better attend to pedagogical realities of classrooms such as graded versus ungraded work, pedagogical framing, and if students have opportunities to reflect on their beliefs. These can be measured elements of quantitative studies or collected as artifacts in future qualitative investigations. Finally, the model presented herein is particularly simple from the perspective of pre-service teachers' experiences with assessment. Although it was beyond the scope of the current study, future research can expand the model to consider additional complexity stemming from pre-service teachers' own experiences with assessment.

Third, although the epistemic emotions have been shown to function adequately as single item measures (Pekrun et al., 2017), our single item indicators of content learning and application to practice have no such evidence of reliability or validity. We created these items to be closely related to the learning activities and ask quite plainly about the desired outcomes related to course learning and application to practice. Research with other constructs has often shown that single items can be adequate measures when the construct is indeed straightforward, and commonplace to the respondent (Allen et al., 2022; Ainley & Patrick, 2006; Gogol et al., 2014). Although grades could have been used as a more objective measure of course learning, there are no common measures of application to practice and researchers may need to attend to this for assessment specifically or in terms of teacher preparation more generally. In addition, researchers may want to augment self-report data with evidence from actual assessments created by pre-service teachers or data from in-school practicum placements. Such triangulation would

provide important information on the lasting power of leveraging epistemological emotions for learning about classroom assessment.

Conclusion

Classroom assessment has long been recognized as an emotional experience for students (Schutz & Davis, 2000). In this research, we demonstrated that similarly pre-service teachers feel epistemic emotions when learning about classroom assessment. Rather than focusing on classroom assessment strictly as a professionally mandated responsibility, instructors may want to embrace the emotional reality of assessment and consider the role of epistemic emotions in pre-service teachers' learning of classroom assessment content and application to practice.

References

Ainley, M., & Patrick, L. (2006). Measuring self-regulated learning processes through tracking patterns of student interaction with achievement activities. *Educational Psychology Review, 18*, 267–286. https://doi.org/10.1007/s10648-006-9018-z

Alberta Education. (2022). *Guide to Education*. Alberta Government. https://www.alberta.ca/guide-to-education.aspx

Allen, M. S., Iliescu, D., & Greiff, S. (2022). Single item measures in psychological science. *European Journal of Psychological Assessment, 38,* 1-5. https://doi.org/10.1027/1015-5759/a000699.

Brackett, M. A., Floman, J. L., Ashton-James, C., Cherkasskiy, L., & Salovey, P. (2013). The influence of teacher emotion on grading practices: A preliminary look at the evaluation of student writing. *Teachers and Teaching*, *19*(6), 634-646. http://dx.doi.org/10.1080/13540602.2013.827453

Brown, G. T. L. (2004). Teachers' conceptions of assessment: Implications for policy and professional development. *Assessment in Education Principles Policy and Practice*, *11*(3), 301–318. https://doi.org/10.1080/0969594042000304609

Brown, G. T. L., & Harris, L. R. (Eds.). (2016). *Handbook of human and social factors in assessment*. Routledge.

Cardinal, T., Murphy, M. S., Huber, J., & Pinnegar, S. (2022). (Re) making assessment in the trans-systemic space shaped in the meeting of personal, Indigenous, and relational ways of knowing and being. *Studying Teacher Education, 1*(18), https://doi.org/10.1080/17425964.2022.2137127.

Daniels, L. M., Goegan, L. D., Radil, A. I., & Frohlich, J. R. (2020). Simultaneously student and teacher: measuring achievement goals in preservice teachers. *The Journal of Experimental Education*, *88*(1), 165-182. https://doi.org/10.1080/00220973.2018.1543641

Daniels, L. M., & Poth, C. A. (2017). Relationships between pre-service teachers' conceptions of assessment, approaches to instruction, and assessment: An achievement goal theory perspective. *Educational Psychology, 37*(7), 835–853. DOI:10.1080/01443410.2017.1293800

Darling-Hammond, L., & Baratz-Snowden, J. (2007). A good teacher in every classroom: Preparing the highly qualified teachers our children deserve. *Educational Horizons*, *85*(2), 111–132.

Darling-Hammond, L., Hammerness, K., Grossman, P., Rust, F., & Shulman, L. (2005). The design of teacher education programs. In L. Darling-Hammond & J. Bransford (Eds.), *Preparing teachers for a changing world: What teachers should learn and be able to do* (pp. 390-44). Jossey-Bass.

DeLuca, C., Chavez, T., Bellara, A., & Cao, C. (2013). Pedagogies for preservice assessment education: Supporting teacher candidates' assessment literacy development. *The Teacher Educator, 48*(2), 128-142. https://doi.org/10.1080/08878730.2012.760024

DeLuca, C. & Klinger, D. A. (2010). Assessment literacy development: Identifying gaps in teacher candidates' learning, *Assessment in Education: Principles, Policy & Practice, 17*(4), 419-438. https://doi.org/10.1080/0969594X.2010.516643

D'Mello, S. K., Lehman, B., Pekrun, R., & Graesser, A. C. (2014). Confusion can be beneficial for learning. *Learning and Instruction, 29*, 153–170. doi:10.1016/j.learninstruc.2012.05.003

Education International & UNESCO. (2019). *Global Framework of Professional Teaching Standards.* Retrieved on October 28, 2022, from: https://www.ei-ie.org/en/item/25734:global-framework-of-professional-teaching-standards

Edwards, F. (2021). The influence of emotion on preservice teachers as they learn to assess student learning. *Australian Journal of Teacher Education (Online)*, *46*(4), 16-34. http://dx.doi.org/10.14221/ajte.2021v46n4.2

Edwards, F. (2017). A rubric to track the development of secondary pre-service and novice teachers' summative assessment literacy, *Assessment in Education: Principles, Policy & Practice, 24*:2(2), 205-227. https://doi.org/10.1080/0969594X.2016.1245651

Ferguson, K., Frost, L., & Hall, D. (2012). Predicting teacher anxiety, depression, and job satisfaction. *Journal of Teaching and Learning*, *8*(1), 27-42.

Frenzel, A. C., Daniels, L., & Burić, I. (2021). Teacher emotions in the classroom and their implications for students. *Educational Psychologist*, *56*(4), 250-264. https://doi.org/10.1080/00461520.2021.1985501

Gogol, K., Brunner, M., Goetz, T., Martin, R., Ugen, S., Keller, U., Fishbach, A., & Preckel, F. (2014). "My questionnaire is too long!" The assessments of motivational-affective constructs with three-item and single-item measures. *Contemporary Educational Psychology*, *39*(3), 188-205. https://doi.org/10.1016/j.cedpsych.2014.04.002

Guskey, T. R., & Link, L. J. (2019). Exploring the factors teachers consider in determining students' grades. *Assessment in Education: Principles, Policy & Practice*, *26*(3), 303-320. https://doi.org/10.1080/0969594X.2018.1555515

Hemphill, L. S., & Hemphill, H. H. (2007). Evaluating the impact of guest speaker postings in online discussions. *British Journal of Educational Technology*, *38*(2), 287–293. https://doi-org.login.ezproxy.library.ualberta.ca/10.1111/j.1467-8535.2006.00622.x

JASP Team. (2022). JASP (Version 0.16.3)[Computer software].

Leighton, J. P. (2017). *Using think-aloud interviews and cognitive labs in educational research*. Oxford University Press.

Lodge, J. M., Kennedy, G., Lockyer, L., Arguel, A., & Pachman, M. (2018). Understanding difficulties and resulting confusion in learning: An integrative review. *Frontiers in Education*, *3*. https://doi.org/10.3389/feduc.2018.00049

Mayorga, E., & Picower, B. (2018). Active solidarity: Centering the demands and vision of the Black Lives Matter movement in teacher education. *Urban Education*, *53*(2), 212-230. https://doi.org/10.1177/0042085917747117

Mertler, C. A. (2009). Teachers' assessment knowledge and their perceptions of the impact of classroom assessment professional development. *Improving Schools*, *12*(2), 101–113.

Muis, K. R., Chevrier, M., Denton, C. A., & Losenno, K. M. (2021). Epistemic emotions and epistemic cognition predict critical thinking about socio-scientific issues. *Frontiers in Education*, *6*. https://doi.org/10.3389/feduc.2021.669908

Muis, K. R., Chevrier, M., & Singh, C. A. (2018). The role of epistemic emotions in personal epistemology and self-regulated learning. *Educational Psychologist*, *53*(3), 165–184. https://doi.org/10.1080/00461520.2017.1421465

Muis, K. R., Pekrun, R., Sinatra, G. M., Azevedo, R., Trevors, G., Meier, E., & Heddy, B. C. (2015a). The curious case of climate change: Testing a theoretical model of epistemic beliefs, epistemic emotions, and complex learning. *Learning & Instruction*, *39*, 168–183. https://doi.org/10.1016/j.learninstruc.2015.06.003

Muis, K. R., Psaradellis, C., Lajoie, S. P., Di Leo, I., & Chevrier, M. (2015b). The role of epistemic emotions in mathematics problem solving. *Contemporary Educational Psychology*, *42*, 172–185. https://doi-org/10.1016/j.cedpsych.2015.06.003

Nerantzaki, K., Efklides, A., & Metallidou, P. (2021). Epistemic emotions: Cognitive underpinnings and relations with metacognitive feelings. *New Ideas in Psychology*, *63*. https://doi-org/10.1016/j.newideapsych.2021.100904

Nichols, S. L. & Varier, D. (Eds.). (2021). *Teaching on Assessment.* Information Age Publishing, Incorporated.

Ostorga, A. N., & Farruggio, P. (2013). The use of a virtual guest speaker as a catalyst for deep learning. *Procedia-Social and Behavioral Sciences*, *93*, 2144-2151.

Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review,* 315-341.

Pekrun, R., Goetz, T., Perry, R. P., Kramer, K., Hochstadt, M., & Molfenter, S. (2004). Beyond test anxiety: Development and validation of the test emotions questionnaire. *Anxiety, Stress, and Coping*, *17*(3), 287–316.

Pekrun, R., Murayama, K., Marsh, H. W., Goetz, T., & Frenzel, A. C. (2019). Happy fish in little ponds: Testing a reference group model of achievement and emotion. *Journal of*

Personality and Social Psychology, *117*(1), 166–185. https://doi.org/10.1037/pspp0000230

Pekrun, R., Vogl, E., Muis, K. R., & Sinatra, G. M.. (2017). Measuring emotions during epistemic activities: The epistemically-related emotion scales. *Cognition and Emotion*, *31*(6), 1268-1276. https://doi-org/10.1080/02699931.2016.1204989

Pengnate, S. (2019). Shocking secret you won't believe! Emotional arousal in clickbait headlines: an eye-tracking analysis. *Online Information Review*, *43*(7), 1136-1150.

Popham, W. J. (2003). Seeking redemption for our psychometric sins. *Educational Measurement: Issues and Practice, 22*(1), 45-48.

Rasooli, A., Zandi, H., & DeLuca, C. (2019). Conceptualising fairness in classroom assessment: Exploring the value of organisational justice theory. *Assessment in Education: Principles, Policy & Practice*, *26*(5), 584-611. https://doi.org/10.1080/0969594X.2019.1593105

Reeve, J. (2016). Autonomy-supportive teaching: What it is, how to do it. *Building autonomous learners: Perspectives from research and practice using self-determination theory*, 129-152.

Rogers, T. W. (1993). *Principles for fair student assessment practices for education in Canada*. University of Alberta, Center for Research in Applied Measurement and Evaluation.

Schutz, P. A., & Davis, H. A. (2000). Emotions and self-regulation during test taking. *Educational Psychologist*, *35*(4), 243–256. https://doi-org/10.1207/S15326985EP3504_03

Shin, D. D., & Kim, S. I. (2019). Homo curious: Curious or interested? *Educational Psychology Review, 31*(4), 853-874. https://doi.org/10.1007/s10648-019-09497-x

Steinberg, C. (2008). Assessment as an "emotional practice." *English Teaching: Practice and Critique*, *7*(3), 42-64.

Steinhauer, E., Cardinal, T., Higgins, M., Madden, B., Steinhauer, N., Steinhauer, P., Underwood, M., Wolfe, A., & Cardinal, B. (2020). Thinking with Kihkipiw: Exploring an Indigenous Theory of Assessment and Evaluation for Teacher Education. In S. Cote-Meek, & T. Moeke-Pickering (Eds.), *Decolonizing and Indigenizing Education in Canada* (pp. 73-90). Canadian Scholars.

Stough, L. M., & Emmer, E. T. (1998). Teachers' emotions and test feedback. *International Journal of Qualitative Studies in Education*, *11*(2), 341–361.

Trevors, G. J., Muis, K. R., Pekrun, R., Sinatra, G. M., & Winne, P. H. (2016). Identity and epistemic emotions during knowledge revision: A potential account for the backfire effect. *Discourse Processes, 53*(5-6), 339-370. https://doi.org/10.1080/0163853X.2015.1136507

Vogl, E., & Pekrun, R. (2016). Emotions that matter to achievement: Student feelings about assessment. In G. Brown & L. Harris (Eds.), *Handbook of human and social conditions in assessment* (pp. 111-128). Routledge.

Vogl, E., Pekrun, R., Murayama, K., & Loderer, K. (2020). Surprised-curious-confused: Epistemic emotions and knowledge exploration. *Emotion*, *20*(4). https://doi-org/10.1037/emo0000578

Vogl, E., Pekrun, R., Murayama, K., Loderer, K., & Schubert, S. (2019). Surprise, curiosity, and confusion promote knowledge exploration: Evidence for robust effects of epistemic emotions. *Frontiers in Psychology*, *9*. https://doi-org/10.3389/fpsyg.2019.02474

Wearmouth, J., Smith, A. P., & Soler, J. S. (2004). Computer conferencing with access to a "guest expert" in the professional development of special educational needs coordinators. *British Journal of Educational Technology*, *35*(1), 81–93.

Yu, S., Zheng, Y., Jiang, L., Liu, C., & Xu, Y. (2021). I even feel annoyed and angry?: Teacher emotional experiences in giving feedback on student writing. *Assessing Writing*, *48*. https://doi-org/10.1016/j.asw.2021.100528

Table 1

Descriptive Statistics for all Study Variables

	Teacher Talk Videos n = 182					Grading Activity n = 174				
	M	*SD*	Range	Skew	Kurtosis	*M*	*SD*	Range	Skew	Kurtosis
Frustration	1.95	.79	1-4	.56	-.05	2.85	1.18	1-5	.11	-.88
Curiosity	3.44	.92	1-5	-.50	.03	3.69	.86	1-5	-.86	1.08
Surprise	3.24	.82	2-5	.03	-.70	2.70	.89	1-5	-.24	-.40
Learning	3.41	.84	1-5	-.23	-.42	3.25	.98	1-5	-.53	-.32
Application	3.84	.80	2-5	-.55	.08	3.98	.80	1-5	-1.02	1.90

Table 2

Pearson Zero-Order Correlation Matrix

	1	2	3	4	5	6	7	8	9
1. TT Frustration									
2. TT Curiosity	-.40								
3. TT Surprise	-.22	.44							
4. TT Learning	-.45	.52	.35						
5. TT Application	-.49	048	.41	.56					
6. GR Frustration	.17	-.11	-.12	-.14	-.11				
7. GR Curiosity	-.15	.17	.17	.23	.17	.15			
8. GR Surprise	.003	.20	.24	.09	.14	.29	.36		
9. GR Learning	.11	-.02	-.08	-.20	.12	-.27	.11	.07	
10. GR Application	-.10	-.003	.14	.11	.27	-.17	.26	-.01	.43

Note. TT = Teacher Talk Videos, n = 179-182; GR = Grading Activity, n = 170-171; TT and GR n = 146-150; r > +/- .15, p < .05

Table 3

Results of Path Models

	Teacher Talk Videos		Grading Activity	
Predictors	Learning	Application	Learning	Application
	β [95% CI]	β [95%CI]	β [95% CI]	β [95% CI]
Frustration	-.30 [-.44,-.17]	-.35 [-.48,-.22]	-.28 [-.41,-.16]	-.14 [-.24, -.04]
Curiosity	.32 [.19,.45]	.21 [.08,.32]	.09 [-.08, .26]	.29 [.15, .43]
Surprise	.14 [.003,.28]	.23 [.10,.36]	-.05 [-.22, .13]	-.06 [-.20, .08]
R^2	.36	.38	.12	.12

Figure 1

Conceptual Model Linking Study Variables in Pre-service Teacher Learning about Assessment

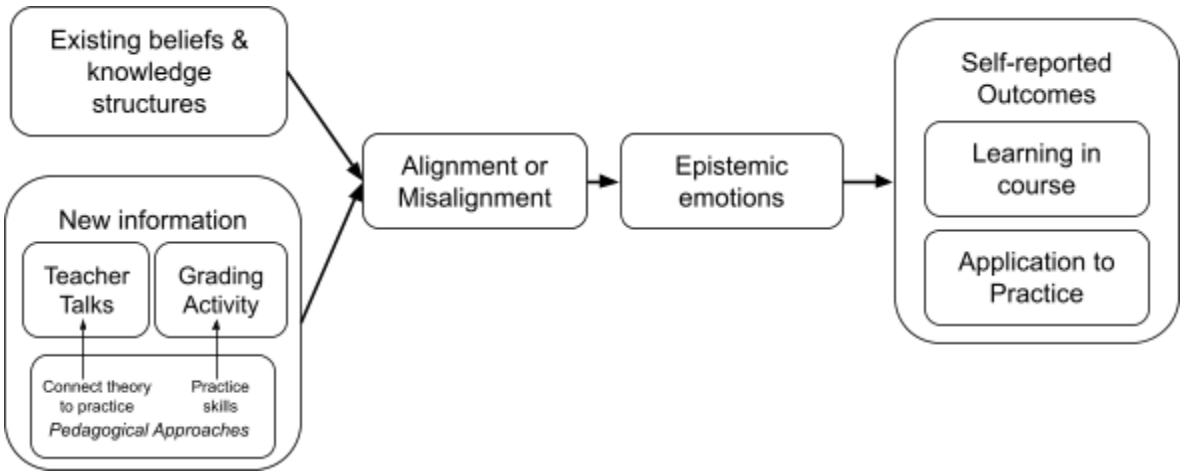


Figure 2

Materials for Teacher Talk Videos Learning Experience from Topic 10 Application Activity

Syllabus Description of Teacher Talks: To maximize the relevance of the topics in our course to your practicum, I interviewed current teachers so you can hear how they enact these topics in their classrooms.

Descriptor accompanying each video: The "Teacher Talks" Videos are one way that I have tried to bridge the theory with practice. I am thankful for these teachers' time and perspectives.

Overview of video content and duration by interviewee:

Course Topic	Duration of Video Clip	Subject/Grades Taught by Interviewee	# Years Teaching	Gender
Goals and Functions of Assessment	5:34	Grade 8/9 ELA	4	Man
Validity and Reliability	5:18	Grades 11/12 Social Studies	12	Woman
Summative and Formative Assessment	8:06	Band/Math	30	Woman
Motivating with Assessment	4:43	Grades 7-9 Spanish	18	Woman
Equity and Fairness	6:43	11/12 Social Studies	12	Woman
Success and Cheating	8:01	Social Studies, Robotics	11	Man
Planning for Assessment	8:58	Grade 4, Junior High	2	Man
Selected Response Tests	5:34	Grades 10-12 Math	18	Woman
Performance Assessment	4:08	Grades 7-9 Spanish	18	Woman
Giving and Using Feedback	11:08	Band/Math	30	Woman
Grading and Reporting	7:16	Grades 10-12 Math	18	Woman

Topic 10 Instructions: We've been making Teacher Talks and not really had a chance to get your perspective on them. We'd like you to answer the following questions and then if you are willing consent for your responses to be used for research purposes.

Figure 3

Materials for Grading Activity Learning Experience from Topic 11 Application Activity

Topic 11 Instructions: I want to give you a chance to practice your professional judgment. This might be really hard. You might change your answers along the way. You might want to make notes for how you would change your assessment practices in the future. But for the moment imagine that this is the information you have on students at the end of the reporting term and it's time for a report card.

Gradebook Information

Raw Scores

	Graded Homework/10								Exams/50	
Wafiya	6	5	6	7	7	8	8	9	30	38
Rebecca	4	5	5	7	6	8	9	10	26	38
Avery	10	10	0	10	10	0	0	10	48	42
Vinudi	9	8	9	8	8	9	9	9	26	28
Yusif	10	10	9	8	8	9	7	7	48	34
Benjamin	5	7	8	7	8	9	8	9	23	40
Class avg	7.3	7.5	6.2	7.8	7.8	7.2	6.8	9.0	33.5	36.7

Percentages

	All Quizzes	All Exams
Wafiya	70	68
Rebecca	67.5	64
Avery	62.5	90
Vinudi	86.25	54
Yusif	85	82
Benjamin	76.25	63

Behavioural notes

Attendance	Participation
1 absence	high
4 absence	some
14 absence	interruptive
0 absence	some
0 absence	quiet
2 absence	high

Based on the following standards for evaluation, what final letter grade would you assign to each student?

Written Performance Descriptors	Letters	Percentages
The student has demonstrated exemplary performance in relation to the learner outcomes.	A	80 - 100
The student has demonstrated proficient performance in relation to the learner outcomes.	B	65 - 79
The student has demonstrated adequate performance in relation to the learner outcomes.	C	50 - 64
The student has demonstrated limited performance in relation to the learner outcomes.	D	0 - 49

Figure 4

Self-reported Estimate of Teacher Talks Watched

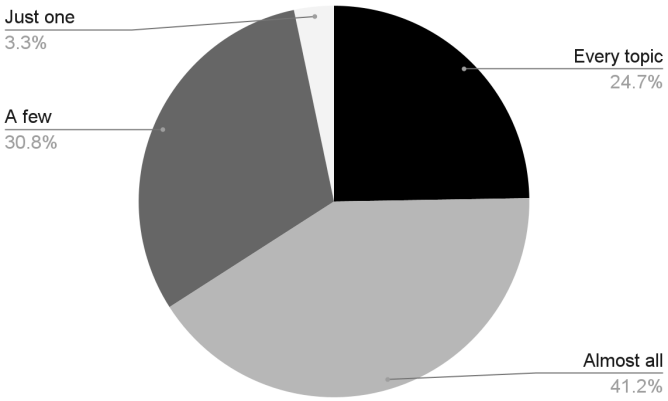
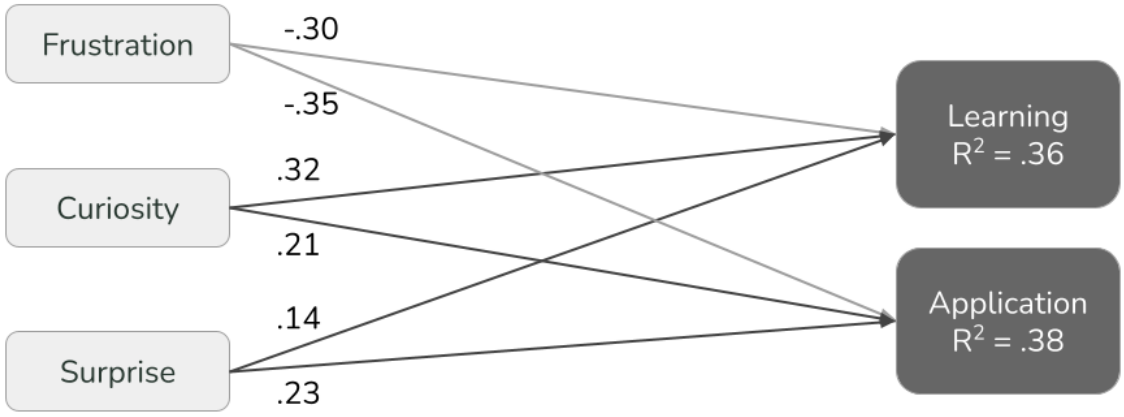


Figure 5

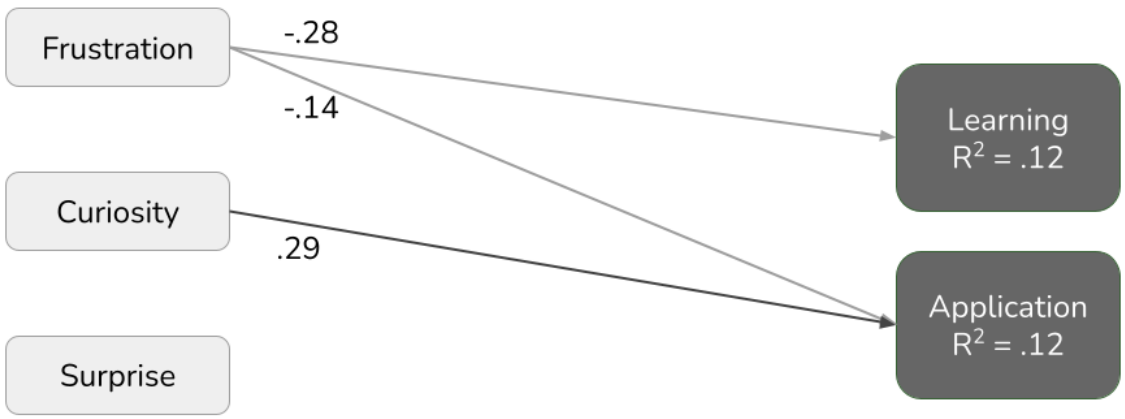
Path Diagram for Teacher Talks



Note: All paths are $p < .05$

Figure 6

Path Diagram for Gradebook Activity



Note: All paths are $p < .05$