Received 24 May 2023
Revised 7 September 2023
Accepted 11 September 2023

Cognitive appraisals and information-seeking achievement emotions: a qualitative study of Swedish primary teacher students

Claes Dahlqvist
Abo Akademi University, Turku, Finland and Kristianstad University, Kristianstad, Sweden, and
Christel Persson
Kristianstad University, Kristianstad, Sweden

Abstract

Purpose – Primary teachers play a vital role in fostering pupils' successful futures. Therefore, gaining knowledge of primary teacher students' learning processes, including the achievement of information-seeking skills, is crucial. The aim of this paper is to understand better the interplay between cognitive appraisals and emotions in the constructivist process of learning and achieving information-seeking skills.

Design/methodology/approach – In-depth semi-structured interviews were conducted with six Swedish primary teacher students. The analysis of qualitative data was deductive and theory-driven, guided by Kuhlthau's information search process model, Scherer's semantic space of emotions and Pekrun's control-value theory of achievement emotions.

Findings – Anger/frustration, enjoyment and boredom were identified as activity emotions and anxiety, hopelessness and hope as prospective outcome emotions. The retrospective outcome emotions found were pride, joy, gratitude, surprise and relief. The appraisals eliciting the achievement emotions were the control appraisals uncertainty/certainty (activity and prospective outcome) and oneself/other (retrospective), and value appraisals negative/positive intrinsic motivation (activity) and failure/success (prospective and retrospective). The interplay between appraisals and emotions was complex and dynamic. The processes were individually unique, non-linear and iterative, and the appraisals did not always elicit emotions.

Originality/value – The study has theoretical and methodological implications for information behaviour research in its application of appraisal theories and the Geneva affect label coder. In addition, it has practical implications for academic librarians teaching information-seeking skills.

Keywords Information-seeking behaviour, Information literacy, Information-seeking skills, Information-seeking emotions, Achievement emotions, Primary teacher students

Paper type Article

Introduction

Teachers play a vital role in shaping and preparing pupils for successful futures, fostering their wellbeing and promoting civic engagement and social responsibility. Educating teacher students—future teachers—and understanding their learning and achievement processes appears in this light to be of fundamental importance. This understanding also applies to the learning of information literacies, essential for successful studies and future practices, as manifested in information literacy frameworks for higher education (e.g. ACRL, 2015; Bent and Stubbings, 2011).

Journal of Documentation
Vol. 79 No. 7, 2023
pp. 280-307
Emerald Publishing Limited
0022-0418
DOI 10.1108/JD-05-2023-0100

In this article, primary teacher students' achievement of information-seeking skills is explored. As future teachers, the students will teach pupils in their first critical formative years in school. Gaining knowledge of their learning processes, including the achievement of information-seeking skills, therefore appears particularly necessary. Information-seeking skills are conceptualised as enacted abilities and normative objects of learning and a core information literacy, in accordance with a well-established definition of information literacy as the ability to identify the need for, seek, critically evaluate and use information (Limberg *et al.*, 2012; Lloyd, 2017).

The motivation for the study began with an observation of how emotional the seeking and learning process is and how accurately Kuhlthau's (1988a, 1988b) constructivist information search process (ISP) describes it. In addition, the model sparked a curiosity of how the cognitive (thoughts) and affective (feelings) process in it interplay. To understand the interplay, the study turned to appraisal theories for explanation, interpretation and deeper insights.

Literature review

Everyone experiences emotions and can relate to them. However, defining emotions, as the appraisal theorist Scherer (2005, p. 695) described it, is a "notorious problem" and there is no consensus among researchers. In an attempt to define emotions, Shuman and Scherer (2014, pp. 15–16) suggested that emotions are short-lived episodes or events of significance for the individual that:

> . . . consist of multiple components: a subjective feeling component, a motor component, a physiological component, an action tendency component, a motor activity component, and an appraisal component.

From this definition, it follows that emotions can have biological, neurological and physiological theoretical underpinnings. Acknowledging these, the study focuses on the appraisal component, **the cognitive evaluation of a situation of significance for the individual** and how appraisal theories explain the nature of emotions. In cognitive psychology, appraisal theories assume how emotions are driven by appraisals, which affect the other components. Changes in appraisal impact the other components. The extent to which emotions contribute to the individual's wellbeing—positive/pleasant or negative/unpleasant—is appraised. If negative, further appraisal takes place, leading to more multi-dimensional emotional states (Ellsworth and Scherer, 2003; Lazarus and Smith, 1988; Shuman and Scherer, 2014).

Researchers (e.g. Pekrun, 2019; Pekrun and Linnenbrink-Garcia, 2014) have noted that studies of the role of emotions in learning processes have increased the last 30 years, in particular in higher education and from an educational psychology perspective. Two handbooks (Schutz and Pekrun, 2007; Pekrun and Linnenbrink-Garcia, 2014) are examples of this growing interest, as well as seminal appraisal theory contributions such as Linnenbrink and Pintrich (2002) asymmetrical bidirectional model and Pekrun (2006) control-value theory of achievement emotions.

Emotions have also been the object of investigation in library and information science (LIS) research. Nahl and Bilal (2007) even foresaw an affective "paradigm" in LIS back in 2007, and Hartel (2019) later identified an affective "turn" in information behaviour (IB) research. However, there is still a limited body of literature on emotions, as noted by several researchers (e.g. Dahlqvist, 2021a, b and 2022; Krakowska, 2020; Lopatovska and Arapakis, 2011; Savolainen, 2015a; Savolainen, 2015b). Despite this lack of research, there are several valuable LIS and IB contributions.

Nahl (2007b) identified four IB research areas studying affective behaviours. The impact of social and cultural contexts on cognitive-affective relationships has been investigated, as well as emotions' control of cognitive operations. Affective neuroscience is another area in which brain and neural system functions are explored, informed by biological explanations, along

with the area of affective computing and human–computer interaction (HCI) where the implications of affective behaviours for designing information technology systems are studied.

Lopatovska and Arapakis (2011) offered an LIS literature review focusing on information systems, information retrieval and HCI. Theories of emotions applied are categorised after the structure and manifestation of emotions: the discrete and the continuous. In the discrete approach, researchers argue that there are several basic general emotions. In the continuous approach, emotions are represented in multi-dimensional spaces wherein levels of arousal and valence are of interest.

In a more recent review of IB studies of affective phenomena research by Krakowska (2020), the frequency of terms used in the literature was thematically clustered in categories. Information searching and seeking appeared rather frequently in the 35 identified articles, as well as high school and doctoral students. Another category identified was Kuhlthau's ISP model.

In another review, Dahlqvist (2021a, b and 2022) thematically analysed teacher students' information-seeking behaviours and information literacies, with a focus on information-seeking emotions. Four studies were identified. New students' emotional experiences were studied in a qualitative study and compared with Master's students and information experts (Tabatabai and Shore, 2005). In the others (Canan Gungoren *et al.*, 2019; Çevik, 2015; Chen *et al.*, 2019), teacher students' feelings, thoughts and intentions in relation to their perceived searching strategy skills were investigated.

Previous conceptual discussions and applications of appraisal theories in LIS are even more limited, particularly in information-seeking behaviour research. Nahl (2005) contribution stands out with her affective load theory (ALT). Uncertainty and time pressure experienced are the appraisals that determine emotions, which impact cognitive processes. Savolainen's conceptual works also offer some insights that draw on appraisal theories. Kuhlthau's information search process model is scrutinised in one study (Savolainen, 2015a) and compared to Nahl (2007a) social-biological information technology model in another (Savolainen, 2015b). In a review, Savolainen (2016) applied an appraisal theory framework to analyse affective barriers and their impact on information-seeking activities.

Theoretical framework

The overarching meta-theory guiding the study is cognitive constructivism. The students' individual achievement processes are understood as processes of making sense of and constructing meaning of the world based on their own experiences (Case and Given, 2016; Talja *et al.*, 2005).

More specifically, Kuhlthau's ISP model, which is built on constructivist learning theories (Bruner, 1986; Dewey, 1933; Kelly, 1963), provides the study with an LIS and IB understanding of cognitive and affective experiences in the learning process. The semantic space of emotions (SSE) and the control-value theory of achievement emotions (CVT) contribute with explanations of the interplay between the realms of thoughts and feelings in the ISP model from an appraisal theory perspective. The relevance of applying SSE and CVT in relation to the achievement of information-seeking skills, has been discussed more thoroughly elsewhere (Dahlqvist, 2021a, b and 2022).

Information search process model

Informed by the constructivist learning process, Kuhlthau's ISP model describes the information-seeking process in stages, including the processes of cognitive and affective experiences. Initially developed from a qualitative study of American high school students (Kuhlthau, 1988a), the model was later verified through larger scale studies (Kuhlthau, 1989) and confirmed through longitudinal investigations of students' experiences after four years of college (Kuhlthau, 1988b, c). The latest version includes six stages, integrating the processes of the cognitive and affective realms. Figure 1 illustrates the model, focusing on the processes of the realms of feelings and thoughts (Kuhlthau, 1988c, p. 421).

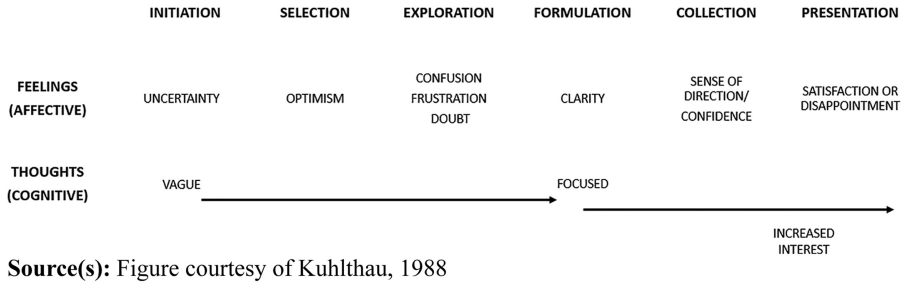
Besides providing the study with the notion of seeking and learning as a constructivist process involving the processes of thoughts and feelings, the ISP model offer concepts to identify appraisals and emotions.

The semantic space of emotions

Scherer (2005) proposed that Russell's (1980) classic two-dimensional circumplex model of emotion, which includes valence (negative-positive) and intensity (calm-arousal) appraisal dimensions, could be enhanced by adding appraisals of control (low-high) and expected goal attainment (conducive-obstructive). This addition result in a four-dimensional model, the semantic space of emotions (SSE). A modified version (Scherer, 2005, p. 720) is presented in Figure 2.

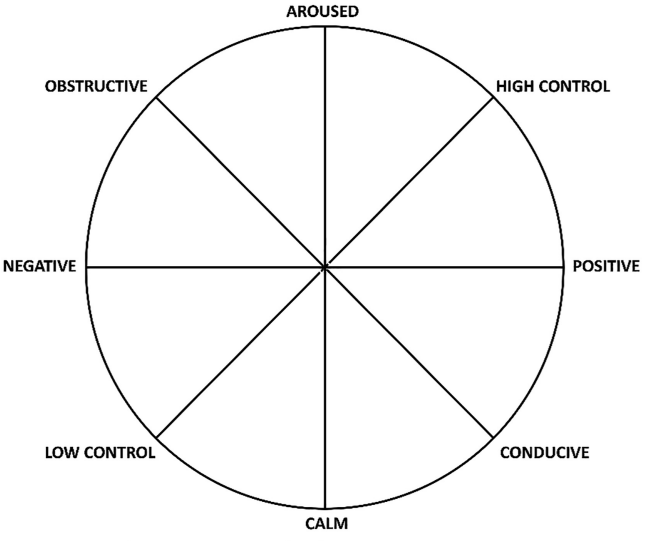
According to Scherer (2005), natural language expressions of emotions, the subjective feeling component, are the best way to capture the qualitative variation of emotions. The expression of specific feelings has its location in the SSE and is defined by its quality across the bipolar dimensions.

The ambition of the SSE was to capture all affective experiences. The close relationship between appraisals and emotions means that appraisals are also found in SSE and provide the study with appraisal concepts in addition to the explanation above derived from appraisal theory. The study also applies the SSE's notion of emotion categories, meaning that there are



Source(s): Figure courtesy of Kuhlthau, 1988

Figure 1. Kuhlthau's information search process (ISP) model



Source(s): Figure courtesy of Scherer 2006

Figure 2. Scherer's semantic space of emotions (SSE)

qualitative variations not only between appraisals and emotions, but also within categories. These affect categories are found in the SSE's complementary methodology tool, the Geneva affect label coder (GALC) (Scherer, 2005, pp. 714–715), which is also used in the study.

The control-value theory of achievement emotions

Pekrun (2006) control-value theory of achievement emotions (CVT), with some modifications (Pekrun *et al.*, 2007; Pekrun and Perry, 2014), integrates several theoretical approaches (e.g. motivational and expectancy theories). The basic assumption of CVT is that emotions have a fundamental impact on the achievement process, where positive emotions have a positive effect and negative emotions a negative effect. Another assumption is that this process involves certain emotions that otherwise would not be present; a third is that these achievement emotions are the result of control and value appraisals.

Pekrun and Perry (2014, p. 320) defined achievement emotions as "tied directly to achievement activities (e.g. studying) or achievement outcomes (success and failure)", and there are three types. Achievement activity emotions are experienced when the attentional focus is on activities and actions. When directed towards a future expected (prospective) or past experienced (retrospective) outcome, achievement outcome emotions are experienced. Specific structures of interplay between appraisals are posited to determine specific achievement emotions. These relationships are shown in Tables 1, 2 and 3 (Pekrun, 2006, p. 320).

Table 1. Prospective outcome emotions with appraisals

Object focus	Outcome expectancy (value)	Outcome control expectancy (control)	Emotions
Outcome, prospective	Success	High	*Anticipatory joy*
		Medium	*Hope*
		Low	*Hopelessness*
	Failure	High	*Anticipatory relief*
		Medium	*Anxiety*
		Low	*Hopelessness*

Source(s): Table courtesy of Pekrun, 2006

Table 2. Retrospective outcome emotions with appraisals

Object focus	Outcome value	Causes of control	Emotions
Outcome, retrospective	Positive – Success	Irrelevant	*Joy*
		Self	*Pride*
		Other	*Gratitude*
	Negative – Failure	Irrelevant	*Sadness*
		Self	*Shame*
		Other	*Anger*

Source(s): Table courtesy of Pekrun, 2006

Table 3. Activity emotions with appraisals

Object focus	Intrinsic value	Control	Emotions
Activity	Positive	High	*Enjoyment*
	Negative	High	*Anger*
	Positive/Negative	Low	*Frustration*
	None	Low	*Boredom*

Source(s): Table courtesy of Pekrun, 2006

For prospective outcome emotions, the value appraisals—expected success and failure—interact with control appraisals of the expected outcome on different levels. Together, they elicit specific emotions (see Table 1).

Retrospective outcome emotions (see Table 2) are experienced after the achievement of learning outcomes. The emotion experienced is a joint product of positive (success) and negative (failure) experienced values and causes of controllability.

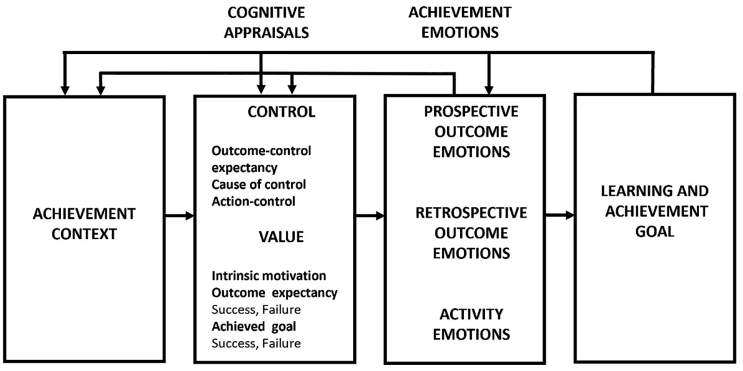
Activity emotions (see Table 3) are tied to the activity itself. Specific emotions are functions of the perceived ability to control actions and the inner motivation of performing the activities, or their subjective intrinsic values.

Figure 3 show an adopted version (Pekrun, 2006, p. 328) of the structure of CVT with the elements of achievement context, cognitive appraisals, achievement emotions and learning and achievement. The achievement context shapes appraisals and emotions, which impact learning processes and outcomes. Reciprocal causation and feedback loops between the elements tie the elements non-linearly. For example, increased perceived control generates positive emotions, which feed back into and enhance control appraisals that, in turn, result in more and higher intensity positive emotions, beneficial for learning and the achievement of goals. Conversely, low control appraisals resulting in negative emotions can impede learning outcomes through feedbacks loops. The feedback loops imply that untargeted appraisals and negative emotions can have a long-term negative impact on learning and achievement.

The CVT constitutes the study's tool for analysing the interplay between cognitive appraisals (hereafter also referred to as appraisals) and achievement emotions. Its concepts and explanations of the interplay between the cognitive and affective behaviours guide the analysis and interpretation of the results.

Aim and research questions

The aim of the study is to increase understanding of primary teacher students' learning processes. Their vital future role as educators of pupils in their first formative years is crucial to understand. In particular, the study aims to gain deeper knowledge of the interplay between cognitive and affective behaviours in the processes of achieving information-seeking skills in formal higher education contexts. To get this deeper understanding, Swedish primary teacher students are studied with the guidance of appraisal theory explanations and concepts. The research questions (RQ) the study seeks answers to are as follows.



Source(s): Figure courtesy of Pekrun, 2006

Figure 3.
Control-value theory of achievement emotions (CVT)

RQ1. What cognitive appraisals and information-seeking achievement emotions are Swedish primary teacher students experiencing in the process of achieving information-seeking skills?

RQ2. How do cognitive appraisals and information-seeking achievement emotions interplay in the process of achieving information-seeking skills?

RQ3. What characterises the interplay between cognitive appraisals and information-seeking achievement emotions in the process of achieving information-seeking skills?

Method

With the ambition to explore and discover and to obtain an in-depth and nuanced understanding of the students' cognitive appraisals and information-seeking emotions, a qualitative approach was chosen.

Students from one and the same course were followed with the aim of discovering qualitative variations in an identical achievement context. They were followed for ten weeks, and although the time frame was short, the process approach shares similarities with qualitative longitudinal methods. Longitudinal qualitative studies are especially applicable to obtain in-depth data from the same individuals on several occasions, capturing "real time" experiences in temporal and dynamic processes over time. To generate such rich data, individual in-depth interviews are suitable (Neale, 2020). This verbal communication, where the interviewer, by asking questions, obtains information from an informant, is a well-established method to capture people's experiences and understanding of the world through their words and natural language expressions. With the aim of getting qualitatively rich data capturing students' subjective and individually unique experiences in the processes, semi-structured interviews were employed. The less structured interviews allowed the students to elaborate freely and reflect on open-ended questions and topics (Kvale, 1996).

Participants and setting

The participants were students enrolled on a course in a primary teacher education programme at a Swedish university. The aim of the ten-week course was to conduct a knowledge overview (KO), the literature review part of the exam thesis. **The requirements of the exam thesis entailed that the students should conduct independent research on individually (or in pairs) chosen subjects of interest.**

The course's 25 students were invited to participate during the course introduction and informed of the aim of the study and the conditions for participating. Given the longitudinal process approach, with the aim of generating rich and qualitative data on several occasions with the same students, a small sample size with five to ten students was considered sufficient (Neale, 2020). Six students, one male and five females, agreed to participate and signed an informed consent. They were given anonymised names. Four of the students conducted the KO in pairs. Thus, four KOs were followed. In Table 4, the four KOs are shown with names. Jane conducted the KO together with another student, not part of the study.

Week	1	2	3	4	5	6	7	Follow up	
Jane	63 min	55 min	55 min	35 min	17 min	27 min	–	19 min	4 h 31 min
Ann/Tom	54 min	59 min	55 min	66 min	62 min	56 min	50 min	40 min	7 h 22 min
Sue/Pam	55 min	50 min	56 min	59 min	64 min	57 min	63 min	26 min	7 h 10 min
Ruth	58 min	53 min	57 min	64 min	61 min	62 min	65 min	24 min	7 h 24 min
								Total	26 h 27 min

Table 4.
Interview occasions for each KO with students and duration

Source(s): Table by authors

Learning activities during the course were lectures, supervisor meetings and final seminars with defence and opposition of the KOs (see Figure 4). Instructions, assessment criteria, achievement goals and learning materials were available in the learning management system (LMS). The first author led the information-seeking skills lecture, having a peripheral role, which was clearly stressed, meaning no contact with teachers and supervisors and no involvement in learning design, supervision and assessment.

The information-seeking skills achievement goal was formulated as follows: after completion of the course, the students should be able to seek information in a structured way and make a relevant selection of research within the chosen research area.

Data collection

Data were collected during the COVID-19 pandemic in the spring of 2021. The students were followed during the course for ten weeks and interviewed on seven to eight occasions, resulting in 31 interviews (see Table 4). The interviews were conducted via Zoom, resulting in digital audio files, which were transcribed. The transcripts were translated from Swedish to English and lightly edited, leaving out phrases irrelevant to the conversation such as fillers (e.g. uh, um, eh), pauses and repetitions.

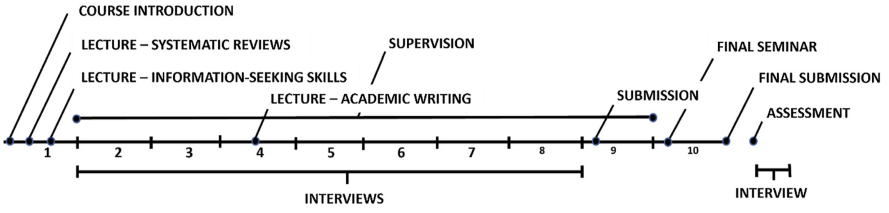
The students were asked to describe their emotional experiences during the past week in relation to information-seeking activities and the task with its achievement goal. No strict interview guide was followed. The interviews were relaxed, informal conversations, **allowing the flexible capture of the individuals' experiences at specific points in time.**

Data analysis and coding

Data analysis is a creative process where the researcher moves between inductive and deductive approaches, interpreting and analysing the qualitative data (Merriam and Tisdell, 2015). The analysis was deductive and theory-driven, though involving inductive elements. NVivo was used in the process for coding and categorising. The process required high levels of interpretation and considerations along the way, as acquaintance with the data evolved with several rounds of merging and splitting codes.

In the first step, students' feelings, the subjective emotional experience and appraisals were inductively coded verbatim, or "in vivo", as Saldaña (2013) **labels it**. He also **identifies** emotion coding as a specific type of coding where vocality—how something is expressed—plays a role. In the study, vocality was a factor to some extent. In the second step, feelings and appraisals were deductively categorised (see Appendix, Tables A1 and A2) in accordance with the GALC (Scherer, 2005, pp. 714–715).

In the third step, metaphors and phrases/words were identified and coded, deduced from the affect categories found in the previous step. In the next steps, four and five, the affect categories were translated to equivalent achievement emotions in CVT, and, in turn, to the achievement emotions finally identified in the study (see Table 7).



Source(s): Figure by authors

Figure 4.
Timeline: learning activities and interviews

In the following sections, the results and analysis are separated, although the results of the analysis are presented in both sections. Under results, an overall narrative picture of the emotional journeys for each KO is presented with illustrative quotes without referring to the theoretical framework. In the analysis, though, the framework is applied, explaining the identification of appraisals, achievement emotions, their interplay and their processes. Finally, the results and analysis are discussed and concluded.

Results

The results are presented and narrated according to the achievement emotion type: activity emotions, prospective outcome emotions and retrospective outcome emotions. Emotions in relation to contextual elements with indirect implications for the achievement of the learning goal—instructions, supervision and seminars—are considered prospective outcome emotions. Activity and prospective outcome emotions were experienced over time in processes and the processes for each KO are narrated in chronological order.

Activity emotions

All students experienced short-lived emotions of anger/frustration and enjoyment throughout the processes in specific information-seeking situations. This ambivalence was often metaphorically described as "a rollercoaster" and "up and down". However, the activity emotions of interest in the study are emotions with longer duration, tied to activities during one or several search sessions.

Jane's process. Jane was excited to start, enjoying the process:

> I have been longing for this, it's one of the milestones, it feels fun to write and do this.

Soon, however, she "lost motivation" which made her "feel frustration". The frustration and being "so damned annoyed" were a product of uncertainties:

> Are we thinking wrong? [. . .] What do we need to change? Are we searching for the wrong word? There are so many questions. It just spins in the head.

In the next week, the motivation was still "not at its peak", expressed as she didn't "want to do this, no searching, no reading. I just want to puke!"

The fourth week "felt like a punch in the face", having to start the process again, making her wonder: "What the hell am I doing wrong?"

Gradually she felt "much better" as she got some structure, and in the last week, she found herself "in a nice little bubble". She was particularly satisfied that the searching part had "lightened", the part that had made "everything so awful before".

Ann and Tom's processes. Both Ann and Tom were highly motivated to search throughout their processes. Ann thought it was "so interesting and fun" and Tom was excited:

> You really gain so much new knowledge. Which not only benefits the work, but benefits the future work. I think that feels great fun.

However, Tom felt "lost, thrown out in the blue" initially and Ann wondered:

> Why are we doing this? What do we do with this search string? [. . .] I got 17,000 articles. Which article was a result of which search string? It's such total confusion!

The uncertainty also made her angry: "Damn, why are there no articles? Why are there 1,000?"

The fourth week, they were more comfortable, as described by Tom:

> Now you have some confidence [. . .] You don't need to be afraid of missing something. The compass is working better now.

As Tom put it, they were "hitting a wall" in the sixth week. This obstacle led to a temporary loss of motivation for Ann, with anger as a consequence:

> I was so damned fed up with that we have to search all the time. We found this dissertation [. . .] But we can't access the articles. What the hell should we do?

The final week was more comfortable for them, conducting some complementary searches. Tom was able to "decide not to bother" and Ann felt "very relaxed".

Sue and Pam's processes. Being motivated initially, Pam soon lost it, which affected her process throughout. Likewise, Sue was not motivated to conduct the task in general:

> Why do I have to do this? I just want to go out and work. This is something that I see as a necessary evil to get my degree. I hate this part. I think that writing a thesis is among the most boring things there is.

The first weeks, Pam thought searching was like "a jungle", not finding "a damn thing in Swedish" and Sue was stressed and frustrated not finding anything. Soon, the stress and frustration subsided a little for both and Sue felt more "productive" searching in the databases compared to reading and writing. Finding a book in the fourth week made it more "fun" for both, the only time they experienced enjoyment and made Pam burst out: "Finally!"

Approaching submission, Pam still wondered what she was "doing wrong", making her "mad". However, she was more comfortable: "It's not as unfamiliar to you any more, maybe it's not as emotional". Although frustrated about how many searches they still needed, Sue was calm, having the strategy of not "allowing" herself to be negative and not doing "a damn database search" in her final weeks.

Ruth's process. Initially Ruth was motivated, enjoying "looking around", but the unfamiliarity with databases made her frustrated not finding "these damn keywords!" The next week, thinking searching was "so damn hard" made her angry:

> I was so damn mad! I sat all morning and tried and tried and looked for synonyms and what it could possibly be called in English [. . .] I just felt, but what the hell!

The fourth week, although being uncertain searching, she was more comfortable, having "some small familiarity". In week five, stronger feelings of discouragement resulted in a lack of motivation: "It was like punching a hole in a balloon [. . .] it's not fun to feel like this was boring."

She was still frustrated searching, finding it very difficult, thinking that "no other part of the entire education that is as eclectic" as searching in databases. However, she thought that she at least had a "little, a little, grasp of how it works" and was "a bit happy" discovering a journal that was "exactly it".

Approaching the end, she had reached "some kind of equilibrium", with slightly increased motivation and satisfaction: "It's like a training session for the brain with a bit of training pain, and I'm feeling pretty good about it".

However, the few searches done still involved anger:

> Damn, what was I supposed to write here? This thing with parentheses and quotation marks. I typed in a name: no hits, and thought: what the hell? Why isn't it here?

Prospective outcome emotions

Jane's process. Jane was certain of achieving the goal in the end all along, trusting her abilities: "I'm calm when it comes to succeeding in the end [. . .] I get there eventually, always."

Getting started, she was unsure if she was "actually doing something that is right", causing some "panic", "increased heart rate" and even some "despair". On the other hand, she was comfortable in succeeding, being a person that "always has hope."

The third week she was "scared", worried if she was searching in a systematic way, although knowing "deep inside" she was. She was also relieved she had "come somewhere at least". The next week was "heavier", with more stress and "despair", having to search for "new stuff again":

> Are we doing the right thing? What is right? What should we do? It's a bit of hopelessness.

The question of having documented "enough" bothered her, as well as thinking it was "scary" not really knowing if she had found relevant articles. However, realising they after all had "come a long way" was a relief.

For the remainder of the process, she was calm and comfortable. In the fifth week she felt happy "being in a nice little bubble", although it was "frightening that it has been so easy to search". In the last week she looked forward to the final seminar, after which "it felt so great" and she thought they had "done a damn good job". Although still questioning whether she was searching systematically and "afraid" of understanding the texts wrong, she was confident that it could not "go wrong".

Approaching final submission, she was still relaxed and satisfied, although with temporary doubts. At the final seminar, though, she felt "extremely nervous" and "desperate" since there were very few comments on their work.

Ann and Tom's processes. Ann and Tom were confident of succeeding in the end, described by Tom as a feeling that "in the end it will be fine". The first three weeks involved a lot of questions for Ann:

> When I just test something [. . .], do you have to document that as well? When is it enough? And we are supposed to have new research—but what is new? What is a good search string? [. . .] Is it all research literature we should find? What is a reputable journal?

Feeling they had "lost how to do things", they felt "some panic" and were "nervous" about not finding the knowledge gap. The uncertainty even resulted in hopelessness in the third week, described by Ann as: "We were not as good as we thought, too much confidence. So, the fall was high. Now we must shovel up the pieces and think again."

However, after all, both being excited, they had hope.

In the fourth week, they had a sense of having "the clock against" them, as Tom described it. Not knowing how much was expected led to feelings of a hopeless task. They were also "afraid" of dismissing relevant articles. However, focusing on the research questions made them much calmer. This increased certainty persisted and grew in the fifth week, and although anxious looking at previous work, they now were hopeful, having "belief in the future".

The "wall" encountered in the sixth week, forcing them to "start over", made Ann reflect: "As positive as we were last week, it's just as easy to fall down and both just: what the hell is this?"

They were still "afraid" of having missed the texts that Ann referred to as being "wow!" Despite the anxiety, Ann still had a "huge desire to seek" paired with hope and growing confidence, learning how to search "more and more".

In the next week they were more positive, being able to "actually determine what is right or what is not". For the remainder of the process their level of certainty grew steadily, and approaching the end they felt "damn good!" about themselves, which led to positive emotions of enthusiasm, pride and even curiosity. Submitting the work, they were still satisfied and certain about succeeding.

Sue and Pam's processes. Sue and Pam were both confident in achieving the outcome, that "everything will work out in the end".

The fact that the task of searching would be assessed caused anxiety throughout the process. Pam described it as she "probably wouldn't have had as many anxiety attacks" otherwise, and Sue as having a "worry".

In the beginning they were stressed about not finding anything. Pam was "terrified" and felt "panic" and feelings of hopelessness:

> I can't see any light at the end of the tunnel to find something that will fit in [. . .] How long should I spend on this? When do I have to move forward to not fall behind?

How many texts were required was a source for anxiety for Sue, making her wonder: "Do I need ten, fifty? When should I give up and move on?"

Sue thought the instructions were "messy" and Pam found them "a bit fuzzy", resulting in feelings of a hopeless task ahead of them. However, having the requirements clarified, they felt calmer and relieved.

From the third week, Sue thought that they had a "much better method part", creating some hope. Likewise, Pam felt comfort in that not finding texts could also be "seen as a result".

However, Pam did not feel they had found the article that was "the jackpot" and therefore wondered if they were making a "mistake in the search". Similarly, Sue questioned if her "definition of enough may be far too low", a source of anxiety and the only time Sue questioned the outcome: "Shit, what if we don't pass?"

Similarly, Pam felt hopelessness, wondering if achieving the goal was possible:

> When it doesn't move forward, it feels like a failure and then you get this feeling of: damn, are we going to make it?

In the final weeks, Sue was still a bit afraid of how the searches would be assessed. However, approaching submission and having final positive feedback, both were more confident in what and how to document the search process. Approaching the end, they felt that their work was easily "enough", making Sue proud and Pam reflect: "Isn't that really strange? Searching that was the hardest part in the beginning."

Consequently, Pam was "feeling safe rowing this ashore" and Sue thought the remaining process was "downhill".

Submitting the text, Pam was satisfied, but nervous: "what if it's not enough?" Likewise, Sue was pleased and so proud that she "printed it out in book format". She was also relieved at having "that part out of the way."

Ruth's process. Initially, Ruth was comfortable, although thinking it was "messy" and nervous about what "to report". Seeking more systematically in the third week, she experienced anger towards the demands, which were "not reasonable", causing discouragement:

> I felt that I might not be able to do this. This is the first time in my studies ever in total, all ten years, that I just feel like I can't do this, and I won't be able to either.

In the fourth week, she wasn't "down in the same valley". Now, she was calmer and curious about her new focus and hopeful: "I have hope, maybe. I think it won't be easy, but maybe it will work."

Realising there was a reason that she was unable to find anything, she felt some relief. However, the new focus caused some anxiety. In the fifth week, feelings of hopelessness were back, Ruth feeling "very dejected and that this is not going to work". However, she experienced some comfort in having at least accomplished the learning goal, if it is enough "to have a little, little, grasp of how it works".

In subsequent weeks, she was still uncertain and nervous about not finding relevant texts and she searched systematically and not "like a little random". The "strong experiences" of hopelessness and anxiety experienced previously still affected her:

> I think that it meant something, that experience when it just didn't work out. That it is like that with all learning, that a strong negative experience can have an impact a long time afterwards.

On the other hand, she gradually became more confident in having a strategy for "some kind of self-preservation" moving forward, that "here is the limit". In the seventh week, she was looking forward to getting the final feedback and hopeful. She also felt "great" having found a thesis, which made her calmer.

In the last week, she was even more comfortable and got feedback that "everything is going well", which felt "incredibly nice". However, she was still not certain if she had "missed something" and began to worry that someone "would question the database search" at the final seminar.

Although satisfied with her work when submitting it, she was a bit "afraid" of not having enough. At the seminar, though, it proved to be easily enough, having more texts than other students, but also surprising that there were few comments on her searches.

Retrospective outcome emotions

All students were successful and passed with distinction.

Jane. Jane was proud, happy and relieved:

> You could really talk about pride! It felt so freaking good to pass with distinction! [. . .] The relief! I don't need to complement anything, no nothing! So, I scream a bit and am super happy and then I cry!

She was also "so very grateful" towards her supervisor, although surprised that "the methods part, the systematic search, wasn't commented on at all".

Ann and Tom. Ann and Tom were also proud of passing with distinction: "Damn, we deserved this! We are really so proud and happy! [. . .] We should get this grade!

They "celebrated properly!" and both "cried" with happiness. Despite being confident about passing, it was a "great relief". Ann and Tom were also surprised at not receiving any feedback on their seeking achievements.

Sue and Pam. Sue and Pam were both happy and surprised, especially Sue: "We were completely in shock! I screamed straight out!"

For Pam, passing was a great relief: "It was like huge boulders on each shoulder, they disappeared. It was great! What a relief!"

Their searches were appreciated, which made them proud of as Sue put it, having done "a hell of a job".

Ruth. Ruth's success elicited both joy and pride:

> Given that I actually seriously felt for a while that this might be the point that I can't make it, depending on this particular thing with the search, I feel absolutely proud of it. It's amazing, because I felt that I can't handle this, I can't do this.

She also thanked the interviewer, thinking it had "been extremely valuable". There was also a surprise and "a small emptiness" that no one especially commented on the searches, given that there "was much more anxiety and frustration connected to the search" than the other parts.

Analysis

The steps in the analysis process for the identification of appraisals and information-seeking achievement emotion with results are presented in Appendix Tables A1 and A2 In Table A1, all the inductively identified feelings with synonymous expressions are presented and categorised in accordance with GALC. The 25 locations in the SSE are visualised in Figure 5.

Examples of words/metaphors/phrases implying the GALC categories are also found in the Appendix, Table A1 Such examples are also provided for the control and value appraisals that after further analysis showed to be the most relevant (see below). Thus, the quality of the finally identified appraisals and information-seeking emotions is found in the Appendix. Quality

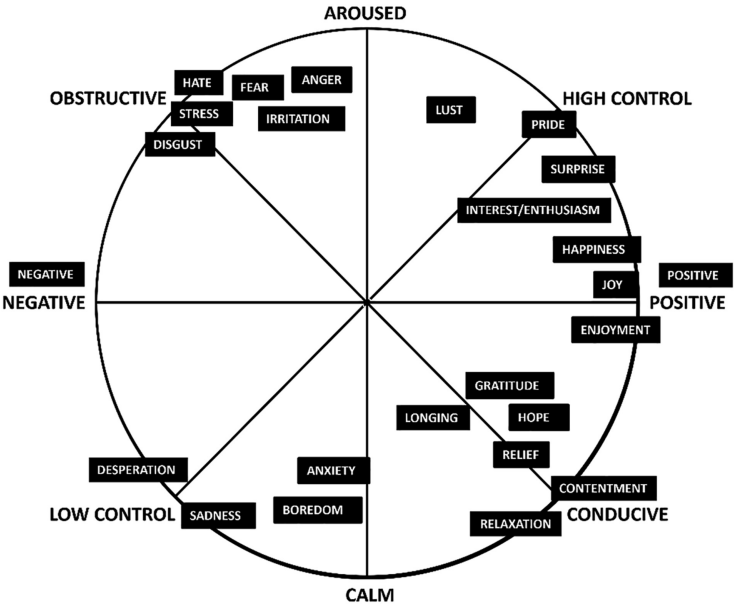


Figure 5.
The semantic space of information-seeking GALC categories

hereafter refers to the Appendix, where there are also indicators of degree (e.g. "calm*", "ang*"). In addition, other expressions of degree, for example "more uncertain", "less frustration", "extremely nervous", are in the following considered as indicators of quality.

Cognitive appraisals

The value appraisals for prospective and retrospective outcome emotions—failure, success—and the control appraisals for retrospective outcome emotions—self, other, irrelevant—are not behaviours and were easily identified and directly derived from CVT. However, control appraisals for the prospective outcome and negative and positive intrinsic values of activity emotions required interpretation and were given other labels.

Uncertainty and certainty. The medium control appraisal found in CVT was not considered, since such detailed differentiation was neither the ambition nor considered identifiable. Thus low and high control appraisals were the appraisals for identification. Low control appraisals were challenging to identify. GALC categories did not capture all the appraisals experienced and additional concepts were needed. Emotions were found close to the low control endpoint in the control appraisal dimension in the SSE but not included in a GALC category, and concepts in the ISP model helped find these (see Table 5).

GALC categories found close to the calm and conducive endpoints in the SSE dimensions emerged as proper concepts capturing the high control appraisal (see Table 5. So did positive in the valance dimension of the SSE, in accordance with the notion of unpleasant/pleasant as the first general valance appraisal check of an event (Shuman and Scherer, 2014). Consequently, negative was identified as a low control appraisal. In addition, stress, close to the endpoints aroused and obstructive, opposite calm and conducive in the SSE, was found to be a low control appraisal, which is also in line with the theoretical assumptions of stress as the initial appraisal predating secondary appraisals (Folkman *et al.*, 1986; Lazarus and Smith, 1988) and time pressure as one of the appraisals in Nahl's affective load theory (2005).

Finally, low and high control were labelled uncertainty and certainty. Uncertainty was considered the best concept capturing low control and consequently certainty the opposing

concept describing high control. Table 5 presents the concepts and GALC categories for each appraisal.

Negative and positive intrinsic motivation. The value appraisals were directly translated from CVT, although labelling value as motivation. Disgust, hatred, longing and lust were not interpreted in their literal sense but as spoken language expressions. Table 6 shows the concepts and GALC categories for each appraisal.

Information-seeking achievement emotions

In Table 7, the identified information-seeking achievement emotions are shown after categorising affect according to the achievement emotion in CVT (step 4 and 5 in the analysis

Control appraisal	Appraisal concept/GALC category
Uncertainty	Confusion Uncertainty/Doubt Uncomfortable Negative (GALC) Stress (GALC)
Certainty	Contentment (GALC) Relaxation (GALC) Positive (GALC)

Table 5. Appraisals: Uncertainty and certainty

Source(s): Table by authors

Value appraisal	Appraisal concept/GALC category
Negative intrinsic motivation	Low motivation Disgust (GALC) Hatred (GALC)
Positive intrinsic motivation	Interest/Enthusiasm (GALC) Motivation Longing (GALC) Lust (GALC)

Table 6. Appraisals: Negative and positive intrinsic motivation

Source(s): Table by authors

Achievement emotion CVT	4. GALC category	5. Achievement emotion study	Achievement emotion type
Anger, Frustration Boredom Enjoyment	Anger, Irritation Boredom Enjoyment	Anger/Frustration Boredom Enjoyment	Activity
Anxiety Hopelessness	Anxiety, Fear Desperation, Sadness	Anxiety Hopelessness	Prospective outcome
Hope	Hope	Hope	
Pride Joy Gratitude	Pride Joy, Happiness Gratitude Relief Surprise	Pride Joy Gratitude Relief Surprise	Retrospective outcome

Table 7. Information-seeking achievement emotions

Source(s): Table by authors

process). Anger and frustration were merged into anger/frustration. It proved very difficult to distinguish one from the other, as indicated by their closeness in the SSE and being part of the same GALC category. Moreover, fear was not interpreted in its literal sense but as the spoken expression of anxiety, while hopelessness, not an affect category, comprised desperation and sadness. Two additional retrospective outcome emotions were found: relief and surprise.

Achievement processes

The presence of appraisals and achievement emotions for each week(s) and each student(s) is indicated in Tables 8–15 in grey and appraisal type with its initial letter: uncertainty (U), certainty (C), negative (N), positive (P) and intrinsic motivation, failure (F), success (S). In the tables for

Week	1-2	3	4	5	6	7	8
Jane	UC/NP			C/P	No seeking	No seeking	No seeking
Ann	UC/P				UC/NP	C/P	
Tom	UC/P					C/P	
Sue	UC/N		UC/NP	No seeking	UC/N	No seeking	No seeking
Pam	U/N		UC/NP	U/NP	UC/N	No seeking	No seeking
Ruth	UC/P	UC/NP	UC/N	UC/NP		No seeking	UC/P

Source(s): Table by authors

Table 8. Appraisal processes: activity emotions

Week	1-2	3	4	5	6	7	8	9-10
Jane	UC/S				C/S	UC/S	No work	UC/S
Ann/Tom	UC/S					C/S		
Sue	UC/S			U/FS	UC/S		C/S	
Pam	U/S		UC/S		UC/FS	UC/S		
Ruth	UC/S	UC/FS	UC/S	UC/FS	UC/S			

Source(s): Table by authors

Table 9. Appraisal processes: prospective outcome emotions

Week	1-2	3	4	5	6	7	8	Frequency
Jane	U/N	U/N	U/N		No seeking	No seeking	No seeking	3
Ann	U	U			U/N			3
Tom		U						1
Sue	U/N	U/N	U/N	No seeking	U/N	No seeking	No seeking	4
Pam	U/N	U/N	U/N	U/N	U/N	No seeking	No seeking	5
Ruth	U/N	U/N	U/N	U/N	No seeking	No seeking	U/N	5
								n = 25

Source(s): Table by authors

Table 10. Processes with appraisals: anger/frustration

Week	1-2	3	4	5	6	7	8	Frequency
Jane	P	P			No seeking	No seeking	No seeking	2
Ann	P	P	P	P	P	P	P	7
Tom	P	P	P	P	P	P	P	7
Sue			C/P	No seeking			No seeking	1
Pam			C/P			No seeking	No seeking	1
Ruth				C/P	No seeking			1
								n = 19

Source(s): Table by authors

Table 11. Processes with appraisals: enjoyment

activity and prospective outcome emotions, a frequency column is added as an indicator of how common the presence was for each student and in total. The processes of appraisals and prospective outcome emotions for Ann and Tom were nearly identical, which is why those two are presented together. The quality of the appraisals and emotions and their interplay in the processes are analysed in the narrative analysis.

Cognitive appraisals (See Table 8 and 9). The same concepts were used to express uncertainty and certainty for both activity and prospective outcome emotions. Often the very same expression was directed to both activity and prospective outcome emotions. In the control dimension, a lower degree of uncertainty means a higher degree of certainty and vice versa. However, the degree of control was mainly expressed through qualitative variations of uncertainty, while certainty was more stable.

Uncertainty varied in quality both within and between the processes. For example, Pam thought that seeking was a "jungle" initially and "not that unfamiliar" in the end, and while Ann experienced "total confusion" and Ruth "complete lack of knowledge" in the beginning, Sue thought it was "a bit messy".

Intrinsic motivation was often expressed as negative/positive (e.g. "unmotivated/motivated", uninterested/interested) and was implicitly present. The quality varied mainly between the

Table 12.
Processes with appraisals: boredom

Week	1-2	3	4	5	6	7	8	Frequency
Sue	N	N	N	No seeking	N	N	No seeking	5
Ruth				U/N	No seeking		No seeking	1
								n = 6

Source(s): Table by authors

Table 13.
Processes with appraisals: anxiety

Week	1-2	3	4	5	6	7	8	9-10	Frequency
Jane	U	U	U	U		U	No work	U	6
Ann/Tom	U	U	U	U	U				5
Sue	U	U	U	U/F	U	U	U	U	8
Pam	U	U	U	U	U/F	U	U	U	8
Ruth	U	U/F	U	U/F	U	U	U	U	8
									n = 35

Source(s): Table by authors

Table 14.
Processes with appraisals: hopelessness

Week	1-2	3	4	5	6	7	8	9-10	Frequency
Jane	U		U				No work	U	3
Ann/Tom	U	U	U						3
Sue	U	U							2
Pam	U	U	U		U/F				4
Ruth		U/F		U/F					2
									n = 14

Source(s): Table by authors

Table 15.
Processes with appraisals: hope

Week	1-2	3	4	5	6	7	8	9-10	Frequency
Jane	C/S						No work		1
Ann/Tom		C/S		C/S	C/S				3
Sue				C/S					1
Ruth			C/S			C/S			2
									***n* = 8**

Source(s): Table by authors

processes. For example, Sue had a "strong aversion" to seeking and Jane "lost motivation" occasionally, and while Ann had "huge desire" to seek, Ruth thought it was "interesting".

Activity emotions. Anger/frustration (See Table 10). Uncertainty and negative intrinsic motivation led to anger/frustration, except for Ann and Tom, who were highly motivated throughout the process. While the intrinsic motivation was stable and implicitly present, the quality of uncertainty affected the quality of anger/frustration, and besides being indirect, the interplay was often direct, visible in the very same expression, as when Ann wondered: "Damn, why are there no articles?" and Jane asked herself: "What the hell am I doing wrong?"

Tom experienced anger/frustration only once, being "kind of" frustrated. For the others, the experiences varied according to the process. For example, Jane had Pam had quite intense feelings throughout their processes, expressed as being "annoyed" and "freaking out", and through the use of expletives (e.g. "Damn!"). For, Sue, on the other hand, anger/frustration was expressed as being "frustrated".

Anger/frustration had slightly higher intensity and more frequency initially that decreased over time. For example, Ruth was "enraged" and "furious" in the third week, having the expressed most intense feelings in the study, and "not that angry" the following week. However, both Ruth's and Ann's anger/frustration had higher intensity in their third and sixth weeks than in the previous weeks. Ruth's experienced rage after having been "a little frustrated" in the first weeks, and Ann was "so damned fed up" in the sixth week, the only week she lost motivation, from experiencing no anger/frustration the previous week.

Anger/frustration was also involved in other types of interplay. Sue was "stressed" because she was frustrated, an example of reciprocal causation. There were also examples of feedback loops, where anger/frustration together with uncertainty constituted the appraisal resulting in anxiety and hopelessness. For example, Ann was "irritated" and Pam and Ruth "frustrated" by not understanding the instructions. Ruth also directed her anger towards the achievement goal as such, thinking it was just "one hell of a learning goal out of many".

Enjoyment (See Table 11). The enjoyment processes for Ann, Tom and Jane did not show much qualitative variation within the processes as results of the likewise stable levels of positive intrinsic motivation. The variation showed between the processes, where Ann and Tom were highly motivated and "excited" to search across all weeks, while Jane was motivated and felt it was more or less "fun" her first two weeks. On the only occasions of enjoyment for Sue, Pam and Ruth, increased certainty and temporary moments of finding motivation made searching more "fun" for Sue and Pam and left Ruth feeling "a bit happy".

Boredom (See Table 12). Boredom was only experienced by Sue and Ruth, expressed verbatim with no qualitative variation. In Sue's case, it was present during the whole process because of her strong negative intrinsic motivation. For Ruth, uncertainty was also a factor, which in turn fed back and affected her motivation—thus, another example of a reciprocal causation.

Prospective outcome emotions. Anxiety (See Table 13). Anxiety was the most qualitatively varied prospective outcome emotion. Anxiety has, by definition, an inherent uncertainty appraisal and it cannot be experienced without uncertainties of a future outcome, and uncertainty alone led to anxiety in most of the cases. For Sue, Pam and Ruth, however, temporary expectations of failure enforced uncertainty, leading to more intense feelings, which turned into hopelessness for Pam and Ruth. Besides having indirect relations, the inherent uncertainty appraisal meant that the interplay between uncertainty and anxiety was both implicit and direct. In any case, uncertainty and anxiety followed the same qualitative pattern.

Variations showed between the processes. While Ruth, for example, expressed her anxiety in terms of being "nervous" and having "a worry", Pam was "terrified" and felt "panic". There were also variations within the processes with a tendency towards higher intensity and more negative valence in the beginning that decreased throughout. For example, Ann and Tom had "panic" initially and were a bit "afraid" later in the process. However, submitting the work entailed increased uncertainty and anxiety for Pam, Ruth and Jane. Jane even became "extremely nervous" at the final seminar.

For Ruth, anxiety was also directed towards the activity and affected its uncertainty appraisal. Before searching, she had to "take a deep breath" and got "really nervous" using technology in general.

Hopelessness (See Table 14). The students experienced hopelessness as a result of uncertainty alone in most cases, except for Ruth and Pam, where expected failure also contributed. There were indirect links between appraisals and hopelessness, but the implicit uncertainty appraisal and failure were also shown in the very same expression, such as when Ruth experienced her strong feelings: "I have nothing. This really isn't enough". Ruth's hopelessness was also an example of where vocality—how a feeling is expressed—played a role.

The processes showed variations mainly between the students' processes. Jane experienced her hopelessness in terms of "despair", while Ann, Tom and Sue expressed it verbatim. For Ruth, the temporary failure expectancy led to her more intense experiences, being discouraged and dejected. Likewise, Pam had intense feelings, seeing "no light at the end of the tunnel" and her information-seeking attempts as a failure, which she also expected on one occasion, enforcing the experience of hopelessness.

For Ruth, hopelessness, with its implicit uncertainty appraisals, also composed the activity uncertainty appraisal, resulting in boredom.

Hope (See Table 15). Hope was expressed verbatim with no qualitative variation and experienced by all but Pam. The students were hopeful as a result of implicit expectations of success paired with certainty.

Retrospective outcome emotions. Table 16 presents the presence of each emotion for each student(s) with appraisals. Ann's and Tom's emotions with appraisals are presented together, having nearly identical experiences.

Retrospective outcome emotions were experienced after assessment and not at one point in time and not as processes. Pride and surprise were only expressed verbatim. Joy was expressed through descriptive words, as when Ann and Tom "cried" and when Sue and Pam "screamed straight out!" Gratitude was experienced as being thankful and grateful, while relief was expressed verbatim or metaphorically, such as when Ann experienced that "huge boulders on each shoulder disappeared".

Table 16.
Retrospective outcome emotions with appraisals

Emotion	Pride	Joy	Gratitude	Relief	Surprise
Control	Self	Irrelevant	Other	Irrelevant	Irrelevant
Value	S	S	S	S	S
Jane					
Ann/Tom					
Sue					
Pam					
Ruth					

Source(s): Table by authors

Pride and relief were also involved in the prospective outcome process, still having a retrospective focus but having implications for the future outcome by enforcing the sense of certainty. Approaching submission, Sue, Ann and Tom were proud of their accomplishments thus far. Sue was also relieved in relation to being proud and Jane was relieved early in her process, having come as far as she had.

Discussion

In the following, the results are discussed in relation to the theoretical framework, including the ISP model. However, there are differences between the model and the study which do not make them entirely comparable. In the ISP model, information seeking is the tool or the means to achieve other learning outcomes than information-seeking skills. In the study, the information seeking is also the goal for learning, which is assessed and required to be demonstrated. Therefore, the cognitive and emotional experiences can be different, as well as the characteristics of the processes. That said, comparison highlights similarities and differences between similar constructivist learning contexts.

Cognitive appraisals and information-seeking emotions

The study shows a wide range of experienced appraisals and emotions, as expressed in the natural language. A total of 36 feelings were expressed, equivalent to 25 GALC affect categories, among which ten appraisals and 15 information-seeking achievement emotions were identified. Table 17 shows the identified appraisals and information-seeking achievement emotions and types and the relationships between them. In the Appendix Tables A1 and A2, the analysis processes for identification with results can be found.

The weekly presence of emotions varied between activity and prospective outcome emotions (see Tables 10–15). While this does not say anything about the frequency each week and the quality of the emotion, it is notable that there are more negative emotions and that they had a considerably higher weekly presence than the positive, anxiety being by far the most experienced emotion.

Cognitive appraisals. Thoughts in the ISP model are the equivalent to appraisals from an appraisal theory perspective. The model suggests that thoughts progress from vague to focused through the stages of initiation, selection, exploration and formulation and increased interest in the formulation, collection and presentation stages. Vague/focused and increased interest could, liberally interpreted, be compatible with uncertainty and certainty and positive intrinsic motivation appraisal in the study.

Appraisals			Achievement emotion type
Control	Value	Achievement emotion	
Uncertainty	Negative intrinsic motivation	Anger/Frustration	Activity
Certainty	Positive intrinsic motivation	Enjoyment	
Uncertainty	Negative intrinsic motivation	Boredom	
Uncertainty	Failure	Anxiety	Prospective outcome
Uncertainty	Failure	Hopelessness	
Certainty	Success	Hope	
Oneself	Success	Pride	Retrospective outcome
Other	Success	Gratitude	
Irrelevant	Success	Joy, Surprise, Relief	

Source(s): Table by authors

Table 17. Cognitive appraisals and information-seeking achievement emotions

As observed by Savolainen (2015a), Kuhlthau viewed uncertainty both as a feeling and a cognitive state and it could therefore be interpreted as an appraisal. Nahl (2005, 2007a) and Savolainen (2015a, 2015b, 2016), who have contributed to an understanding of appraisal theory in LIS and IB, have identified uncertainty as the main appraisal. In Nahl (2005) affective load theory, uncertainty, together with time pressure, is the appraisal determining emotional experiences. In this light, it is not surprising that uncertainty proved to be one of the appraisals experienced by the students and the one with the most impact. This shows the accuracy of Kuhlthau's (2004, p. 92) identification of the uncertainty principle as the main factor affecting the learning process.

In the study, appraisals are more nuanced than the equivalent thoughts in the ISP model. Since the CVT was used as the analytical tool, two appraisals worked together, contributing to the complexity—even more so given that the semantic spaces behind the identified appraisals show a wide range of qualitative differences in experiencing them.

Information-seeking achievement emotions. Compared to the ISP model (see Figure 1), there are more emotions involved in this study. Kuhlthau identified nine feelings in the affective realm, of which seven are appraisals in the study: uncertainty, optimism (equivalent to positive), confusion, doubt, confidence, satisfaction and clarity (analogous to comfortable). The common emotions are frustration (anger/frustration) and disappointment (hopelessness). However, Kuhlthau identified two additional emotions not found in the model: anxiety as an "affective symptom" (Kuhlthau, 2004, p. 92) and relief in the search closure stage in the first version of the model (Kuhlthau, 1988a). Another difference is that most of the identified achievement emotions—anger/frustration, enjoyment, anxiety, hopelessness, pride, joy and relief—comprise in themselves two or more GALC affect categories, which in turn incorporate qualitatively varied ways of expressing them.

Interplay between appraisals and emotions

In contrast to the ISP model with two separate processes of thoughts and feelings, this study offers insights into the interplay between them. In addition, two types of thoughts—that is appraisals—interact, eliciting specific emotions, except for the formulation stage, where focus and an initial level of interest are present. Another essential difference is that in the same stage of the ISP model, two type of thoughts (appraisals) and no emotion are found, hence not enabling an appraisal theory explanation. Table 17 presents the control and value appraisals antedating the specific emotion.

Anger and frustration are two separate emotions in CVT, making all combinations of uncertainty/certainty and negative/positive intrinsic motivation possible in eliciting anger/frustration. The interplay followed the same pattern of interplay in this study, but for the other activity and prospective outcome emotions, the interplay was different from that assumed in CVT.

Unlike the assumption in CVT, enjoyment was mainly the result of positive intrinsic motivation alone and not together with certainty. In addition, CVT assumes that boredom is the product of no value or indifference. However, the students found the activities important for succeeding in getting the grade. Rather, negative intrinsic motivation was the determinator, which for one of the students was enough to elicit boredom on its own, not together with uncertainty.

Uncertainty alone was enough in most cases to elicit anxiety and hopelessness, without, as stipulated in CVT, expectations of failure. The medium CVT control appraisals affecting anxiety and hope could not be identified. Rather, uncertainty, equivalent to low control, determined anxiety, while high control, or certainty, resulted in hope together with implicit expectations of success.

The interplay between appraisals and retrospective outcome emotions was in accordance with CVT. Person(s)—oneself, other or irrelevant—causing the emotion constituted the

control appraisal and success the value appraisal. Pride, joy and gratitude and their interplay with appraisals were the same as suggested in CVT.

Reciprocal causation, feedback loops and double functions. The interplay concerning activity and prospective outcome emotions was complex. The reciprocal causality and feedback loops between appraisals and activity and prospective outcome emotions posited by CVT (see Figure 3) were evident in the study, showing dynamic relations and structures.

Enjoyment, boredom, anxiety and hopelessness are all emotions intimately related to appraisals by definition. Therefore, an implicit reciprocal causation seems logical. However, boredom and anger/frustration were the only emotions showing the reciprocal relation explicitly. Motivation was low because the activity was boring, and stress was experienced because it was frustrating.

In CVT, emotions affect appraisals through feedback loops and, in turn, have the potential to impact the same or other types of achievement emotions. All the negative motions in the study were related and interacted and were not experienced as separate processes. For the positive emotions, though, these relationships did not show.

Together with uncertainty, anger/frustration was the appraisal resulting in anxiety and hopelessness. Similarly, hopelessness, with its implicit uncertainty appraisals, gave rise to the activity uncertainty appraisal, leading to boredom. Moreover, anxiety, with its inherent uncertainty, affected uncertainty for activity emotions, though it did not have an explicit impact on anger/frustration or boredom.

Other examples of emotions having double functions, but not as a result of feedback loops, are pride and relief. They were not only experienced after assessment: they were also part of the process for prospective outcome emotions, constituting and contributing to the certainty appraisal.

Characteristics of the processes

The processes are individually unique. The achievement processes for each student, both in total and for each achievement emotion, are individually unique despite the nearly identical achievement context. The variations in experiencing appraisals and achievement emotions, and the weekly presence, result in six distinct processes comprising unique processes for each achievement emotion.

For boredom, enjoyment and hope, the processes were relatively stable and the results of likewise stable appraisals processes with variations mainly between the students' processes. The processes for anger/frustration, anxiety and hopelessness, on the other hand, showed variation within and throughout the individual processes. Thus, these processes were even more differentiated.

The processes are non-linear and iterative. The specific feelings and thoughts present at each stage of the ISP model show their presence and progression. Feelings evolved from negative to positive and thoughts from vague to focused and with increasing interest. Similarly, students in the study experienced more intense and more negative appraisals and emotions in the first half of the processes, which became less intense and more positive approaching the end.

However, the achievement processes do not follow a strict progression. The processes have no static sequential stages capturing a certain type of action, degree of focus, interest and specific emotions. The appraisals were present (with the exception of failure) throughout the processes, eliciting negative and positive emotions at the same points in time. The processes were also iterative. The valence and intensity of uncertainty with the elicited negative emotions anger/frustration, anxiety and hopelessness could be considerably higher than in the previous week(s) when obstacles forced the students to start their processes again.

Individuals' experiences of the world rarely follow a linear path; rather, they are unpredictable, dynamic and complex (Neale, 2020, p. 111). The linear and static characteristic

of the ISP and other similar models is a shortcoming that several researchers (e.g. Foster, 2005; Godbold, 2006; Robson and Robinson, 2013) have observed when reviewing models of information-seeking behaviour. However, as shown in this study, the information-seeking process is non-linear, dynamic and iterative, which should be reflected in theoretical models.

The appraisal processes are not always eliciting achievement emotions. The appraisals students experienced during the processes did not necessarily result in emotions. The rich variety of appraisals and emotions inherent in the identified appraisals suggest that the appraisals constitute processes, with a complex interplay between appraisals and emotions. These processes could probably in themselves be explained with other appraisal theory assumptions than those addressed in this study.

Regardless of what experiences are interpreted as appraisals and emotions, all experiences from a constructivist point of view affect the learning and achievement processes. That is, the appraisal processes, though not having the function of eliciting emotions, are part of and have an impact on learning and achievement. Consequently, it is important to gain knowledge about these processes in order to understand fully how teacher students learn in the process of achieving information-seeking skills.

Conclusion

This study makes a valuable contribution to the limited body of literature on emotions identified by researchers in information-seeking behaviour research in general (e.g. Krakowska, 2020; Lopatovska and Arapakis, 2011; Savolainen, 2015b) and regarding teacher students in particular (Dahlqvist, 2021a, b and 2022). Increased knowledge of the fundamentally important role emotions play in formal and higher education contexts, especially an in-depth understanding of the qualitative nuances and variations of primary teacher students' experienced appraisals and emotions in the process of achieving information-seeking skills. Given their pivotal role as future teachers of pupils in their first formative years, it is crucial to understand how teacher students learn in achievement contexts.

As with all qualitative studies, this study has its limitations in terms of generalisation of the findings. It provides only a qualitative glimpse of reality. More students could have been included, as well as other educational contexts for comparison. However, future qualitative and quantitative studies can build on the results for more generalisable findings.

Regardless of its limitations, this study has theoretical methodological and practical implications for the understanding of emotions in library and information science research in general and information-seeking behaviour in particular. The application of the theories of semantic space of emotions and control-value theory of achievement emotions borrowed from cognitive and educational psychology provides analytical tools for understanding information-seeking emotions, especially in higher education achievement settings. In addition, the Geneva affect label coder used for the identification of appraisals and emotions has the potential to be a valuable methodological instrument for defining, mapping and categorising emotions and appraisals in all kinds of studies of information behaviour focusing on emotions.

The findings also have practical implications for academic instruction. Librarians and others involved in teaching and supporting students' information-seeking skills and other information literacies can benefit from the findings. Explanations of the complex interplay of appraisals and information-seeking achievement emotions can guide the design of teaching and learning activities, learning goals and support structures, which is beneficial for students' achievement of information-seeking skills. Future exploration of the results can identify which elements of the achievement context are related to specific appraisals and emotions and, by implication, how these can be designed to promote appraisals and emotions beneficial for learning.

References

Association of College and Research Libraries [ACRL] (2015), "Framework for information literacy for higher education", available at: http://www.ala.org/acrl/standards/ilframework (accessed 20 May 2023).

Bent, M. and Stubbings, R. (2011), "The SCONUL seven pillars of information literacy: core model", available at: https://www.sconul.ac.uk/sites/default/files/documents/coremodel.pdf (accessed 17 May 2023).

Bruner, J.S. (1986), *Actual Minds, Possible Worlds*, Harvard University Press, Cambridge, MA.

Canan Gungoren, Ö., Gur Erdogan, D. and Kaya Uyanik, G. (2019), "Examination of preservice teachers' lifelong learning trends by online information searching strategies", *Malaysian Online Journal of Educational Technology*, Vol. 7 No. 4, pp. 60-80.

Case, D.O. and Given, L.M. (2016), *Looking for Information: A Survey of Research on Information Seeking, Needs, and Behavior*, Emerald, Bingley.

Çevik, Y.D. (2015), "Predicting college students' online information searching strategies based on epistemological, motivational, decision-related, and demographic variables", *Computers and Education*, Vol. 90, pp. 54-63.

Chen, Y.-J., Chien, H.-M. and Kao, C.-P. (2019), "Online searching behaviours of preschool teachers: a comparison of pre-service and in-service teachers' evaluation standards and searching strategies", *Asia-Pacific Journal of Teacher Education*, Vol. 47 No. 1, pp. 66-80.

Dahlqvist, Claes (2021a), "Information-seeking behaviours of teacher students: a systematic review of quantitative methods literature", *Education for Information*, Vol. 37 No. 3, pp. 259-285.

Dahlqvist, Claes (2021b), "Information-seeking behaviours of teacher students: a systematic review of qualitative methods literature", *Education for Information*, Vol. 37 No. 3, pp. 287-313.

Dahlqvist, C. (2022), "Understanding information-seeking achievement emotions: exploring a cognitive appraisal theory framework", *Information Research*, Vol. 27, Special issue.

Dewey, J. (1933), *How We Think: A Restatement of the Relation of Reflective Thinking to the Educative Process*, Heath, Boston, MA.

Ellsworth, P.C. and Scherer, K.R. (2003), "Appraisal process in emotion", in Davidson, R.J., Scherer, K.R. and Goldsmith, H.H. (Eds), *Handbook of Affective Sciences*, Oxford University Press, Oxford, pp. 572-595.

Folkman, S., Lazarus, R.S., Dunkel-Schetter, C., DeLongis, A. and Gruen, R.J. (1986), "Dynamics of a stressful encounter: cognitive appraisal, coping, and encounter outcomes", *Journal of Personality and Social Psychology*, Vol. 50 No. 5, pp. 992-103.

Foster, A. (2005), "A non-linear model of information seeking behaviour", *Information Research*, Vol. 10 No. 2.

Godbold, N. (2006), "Beyond information seeking: towards a general model of information behaviour", *Information Research*, Vol. 11 No. 4.

Hartel, J. (2019), "Turn, turn, turn", *Information Research*, Vol. 24 No. 4.

Kelly, G.A. (1963), *A Theory of Personality: the Psychology of Personal Constructs*, Norton, New York.

Krakowska, M. (2020), "Affective factors in human information behavior: a conceptual analysis of interdisciplinary research on information behavior", *Zagadnienia Informacji Naukowej-Studia Informacyjne*, Vol. 58 No. 1A, pp. 75-95.

Kuhlthau, C.C. (1988a), "Developing a model of the library search process: cognitive and affective aspects", *Reference Quarterly*, Vol. 28, pp. 232-242.

Kuhlthau, C.C. (1988b), "Longitudinal case studies of the information search process of users in libraries", *Library and Information Science Research*, Vol. 10 No. 3, pp. 257-304.

Kuhlthau, C.C. (1988c), "Perceptions of the information search process in libraries: a study of changes from high school through college", *Information Processing and Management*, Vol. 24 No. 4, pp. 419-427.

Kuhlthau, C.C. (1989), "The information search process of high-, middle-, and low-achieving high school seniors", *School Library Media Quarterly*, Vol. 17 No. 4, pp. 224-226.

Kuhlthau, C.C. (2004), *Seeking Meaning: A Process Approach to Library and Information Services*, Libraries Unlimited, Westport, CT.

Kvale, S. (1996), *Interviews: an Introduction to Qualitative Research Interviewing*, Sage, Thousand Oaks, CA.

Lazarus, R.S. and Smith, C.A. (1988), "Knowledge and appraisal in the cognition-emotion relationship", *Cognition and Emotion*, Vol. 2 No. 4, pp. 281-300.

Limberg, L., Sundin, O. and Talja, S. (2012), "Three theoretical perspectives on information literacy", *Human IT: Journal for Information Technology Studies As a Human Science,* Vol. 11 No. 2.

Linnenbrink, E.A. and Pintrich, P.R. (2002), "Achievement goal theory and affect: an asymmetrical bidirectional model", *Educational Psychologist*, Vol. 37 No. 2, pp. 69-78.

Lloyd, A. (2017), "Information literacy and literacies of information: a mid-range theory and model", *Journal of Information Literacy*, Vol. 11 No. 1, pp. 91-105.

Lopatovska, I. and Arapakis, I. (2011), "Theories, methods and current research on emotions in library and information science, information retrieval and human–computer interaction", *Information Processing and Management*, Vol. 47 No. 4, pp. 575-592.

Merriam, S.B. and Tisdell, E.J. (2015), *Qualitative Research: A Guide to Design and Implementation*, John Wiley & Sons, Newark, NJ.

Nahl, D. (2005), "Affective load", in Fisher, K.E., Erdelez, S. and McKechnie, L. (Eds), *Theories of Information Behavior*, Information Today, Medford, NJ, pp. 39-43.

Nahl, D. (2007a), "Social–biological information technology: an integrated conceptual framework", *Journal of the American Society for Information Science and Technology*, Vol. 58 No. 13, pp. 2021-2046.

Nahl, D. (2007b), "The centrality of the affective in information behaviours", in Nahl, D. and Bilal, D. (Eds), *Information and Emotion: the Emergent Affective Paradigm in Information Behavior Research and Theory*, Information Today, Medford, NJ, pp. 3-37.

Nahl, D. and Bilal, D. (2007), *Information and Emotion: the Emergent Affective Paradigm in Information Behavior Research and Theory*, Information Today, Medford, NJ.

Neale, B. (2020), "Researching educational processes through time: the value of qualitative longitudinal methods", in Ward, M.R.M. and Delamont, S. (Eds), *Handbook of Qualitative Research in Education*, Edward Elgar Publishing, Cheltenham, pp. 102-114.

Pekrun, R. (2006), "The control-value theory of achievement emotions: assumptions, corollaries, and implications for educational research and practice", *Educational Psychology Review*, Vol. 18 No. 4, pp. 315-341.

Pekrun, R. (2019), "Inquiry on emotions in higher education: progress and open problems", *Studies in Higher Education*, Vol. 44 No. 10, pp. 1806-1811.

Pekrun, R. and Linnenbrink-Garcia, L. (2014), *International Handbook of Emotions in Education*, Routledge, New York.

Pekrun, R. and Perry, R.P. (2014), "Control-value theory of achievement emotions", in Pekrun, R. and Linnenbrink-Garcia, L. (Eds), *International Handbook of Emotions in Education*, Routledge, New York, pp. 120-141.

Pekrun, R., Frenzel, A.C., Goetz, T. and Perry, R.P. (2007), "Chapter 2. The control-value theory of achievement emotions: an integrative approach to emotions in education", in Schutz, P.A. and Pekrun, R. (Eds), *Emotion in Education*, Academic Press, Burlington, VT, pp. 13-36.

Robson, A. and Robinson, L. (2013), "Building on models of information behaviour: linking information seeking and communication", *Journal of Documentation*, Vol. 69 No. 2, pp. 169-193.

Russell, J.A. (1980), "A circumplex model of affect", *Journal of Personality and Social Psychology*, Vol. 39 No. 6, pp. 1161-1178.

Saldaña, J. (2013), *The Coding Manual for Qualitative Researchers*, Sage, London.

Savolainen, R. (2015a), "Approaching the affective factors of information seeking: the viewpoint of the Information search process model", *Information Research*, Vol. 20 No. 1.

Savolainen, R. (2015b), "The interplay of affective and cognitive factors in information seeking and use: comparing Kuhlthau's and Nahl's models", *Journal of Documentation*, Vol. 71 No. 1, pp. 175-197.

Savolainen, R. (2016), "Approaching the affective barriers of information seeking: the viewpoint of appraisal theory", *Information Research*, Vol. 21 No. 4.

Scherer, K.R. (2005), "What are emotions? And how can they be measured?", *Social Science Information Sur Les Sciences Sociales*, Vol. 44 No. 4, pp. 695-729.

Schutz, P. and Pekrun, R. (2007), *Emotion in Education*, Elsevier Academic Press, Amsterdam.

Shuman, V. and Scherer, K. (2014), "Concepts and structures of emotions", in Pekrun, R. and Linnenbrink-Garcia, L. (Eds), *International Handbook of Emotions in Education*, Routledge, New York, pp. 13-35.

Tabatabai, D. and Shore, B.M. (2005), "How experts and novices search the web", *Library and Information Science Research*, Vol. 27 No. 2, pp. 222-248.

Talja, S., Tuominen, K. and Savolainen, R. (2005), "'Isms' in information science: constructivism, collectivism and constructionism", *Journal of Documentation*, Vol. 61 No. 1, pp. 79-101.

(The Appendix follows overleaf)

Appendix

Table A1.
Steps 1–3 Data analysis process: information-seeking achievement emotions

1. Feeling concept/code (in vivo) Truncated word stems indicated with *	2. Affect category GALC	3. Feelings implied (excerpt examples): a) Metaphors b) Phrases/words expressing feelings
Anger (ang*) Frustration (frustrat*) Rage (furious)	Anger	a) "I want to pull out my hair and throw away the computer!" b) "What the hell!"; "Damn!"; "I even said to him: Go home!"
Anxiety (anx*) Nervousness (nervous*) Worry (worr*)	Anxiety	b) "I had palpitations and couldn't sleep"
Boredom (bor*)	Boredom	No
Comfortable (chill, comfortable, confiden*, safe, secure) Satisfaction (satisf*, happy with, pleased)	Contentment	a) "We feel safe rowing this ashore"; "The compass is working better now" b) "Now I'm even a bit nonchalant" "I feel we can't do anything wrong"
Hopelessness (hopeless*, despair, resigned, discouraged) Disappointment (disappoint*)	Desperation	a) "I can't see any light at the end of the tunnel" b) "Nothing, I have nothing, it really isn't enough"
Aversion (aversion)	Disgust	No
Fear (afraid, fear, frightened, horrified, terrified) Panic (panic*)	Fear	No
Gratitude (grat*, thank*)	Gratitude	No
Happiness (delight, happ*)	Happiness	No
Hate (hat*)	Hate	No
Hope (hop*)	Hope	No
Absorbed Curiosity (curi*) Enthusiasm (enthusias*) Interest (interest*)	Interest/ Enthusiasm	b) "I lose myself in it"
Irritation (annoyed, irrita*)	Irritation	No
Joy (amazed, excited, joy)	Joy	b) "We really celebrated!"; "I screamed straight out!"
Longing (long*)	Longing	No
Lust (desire)	Lust	No
Enjoyment (enjoy*, happy, excited, fun, like, glad)	Enjoyment	a) "I want to dance on the tables!"
Pride (pride, proud)	Pride	No
Calm (calm*) Relaxation (relaxed)	Relaxation	No
Relief (relie*)	Relief	a) "Huge boulders on each shoulder disappeared"
Dejected (dejected)	Sadness	No
Surprise (shocked, surprised)	Surprise	No
Stress (stress*)	Stress	a) "Having the clock against you"
Positive (positive)	Positive	b) "Feeling fine/good/great/nice"
Negative (negative, awful)	Negative	a) "Feel like crap" b) "Not feeling well/good"; "Feeling bad"

Source(s): Table by authors

Appraisal CVT	1. Appraisal concept/code (in vivo) Truncated word stems indicated with *	2. Appraisal type study	3. Cognitive appraisal implied (excerpt examples): a) Metaphors b) Phrases expressing appraisal
Low control (Activity and prospective outcome)	Confusion (confus*) Uncertainty/Doubt (not certain, uncertain*, doubt*) Uncomfortable (insecure, not comfortable/safe/secure, uncomfortable, unsafe) Negative (see Table A1) Stress (see Table A1)	Uncertainty	a) "It's spinning in my head"; "It's like a jungle"; "It's like being thrown into deep water" b) "Where should I use an asterisk?"; "What are we looking for?"; "I don't understand this subject word thing" "There are so many questions!"; "How many articles do we need?"; "Am I doing it right?"; "What are we supposed to document?"; "I can't do this"; "It all started with total lack of knowledge"
High control (activity and prospective outcome)	Contentment (see Table A1) Relaxation (see Table A1) Positive (see Table A1)	Certainty	No
Negative intrinsic value (activity)	Low motivation (not motivated, not interested, uninterested, unmotivated, not fun) Disgust (see Table A1) Hatred (see Table A1)	Negative intrinsic motivation	b) "I don't want to do this. I just want to puke!"
Positive intrinsic value (activity)	Interest/Enthusiasm (see Table A1) Motivation (motivat*, looking forward to, going to be fun) Longing (see Table A1) Lust (see Table A1)	Positive intrinsic motivation	No

Source(s): Table by authors

Table A2.
Steps 1–3 data analysis process: cognitive appraisals

About the authors

Claes Dahlqvist is a doctoral student at the department of information Studies at Åbo Akademi University, Finland. He also works as an instruction librarian at the department of Library and Higher Education Development at Kristianstad University, Sweden. His research interests are focused on affective information-seeking behaviour, particularly emotions, in educational contexts. Claes Dahlqvist is the corresponding author and can be contacted at: claes.dahlqvist@abo.fi

Christel Persson, PhD in Science Education, Docent in Science Education with a focus on sustainable development at Åbo Akademi, Vasa, Finland. Christel is involved in collaborative research projects with the surrounding community regarding sustainable environmental behaviour and development of educational and digital tools in the subject area.