

Understanding information-seeking achievement emotions - exploring a cognitive appraisal theory framework

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Abstract

Introduction. Given the limited body of literature on information-seeking emotions in library and information science research in general and relative to appraisal theories in an educational context, the findings of this paper will make a valuable conceptual and theoretical contribution to the field. The paper explores a proposed appraisal theory framework for understanding the information-seeking emotions of higher education students in learning and achieving information-seeking skills. Studying this process is crucial for academic success and future research-informed practice.

Method. The relevance of applying the framework, Scherer's (2005) semantic space of emotions and Pekrun's (2006) control-value theory of achievement emotions, is presented, elucidated and discussed. Concepts, elements, structure and dynamics of the theories are presented.

Analysis and results. The framework offers an understanding and explanation of the nature of information-seeking emotions and their interplay with cognitive appraisals in the complex constructivist learning process of achieving information-seeking skills.

Conclusion. Viewed together, the framework has the potential to be an appropriate analytical tool to investigate information-seeking emotions in the process of learning and achieving information-seeking skills.

Topic areas: information-seeking behaviour, information literacy

Keywords: information-seeking skills, information-seeking emotions, information-seeking achievement emotions, control-value theory of achievement emotions, semantic space of emotions

Introduction

Given the identified instrumental role of emotions in learning (e.g., Kuhlthau, 1993; Linnenbrink and Pintrich, 2002; Pekrun, 2006), understanding emotions and their role in an individual's meaning-making learning process is crucial. This understanding of emotions also applies to the process of achieving and learning information-seeking skills and other information literacies, commonly defined as individual's abilities to identify the need for, critically evaluate and use information in different contexts (e.g., Limberg, Sundin and Talja, 2012; Lloyd, 2017).

It is likely that anyone can relate to and has an idea of what emotions are; we all have feelings and can relate to them. However, wanting to understand what characterises emotions, differentiates them from each other and how they relate to cognitive behaviours and the learning process shows that understanding emotions is a complex task. Appraisal theories offer an understanding of these complex relations and processes.

Although situated in a higher education context where measurable and normative information-seeking skills are the goals for learning and achievement, the paper is positioned within information-seeking behaviour research, defined by, for example, Case and Given (2016, p. 3) as "the ways that individuals [...] seek [...] information in various life contexts". Such holistic view of information-seeking behaviours embraces non-observable behaviours like emotions and is compatible with many researchers' (e.g., Wilson, 2016; Nahl, 2007) explicit recognition of information-seeking emotions as information-seeking behaviours.

Cognitive appraisal theories

Cognitive psychology researchers and appraisal theorists Shuman and Scherer (2014, pp. 15-16) define *emotions* as events or episodes 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". In relation to

information seeking, such multiple-component events are defined herein as information-seeking emotions.

Since the 1950s, social science researchers have acknowledged a cognitive appraisal component as a fundamental part of emotions. All major theories of emotions acknowledge an appraisal component; however, appraisal theories suggest that emotions are driven by cognitive appraisals, and other components of emotions are affected by these appraisals. Changes in appraisals impact other emotional components in a constant process of interactions. The extent to which emotions contribute to the individual's well-being – pleasant or unpleasant – is appraised. If the emotion is negative or unpleasant, further appraisal occurs, eliciting more complex and multi-dimensional emotional states (Ellsworth and Scherer, 2003; Lazarus and Smith, 1988; Shuman and Scherer, 2014).

Since cognitive appraisal theories explain an individual's complex affective and cognitive meaning-making relations and processes, they are compatible with a cognitive constructivist meta-theoretical perspective (Kuhlthau, 1993; Talja et al., 2005). In a learning context, the perspective means that learning is a process of constructing meaning from past and present cognitive and emotional experiences. Being aware of and targeting the cognitive appraisals and emotions in this process have potential for learning designs and support structures that are beneficial for and promote students' learning (Pekrun, 2006).

Literature review

Researchers (e.g., Dahlqvist, 2021a, 2021b; Krakowska, 2020; Lopatovska and Arapakis, 2011; Savolainen, 2015a, 2015b) have identified gaps regarding library and information science research on information-seeking emotions. This is not the place for an extensive review of existing research, but some overviews should be mentioned for further exploration. Lopatovska and Arapakis (2011) offer a library and information science literature review focusing on information systems, information retrieval and human-computer interaction. Theories of emotions applied are categorised after approach (cognitive and somatic) and emotional structure and manifestation (discrete and continuous).

Nahl (2007) provides an overview of information behaviour research areas studying the role of emotions and affective phenomena: cognitive science, affect control studies, affective neuroscience and affective computing and human-computer interaction emotions. In a more recent review (Krakowska, 2020), information behaviour studies exploring affective factors are categorised (e.g., information searching, information seeking, information activities). Kuhlthau's (1993) ground-breaking information search process model is one of the categories, the most cited work on emotions in the information-seeking behaviour literature. It is also one of the few studies of information-seeking emotions in the cognitive constructivist learning process in educational contexts.

Theoretical contributions built on appraisal theories in information-seeking behaviour research are even more limited. Nahl (2005a; 2005b) stands out with her affective load theory (although not explicitly referring to its components as cognitive appraisals), the basis for the development of the social-biological information technology model (2007). Experienced *uncertainty* and *time pressure* are identified cognitive appraisals that determine emotions, which in turn impact cognitive processes. Savolainen's conceptual papers also offer theoretical insights, drawing on appraisal theories. In a review, Savolainen (2016) analyses information-seeking activities through an appraisal theory lens, where negative appraisals of sources are found to determine affective barriers. Cognitive appraisals and emotions in Kuhlthau's information search process model are briefly discussed solely in one study (Savolainen, 2015a) and in more detail compared to Nahl's (2007) social-biological information technology model in another (Savolainen, 2015b). In terms of appraisal concepts, levels of *uncertainty* are identified as the primary cognitive appraisal that interplay with affective factors in the models.

Although recognised as instrumental for learning and academic success, studies of emotions in educational research have been neglected to a large extent. Researchers (e.g., Pekrun, 2019; Pekrun and Linnenbrink-Garcia, 2014) have identified that studies have started to increase over the last 30

years, especially regarding learning in higher education and from an educational psychology perspective. Two handbooks (*Emotion in education*, 2007; *International handbook of emotions in education*, 2014) are indicative of this growing attention as well as prominent appraisal theoretical contributions, among which, Linnenbrink and Pintrich's (2002) *Asymmetrical bidirectional model* and Pekrun's (2006) *Control-value theory of achievement emotions* stand out as frequently cited and applied.

A cognitive appraisal theory framework

A cognitive appraisal theory framework is presented in the paper: the semantic space of emotions and control-value theory of achievement emotions. The relevance of applying the framework to understand cognitive appraisals and emotions in the process of learning and achieving information-seeking skills is elucidated and discussed. In the following, the theoretical framework is presented. Next, the framework is discussed relative to previous literature and an information-seeking skills learning and achievement context.

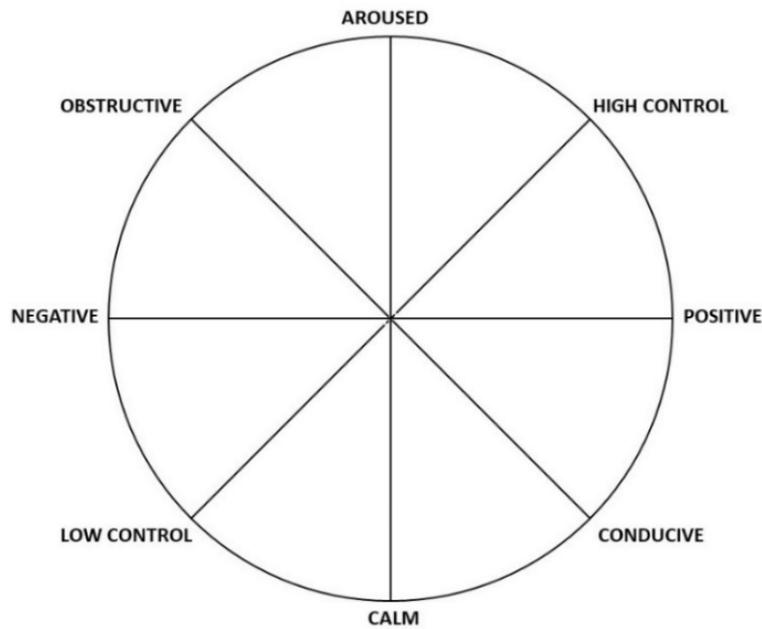
It is hoped that the findings of this paper will make a valuable contribution to the limited body of literature on information-seeking emotions in library and information science in general and information-seeking behaviour research in particular. To the author's knowledge, the semantic space of emotions and control-value theory of achievement together as a framework has not been previously applied in information-seeking behaviour research.

The semantic space of emotions

Scherer (2005) proposes that an individual's natural language expressions of emotions, the subjective *feeling* component, is the best and most accurate way to capture the variety and nuances of emotions. These expressions of feelings have led to the development of the Geneva affect label coder (p. 714-715), an instrument for identifying and categorising feelings as expressed in different languages. In English, the coder consists of 36 affect categories or labels aiming to capture the central meaning of a large and heterogeneous number of feelings expressions (established words as well as informal words and metaphors). Each expression (indexed as words or word stems) is coded with an affect label, and close-related expressions can be found in each category. For example, the feelings expressions *jitter**, *nervous**, *wary** and *worry** have the affect label category *anxiety*.

To fully understand these feelings from an appraisal theory perspective, Scherer (2005) suggests that two appraisal dimensions are integrated in Russell's (1980) classical two-dimensional circumplex model of emotion (valence: negative-positive; intensity: calm-arousal). By adding appraisals of control (low-high) and goal expectancy/coping potential (conductive- obstructive), four characteristics describe the emotions in the model, called the semantic space of emotions (see Figure 1.) Thus, an appraisal theory-derived and more nuanced understanding of the complex nature of emotions is provided.

Figure 1: Adapted and modified from Scherer's (2005, p. 720) semantic space of emotions



The control-value theory of achievement emotions

The control-value theory of achievement emotions (Pekrun, 2006), with some modifications (Pekrun, 2007; Pekrun and Perry, 2014), provides an integrated theoretical approach (e.g., personality, motivational and expectancy theories) for the understanding of emotions in the learning or achievement process. The basic assumption of the theory is that emotions have a fundamental impact on the process of learning and achievement. Another assumption is that this process involves certain emotions tied to formal achievement goals that otherwise would not be present. A third assumption is that these achievement emotions result from control and value appraisals, types of appraisals that are considered the most important in a learning and achievement context. Specific structures of relationships and interplay between these appraisals are posited to determine specific achievement emotions.

Pekrun and Perry (2014, p. 121) define achievement emotions as “affective arousal that is tied directly to achievement activities (e.g., studying) or achievement outcomes (success and failure)”. Thus, achievement emotions have a different focus: activity and outcome. Achievement activity emotions are related to achievement activities, and the attentional focus is on the action. Achievement outcome emotions are experienced when the focus is directed towards a future expected (prospective) or past experienced (retrospective) outcome.

Integrated with the valence (positive-negative) and intensity (arousal/activating, calm/deactivation) dimensions in Russell's (1980) circumplex model, a three-dimensional taxonomy of achievement emotions is provided (see Table 1).

Object focus	Positive, pleasant emotion		Negative, unpleasant emotion	
Activity	Activating <i>Enjoyment</i>	Deactivating <i>Relaxation</i>	Activating <i>Anger, Frustration</i>	Deactivating <i>Boredom</i>
Outcome	<i>Joy, Hope, Pride, Gratitude</i>	<i>Contentment, Relief</i>	<i>Anxiety, Shame, Anger</i>	<i>Sadness, Disappointment, Hopelessness</i>

Table 1: Adapted from Pekrun, Frenzel, Goetz and Perry's (2007) three-dimensional taxonomy of achievement emotions

Control and value appraisals

Achievement emotions are posited to be functions of specific structures of individuals' perceived control (future and past) and subjective values (positive-negative) regarding activities and outcomes. If any appraisals are missing, no emotion will be triggered. There are three types of value appraisals. Intrinsic values refer to the importance experienced through performing activities and achieving the outcomes regardless of external factors. If the perceived importance is induced by external factors such as getting grades necessary for a future profession, values are extrinsic. A third type of value appraisal concerns values of expected or experienced outcomes, positive (success) or negative (failure). Depending on the type of achievement emotion – prospective outcome, retrospective outcome or activity – control and value have different functions and importance.

Achievement emotions

For *prospective outcome emotions*, positive (success) and negative (failure) value appraisals of expected outcome interplay with control appraisals of the expected outcome on different levels. Together, they elicit specific emotions (See Table 2).

Object focus	Cognitive appraisal	Cognitive appraisal	Emotions
	Outcome-value expectancy	Outcome-control expectancy	
Outcome, prospective	Positive - success	High	<i>Anticipatory joy</i>
		Medium	<i>Hope</i>
		Low	<i>Hopelessness</i>
	Negative - failure	High	<i>Anticipatory relief</i>
		Medium	<i>Anxiety</i>
		Low	<i>Hopelessness</i>

Table 2: Prospective outcome emotions and their cognitive appraisals. Adapted from Pekrun (2006, p. 320)

Retrospective outcome emotions (see Table 3) are experienced after the achievement of learning outcomes. The emotion experienced is a combined product of positive (success) and negative (failure) experienced values and causes of controllability.

Object focus	Cognitive appraisal	Cognitive appraisal	Emotions
	Achieved value outcome	Causes of control	
Outcome, retrospective	Positive - Success	Irrelevant	<i>Joy</i>
		Self	<i>Pride</i>
		Other	<i>Gratitude</i>
	Negative - Failure	Irrelevant	<i>Sadness</i>
		Self	<i>Shame</i>
		Other	<i>Anger</i>

Table 3: Retrospective outcome emotions and their cognitive appraisals. Adapted from Pekrun (2006, p. 320)

Activity emotions (see Table 4) are tied to the activity itself. Specific emotions are functions of the expected ability to control actions and the perceived importance of performing the activities or their subjective intrinsic values.

Object focus	Cognitive appraisal		Emotions
	Action intrinsic value	Action-control-expectancy	
Activity	Positive	High	<i>Enjoyment</i>
	Negative	High	<i>Anger</i>
	Positive/Negative	Low	<i>Frustration</i>
	None	Low	<i>Boredom</i>

Table 4: Activity emotions and their cognitive appraisals. Adapted from Pekrun (2006, p. 320)

Elements, structure and dynamics of the theory

Figure 3 presents the structure of the theory with its elements. Besides achievement emotions and cognitive appraisals, the elements of *achievement context* and *learning and achievement* are integrated.

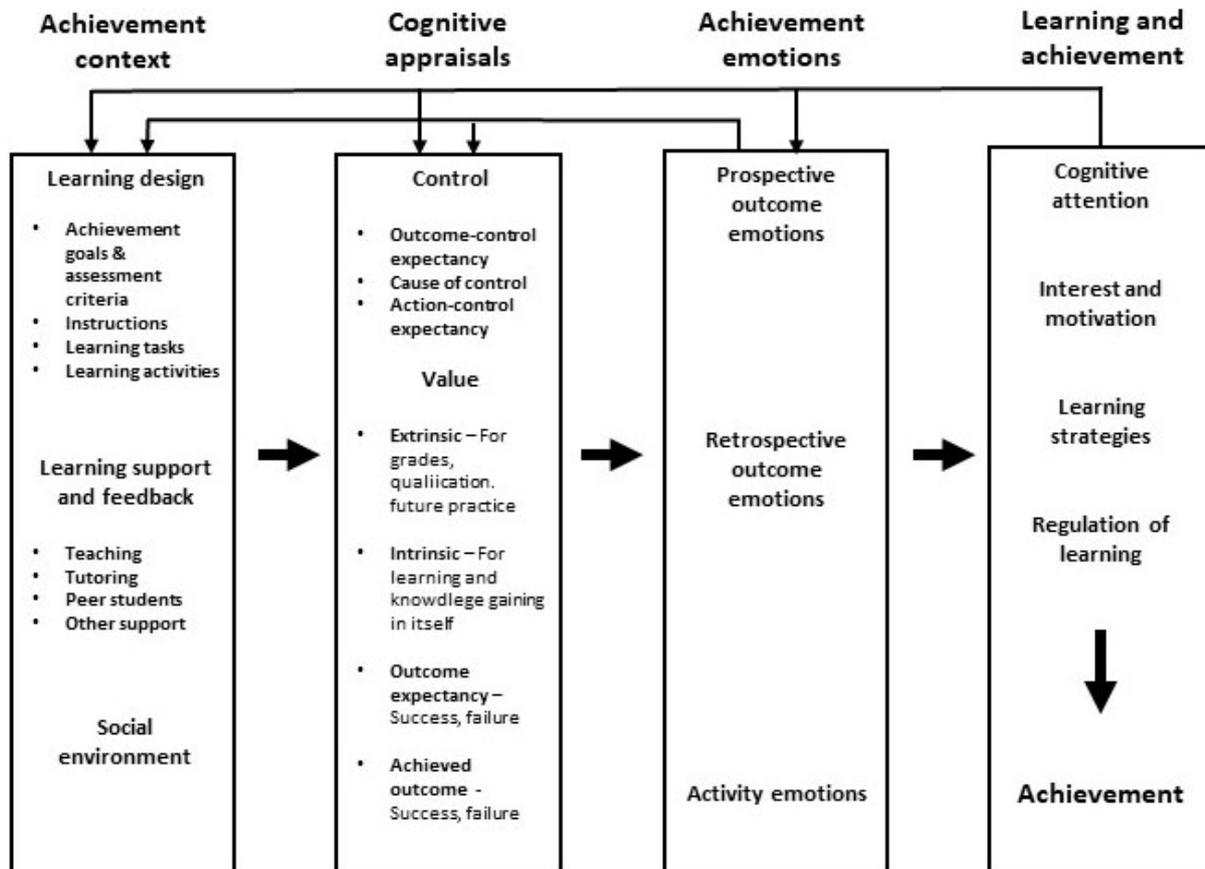
Although acknowledging that the social context and broader academic context impact achievement emotions, the control-value theory focuses on the proximal learning context and how it affects cognitive appraisals and achievement emotions. Course/learning design in terms of learning activities, tasks, outcomes, instructions and assessment criteria is an essential part of this context. So are formal and informal support and feedback structures from teachers, tutors, peers and others.

All elements in the theory are part of the learning and achievement process. However, the theory indicates some cognitive factors or processes in the learning and achievement element of the theory: attentional focus, motivation to learn, learning strategies and regulation of learning.

The achievement context plays a role, as it shapes and organises cognitive appraisals and achievement emotions in different ways. In turn, emotions are posited to impact learning processes that influence learning outcomes. From the reciprocal causation with feedback loops between the elements suggested in the theory (see Figure 3), it follows that the learning and achievement processes reciprocally affect emotions, appraisals and the context in a dynamic, non-linear way.

The reciprocal causation and feedback loops imply that changes in one element impact the other elements, and vice versa. For example, targeting cognitive appraisals that lead to higher perceived control by the learner results in a more pleasant achievement emotion, which affects the appraisals through feedback loops and positively impacts learning and achievement outcomes. Another implication is that emotions, although short-lived, can have an impact over a prolonged period. If a negative emotion that has a negative impact on learning is not targeted and changed (e.g., by increasing perceived control), it might result in failure to achieve learning outcomes.

Figure 3: Pekrun's (2006, p. 328) control-value theory of achievement emotions



Discussion

In the following section, the theoretical elements and content necessary for applying the appraisal theory framework in a higher education context are discussed. Elements that explain the role of cognitive appraisals for understanding emotions in the process of learning and achieving information-seeking skills.

A semantic space of information-seeking emotions

The Geneva affect label coder provides a methodological tool for identifying students' subjective information-seeking emotional experiences, the feelings component of emotions. Expressions of information-seeking feelings can be mapped against the coder and reveal related feelings as well as their respective affect label category. Distributed over the semantic space, the characteristics of the emotion (positive-negative; calmness-arousal) are visualised and understood to recognize how they relate to each other in and between the affect label categories. Thus, the semantic space provides the possibility to identify and explore the variety of close-related information-seeking achievement emotions other than those identified in the control-value theory and, the other way around, to group and categorise similar achievement emotions with assistance of the affect label coder.

Since it is sometimes difficult to differentiate between appraisals and emotions, the semantic space also provides some concepts that could be interpreted as expressions of control, such as confidence and satisfaction or lack thereof (e.g., uncertainty and doubt). In addition, it offers some concepts that reflect appraisals of extrinsic and intrinsic value, such as interest and enthusiasm.

The goal-expectancy appraisal (conducive-obstructive) and the control appraisal (low-high) integrated in the semantic space also contribute to an appraisal theory explanation. A more nuanced

understanding of the control appraisal is offered and complements the control appraisal in the control-value theory. For example, the semantic space tells that *anger* is determined by high-level control appraisals, which are also obstructive, and low-level control appraisals that antedate *boredom* are also conducive (or at least not very obstructive).

Information-seeking achievement emotions - a control-value theoretical perspective

A basic assumption of the control-value theory is the presence of explicit learning outcomes or achievement goals. The importance of achieving explicit information-seeking skills as learning outcomes and other information literacies are fundamental for academic success and future research-informed practices and reflected in guidelines and frameworks of information literacy learning outcomes (e.g., Bent and Stubbings, 2011; ACRL, 2016). Such normative and measurable learning outcomes are necessary to elicit achievement emotions, and emotions tied to this goal with activities constitute the different types of achievement emotions.

If students are required to demonstrate the achievement of formal information-seeking skills learning outcomes (measurable and observable abilities to seek), the achievement process involves emotions in relation to achievement activities and the success or failure of achieving outcomes, *information-seeking achievement emotions*. Thus, the theory also implies that the process involves information-seeking emotions different from those where information seeking is the means for achieving other learning outcomes (as in Kuhlthau's [1993] information search process).

Achievement context. Achievement goals are part of the achievement context element in the theory. In the achievement process of information-seeking skills, learning activities, tasks, instructions and assessment criteria are designed to achieve successful information-seeking skills learning outcomes. Formal and informal support and feedback structures from teachers (e.g., instruction librarians), tutors, peers and others are also an essential part of the context.

Information-seeking achievement emotions. The theory suggests two types of achievement emotions, determined by the focus of the emotions: activity or outcome.

In the process of achieving information-seeking skills, students experience *activity emotions* relative to information-seeking actions and activities with connected learning activities (e.g., documenting and managing seeking strategies, selection of sources) in specific situations. Emotions experienced in relation to future expected information-seeking skills achievement goals are *prospective outcome emotions*. *Retrospective outcome emotions* are experienced when emotions are directed towards achieved and assessed information-seeking skills achievement goals.

As discussed earlier, the semantic space can help identify other potentially relevant close-related information-seeking achievement emotions the control-value theory can theoretically explain. The Geneva affect label coder also enables the categorisation of emotions if needed.

Control and value appraisals. The theory provides an understanding and explanation of the complex affective and cognitive meaning-making relations and processes. In an information-seeking skills achievement context, it primarily means that information-seeking achievement emotions are explained and understood by cognitive control and value appraisals.

Expected levels of control over information-seeking activities and prospective information-seeking skill outcomes are appraised on different levels (see Tables 2 and 4). Regarding retrospective achieved outcomes (see Table 3), the causes of control are appraised. While the causes of the control over retrospective achievement information-seeking emotions seem relatively easy to detect, it might be difficult to identify students' experienced level of expected controllability over actions and outcomes. Therefore, concepts to describe controllability seem necessary. However, the theory does not provide any conceptual guidance. Thus, descriptive negative (e.g., uncertainty, doubt, stress) and positive (e.g., certainty, confidence, calmness) concepts might be helpful in exploring control experiences. This can be done with the assistance of the semantic space of emotions, which provides some control appraisal

concepts. The semantic space also offers, as previously indicated, a goal-expectancy appraisal dimension (conductive-obstructive). Thereby, students' experiences of control over future information-seeking activities and information-seeking skills achievement learning outcomes are given a more nuanced explanation.

In the information-seeking emotions literature, Nahl (2005; 2007) and Savolainen (2015a; 2015b) have identified appraisals of controllability, although not explicitly referring to them as such. *Uncertainty* and *time pressure* (in Nahl's [2005a; 2005b] affective load theory) are concepts identified that describe levels of controllability. Value appraisals, on the other hand, are not discussed.

Students' perceived importance of achieving information-seeking skills learning outcomes, such as getting grades and qualification, constitute the extrinsic value appraisals. If learning and gaining knowledge of information seeking per se is valued, the intrinsic values are appraised. According to the theory (see Table 3), intrinsic values of information-seeking achievement activities are particularly relevant. Expected and achieved information-seeking skills achievement outcomes are also appraised in terms of success or failure. Unclear in the theory, and perhaps of significance, is the role of extrinsic values and how these and intrinsic values of prospective and retrospective outcomes interplay with other appraisals. The theory does not present any concepts describing value appraisals either. Students' experiences of expected and achieved success or failure of outcomes appear rather uncomplicated to identify. Intrinsic and extrinsic value appraisals on the other hand, would benefit from conceptual direction. A reasonable interpretation would be that interests, motivation, attitudes and beliefs reflect such value appraisals. Regarding value appraisals, the semantic space of emotions also has potential to be a valuable tool for discovering value appraisal concepts.

The theory posits that information-seeking achievement emotions cannot be explained by control and value appraisals separately. The main contribution of the theory is that it offers a deep understanding of the complexity of information-seeking emotions in a learning and achievement context by suggesting that certain relations between control and value appraisals elicit specific information-seeking achievement emotions. For example, students experience different information-seeking achievement emotions when expecting the success of achieving information-seeking skills as learning outcomes depending on the experienced level of control (e.g., low-hopelessness, high-anticipatory joy).

Elements, structure and dynamics

Information-seeking achievement emotions cannot be understood if isolated in themselves. The information-seeking skills achievement context shapes cognitive appraisals and information-seeking achievement emotions, which, in turn, impact learning processes and outcomes. Through iterative processes with reciprocal causation and feedback loops (see Figure 3), the theory implies that all elements affect and are affected by the other elements. Thus, negative information-seeking achievement emotions that negatively impact learning and achievement outcomes can be changed by targeting the cognitive appraisals that elicit them and/or other elements in the theory.

Conclusions

The framework - the semantic space of emotions and the control-value theory of achievement emotions - has potential to be an appropriate tool for analysing the cognitive appraisals and information-seeking emotions of higher education students in the process of learning and achieving information-seeking skills.

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