

## Emotional presence as a cognitive appraisal process in higher education: Scale development and validation

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Epistemic engagement among higher education learners often involves cognitive appraisal operations which generate emotional processes. This study aims to develop and validate a multidimensional *Emotional Presence Scale* (EPS) to measure learners' experience of emotion due to cognitive appraisal in epistemic processes. Based on the cognitive-motivational-relational theory of emotion, the EPS was developed and validated through a three-phase process of theoretical conceptualisation, item generation and psychometric analysis. Exploratory and confirmatory factor analyses of data on a multi-institutional sample of Japanese universities (N = 361) produced a four-dimensional structure of emotional presence: interest-curiosity, emotional awareness, expression management, and emotional regulation. The EPS has adequate psychometric properties and is meaningfully related to external variables of task value, satisfaction, and motivation. The findings indicate that the EPS could be a desirable tool to measure emotional presence in higher educational settings where epistemic engagement is crucial.

### Introduction

One of the main aims of higher education institutions is to provide a meaningful and sustainable educational experience. Student learning experience has been found to be related to study behaviour and academic performance (Ning & Downing, 2010). Undeniably, the affective dimension of learning constitutes an important area of educational experience (Hayat et al., 2020; King & Chen, 2019). For instance, epistemic emotions have been found to be the necessary elements in knowledge construction (Dewey, 1938; Vogl et al., 2019), never more so than in higher education where epistemic processes are important. It is believed that multiple practices of knowledge negotiation, such as deciphering knowledge credibility, quality, and novelty are involved during epistemic processes (Swales, 1990). Such practices can possibly lead to the development of emotion in learning (Alonso-Tapia et al., 2020; Muis et al., 2015). Muis et al. (2015) revealed that positive epistemic emotions could be responsible for deep learning strategies among university students. The occurrence of such emotions is believed to be the outcome of an individual's appraisals of various learning factors in relation to the subjective importance of learning goals, motivation, and individual well-being (Pekrun 2006).

The pursuit of emotions in academic research has undeniably posed certain challenges and has at times even been neglected. One reason for this could be the difficulty involved in defining emotions itself. The term 'emotion' has been found to have at least more than 90 definitions within various categories (Kleinginna & Kleinginna, 1981). A notable example of this is the *Community of Inquiry* (CoI) framework, a well-established conceptual framework that describes learners' educational experience in academic discourse of inquiry learning (Garrison et al., 2001). It posits that learning experience can be examined through

the dynamic interaction between three main elements: teaching presence, cognitive presence, and social presence (Garrison, 2011), in the absence of 'emotional presence'. Although the existing CoI framework incorporated 'affective expression' as a part of social presence, the focus is on assessing an individual's sense of belonging and ability to form impressions for social interaction in a CoI. This drawback has been highlighted in some literature and calls for the inclusion of emotional presence into the CoI framework have been made (e.g., Cleveland-Innes & Campbell, 2012; Stenbom et al., 2016).

## **Emotional presence in learning**

Emotional presence is a key construct in the transactional process in education (Lehman, 2006, p.15). In the past, emotional presence was explored by a handful of researchers in educational research. Various definitions were found, among them include notions of 'outward expression of emotion' (Cleveland-Innes & Campbell, 2012; Jiang & Koo, 2020), 'ability to feel' (Majeski et al., 2018; Williams, 2017), and 'emotional transfers' (Sarsar & Kisla, 2016). However, there still exists theoretical vagueness around the concept of emotional presence.

To date, research into emotional presence has focused on online discussion contexts, in line with the initial development of the CoI framework. However, research using the CoI framework itself has over the years expanded into blended learning and face-to-face contexts (e.g., Akyol et al., 2009; Warner, 2016); while for emotional presence, there is still a lack of any integrated approach to conceptualisation and measurement in the conduct of investigations, in both face-to-face and virtual settings. Due to these limitations, no studies have yet been found that have examined emotional presence in settings beyond that of the online learning environment.

## **Need for a new concept and measurement of emotional presence**

The wide variety of emotional presence concepts has led to marked variation in developing instruments to measure the construct. Studies to date have found two measurements that were presented theoretically and empirically: Cleveland-Innes and Campbell's (2012) six-item scale, and Sarsar and Kisla's (2016) 21-item scale. These scales were designed primarily to measure the outward expressions or transfer of emotions in online learning, particularly in text-based discussions.

Most researchers have focused on 'observable emotional contents' and 'emotional transfer' as the concepts of emotional presence. From the affective standpoint, this may seem insufficient to describe learners' educational experience. While the existing concepts have enabled investigation into the ubiquitous nature of emotional presence in online discussions, the implicit processes of emotional experience have yet to be examined, even though the importance of these processes of emotion in education has been widely acknowledged. Emotional awareness, for example, has been related to enhancing prosocial behaviours in the process of critical discussions (Doktor et al., 2018; Ojala, 2013); and influencing emotional regulation, itself being an important element for learning self-

regulation (Boekaerts & Pekrun, 2016). Therefore, the concept of emotional presence should not be limited to the 'emotional contents' of text-based discussion.

In addition, the concept of emotional presence as the outward expressions of emotions proposed by previous literature may provide an inconclusive picture of one's perceived experience of emotion in learning, as individuals may not express their experienced emotions as they are (Planalp et al., 2018), whether in words or gestures. Previous studies have found an individual's expression of emotions was itself bound contextually and culturally (Barsade & Knight, 2015; Härtel et al., 2009), alongside personality factors (Planalp et al., 2018). Specifically, appraisal of environmental stimulus is one of the determinants of emotional expression. In a culture such as that of Japan (i.e., the context of this study) where interdependence is foregrounded, suppression of negative emotions is appreciated as an accommodation of others' needs above personal preferences (Morling et al., 2002; Schouten et al., 2020). This suppression results in a large part of one's experienced emotions lurking within the innermost construal of the situations and coping with interpersonal emotive experiences, intra-personally. Emotional display rules, referring to acting in accordance with the societal or cultural norms in emotional expressions, have yet to be explored in depth in the academic field. Hence, this study suggests that the concept of emotional presence should be based on learner's perceived experience of emotions, including both intrapersonal and interpersonal spheres.

Due to the issues mentioned above, existing measurements offer limited capability in identifying emotional presence beyond text-based discussions. Such is the case for face-to-face or blended learning environments where emotional contents are, in fact, largely undetectable through the written word. Hence, a new instrument is necessary to examine emotional presence of epistemic processes in both text-based and non-text-based learning contexts, that include face-to-face and blended learning contexts.

This study aims to reduce these gaps by grounding the concept of emotional presence based on a cognitive appraisal theory of emotion within the process of developing a reliable and validated instrument to measure the construct.

## **Theoretical framework**

In this regard, the present study applies the *Cognitive-Motivational-Relational (CMR) theory* of emotion, with its focus on the development of emotion based on one's cognitive appraisal of various factors in the learning environment to achieve learning mastery and learning goals. Through this theory, appraisal processes based on individual aspects were involved in the development of emotion in learning.

### **The cognitive-motivational-relational (CMR) theory of emotion**

The CMR theory of emotion explains three important concepts about the process of occurrence of emotions, which are cognitive, motivational, and relational (Lazarus, 1991a, 1991b). 'Cognitive' refers to appraisal processes unique and relative to the person and environment. A person evaluates the personal significance of the stimuli based on existing

knowledge and beliefs. 'Relational' refers to the occurrence of emotions in a person-environment relationship. That is, the intrapersonal sphere within the person is constantly appraising the interpersonal sphere of the environment. 'Motivational' refers to the emotions being the reactions of personal motivation that could be influenced by societal and cultural values.

In this theory, the power of cognitive appraisal to shape the reaction of emotion is emphasised, and conversely, that emotion has the power to disrupt the cognitive processes of the subsequent reappraisals. It is illustrated as a multidimensional system consisting of causal antecedents, and mediating processes (see Figure 1). Personality factors interact with stimulus of the environment leading to situational construal that results in appraisal processes. Cognitive appraisal functions as the centre of the construct, and determines if an emotion will occur, the type of emotion and its intensity (Lazarus, 1991a). The emotional response will further exert influences on secondary appraisal of action tendencies and translated into coping processes.

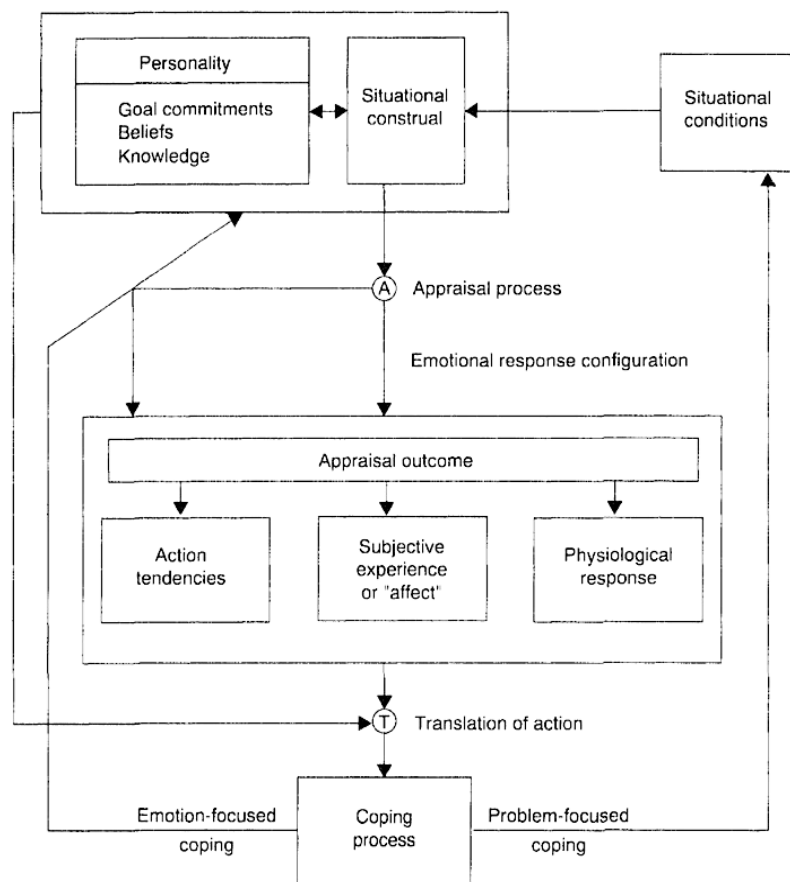


Figure 1: Model of the cognitive-motivational-relational-emotive system  
 Source: Chapter 5: Issues of causality, in Lazarus (1991a)

## Concepts of emotional presence as a cognitive appraisal process

### *Emotional presence as a four-dimensional construct*

In the current study, emotional presence is defined as the experience of emotion during the ongoing interaction between a learner and the situated learning environment in the epistemic engagement of learning. CMR theory views the occurrence of emotions as a dynamic process that encompasses three main areas: the cognitive appraisal, the emotive experience, and the coping with emotions. Within these three areas, this study identified four important dimensions related to the experience of emotions in a learner-learning environmental relationship (see Figure 2). These four dimensions are (i) emotive experience, (ii) emotional awareness, (iii) emotional expression, and (iv) emotional regulation.

- (i) Emotive experience dimension refers to a learner's experience of epistemic emotions during the process of knowledge exploration and generation. Epistemic emotions were found to have positive effects on epistemic processes (Vogl et al., 2019). For example, curiosity was found to promote exploratory behaviour (Litman et al., 2005). Confusion, too, was seen as beneficial to learning (D'Mello et al., 2014). Hope is found to be important in sustaining learning amidst difficulties (Feldman & Kubota, 2015). This study focuses on five emotions: interest, curiosity, confusion, anxiety, and hope.
- (ii) Emotional awareness dimension measures the ability to recognise and describe the type of emotions and their changes, as well as identify the reason behind the occurrence. This dimension is deemed important in appraisal processes as emotional awareness is considered crucial in building meaningful and purposeful relationships within the learning community (Goldsworthy, 2000; Hsieh et al., 2014), and was found to be associated with course satisfaction (Downey, 2003), academic achievement (Parker et al., 2004), meta-emotions (feeling about feelings), and emotion regulation (Goldsworthy, 2000; Szczygiel et al., 2012).
- (iii) Emotional expression dimension refers to the construal of situations and environments allowing one to express thoughts and feelings to promote learning within the community. Emotional expression was found to be influenced by self-presentation and interactional goals (Hayes & Metts, 2008). Conversely, the decision to express (or suppress) one's emotions could be goal-directed and strategic to elicit desired responses from others (Planalp et al., 2018). In the learning process, factors such as self-image, learning goals, and culture will most likely influence emotional expression.
- (iv) Emotional regulation encompasses strategies in managing positive and negative emotions. According to CMR theory, there are two main strategies in the regulation of negative emotions, which are problem-focused or emotion-focused (Lazarus, 1991b). Problem-focused strategy refers to rethinking resulting in a new plan to solve the problem and eliminate the negative emotive experience. Emotion-focused strategy refers to reducing the negative effects of emotions when the stressor is

beyond one's control. Additionally, this study also included regulation of positive epistemic emotion, which was found to enhance motivational level for goal attainment (Sansone et al., 2012).

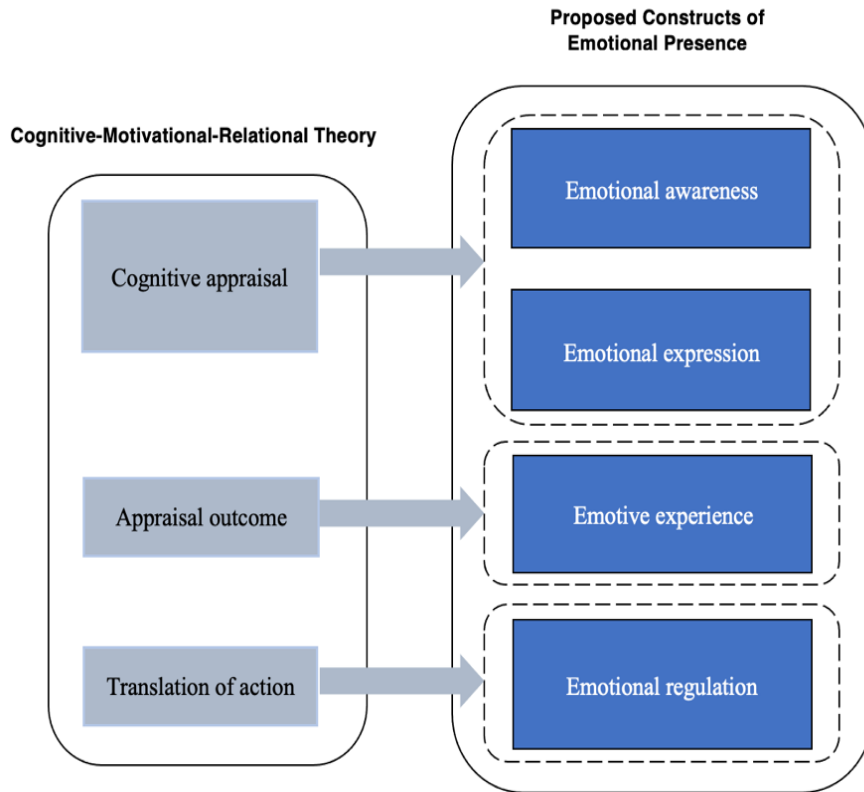


Figure 2: Proposed emotional presence as a four-dimensional construct based on the CMR theory of emotion

### Research questions

The aim of this study was to develop and validate a multidimensional *Emotional Presence Scale* (EPS) in order to measure learners' experience of emotions in the epistemic engagement of learning in higher education. The conceptualisation and propositions of the dimensions were drawn from within the CMR theory of emotion. Thus, this study was guided by two research questions:

1. What are the underlying dimensions of emotional presence in the higher education context?
2. Is the EPS a reliable and valid scale?

## Method

### Participants

The participants comprised a multi-institutional sample of students in Japan, from various public and private universities. Of a total 365 participants, four responses were found to be incomplete and were eliminated. The participants were predominantly Japanese (85.8%,  $n=307$ ), aged 18-25 (92.8%,  $n= 335$ ), and undergraduates (87.7%,  $n=316$ ). The proportion of male to female participants was almost equal, with males at 49.0% and females at 50.1% (Table 1).

Table 1: Demographic profile of survey participants (N=361)

		<i>n</i>	%
Gender	Male	177	49.0
	Female	181	50.1
	Others	2	0.6
	Unreported	1	0.3
Level	Undergraduates	316	87.5
	Graduates	42	11.6
	Others	3	0.9
Age	18-25	335	92.8
	26-35	19	5.3
	36-45	2	0.5
	46 and above	5	1.4
Region	Kanto	309	85.6
	Hokkaido	31	8.6
	Kyushu	16	4.4
	Chubu	5	1.4

### Instruments: Emotional presence scale

To develop a psychometric scale to measure emotional presence, the researcher conducted a comprehensive literature review, consulted experts' advice on item development and conducted in-depth interviews with seven university students.

#### *Initial item development and pre-testing*

At the initial phase, 22 items were developed for the purpose of pre-testing the instrument on a batch of 128 university students. Using *SPSS*, a preliminary analysis via exploratory factor analysis was run on these items which generated a three-factor construct for emotional presence. Taking the results together, the researcher consulted with three experts who were professors in the field and received suggestions to improve the scale. Subsequently, some items were added, reworded, or deleted entirely to improve clarity and content validity. Items reflecting emotions of interest and curiosity were integrated together as 'interest-curiosity' because of the difficulty in distinguishing one from another, as pointed out by previous studies (Ainley, 2019; Alexander, 2019). Moreover, the researcher made the considered assumption that there was no apparent need to

distinguish emotions as one single entity if they seemed to appear as a mixed emotion during the learning process. In addition, a glossary of emotions providing the definition of emotions was added. To pursue deeper into understanding emotional presence of higher education learners, the researcher also recruited seven university students for in-depth interviews. Finally, a 41-item scale was finalised for empirical testing.

#### *Translation*

In the second phase, the researcher recruited two bilingual translators to translate the items into Japanese using a back-translation method. The purpose was to administer the instrument to Japanese students who could not understand English at an advanced level. The translators ensured that the instrument was contextually relevant and culturally equivalent in Japan. The translators were recruited based on their status as educational researchers with experience translating questionnaires in both languages. Discrepancies between the original version and back-translated version were discussed. Adjustments were subsequently made to the Japanese version. Following this, the translated scale was sent to 11 Japanese students to check for possible ambiguities and ease of interpretability, which resulted in no significant changes.

#### *Final item development for empirical testing*

A total of 41 items, encompassing four dimensions were created to tap perceptions of emotional presence (see Appendix A). These items consist of personality variables and context-situational variables. The emotion appraisal domain comprised 10 items reflecting emotional awareness and emotional expression (Hayes & Metts, 2008; Stein & Book, 2011); the emotive experience domain comprised 15 items reflecting epistemic emotions (Pekrun, 2019; Schmidt & Rotgans, 2021, for items of interest-curiosity; D'Mello et al., 2014; Lehman et al., 2013 for items of confusion; Griffin & Roy, 2019; Hills, 2007; Muis et al., 2015; Rosenfeld, 1978 for items of anxiety; and Pintrich et al., 1991 for hope). One item developed from the findings of interviews was Item 6 ("The course content was somehow related to my past experience").

The emotional regulation domain consisted of 15 items reflecting positive and negative emotional regulation strategies (Abdi et al., 2012; Greenglass et al., 1999; Nelis et al., 2011; Senol-Durak et al., 2011 for items of regulation of negative emotions; Quidbach et al., 2010; Nelis et al., 2011 for items of regulation of positive emotions).

Additionally, interview results revealed that students utilised some common strategies to regulate their emotions; among them were 'refocusing on planning' and 'behavioural display of emotions'. In general, findings from the interviews ran parallel with previous literature and no new dimensions were deemed necessary.

Participants answered the items using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The sequence of the items was randomised except for items of emotional regulation (Items 27 and 28) with the exact beginning phrase of the sentences. Besides, demographic items, one item for perceived satisfaction, and one item for perceived motivation were also included in the survey.



**Instruments: Task value scale**

In examining the convergent validity of the EPS, the task value scale, a component of the *Motivated Strategies for Learning Questionnaire* (Pintrich et al., 1991), was used to measure the correlational relationship between both constructs. The employed scale has six items in total. A five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used for item responses.

**Instruments: Test emotion scale (hope)**

To examine the divergent validity of the EPS, the test emotion scale (Pekrun et al., 2002) was used to measure the correlational relationship between both scales. The scale has eight items in total, with a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) for responses.

**Data collection**

After obtaining approval from the educational institution's Research Ethics Committee to conduct the study, participants were recruited from various universities across Japan from June to August 2019. The participants were asked to reflect upon their experience in a recently completed course in answering the survey. The responses were collected via hardcopy form and online survey using *Google Forms*. A total of 365 responses were received, 241 via hardcopy and 124 responses via the online survey.

**Data analyses**

Data analyses were performed using the *IBM Statistical Package for Social Sciences* (SPSS) Version 23 and *AMOS* version 24. The sample was divided randomly into two groups to perform exploratory factor analysis (EFA) ( $n = 245$ ) and confirmatory factor analysis (CFA) ( $n = 116$ ).

Sample size for EFA was reasonably adequate, as this study fulfilled the recommendation of five to ten participants per item by Kass and Tinsley (1979), and five to twenty participants per item by Costello and Osborne (2005). The suitability of the data for factor analysis was determined by employing two indices: the Kaiser-Meyer-Olkin (KMO) which measures sampling adequacy (Kaiser, 1974) and should be .60 or higher, and the Bartlett's test of sphericity (BS) which measures correlation between items (Bartlett, 1950) which should be significant at a probability of .05 or less. To ascertain non-multicollinearity among items, the values of bivariate correlation coefficient of all items should be less than .80 (Field, 2013).

EFA was performed using maximum likelihood (ML) estimation with Promax rotation. To determine the number of factors to be retained, a scree plot was used as the main reference, as the eigenvalue approach has been criticised as unreliable for factor retainment selection (Velicer & Jackson, 1990). Item retainment was decided based on theoretical relevance, communalities value at or above .40 (Carpenter, 2018, p.26), factor

item loadings at or above .30 (Russell, 2002; Tinsley & Tinsley, 1987), insignificant cross-loadings of less than .40, factor reliability level, a minimum of three salient loadings, and parsimony (Carpenter, 2018, p.39).

CFA was performed using ML estimation to assess if the data fit the hypothesised model. The researcher abided by several fit indices recommended by Hu and Bentler (1999) to assess the adequacy of confirmatory analysis: Comparative Fit Index (CFI), Incremental Fit Index (IFI) and Tucker-Lewis Index (TLI) indices to be greater than .95; and root mean square error approximation (RMSEA) index to be less than .06.

As for convergent and divergent validity, average variance extracted (AVE) and composite reliability (CR) were computed for each latent variable. Following Fornell and Larcker's (1981) recommendations, AVE values that exceed .50 demonstrate good convergent validity, and AVE values should exceed the squared correlation between each paired factor to show good discriminant validity. To ascertain internal consistencies of the EPS, CR values and Cronbach alpha should be higher than .70 (Nunnally, 1978).

As for criterion validity, the relations between the EPS and cognitive appraisals of task value, test emotion (hope), satisfaction, and motivation were examined. Since the cognitive appraisal of task value is regarded as an antecedent of emotional processes (Pekrun, 2006), it is postulated that the task value scale would correlate positively to the EPS. Moreover, as the experience of emotions is related to individual motivational and satisfaction factors, it is expected that the EPS would correlate positively with satisfaction and motivation. Finally, as the EPS is intended to measure epistemic learning processes, it should be different from test-related emotions. As such, it is expected that the EPS should be only weakly or not at all correlated with test emotions (in this case, the 'hope' scale is used).

## **Findings**

### **Normality test**

Prior to running EFA on the data, an analysis of the normality of the data was performed. Items that were skew or kurtic (i.e., standardised  $\bar{x}$  value above the absolute value of 3.29 for  $p < .001$ , two-tailed test: Tabachnick & Fidell, 2014) were removed. As a result, six items (items 2 and 41 were deemed skewed; items 27, 29, 34 and 37 were kurtic) that violated the criteria were removed. The KMO value at .856 was considered 'meritorious' (Kaiser, 1974, p.35); while the Bartlett's test of sphericity indicator was significant, implying that the sample was suitable for factor analysis (Carpenter, 2018).

### **Exploratory factor analysis**

In the initial run of EFA, the minimum value of eigenvalue was set at 1 (Kaiser-Guttman rule). The scree plot of a four-factor solution was observed, consistent with the researcher's priori of four factor structure based on the theoretical framework. Criteria of

bivariate correlation coefficients and communalities value of all items were met. In the four-factor solution, items with weak factor loading or cross loading issues were removed. A total of 16 items were removed in this process (Items 6 to 14, 16, 21, 23, 28, 32, 33, and 39). For parsimony purposes, as well as the researcher's discretion on conceptual representation, three further items were removed (Items 4, 15, and 38), resulting in a four-factor, 16-item solution. The final solution is presented in Table 2. The four factors, or subscales, were named, interest-curiosity, emotional regulation, expression management, and emotional awareness.

Table 2: Factor loadings of the items for the EPS

Items	Factor loadings			
	1	2	3	4
<b>Interest-curiosity</b>				
1 I was interested in engaging in discussions about the material.	<b>.799</b>	-.095	.089	-.045
3 I was curious to search for more information about the new knowledge.	<b>.776</b>	.080	-.067	.097
5 I was curious to know beyond what was taught in the class.	<b>.717</b>	-.032	.095	-.101
<b>Emotional regulation:</b>				
When I experience negative emotions (e.g., anxiety, confusion) in study,				
30 I think about the positive things I could learn from the situation.	-.133	<b>.745</b>	.091	-.051
31 I work out a plan to improve my learning strategies.	-.113	<b>.738</b>	.094	.066
35 I look up for more information to clarify my doubts.	-.024	<b>.719</b>	-.062	-.069
36 I do not think of giving up.	-.039	<b>.581</b>	.088	.010
When I experience positive emotions (e.g., interest, curiosity, hope) in study				
40 I eagerly share with others about what I learnt.	.171	<b>.340</b>	-.047	.014
<b>Expression management</b>				
26 I was able to control the way I expressed my emotions.	-.032	-.023	<b>.897</b>	-.059
25 I expressed my emotions in ways that were appropriate to the learning environment.	.049	-.047	<b>.688</b>	.096
24 I could manage my negative emotions in this course.	.050	.124	<b>.596</b>	-.127
22 I knew the appropriate ways of expressing emotions in this learning environment.	-.049	-.058	<b>.553</b>	.316
<b>Emotional awareness</b>				
18 I was sensitive to the changes of my emotions (e.g., interest, confusion, curiosity, anxiety, etc.) when studying.	-.088	.002	-.077	<b>.962</b>
17 I was aware of my emotions (e.g., interest, confusion, curiosity, anxiety, etc.) when studying.	.082	-.065	-.019	<b>.791</b>
20 I was aware of others' expression of emotions in this course.	.029	.156	.200	<b>.389</b>
19 I knew the reasons I felt the way I did.	.143	.036	.085	<b>.302</b>

Table 3 presents the descriptive statistics and reliability scores for the subscales. Cronbach's alpha values were of adequate range (i.e.,  $>.70$  according to Schmitt, 1996).

Table 3: Subscales' mean, standard deviations, and reliability scores

EPS subscales	No. of items	Mean	SD	Cronbach's alpha
1. Interest-curiosity	3	3.06	1.03	.803
2. Emotional regulation	5	3.21	0.88	.755
3. Expression management	4	2.83	0.90	.786
4. Emotional awareness	4	2.83	0.96	.741

### Confirmatory factor analysis

Based on the EFA results, a first-order model postulating four subscales of the EPS was examined. All indices of the fit statistics of the proposed model were within the cutoff values ( $\chi^2/df = 1.215$ ,  $p = .073$ ; CFI = .966; IFI = .967; TLI = .958; RMSEA [90% CI] = .039). The analysis did not indicate a need for modification of the proposed model; the results suggest the plausibility of the postulated scales of the EPS according to this model.

### Psychometric properties evidence

AVE values for two of the subscales were above .50, while another two fell short of the cutoff point (Table 4). However, it is acceptable as all CR values were above .70 threshold (Bettencourt, 2004; Fornell & Larcker, 1981), indicating sufficient convergent validity. All AVE values exceeded paired squared correlations between factors, indicating sufficient discriminant validity.

Table 4: Factor correlations, AVE, and CR values of the EPS subscales

Factor correlations, AVE, and CR values	1	2	3	4
1 Interest-curiosity	.585a (.808b)	.345 (.119c)	.461 (.213)	.425 (.181)
2 Emotional regulation		.414 (.769)	.463 (.214)	.359 (.129)
3 Expression management			.646 (.784)	.394 (.155)
4 Emotional awareness				.448 (.730)

a: AVE (average variance extracted); b: CR (composite reliability); c: Squared correlations

Table 5 shows that the EPS was moderately and positively correlated with task value, satisfaction, and motivation (.507, .423, and .522). The EPS was weakly correlated with test emotion (.341).

Table 5: Correlation analyses between EPS and external variables

	Pearson's correlation			
	Task value	Test emotion	Satisfaction	Motivation
EPS	.507**	.341**	.423**	.522**

\*\* Correlation is significant at the .01 level (2-tailed).

## Discussion

The primary purpose of this study was to develop and validate the psychometric properties of the EPS. The results supported the proposed conceptualisation of the EPS. The EPS measures both the internal and external experience of emotions, and filling the gap left in previous emotional presence scale development research which focused mainly on observable emotional expressions.

The findings of this research indicated that the EPS has adequate reliability and validity to assess emotional presence in epistemic processes, while additionally, the multi-institutional sample provides increased external validity to the empirical evidence of the EPS.

EFA analysis indicated that the items cohered into interpretable factors which represented the proposed construct. The factor structure was validated with a second sample via CFA analysis which supported a four-factor model with 16 items. The findings successfully demonstrated that emotional presence has a multidimensional first-order factor structure with four latent dimensions: interest-curiosity, emotional regulation, expression management, and emotional awareness (see Figure 3). The first-order factor structure of emotional presence is consistent with the assumptions of past studies (e.g., Cleveland-Innes & Campbell, 2012; Sarsar & Kisla, 2016). All the items remained in the initial proposed dimension, however, the labels of ‘emotive experience’ and ‘emotional expression’ were changed to ‘interest-curiosity’ and ‘expression management’ respectively, as the new labels were a better conceptual representation of the retained items.

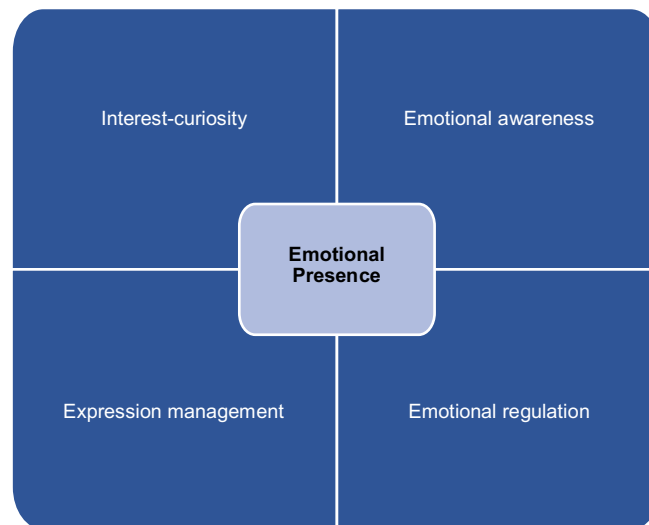


Figure 3: Four dimensions of emotional presence

Interest-curiosity subscale specifically measures learners’ interest and curiosity in knowledge exploration and construction and was found to be the most salient emotion for epistemic engagement in learning. Three other emotions initially included in the survey

items - confusion, anxiety and hope - did not load onto any of the latent factors, indicating a lack of association with the latent factors. Despite findings from previous literature that suggested epistemic emotions, like confusion, could potentially lead to deeper learning, there were situations found where confusion is regarded as unproductive to learning (Lehman et al., 2013, p.86). Similarly, it was found that anxiety could lead to task-irrelevant cognitive activities that impeded task performance (Eysenck, 1979, p.365). Hope, reflecting a sense of expectancy, was not documented as an epistemic emotion (Feldman & Kubota, 2015).

Emotion regulation subscale measures known common strategies undertaken to cope or manage the emotions experienced in the learning process. It is worth noting here that one item of positive emotional regulation, namely 'eagerness to share with others what was learned', was retained. Learners may encounter the need to 'sate' the salient, positive emotions by sharing what they have found to be new, intriguing, or exciting with others. This item reflects the importance of regulating positive emotions (such as interest or curiosity) in learning processes, as emotional regulation has been commonly associated with negative emotions in the past (Garnefski & Kraaij, 2006).

Moreover, expression management subscale is particularly new as past studies focused on measuring emotional presence based on the outward display of emotions. This subscale measures the ability to manage the expression of emotions through appraising context and cultural appropriateness. Bounded by emotional display rules of the situated learning environment, which is contextually and culturally appraised (Buck et al., 1992; Hayes & Metts, 2008), this subscale takes into account individual differences in the way expression of emotions are managed.

The EPS has therefore proved itself to be a desirable tool for measuring the concept of emotional presence in higher education settings. The EPS provides researchers and practitioners an easily administered instrument for assessing the level of emotional presence in a course, a lesson, or a task. Exploratory studies could be undertaken to assess the relationships between emotional presence and other indicators in the learning process, which could provide valuable insights into learners' educational experience. The EPS may also assess the development of emotional presence in educational intervention research related to different uses of pedagogical designs and technologies. Moreover, it is proposed that the EPS can be employed in an epistemic-related activity or setting where critical inquiry of academic discourse and discussion is an important element within a learning community (Swales, 1990; Weaver & Tuten, 2014).

As this study was conducted within a predominantly Japanese cultural background, the findings have deepened our understanding into Japanese university students' educational experience within the affective domain. In view of this, the EPS can be said to adequately measure emotional presence, even in high-context cultural settings where emotions are not explicitly expressed. Nevertheless, further evaluation is needed to obtain broader perspectives across diverse contexts, disciplines, and courses, as these factors might well play a part in influencing the formation of emotional presence. As a self-reporting measurement, the EPS is limited in the way that it requires students to recall their

experience of emotions in learning. Despite this, the immediate conduct of the data collection in this study may well have minimised the errors of varying recollections.

In conclusion, this research offers a new approach to the understanding of emotional presence in the higher education context, not only as emotional states (feelings) or expressions, but rather as a series of emotional processes based on individual appraisals driven by personal beliefs, goals, and desires. It is suggested that future research could examine emotional presence alongside other presences in the CoI framework, not to deny the possibility of considering emotional presence as a fundamental element of the framework. Regardless, the EPS could be an effective and important operational tool of measurement for educators in understanding learners' experience of emotions in epistemic engagement of higher education.

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## Appendix A: Initial items of the EPS for empirical testing

Dimension	Item	Statement
Emotive experience	1	I was interested in engaging in discussion about the material.
	2	I was interested in acquiring new knowledge in this course.
	5	I was curious to search for more information about the new knowledge.
	13	I was curious to find the answers to the questions posed in this course.
	23	I was curious to know beyond what was taught in the class.
	7	I experienced confusion in solving problems related to the course content.
	14	I experienced confusion in understanding the material.
	18	I was confused with new knowledge in this course.
	8	I felt anxious about studying new things in this course.
	9	I felt anxious whenever the teacher asked a question in this class.
	17	I felt anxious to share my ideas with others.
	26	I was worried about whether I had properly understood the material.
	10	I was confident that I could cope well with the difficulties in this course.
	22	I was confident that I would be able to master the material.
24	I was confident that I could achieve good grade in this course.	
6	The course content was somehow related to my past experience.	

Emotional awareness	3	I was aware of my emotions (interest, confusion, curiosity, anxiety etc.) when studying.
	4	I was sensitive to the changes of my emotions (interest, confusion, curiosity, anxiety, etc.) when studying.
	11	I knew the reasons I felt the way I did.
	12	I was aware of others' expression of emotions in this course.
	19	In general, I could describe my emotions easily.
Emotional expressions	15	I knew the appropriate ways of expressing emotions in this learning environment.
	16	I expressed my emotions to others as how I truly felt.
	20	I could manage my negative emotions in this course.
	21	I expressed my emotions in ways that were appropriate to the learning environment.
	25	I was able to control the way I expressed my emotions.
Emotional regulation	27	When I experience negative emotions (e.g., anxiety, confusion) in study,
	i.	I share to people who are close to me.
	ii.	I do not blame myself for the bad experience.
	iii.	I do not blame others for the bad experience.
	iv.	I think about the positive things I could learn from the situation.
	v.	I work out a plan to improve my learning strategies.
	vi.	I do not keep thinking about the bad experience.
	vii.	I distract myself by doing other activities.
	viii.	I seek help from others.
	ix.	I look up for more information to clarify my doubts.
	x.	I do not think of giving up.
	28	When I experience positive emotions (e.g., interest, curiosity) in study,
	i.	I express my feelings through facial expressions (e.g., smile, laughter etc.)
	ii.	I spend time reading up more about the material on my own leisure time.
iii.	I find ways to reward myself for the good learning experience.	
iv.	I eagerly share with others about what I learnt.	

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