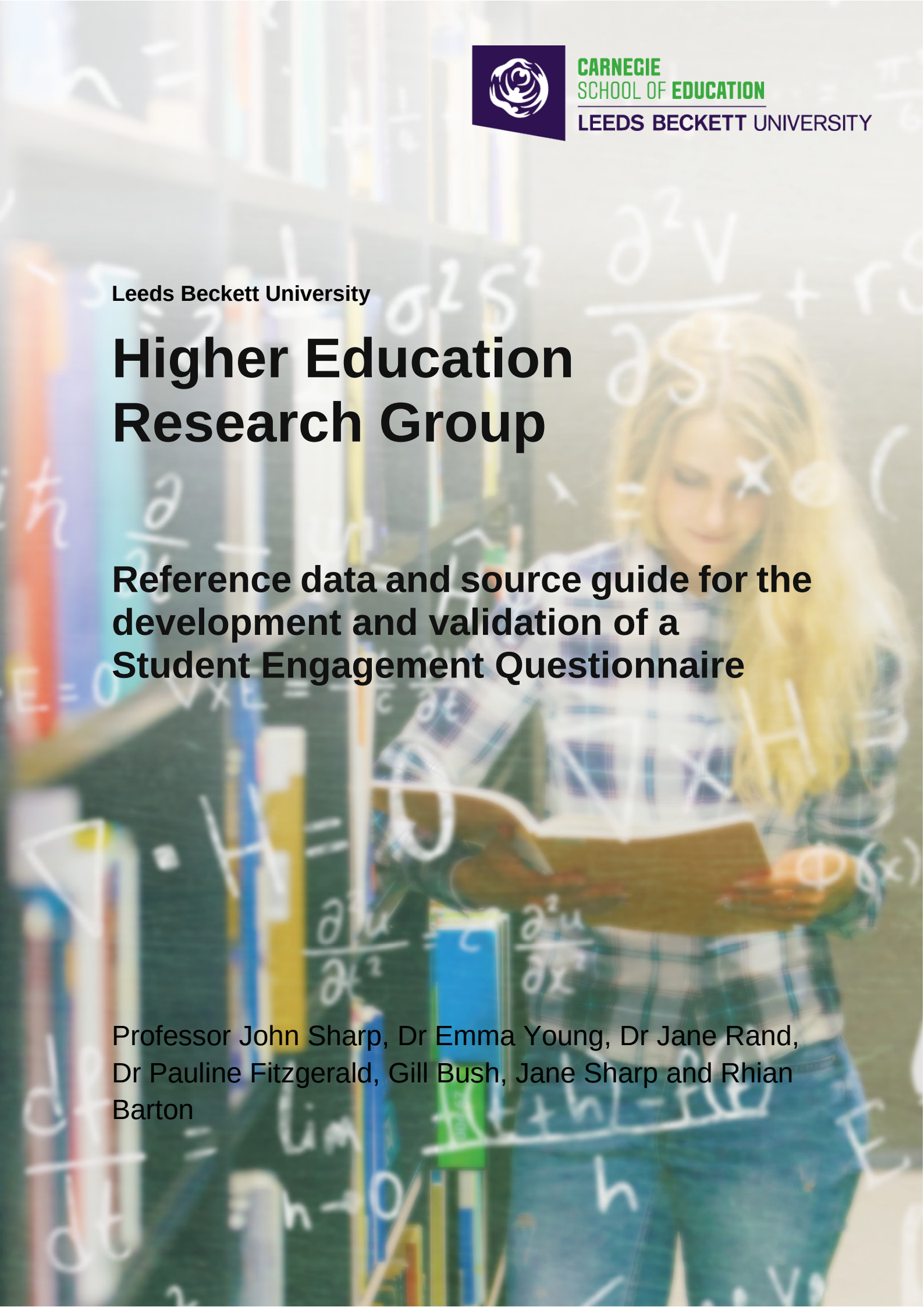

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Reference data and source guide for the development and validation of a Student Engagement Questionnaire

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Abstract

In this working paper, we present details surrounding development of a Student Engagement Questionnaire (SEQ) intended to probe academic boredom and perceived course experiences across the UK Higher Education sector. As part of the validation process, a phase of pre-screening incorporating Principal Component Analysis (PCA) was applied to reduce an otherwise large data set to a more manageable and meaningful size. Exploratory Factor Analysis (EFA) identified and helped understand the SEQ's underlying latent variables and Confirmatory Factory Analysis (CFA) established model fits and second-order factor structures where appropriate. Correlation, cluster and path analysis, used in combination, contributed further in terms of determining the SEQ's robustness as a research instrument as well as highlighting its predictive and diagnostic potential in application.

Key words: Academic boredom, perceived course experiences, exploratory factor analysis, confirmatory factor analysis, cluster analysis, path analysis

Introduction

According to Trowler (2010), student engagement across all areas of higher education provision is a matter:

> *'… concerned with the interaction between time, effort and other relevant resources invested both by students and their institutions intended to optimise the student experience and enhance the learning outcomes and development of students and the performance and reputation of the institution …'* (2)

In a sector perhaps more politicised and competitive now than at any other time in the past, with teaching excellence, student satisfaction, graduate employment and 'value for money' taking centre stage, understanding the very nature and essence of student engagement is essential (Kahu, 2013; Zepke, 2014). Alongside this, if often overlooked, the emotional dimension of learning and what it means to be a student at

university seems equally important. As indicated by Pekrun (2006), both engagement and emotion are inextricably linked and of educational relevance for two main reasons:

> *'… first … emotion can affect students' interest, engagement, achievement and personality development … second … emotions are central to psychological health and well-being, implying that they should be regarded as important educational outcomes in themselves, independent of their functional relevance …'* (333-334)

With academic boredom emerging as one of the most important achievement-related emotions known to actually impact on student engagement (van Tilberg and Igou, 2012; Vogel-Walcutt et al., 2012; Mercer-Lynn et al., 2011, 2013, 2014; Tze et al., 2016; Sharp et al.,2018), the work presented here sets out details of a Student Engagement Questionnaire (SEQ) intended to probe academic boredom and perceived course experiences easily, reliably and all together at the same time. In essence, the SEQ is an amalgamation, modification and extension of two existing instruments: the Academic Boredom Survey Instrument (ABSI) from the exploratory work of Sharp et al. (2016) and the Shortened Experiences of Teaching and Learning Questionnaire (SETLQ) from the work of Entwistle et al. (2002) and Hounsell and Entwistle (2005). Nevertheless, development and validation of the SEQ makes a valuable contribution to the study of higher education research as a whole.

Review of literature

Academic boredom

The study of academic boredom, the boredom experienced by undergraduates attending university or college, has a relatively recent history dating back to at least the 1980s (Wolfgang and Dowling, 1981; Wright and Moore, 1982; Ratcliffe and Burkhart, 1984; Johnston and O'Malley, 1986; Maroldo, 1986; Tolor, 1989). From a questionnaire survey of 252 students enrolled on at least one so-called *'remedial course'* in the United States, for example, Aldridge and DeLucia (1989) reported 41% feeling frequently bored as a result of the mismatch between course expectation and reality, with 80% indicating a need for more classroom stimulation. Adopting the term *'academic boredom'* (43) perhaps for the first time, Aldridge and DeLucia also made

reference to its presence as an *'academic plague'* (43). Even by then, and with reference to the study of boredom at work, academic boredom could easily be considered a reaction to task situations in which the pattern of work was nearly constant or highly repetitive and monotonous resulting in a state of emptiness or longing accompanied by feelings of dissatisfaction yet disinclination to action, as well as an altered perception of time. Boredom in the 1980s also played witness to publication of the Boredom Proneness Scale (BPS) by Farmer and Sundberg (1986). Recognising boredom as a *'common emotion'* and noting the *'disparity between the importance of boredom as an issue in psychology, education and industry and the dearth of research that addresses this disposition'* (4), Farmer and Sundberg's 28-item BPS measured the recurring propensity or habitual disposition of individuals towards getting bored as a trait. Validated with a sample group of only 233 undergraduates also in the United States, Farmer and Sundberg asked a separate group of participants to list which topics covered during the course of a day were most uninteresting, where their attention was directed in lectures as a result and how they rated their lectures at the end of sessions themselves. As predicted, those students more prone to academic boredom than others were the least interested, attentive and involved. As the first full-scale instrument for the measurement of boredom as a trait among the wider population, subsequent scrutiny of the BPS's psychometric properties have since revealed a more involved factor structure, not only in the United States where it was first developed but in other locations around the world too (Table 1). While never perfectly replicated, pointing to culture-specific as well as methodological issues in how replication was attempted, some overlap in outcome is evident. With increasing levels of attention devoted to other types of boredom well into the 1990s (e.g. existential, work-related, free-time, leisure, marital and sexual), and thanks largely, though not exclusively, to Farmer and Sundberg's BPS, the study of academic boredom among undergraduates continued at pace, focusing largely on its correlational relationships with a range of human conditions and pathologies rather than engagement *per se* (Vodanovich, 2003). With much of this work continuing well into the new millennium, so too did an interest in student engagement which also returned to the agenda.

Authors	Sample group	Sample size	Scales and subscales	Technical details
Farmer and Sundberg (1986)	College students in the US No ages or mean provided	233	Boredom proneness (unitary construct – no subscales)	28 items, true-false, boredom self-rating correlation r=.67, p<.001, KR-20 α=.79, 1 week test-retest r=.83
Ahmed (1990)	Psychology students in Canada Age 20-26 years, no mean provided	154	Interest in the environment (apathy); Capacity to concentrate or attend (inattention)	27 items, true-false, KR-20 (full-scale) α=.72 EFA, unrotated, cut-off 0.30, 61.0% of variance
Vodanovich and Kass (1990a)	Psychology students in the US Mean age 24.8 years	385	External stimulation; Internal stimulation; Affective responses; Perception of time; Constraint	27 items, 7-point Likert scale, Cronbach's α=.59 (low) to .73 (high) EFA, varimax rotation, cut-off=0.40, 43.0% of variance
Vodanovich et al. (1997)	African-American university students in the US Mean age 21.0 years	201	Perception of time; Internal stimulation (creativity); External stimulation (monotony); Constraint; Affect; Patience; Internal stimulation (attention)	25 items, 7-point Likert scale, Cronbach's α not provided EFA, varimax rotation, cut-off=0.40, 56.4% of variance
Gordon et al. (1997)	University students and employees in Australia No ages or mean provided	345	Needs a buzz; Inability to self-regulate; Lack of creativity; Restless in restraint	26 items, 7-point Likert scale, Cronbach's α=.47 (low) to .78 (high) EFA, varimax rotation, cut-off=0.30, percentage variance not provided
Vodanovich et al. (2005)	Adults employed at a US university Mean age 28.5 years	787	Internal stimulation; External stimulation	12 items, 7-point Likert scale, Cronbach's α=.86 and .89 respectively CFA: χ^2/df=4.16; CFI=.92, GFI=.94, RMSEA=.05 CFA conducted on earlier scales (mixed outcomes)
Melton and Schulenberg (2009)	Psychology students in the US Mean age 19.8 years	279	Negative (due wording of items); Positive (due wording of items)	23 items, 7-point Likert scale, Cronbach's α=.86 and .78 respectively EFA, oblique rotation, cut-off=0.40, 34.3% of variance CFA conducted on earlier scales (mixed outcomes)
Craparo et al. (2013)	College students in Italy Mean age 21.0 years	312	Creativity (internal stimulation); Apathy; Challenge (external stimulation)	17 items, Likert scale not provided, Cronbach's α=.70, .71 and .63 respectively EFA, promax rotation, cut-off=0.35, 31.7% of variance CFA: CFI >.95, RMSEA <.10 for each subscale

Table 1 Overview of major studies investigating psychometric properties of the Boredom Proneness Scale (EFA=Exploratory Factor Analysis; CFA=Confirmatory Factor Analysis)

Given its age and psychometric limitations, with many original items looking somewhat dated in particular, the BPS remains very much in use today, including the work of Harris (2000) in the United States and Mann and Robinson (2009) in the UK. Realtive to trait, however, measures of state boredom are relatively thin on the ground. Favouring a combined arousal and attention-related theoretical framework, the Multidimensional State Boredom Scale (MSBS) of Fahlman et al. (2013) is a notable exception. In stark contrast to the BPS, this was validated in several stages with over 2000 students at universities in Canada and achieved using both exploratory and confirmatory factor analysis.

Control-Value Theory: A trans-theoretical perspective

While arousal and attention-related theories are certainly commonplace in the study of boredom as a universally experienced phenomenon, with both giving rise to testable predictions among psychologists in the main, Control-Value Theory (CVT) perhaps offers a more fruitful and trans-theoretical framework which better acknowledges the complexity and hybridity of academic boredom across a wide range of higher education settings (Pekrun, 2000, 2006). With the multidimensional perspective of achievement-related emotions established elsewhere, Pekrun considered academic boredom a psychological subsystem with affective, cognitive, motivational, expressive and physiological processes working together in coordinated ways. These were linked directly to both achievement activities and achievement outcomes, the latter being anticipatory or retrospective in nature. Pekrun also noted that academic boredom, like all other achievement-related emotions (e.g. anxiety, anger, hopelessness, shame, enjoyment, hope, pride and relief) could still be conceptualised as either state or trait and *'momentary occurrences within a given situation at a specific point in time … [or] … as habitual [and] recurring'* (2006: 317), the defining characteristics of state (or state-like) and trait (or trait-like) being temporal as well as situational. The basic premise of CVT, that an individual's appraisal of control and value with respect to achievement activities and their outcomes might radically influence academic progression, was game changing (Pekrun and Stevens, 2010). CVT provided the conceptual understanding of academic boredom and its wider relationship with learning from which subsequent investigations could be better operationalised. In accordance with CVT, and in terms of the boredom experienced by undergraduates

alone, academic boredom was (re)defined in alignment with earlier work from the 1980s as a psycho-physiological response to a supposedly meaningful educational event and no longer the invisible or *'silent emotion'* of little interest or unworthy of attention (Pekrun et al., 2010: 531). Since the advent of CVT, a whole new range of academic boredom instruments have appeared including:

- the Achievement Emotions Questionnaire (AEQ);
- the Learning-Related Boredom Scale (LRBS);
- the Boredom Coping Scale (BCS);
- the English Precursors to Boredom Scale (E-PBS);
- the Academic Boredom Scale (ABS-10);
- the Student Experience of Emotions Inventory (SEEI);
- the Boredom Proneness Scale for UK Higher Education (BPS-UKHE).

Psychometric and other details are summarised as shown (Table 2). Of all of these, the AEQ and LRBS (derived from the AEQ itself), being among the first, have since received most attention. Despite their widespread availability, however, complete psychometric evaluations of the AEQ and LRBS were not published until well after they first appeared (Pekrun et al., 2011; Tze et al., 2013a). Firmly identified as a largely negative and deactivating emotion of some importance, academic boredom has now been found to impact usually adversely on intrinsic motivation to learn, perceived effort, achievement goals, the adoption of more favourable learning strategies over others including the ability to self-manage levels of engagement through self-regulation and belongingness and drop-out intention (Ruthig et al., 2008; Daniels, 2008, 2009; Artino, 2009; Artino and Stephens, 2009; Artino and Jones, 2012; Artino et al., 2010; Noteborne et al., 2012; Ranellucci et al., 2015; Garn et al., 2017; Heckel and Ringeisen, 2017; Respondek et al., 2017). In a series of investigations overlapping with and extending their earlier work, Pekrun et al. (2009, 2010, 2014) also tested the reciprocal rather than linear relationship between academic boredom and achievement over an entire semester. Controlling for gender, age, interest, intrinsic motivation and prior achievement, academic boredom was found to exert a negative influence on subsequent academic performance and vice versa as predicted.

Instrument	Authors	Sample group	Sample size	Scales and subscales	Technical details
Achievement Emotions Questionnaire (AEQ)	Pekrun et al. (2011) See also Pekrun et al. (2002b, 2005a) for earlier versions Original in German	Psychology students from a range of disciplines in Canada Mean age 20.6 years	389	Learning-and class-related (trait or state): Boredom; Hopelessness; Anxiety; Anger; Shame; Enjoyment; Hope; Pride. Test-related: Relief included, Boredom not.	11 items per emotion, 5-point Likert scale, Cronbach's α>.75 across all (.92 and .93 for Boredom) CFA: χ^2/df=2.77, CFI=.99, GFI=.92, RMSEA=.07
Learning Related Boredom Scale (LRBS)	Tze et al. (2013a) See also Pekrun et al. (2002b, 2005a, 2011) for earlier versions Original in German	Education students in Canada and China Mean ages 23.3 and 21.0 years respectively	151 and 254 respectively	Learning-related boredom: Affective, Cognitive, Motivational and Physiological	11 items, 5-point Likert scale, Cronbach's α=.90 (Canada) and .89 (China) CFA (combined): χ^2/df=2.28, CFI=.95, RMSEA=.06
Boredom Coping Scale (BCS)	Tze et al. (2013b) after Nett et al. (2010, 2011)	Education students in Canada and China Mean ages 23.3 years and 21.0 years respectively (validated with LRBS above)	151 and 254 respectively	Cognitive-approach; Cognitive-avoidance; Behavioural-approach; Behavioural-avoidance	20 items, 5-point Likert scale, Cronbach's α=.80, .82, .90, .96 (Canada) and .84, .67, .86, .89 (China) CFA (Canada): χ^2/df=1.52, CFI=.95, RMSEA=.06 CFA (China): χ^2/df=1.87, CFI=.94, RMSEA=.06
English Precursors to Boredom Scale (E-PBS)	Tze et al. (2014b) after Daschmann et al. (2011)	University students in Canada Mean age 23.1 years	274	Over-challenge; Under-challenge; Monotony; Lack of meaning; Opportunity cost; Teacher dislike; Lack of involvement; General boredom	22 items, 5-point Likert scale, Cronbach's α=.84, .92, .87, .90, .93, .90, .87 and .83 respectively CFA: χ^2/df=2.61, CFI=.94, RMSEA=.08
Academic Boredom Scale (ABS-10)	Acee et al. (2010)	Applied educational psychology students in the US No ages or means provided	170	Academic boredom (under-challenging circumstances); Self- and Task-boredom (over-challenging circumstances)	10 items, 5 in each of Self- and Task-boredom, 9-point Likert scale, Cronbach's α=.90, .86 and 0.80 respectively CFA (under-): χ^2/df=1.70, CFI=.97, RMSEA=.07 CFA (over-): χ^2/df=2.00, CFI=.96, RMSEA=.08
Student Experience of Emotions Inventory (SEEI)	Trigwell et al. (2012) after Govaerts and Grégoire (2008)	First year biology students in Australia Age 18-25, no mean provided	388	Positive emotions (pride, hope, confidence); Negative emotions I (anger and boredom); Negative emotions II (anxiety and shame)	18 items, 5-point Likert scale, Cronbach's α=.77, .78 and .75 respectively EFA, oblimin rotation, cut-off=0.40, 40.2% of variance
Boredom Proneness Scale (BPS-UKHE)	Sharp et al. (2016) after Farmer and Sundberg (1986)	Education Studies students in the UK Mean age 23.4 years	324	Full-scale, 5-factor and 3-factor short-forms available. Short-form the most parsimonious: Tedium, Time, Concentration	Short-form: 18-items, 5-point Likert scale, Cronbach's α=.85, .74 and .75 respectively CFA: χ^2/df=1.80, CFI=.95, TLI=0.94, RMSEA=.05

Table 2 Overview of major self-report instruments consistent with CVT and the measurement of academic boredom (EFA=Exploratory Factor Analysis; CFA=Confirmatory Factor Analysis)

Following on from the earlier work of Mann and Robinson (2009) in the UK, but adopting the BPS-UKHE and a theoretical framework located within CVT, academic boredom was explored in a study of mixed methods design among final year Education Studies students by Sharp et al. (2016, 2017a,b). Summarising from within the last reported phase of this work (Sharp et al., 2017c), almost all participants involved displayed some propensity towards academic boredom with lower levels of engagement reported in traditional lectures than in other forms of course delivery (58.6% half of the time or less). In terms of the actual onset of academic boredom itself, a perceived excess and inappropriate use of PowerPoint, the personal attributes and qualities of lecturers themselves, the relevance of lecture material presented, coherency and pace, a lack of student-tutor interaction, student behaviour and the lecture-theatre environment were among the most frequently cited triggers. Academic boredom was also found to occur during the completion of written assignments for the purposes of assessment. Cluster analysis of the quantitative data indicated that those participants more prone to academic boredom than others also appeared less intrinsically motivated and more likely to lack a sense of purpose. They were also more likely to describe their attendance at university as good rather than excellent, to manage their time and to deploy other resources less effectively and to spend less time in self-study over the course of a week. With boredom proneness and final year degree mark negatively correlated as anticipated, those participants more prone to academic boredom and less engaged than others were also found to graduate with lower class degree awards. Mindful of their reciprocal and mutually reinforcing relationships, basic path analysis highlighted academic boredom as a positive predictor of surface approaches to learning, a negative predictor of organised effort and a negative predictor of perceived course experiences.

Ways of working/Approaches to learning

In contrast to academic boredom, the ways in which students work and how they approach what they have to learn is a relatively mature field of higher education research with origins in the phenomenographic studies of Marton and Säljö (1976a,b) and the outcomes arising from questions put to students after reading a passage of academic text. Two qualitatively different levels of processing were observed: one involving the search for author meaning and personal understanding, referred to now

as a deep approach, the other simply committing text to memory for the purposes of reproduction, referred to now as a surface approach. A third and strategic approach, the intention to maximise the use of available resources and organise effort, was identified later (Entwistle and Ramsden, 1983; Biggs, 1987). These are summarised as shown (Table 3). While subsequent studies closely replicated the original methodology of Marton and Säljö, most now involve the use of questionnaire-type inventories (Tait et al. 1998; Diseth, 2001; Byrne et al., 2004; Cristina et al., 2010; Abedin et al., 2013; Bilgin et al., 2014). At its most productive, and with its own theoretical and conceptual framework in the motives, intentions and processes of studying to learn as influenced by the personal and environmental experiences of higher education (Entwistle and McCune, 2004; Entwistle, 2009), ways of working/approaches to learning research has been used to identify the deep, strategic and surface profiles common to 'more effective' and 'less effective learners' and to consider student responses and adaptations towards specific course, task and assessment requirements across different disciplinary contexts and cultural boundaries (Entwistle et al., 2000; Entwistle and Peterson, 2004; Byrne et al., 2009; Entwistle, 2009; Diseth, 2002, 2007, 2013; Parpala et al., 2010, 2013; Teixeira et al., 2013). This has found particular application operationally in terms of helping to ensure the constructive alignment between how courses are developed and received (Biggs and Tang, 2011).

In terms of academic achievement, students displaying stronger deep and strategic rather than surface profiles or where flexibility and a range of different cognitive strategies are required tend to do better than others, though outcomes can be highly variable. The considerable body of evidence now available suggests that these profiles occur less as discrete entities and more of a continuum as study habits and practices evolve over time. Sharing many features in common (e.g. complexly inter-related cognitive, affective, behavioural and motivational dimensions), both academic boredom and ways of working/approaches to learning are of sufficient importance in terms of student engagement to warrant further investigation in a single study.

Deep	Strategic/Organised Effort	Surface
Basic intention to actively construct meaning and understanding for oneself: • naturally motivated, interested and engaged • works beyond immediate requirements • questioning and reflective • able to relate ideas to previous knowledge and experience • looks for patterns and principles • sees structure and coherency • uses evidence and makes connections to inform work • explores reason, logic, argument and conclusions critically • learns by rote where appropriate • reflective	Basic intention to maximise effort to support learning and achievement: • intrinsically and extrinsically motivated • systematic and self-evaluative • focused and determined • planned and organised • manages resources including time effectively • alert to academic environment and assessment demands • tasks enhance learning • monitors progress • thoughtful and thorough • metacognitively aware	Basic intention to cope with immediate task demands and course requirements: • requires external stimulus for motivation • seeks breadth rather than depth • sees words and text rather than meaning • learns by rote and with difficulty • memorises unrelated bits of knowledge • reproduces quotes or examples • failure to make spot relevance or make connections • often misses the point • misdirected or unproductive effort • feels under pressure and worries • studies without reflection

Table 3 General ways of working/ approach characteristics (after Marton and Säljö 1976a,b; Ramsden, 2003; Entwistle, 2009; Biggs and Tang, 2011)

Perceived course experiences

The systematic study of perceived course experiences among students at university is widely attributed to the work of Entwistle and Ramsden (1983) with later and equally important contributions from others. Ramsden and Entwistle's early influence over the field continued with publication of the Course Experience Questionnaire (CEQ) developed for use with undergraduates in Australia (Ramsden, 1991) and the Experiences of Teaching and Learning Questionnaire or ETLQ developed for use with undergraduates in the UK (Entwistle et al., 2002). The ETLQ, together with its shortened derivative, the multipurpose SETLQ, came to prominence in the influential Enhancing Teaching-Learning Environments in Undergraduate Courses Project (ETLP) intended to inform the quality of university teaching and course provision as well as to support academic staff in their increasingly diverse roles (Entwistle et al., 2002; Hounsell and Entwistle, 2005).

Despite the inherent shortcomings of relying on questionnaire surveys alone, variations of the CEQ and ETLQ (including the SETLQ) have featured prominently in more recent studies undertaken in Australia, Spain, China and The Netherlands (Lizzio et al., 2002; Zhang, 2003; Kember, 2004; Nijhuis et al., 2008; Román et al., 2008), with particular interest emerging from Norway (Swanberg and Martinsen, 2010; Diseth, 2002, 2007, 2013) and Finland (Lindblom-Ylänne et al., 2006; Ruohoniemi and Lindblom-Ylänne, 2009; Parpala et al., 2010; Haarala-Muhonen et al., 2011; Rytkönen et al., 2012; Hailikari et al., 2016). While also highlighting many of the cultural, contextual, disciplinary and individual differences involved, student encounters with the teaching and learning environment and how their course experiences are perceived are frequently reported as being of more importance than the purposes intended by lecturers, influencing certain ways of working over others rather than vice versa and also impacting upon overall academic performance and achievement. The heuristic model and conceptual framework of learning influences provided by Entwistle (2008, 2009), usefully assimilating the notion of constructive alignment most recently revised by Biggs and Tang (2011), offers considerable insight and helps visualise the complex inter-dependencies involved (Figure 1).

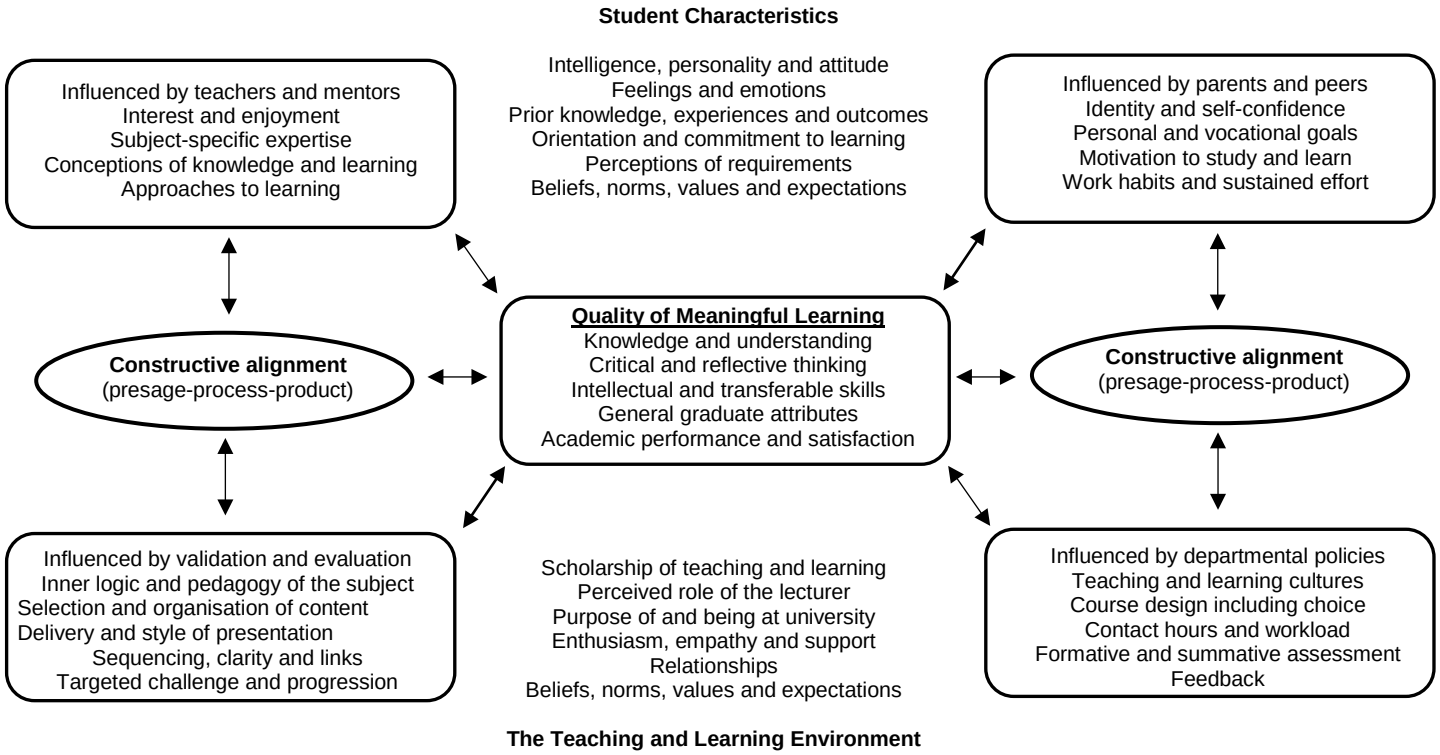

Figure 1 Heuristic model and conceptual framework of learning influences (after Entwistle 2008, 2009 and Biggs and Tang 2011)

Perhaps not surprisingly, given its recent emergence onto the international stage, few studies have so far incorporated achievement-related emotions like academic boredom into a broader research frame despite the somewhat obvious benefits of doing so (Illeris, 2003). In addition to our own work in this area (Sharp et al., 2017a,b,c), and in one of the more interesting applications of performance outcomes among 388 first-year biology students at the University of Sydney reported by Trigwell et al. (2012), the adoption of deeper over surface approaches were clearly associated with more positive emotions and higher assessment scores. By way of contrast, surface approaches and negative emotions were also positively correlated.

Methodology

The Student Engagement Questionnaire (SEQ) remains consistent with Control-Value Theory (CVT) and the definition of academic boredom as a psychophysiological response to a supposedly meaningful educational event presented earlier (Pekrun, 2000, 2006). As a self-report instrument intended for use by heads of department, module leaders and colleagues with responsibility for teaching and learning and student support across a range of disciplines and providers, the SEQ is a largely structured instrument for general rather than clinical use (Appendix 1). Ethical approval for the work was obtained at the lead institution in accordance with its own ethics policy and procedures. This was supported with reference to ethical guidance provided by the British Educational Research Association (BERA, 2011). Ethical approval was also obtained at each of the other participating institutions at a more local level. Student involvement proceeded with informed consent and remained entirely voluntary throughout.

Instrumentation

Early in its design, and throughout its development, the SEQ was structured around three inter-related sections for ease of use and interpretation:

- Section 1: Respondent characteristics including age, sex, year of study, course details, entry qualifications, self-study hours, hours in paid employment, socio-economic background and attendance;

- Section 2: Academic trait and state boredom (including class and study-related variants). This was supplemented with additional information surrounding the sites and triggers of academic boredom and the strategies adopted by students to cope. Provision was also made for the collection of information concerning the boredom associated with revising for tests and completing assignments;
- Section 3: Perceived course experiences including initial course expectations, ways of working/approaches to learning (deep, organised effort and surface), teaching and learning (clarity, choice, teaching for understanding, assessment, feedback and support) and course demand (ease or difficulty).

Development of the SEQ was also informed with reference to the BPS-UKHE, AEQ, LRBS and MSBS presented earlier. Qualitative data from the mixed methods studies of Sharp et al. (2017a,b,c) played an important role in the choice, presentation and readability of individual questionnaire items.

Sampling

1079 SEQs were initially distributed among students across a range of subject disciplines in two college providers of higher education (HE in FE) and two universities (HE) during normal class time and in lectures, seminars and tutorials. This was achieved by colleagues already known to the students and who expressed a keen interest in being involved. All participating institutions, including the lead itself, were selected on the basis of established professional networks to provide the greatest possible diversity of participants in terms of student demographics. In total, 471 SEQs were subsequently returned. Of those, 63 were later found to be incomplete or displayed uniformly extreme, regularly repeating or inconsistent patterns of responses throughout and discarded. The remaining 408 usable returns yielded an effective response rate of 37.8%. The lowest institutional response rate included only 72 SEQs from a distribution of 253 (28.5%); the highest with 35 from a distribution of only 45 (77.8%). The largest distribution at any one institution alone returned 209 SEQs from 549 (38.1%), comprising a little over half of the sample as a whole (51.2%). Film and Media Studies provided the smallest individual subject contribution (15 SEQs or 3.7% of the sample as a whole) while education-related courses at three sites, Business

Studies at two sites and Biomedical Science at one site only provided the largest subject contributions in almost equal measure (98 SEQs or 24.2%, 97 SEQs or 23.8% and 92 SEQs or 22.5% of the sample as a whole respectively). 16 SEQs were obtained entirely at random from a student fair and 18 were obtained from students studying on a part-time basis only. No distance learning students were involved at all.

Data handling and analysis

All data handling and analysis was carried out using SPSS (v.24) and AMOS (v.24), the former for descriptive statistics, Principal Component Analysis (PCA), Exploratory factor Analysis (EFA), correlational analysis and cluster analysis, the latter for Confirmatory Factor Analysis (CFA) and path analysis (Thompson, 2004; Hair et al., 2010; Schumacker and Lomax, 2010; Field, 2013; Ho, 2014; Osborne, 2014). While multiple factor models were anticipated across both academic boredom and the student experience elements of the SEQ, uncertainties surrounding their exact nature warranted the use of both exploratory and confirmatory techniques. With EFA and CFA at its heart, data analysis was, nevertheless, an iterative process involving the identification of vulnerable questionnaire items potentially eligible for elimination and repeated stages of modelling. Despite the intensely statistical approach adopted, vulnerable items were nevertheless retained if supported by CVT or considered of value in research terms. While introducing an element of subjectivity, researcher involvement was also considered essential in the decision-making process in terms of evaluating all possible outcomes and solutions. At the pre-screening stage of data analysis, potentially vulnerable items included those which met the following guidelines:

- relatively low individual item variances indicating insufficient differentiation or the inability to discriminate between responses;
- skewness and kurtosis values indicating a violation of normality (e.g. > +/- .900);
- a majority of relatively low inter-item correlations or relatively low item-total correlations (e.g. < .300 or failing to reach the .05 level of significance);
- correlation coefficients suggesting the possibility of multicollinearity (e.g. > .900).

PCA and EFA outcomes were also considered in terms of sample adequacy (KMO), item patterning or grouping (Bartlett's test of sphericity), eigenvalues (> 1.000), scree plots and the percentage of variance explained. Items considered eligible for elimination were identified alongside:

- low communalities (< .300), low individual item loadings (threshold levels of .350) or where complex cross-loadings between two or more items occurred.

Cronbach's α was used as a measure of scale and subscale reliability (> .600 acceptable, > .700 satisfactory, > .800 good). CFA modelling was considered using a combination of goodness of fit indices and threshold values (e.g. $\aleph^2$/df < 3.000; AGFI > .900, TLI and CFI > .950; RMSEA < .080 satisfactory, < .050 good, pclose > .050 preferred). CFA models were also evaluated using a combination of Average Variance Extracted and Composite Reliability (AVE > .500 and CR > .600 preferred). Items considered eligible for elimination were also identified in terms of:

- low individual regression weights (e.g. < .500).

Guidelines and threshold vaues for all goodness of fit indices have changed over time and vary from one source to another (Bentler, 1990, Blunch, 2008, Hu and Bentler, 2009, Byrne, 2013 and Arbuckle, 2013). Best practice in PCA, EFA and CFA can be found in Fabrigar et al. (1999), Costello and Osborne (2005), Henson and Roberts (2006), Schreiber et al. (2006), Winter and Dodou (2012), Beavers et al. (2013) and Yong and Pearce (2013). Positons surrounding the combined use of EFA and CFA on the same data sets are discussed in Van Pooijen and Van der Kloot (2001) and Fokkema and Greiff (2017).

Respondent characteristics

A detailed breakdown of respondent characteristics is presented as shown (Table 4).

Characteristic	Frequency (%)
Sex	
Male	139 (34.1)
Female	264 (64.7)
Other (prefer not to say/declared)	5 (1.2)
Provider	
College (HE in FE)	107 (26.2)
University (HE)	301 (73.8)
Year of study	
Foundation year	11 (2.7)
First	183 (44.9)
Second	167 (40.9)
Third	47 (11.5)
Degree	
Foundation (FdA)	95 (23.3)
Honours (BA/BSc)	313 (76.7)
Domain	
Arts	38 (9.3)
Humanities/Social Science	252 (61.8)
Science	118 (28.9)
Entry qualifications	
A-levels	247 (60.5)
A-level equivalents (e.g. Access/BTEC/NVQ)	111 (27.2)
Other (e.g. international equivalents)	50 (12.3)
Generation	
First in family in higher education	210 (51.5)
Higher order	198 (48.5)
Occupational background	
Professional	155 (38.0)
Manual	236 (57.8)
Other (e.g. long term unemployed/deceased/don't know)	17 (4.2)
Perceived attendance	
Excellent	186 (45.6)
Good	157 (38.5)
Satisfactory	56 (13.7)
Poor	9 (2.2)

Table 4 Respondent characteristics (n=408)

The mean age of all 408 participants was 21.8 years (SD = 5.82, range = 18 – 53). The mean amount of time devoted to self-study or revision was 9.9 hours per week (SD = 6.63, range = 0 – 35). 221 (54.2%) students were in paid employment, working on average 19.1 hours per week (SD = 10.07, range = 1 – 45). Though not requested, respondents from Business Studies and Biomedical Science were, from records, the most ethnically diverse.

Academic trait boredom

Pre-screening and PCA resulted in the identification of seven 'vulnerable' items from the original 18 presented. Six of these, including all five positively worded items from the BPS-UKHE, were subsequently removed. A further two items, including the one item initially retained, were subsequently removed during initial iterations of EFA (cross-loading) and CFA (low regression weight). The 10 remaining items, given some degree of overlap and duplication with those removed, maintained content validity. Removal of the positively worded items also served to eliminate the possibility of confusion as a result of response bias and the construction of a 'false' subscale on the basis of 'directionality'.

Exploratory Factor Analysis (EFA)

In its final iteration, a Kaiser-Meyer-Olkin (KMO) value of .879 verified sample adequacy for the analysis. Bartlett's test of sphericity yielded a significant value of $\chi^2(45)$ equal to 1287.061 ($p < 0.001$) indicating that correlations between items were sufficiently large to conduct EFA and that the items being analysed would collapse accordingly. Consideration of the scree plot and eigenvalues suggested retaining between one and three factors. Adopting principal axis factoring with orthogonal rotation (varimax), the one factor solution explained 42.92% of the variance observed. With oblique rotation (direct oblimin), anticipating correlation, the two factor solution explained 53.51% of the variance observed in combination. The three factor solution accounted for 62.42% of the total variance observed despite one eigenvalue falling just below the normally accepted limit of 1.000 (Table 5):

Item	Rotated loadings (pattern matrix)		
	Factor 1	**Factor 2**	**Factor 3**
T9 We seem to do the same things over and over again – it's a really familiar and tiresome routine	.860	-	-
T3 I find that that the things we have to do are really repetitive and monotonous	.593	-	-
T10 I find most of what we do really tedious, I'd rather be doing something far more useful somewhere else instead	.540	-	-
T2 I find myself trapped in situations having to do really meaningless things	.396	-	-
T6 I find myself just sitting around on my own doing little of any real value	-	.765	-
T7 I find I struggle to occupy my time or to use it really productively	-	.751	-
T1 I find myself at a loose end, not really knowing what to do next	-	.387	-
T4 It takes more to really stimulate and get me going than most other people I know	-	-	.671
T5 I find it really difficult to get very excited about my work	-	-	.486
T8 I get quite restless or even frustrated unless I'm doing something really engaging	-	-	.483
Eigenvalues	4.292	1.058	0.891
% of variance explained	42.92	10.58	8.91

Table 5 Exploratory factor analysis of academic trait boredom items (values <.350 suppressed; n = 408)

After further inspection, and given the nature of the study, the three factor solution was retained. Items that clustered on the same factors suggested that Factor 1 represented familiarity, repetition, monotony, confinement and meaninglessness (Tedium), Factor 2 the perception and passage of time and how time was used (Time), and Factor 3 represented restlessness and a need for excitement or engagement (Stimulation). The three latent variable EFA solution provided a better fit with theory and offered potentially greater exploratory/explanatory power despite two of the factors comprising only three items each.

Descriptive statistics

Full-scale and subscales statistics are summarised as shown (Table 6):

Measure	Full-scale	Tedium	Time	Stimulation
Number of items	10	4	3	3
Scale/subscale mean	2.66	2.51	2.64	2.89
Standard deviation	0.636	0.738	0.813	0.745
Range	1.00 - 4.70	1.00 - 4.75	1.00 - 5.00	1.00 - 5.00
Inter-item correlation	.251 - .623	.416 - .623	.416 - .611	.296 - .400
Item-total correlation	.554 - .730	.739 - .836	.738 - .846	.736 - .766
Skewness	0.238	0.347	0.057	0.281
Kurtosis	-0.088	-0.032	-0.397	0.106
Cronbach's α	.850	.791	.740	.612
Average Variance Extracted (AVE)	.520	.492	.504	.351
Composite Reliability (CR)	.932	.793	.750	.617

Table 6 Summary statistics for scale/subscales (n=408)

From the skewness and kurtosis values, the full-scale and subscale scores can be considered normally distributed. Inspection of the item-total boxplot indicated only three marginal outliers from the entire data set at the high end of the scale. Relatively low but entirely acceptable, alpha values across the subscales probably reflects the small number of individual items available.

Correlations

Full-scale and subscales correlations are summarised as shown (Table 7):

	Full-scale	Tedium	Time	Stimulation
Full-scale	-	.867***	.823***	.804***
Tedium		-	.552***	.544***
Time			-	.523***
Challenge				-

Table 7 Pearson correlation between components (n=408)

Confirmatory Factor Analysis (CFA)

CFA details summarising model fits for each of the three possible EFA solutions are summarised as shown (Table 8):

Model	χ^2	df	χ^2/df	AGFI	TLI	CFI	RMSEA (90% CI)	p (close)
First-order: One factor	412.811	36	11.467	.772	.625	.700	.160 (.147 - .174)	<.001
First-order: Two factors	120.061	34	3.531	.908	.909	.931	.079 (.064- .094)	<.01
First-order: Three factors	80.970	32	2.530	.936	.945	.961	.061 (.045 - .078)	.123
Second-order with three first-order factors	80.970	32	2.530	.936	.945	.961	.061 (.045 - .078)	.123

Table 8 CFA model fit data (n=408)

While the three factor first-order model provided an entirely satisfactory CFA solution, the same factors or latent variables might also be considered subcomponents of a single overall academic trait boredom construct. Further modelling confirmed that all three components did indeed converge or collapse successfully and effectively onto a single second-order latent construct as predicted by theory (regression weights were virtually identical) indicating that while academic trait boredom is indeed multidimensional in nature it can also be represented meaningfully as a single score derived from the full-scale measure itself (AVE = 0.520, CR = 0.932). The second-order model is presented diagrammatically as shown (Figure 2). All standardised regression weights or factor loadings exceeded .500 and no additional modifications were required (e.g. the insertion of error covariances).

Despite the small number of items per subscale and low reliability of the Challenge subscale, the overall psychometric properties of Academic Trait Boredom as modelled were considered entirely acceptable providing a theory-driven, empirical and statistically parsimonious solution with all three first-order latent variables identified as contributing to an overall trait construct rather than individually correlated constructs.

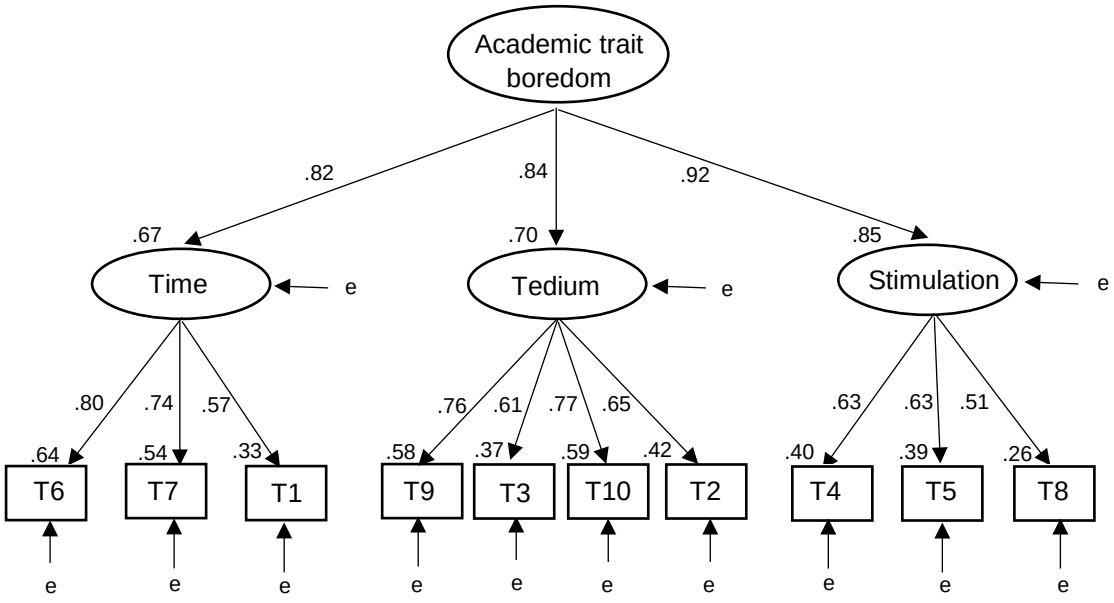

Figure 2 Structural and measurement model of academic trait boredom (n=408)

Individual item summary

Highest and lowest mean item score by subscale as shown (Table 9):

Subscale	Response profile (frequency and percentage)			
	Always/ usually	Occasionally	Rarely/ never	Mean score (SD)
Tedium				
T3 I find that that the things we have to do are really repetitive and monotonous	69 (16.9)	166 (40.7)	173 (42.4)	2.69 (0.871)
T10 I find most of what we do really tedious, rather be somewhere else … more useful instead	50 (12.3)	107 (26.2)	251 (61.5)	2.32 (1.002)
Time				
T7 I find I struggle to occupy my time or to use it really productively	93 (22.8)	125 (30.6)	190 (46.7)	2.66 (1.042)
T6 I find myself just sitting around on my own doing little of any real value	84 (20.6)	140 (34.3)	184 (45.1)	2.64 (1.035)
Stimulation				
T8 I get quite restless or even frustrated unless I'm doing something really engaging	135 (33.1)	147 (36.0)	126 (30.9)	3.04 (1.022)
T4 It takes more to really stimulate and get me going than most other people I know	106 (26.0)	126 (30.9)	176 (43.1)	2.81 (1.008)

Table 9 Academic trait boredom subscale item summary statistics (n = 408)

Academic state boredom (class-related)

EFA

Following pre-screening and PCA, ten of the 16 items originally presented were retained. Kaiser-Meyer-Olkin (KMO) value .910 (excellent). Bartlett's test of sphericity $\chi^2(45) = 1904.017$ ($p < 0.001$). Consideration of the scree plot and eigenvalues suggested retaining two factors. The two factor solution explained 62.58% of the total variance observed in combination (Table 10):

	Rotated loadings (pattern matrix)	
Item	**Factor 1**	**Factor 2**
C5 My mind begins to really wander	.918	-
C7 I start to really lose my concentration	.819	-
C3 I get really tired and sleepy or start yawning	.713	-
C4 I start to really slump or sink into my chair	.670	
C8 My brain just 'switches off'	.667	-
C2 I have real problems staying focused and alert, particularly if there's no way to make a contribution	.641	-
C6 I think about what else I'd rather be doing instead of just sitting here	.639	-
C1 Because everything just drags on by I find myself clock watching more and more	.560	-
C10 As time goes by I get more and more irritable and frustrated, particularly if I can't get involved	-	.771
C9 I feel stuck in the room and unable to escape	-	.739
Eigenvalues	5.216	1.042
% of variance explained	52.16	10.42

Table 10 Exploratory factor analysis of class boredom items (values <.350 suppressed; n = 408)

Factor 2 contains only two items and should be treated with care (a minimum of three items is normally preferred).

Descriptive statistics

Measure	Full-scale	Concentration	Confinement
Number of items	10	8	2
Scale/subscale mean	3.05	3.19	2.49
Standard deviation	0.773	0.803	1.023
Range	1.00 – 5.00	1.00 – 5.00	1.00 – 5.00
Inter-item correlation	.292 - .689	.404 - .689	.609
Item-total correlation	.480 - .824	.685 - .824	.897
Skewness	-0.136	-0.167	0.510
Kurtosis	-0.436	-0.378	-0.378
Cronbach's α	.896	.894	.757
Average Variance Extracted (AVE)	.551	.513	..608
Composite Reliability (CR)	.889	.893	..757

Table 11 Summary statistics for scale/subscales (n=408)

Correlations

Academic trait boredom included.

	Class	Concentration	Confinement	Trait
Class	-	.975***	.716***	.480***
Alertness		-	.543***	.430***
Confinement			-	.462***
Trait				-

Table 12 Pearson correlation between components (n=408)

CFA

One error covariance was inserted to improve the model fit (Items C3 and C4 in Concentration).

Model	$א^2$	df	$א^2$/df	AGFI	TLI	CFI	RMSEA (90% CI)	p (close)
First-order: One factor	212.857	35	6.082	.855	.878	.905	.112 (.098 - .126)	<.001
First-order: Two factors (without mods.)	113.848	34	3.348	.918	.944	.957	.076 (.061 - .092)	.003
First-order: Two factors (with mod.)	81.649	33	2.474	.937	.965	.974	.060 (.044 - .077)	.144
Second-order with two first order factors	81.649	33	2.474	.937	.965	.974	.060 (.044 - .077)	.144

Table 13 CFA model fit data (n=408)

Individual item summary

Highest and lowest mean item score by subscale as shown:

Subscale	Response profile (frequency and percentage)			
	Always/ usually	**Occasionally**	**Rarely/ never**	**Mean score (SD)**
Concentration				
C5 My mind begins to really wander	206 (50.5)	127 (31.1)	75 (18.4)	3.44 (1.012)
C1 Because everything just drags on by I find myself clock watching more and more	123 (30.1)	147 (36.0)	138 (33.8)	2.96 (1.000)
Confinement				
C10 As time goes by I get more … irritable and frustrated … if I can't get involved	98 (24.0)	103 (25.2)	207 (50.7)	2.66 (1.143)
C9 I feel stuck in the room and unable to escape	68 (16.7)	85 (20.8)	255 (62.5)	2.32 (1.139)

Table 14 Academic state boredom (class) subscale item summary statistics (n = 408)

Academic state boredom (study-related)

EFA

Following pre-screening and PCA, eleven of the 16 initial items presented were retained. Kaiser-Meyer-Olkin (KMO) value .926 (excellent). Bartlett's test of sphericity $\chi^2(55) = 2104.991$ ($p < 0.001$). Consideration of the scree plot and eigenvalues suggested retaining two factors. The two factor solution explained 61.10% of the total variance observed in combination (Table 15):

	Rotated loadings (pattern matrix)	
Item	**Factor 1**	**Factor 2**
S5 I get more and more moody and down	.792	-
S8 I get more and more impatient and irritable	.789	-
S7 I get really tired and start drifting off to sleep	.713	-
S11 I feel really isolated and cut off from everyone else	.671	-
S6 Time seems to slow down to a complete standstill	.579	-
S10 I get really bored because the work is too challenging, I don't understand it or know what to do	.501	-
S2 I'd rather put the work off until later and be doing something completely different instead	-	-.852
S1 When I'm bored I have no real desire or motivation to learn	-	-.747
S3 I get really fed up just sitting at my desk	-	-.656
S4 I really struggle to stop my mind wandering on to other things	-	-.643
S9 I find it really hard to concentrate and get easily distracted	-	-.558
Eigenvalues	5.632	1.089
% of variance explained	51.20	9.90

Table 15 Exploratory factor analysis of study boredom items (values <.350 suppressed; n = 408)

Descriptive statistics

Measure	Full-scale	Disinterest	Distraction
Number of items	11	6	5
Scale/subscale mean	2.92	2.65	3.24
Standard deviation	0.796	0.874	0.859
Range	1.00 – 5.00	1.00 – 5.00	1.00 – 5.00
Inter-item correlation	.308 - .692	.394 - .692	.492 - .644
Item-total correlation	.649 - .792	.687 - .821	.782 - .819
Skewness	0.139	0.358	-0.082
Kurtosis	-0.154	-0.087	-0.372
Cronbach's α	.903	.851	.860
Average Variance Extracted (AVE)	.562	.496	.548
Composite Reliability (CR)	.942	.853	.858

Table 16 Summary statistics for scale/subscales (n=408)

Correlations

Academic trait boredom included.

	Study	Disinterest	Distraction	Trait
Study	-	.934***	.899***	.521***
Response		-	.683***	.494***
Focus			-	.459***
Trait				-

Table 17 Pearson correlation between components (n=408)

CFA

Model	$א^2$	df	$א^2$/df	AGFI	TLI	CFI	RMSEA (90% CI)	p (close)
First-order: One factor	256.135	44	5.821	.812	.872	.898	.109 (.096 - .122)	<.001
First-order: Two factors	105.042	43	2.443	.932	.962	.970	.060 (.045 - .074)	.131
Second-order with two first-order factors	105.042	43	2.443	.932	.962	.970	.060 (.045 - .074)	.131

Table 18 CFA model fit data (n=408)

Individual item summary

Highest and lowest mean item score by subscale as shown:

Subscale	Response profile (frequency and percentage)			
	Always/ usually	**Occasionally**	**Rarely/ never**	**Mean score (SD)**
Disinterest				
S5 I get more and more moody and down	113 (27.7)	119 (29.2)	176 (43.1)	2.81 (1.162)
S11 I feel really isolated and cut off from everyone else	88 (21.6)	88 (21.6)	232 (56.9)	2.47 (1.232)
Distraction				
S9 I find it really hard to concentrate and get easily distracted	180 (44.1)	132 (32.3)	96 (23.5)	3.32 (1.109)
S3 I get really fed up just sitting at my desk	150 (36.8)	144 (35.3)	114 (27.9)	3.12 (1.059)

Table 19 Academic state boredom (study) subscale item summary statistics (n = 408)

Approaches to studying

EFA

18 items initially. Eleven items retained after pre-screening and PCA. Kaiser-Meyer-Olkin (KMO) value .775 (good). Bartlett's test of sphericity $א^2(55) = 1024.188$ ($p < 0.001$). Consideration of the scree plot and eigenvalues suggested retaining three factors. Retaining principal axis factoring with oblique rotation, the three factor solution explained 56.52% of the total variance observed in combination (Table 20):

	Rotated loadings (pattern matrix)		
Item	**Factor 1**	**Factor 2**	**Factor 3**
A8 I organise my study time carefully to make the best use of it	.891	-	-
A5 On the whole, I'm quite systematic and organised in my studying	.741	-	-
A10 I'm pretty good at getting down to work whenever I need to	.577	-	-
A2 I generally put a lot of effort into my studying	.556	-	-
A3 A lot of what I learn seems no more than lots of unrelated bits and pieces in my mind	-	.830	
A1 I often have trouble making sense of the things I have to remember	-	.526	
A11 I just go through the motions of studying without really seeing where I'm going	-	.370	
A6 Ideas I've come across in my academic reading often set me off on long chains of thought	-	-	.787
A7 I look at evidence carefully to reach my own conclusions about what I'm studying	-	-	.610
A9 It is important to me to follow the argument or to see the logic behind things	-	-	.477
A4 In making sense of new ideas, I often relate them to practical or real life contexts	-	-	.402
Eigenvalues	3.335	1.479	1.383
% of variance explained	30.50	13.45	12.57

Table 20 EFA analysis of approaches items (values <.350 suppressed; n = 408)

Descriptive statistics

Measure	Organised effort	Surface	Deep
Number of items	4	3	4
Scale/subscale mean	3.46	2.251	3.68
Standard deviation	0.793	0.551	0.585
Range	1.00 – 500	0.75 – 3.75	1.00 – 5.00
Inter-item correlation	.366 - .630	.212 - .424	.252 - .491
Item-total correlation	.718 - .852	.700 - .795	.645 - .772
Skewness	-0.221	-0.001	0.013
Kurtosis	-0.253	-0.361	-0.305
Cronbach's α	.790	.594	.663
Average Variance Extracted (AVE)	.495	.345	.343
Composite Reliability (CR)	.794	.606	.668

Table 21 Summary statistics for subscales (n=408)

Correlations

Academic trait boredom included.

	Organised effort	Surface	Deep	Trait
Organised effort	-	-.269***	. 342***	-.365***
Surface		-	-.258***	.529***
Deep			-	-.244***
Trait				-

Table 22 Pearson correlation between components (n=408)

CFA

Despite there being a second-order model available, conventional practice suggests retaining the first-order model for analytical purposes. As with descriptive statistics (Cronbach's α), values weaker as both deep and surface subscales have one item each with CFA regression weights of .430 and .450 respectively.

Model	$א^2$	df	$א^2$/df	AGFI	TLI	CFI	RMSEA (90% CI)	p (close)
First-order: Three factors	110.035	41	2.684	.927	.906	.930	.064 (.050 - .079)	.050

Table 23 CFA model fit data (n=408)

Individual item summary

Highest and lowest mean item score by subscale as shown:

Subscale	Response profile (frequency and percentage)			
	Agree	**Neutral**	**Disagree**	**Mean score (SD)**
Organised Effort				
A2 I generally put a lot of effort into my studying	263 (64.4)	112 (27.5)	33 (14.4)	3.76 (0.885)
A8 I organise my study time carefully to make the best use of it	174 (42.6)	120 (29.4)	114 (27.9)	3.22 (1.081)
Surface				
A1 I often have trouble making sense of the things I have to remember	152 (37.3)	144 (35.3)	112 (27.5)	3.13 (0.982)
A3 A lot of what I learn seems no more than … unrelated bits and pieces in my mind.	123 (30.2)	121 (29.7)	164 (40.1)	2.89 (0.994)
Deep				
A9 It is important to me to follow the argument or to see the logic behind things	270 (66.2)	120 (29.4)	18 (4.4)	3.78 (0.779)
A6 Ideas I've come across in … reading … often set me off on long chains of thought	220 (53.9)	139 (34.1)	49 (12.0)	3.55 (0.897)

Table 24 Approaches subscale item summary statistics (n = 408)

Teaching and learning

EFA

25 items initially. Twenty one items retained. Kaiser-Meyer-Olkin (KMO) value .902 (excellent). Bartlett's test of sphericity $\aleph^2(210) = 4371.971$ ($p < 0.001$). Consideration of the scree plot and eigenvalues suggested retaining five factors. The five factor solution explained 65.55% of the total variance observed in combination (Table 25):

	Rotated loadings (pattern matrix)				
Item	**Factor 1**	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**
L7 We are given lots of choice over which aspects of the subject to concentrate on	.690	-	-	-	-
L6 We are given a lot of choice over how we go about learning	.673	-	-	-	-
L9 The teaching on this course encourages me to rethink my understanding of the subject	.588	-	-	-	-
L8 On this course I am prompted to think about how well I am learning and how I might improve	.583	-	-	-	-
L10 The teaching on this course gives me a sense of what goes on 'behind the scenes'	.567	-	-	-	-
L11 The teaching on this course helps me to think about the evidence underpinning different views	.529	-	-	-	-
L19 Talking with other students helps me to develop my understanding	-	.861	-	-	-
L18 Students support each other and try to give help when it is needed	-	.733	-	-	-
L2 The topics always seem to follow each other in a way that makes sense	-	-	.761	-	-
L3 What we are taught seems to match what we are supposed to learn	-	-	.742	-	-
L1 It's always clear to me what I'm supposed to be learning during the course	-	-	.718	-	-
L5 I can see how the coursework fits in with what I'm supposed to learn	-	-	.673	-	-
L4 The handouts and other materials we are given help me to better understand the course	-	-	.511	-	-
L14 Staff give me the support I need to help me complete the work for this course	-	-	-	-.822	-
L15 The feedback given on my work helps to clarify things I haven't fully understood	-	-	-	-.797	-
L13 The feedback given on my work helps me to improve my ways of learning and studying	-	-	-	-.705	-
L17 Staff are patient in explaining things which seem difficult to grasp	-	-	-	-.519	-
L12 I am always encouraged to think about how best to tackle the coursework	-	-	-	-.355	-
L16 Staff try to share their enthusiasm about the subject with us	-	-	-	-.338*	-
L21 I enjoy being involved in the course	-	-	-	-	-.796
L20 I find most of what I learn on this course really interesting	-	-	-	-	-.753
Eigenvalues	8.250	1.612	1.480	1.296	1.126
% of variance explained	39.29	7.68	7.05	6.17	5.36

Table 25 EFA of ETL items (values <.350* suppressed; n = 408)

The factor loading on L16 was less than the .350 cut-off selected but retained. Two subscales contain only two items and should be treated with care (a minimum of three items is normally preferred).

Descriptive statistics

Measure	Full-scale	Course	Students	Clarity	Support	Interest
Number of items	21	6	2	5	6	2
Scale/subscale mean	3.82	3.67	3.88	3.82	3.86	4.04
Standard deviation	0.533	0.643	0.873	0.633	0.659	0.779
Range	2.19 – 5.00	1.50- 5.00	1.00-5.00	1.00-5.00	1.83-5.00	1.00-5.00
Inter-item correlation	.130 - .742	.336 - .629	.701	.376 - .667	.278 - .689	.742
Item-total correlation	.510 - .694	.724 - .763	.917 - .927	.752 - .827	.637 - .844	.933 - .944
Skewness	-0.158	-0.296	-0.795	-0.590	-0.282	-1.001
Kurtosis	0.032	0.352	0.807	1.443	-0.196	1.723
Cronbach's α	.920	.832	.823	.849	.853	.852
Ave. Var. Extracted (AVE)	.537	.448	.710	.527	.484	.749
Composite Reliability (CR)	.967	.826	.830	.847	.847	.856

Table 26 Summary statistics for scale/subscales (n=408)

Subscales normally distributed with the possible exception of Interest (marginal).

Correlations

Academic trait boredom included.

	Course	Students	Clarity	Support	Interest	ETL (full-scale)	Trait
Course	-	.372***	.548**	.590***	.488***	.835***	-.311***
Students		-	.356***	.450***	.340***	.592***	-.223***
Clarity			-	.567***	.487***	.796***	-.381***
Support				-	.474**	.854***	-.340***
Interest					-	.666***	-.399***
ETL						-	-.426***
Trait							-

Table 27 Pearson correlation between components (n=408)

CFA

Model	χ^2	df	χ^2/df	AGFI	TLI	CFI	RMSEA (90% CI)	p (close)
First-order: Five factors (without mods.)	666.051	179	3.721	.821	.865	.885	.082 (.075 - .088)	<.001
First-order: Five factors (with mods.)	448.000	175	2.560	.875	.923	.936	.062 (.055 - .069)	.003
Second-order with five first-order factors	456.855	180	2.538	.874	.924	.935	.061 (.055 - .068)	.004

Table 28 CFA model fit data (n=408)

Four error covariances were inserted within three subscales to improve overall fit (Course Items L6 and L7, Support Items L13 and L15, Items L16 and L17 and Clarity Items L4 and L5). The deletion of L16 changed little and was retained.

Individual item summary

Highest and lowest mean item score by subscale as shown:

Subscale	Response profile (frequency and percentage)			
	Agree	Neutral	Disagree	Mean score (SD)
Course				
L9 The teaching encourages me to rethink my understanding … of the subject	289 (70.8)	99 (24.3)	20 (4.9)	3.83 (0.781)
L7 We are given lots of choice over which aspects of the subject to concentrate on	212 (52.0)	110 (27.0)	86 (21.1)	3.43 (0.999)
Students				
L19 Talking with other students helps me to develop my understanding	304 (74.5)	77 (18.9)	27 (6.7)	3.95 (0.918)
L18 Students support each other and try to give help when it is needed	274 (67.1)	100 (24.5)	34 (8.3)	3.82 (0.975)
Clarity				
L5 I can see how the coursework fits in with what I'm supposed to learn	323 (79.2)	69 (16.9)	16 (3.9)	3.93 (0.725)
L2 The topics always seem to follow each other in a way that makes sense	284 (69.6)	94 (23.0)	30 (7.3)	3.74 (0.808)
Support				
L16 Staff try to share their enthusiasm about the subject with us	332 (81.4)	60 (14.7)	16 (3.9)	4.10 (0.789)
L15 The feedback given … helps to clarify things I haven't fully understood	261 (64.0)	104 (25.5)	43 (10.5)	3.71 (0.913)
Interest				
L20 I find most of what I learn on this course really interesting	332 (81.3)	59 (14.5)	17 (4.2)	4.04 (0.833)
L21 I enjoy being involved in the course	326 (79.9)	62 (15.2)	20 (4.9)	4.04 (0.836)

Table 29 ETL subscale item summary statistics (n = 408)

Demand

EFA

10 items initially. Nine items retained. Kaiser-Meyer-Olkin (KMO) value of .829. Bartlett's test of sphericity $\aleph^2(36) = 1061.614$ ($p < 0.001$). Consideration of the scree plot and eigenvalues suggested retaining two factors. The two factor solution explained 54.86% of the total variance observed in combination (Table 30):

	Rotated loadings (pattern matrix)	
Item	**Factor 1**	**Factor 2**
D2 The rate at which new material is introduced	.810	-
D3 The ideas and problems I have to deal with	.769	-
D1 What I was expected to know to begin with	.586	-
D5 The amount of work I'm expected to do	.438	-
D4 The skills or technical procedures needed for the subject	.404	-
D8 Tracking down information for myself	-	.826
D7 Communicating my own knowledge and ideas effectively	-	.707
D6 Organising and being responsible for my own learning	-	.562
D9 Using information technology and computing skills	-	.425
Eigenvalues	3.696	1.242
% of variance explained	41.07	13.79

Table 30 EFA of demand items (values <.350 suppressed; n = 408)

Descriptive statistics

Measure	**Full-scale**	**Academic**	**Information**
Number of items	9	5	4
Scale/subscale mean	3.40	3.29	3.54
Standard deviation	0.593	0.662	0.710
Range	1.67 – 5.00	1.20 – 5.00	1.00 – 5.00
Inter-item correlation	.156 - .555	.235 - .551	.233 - .555
Item-total correlation	.537 - .720	.656 - .819	.662 - .819
Skewness	0.008	-0.025	-0.281
Kurtosis	0.093	0.077	0.196
Cronbach's α	.816	.781	.720
Average Variance Extracted (AVE)	.463	.418	.418
Composite Reliability (CR)	.901	.778	.735

Table 31 Summary statistics for scale/subscales (n=408)

Correlations

Academic trait boredom included.

	Demand	Challenge	Information	Trait
Demand	-	.888***	.845***	-.179***
Academic		-	.505***	-.087^{ns}
Information			-	-.236***
Trait				-

Table 32 Pearson correlation between components (n=408)

CFA

Model	χ^2	df	χ^2/df	AGFI	TLI	CFI	RMSEA (90% CI)	p (close)
First-order: Two factors (without mods.)	98.483	26	3.788	.912	.903	.930	.083 (.066 - .180)	<.001
First-order: Two factors (with mods.)	64.183	25	2.567	.941	.946	.962	.062 (.044 - .081)	.134
Second-order with two first-order factors	64.183	25	2.567	.941	.946	.962	.062 (.044 - .081)	.134

Table 33 CFA model fit data (n=408)

One error covariance was inserted to improve the overall fit (Items D1 and D2). Both Academic and Information subscales each had one regression weight of .480 and .470 respectively.

Individual item summary

Highest (least demanding) and lowest (most demanding) mean item score by subscale as shown:

Subscale	Response profile (frequency and percentage)			
	Easy	Neutral	Difficult	Mean score (SD)
Academic				
D1 What I was expected to know to begin with	215 (52.7)	146 (35.8)	47 (11.5)	3.50 (0.850)
D5 The amount of work I'm expected to do	143 (35.0)	127 (31.1)	138 (33.8)	3.03 (1.010)
Information				
D9 Using information technology and computing skills	281 (68.9)	83 (20.3)	44 (10.8)	3.79 (0.977)
D8 Tracking down information for myself	189 (46.3)	133 (32.6)	86 (21.0)	3.34 (0.995)

Table 34 Academic boredom subscale item summary statistics (n = 408)

Intrinsic value

EFA

Four items indicative of intrinsic value retained. Kaiser-Meyer-Olkin (KMO) value .768 (good). Bartlett's test of sphericity $\chi^2(6) = 342.311$ ($p < 0.001$). Consideration of the scree plot and eigenvalues suggested retaining one factor. Adopting orthogonal (varimax) rotation, the one factor solution explained 56.73% of the total variance observed in combination (Table 35):

Item	Factor matrix
E1 I hoped the things I would learn would help me to develop as a person and broaden my horizons	.714
E3 I hoped the whole experience here would make me more independent and self-confident	.661
E4 I wanted to learn things which might let me help people and/or make a difference in the world	.659
E5 I wanted to study my subject in depth by taking interesting and stimulating modules	.567
Eigenvalue	2.269
% of variance explained	56.73

Table 35 EFA of intrinsic value items (values <.350 suppressed; n = 408)

Descriptive statistics

Measure	Full-scale
Number of items	4
Scale/subscale mean	4.32
Standard deviation	0.552
Range	2.00 -5.00
Inter-item correlation	.363 - .476
Item-total correlation	.733 - .762
Skewness	-0.793
Kurtosis	0.978
Cronbach's α	.739
Average Variance Extracted (AVE)	.425
Composite Reliability (CR)	.746

Table 36 Summary statistics for subscale (n=408)

Correlations

Approaches, experiences and academic trait boredom included.

	Intrinsic value	Organised effort	Surface	Deep	ETL	Trait
Intrinsic value	-	.242***	-.123*	.367***	.328	-.136**
Organised effort		-	-.269***	.342***	.333***	-.365***
Surface			-	-.258***	-.289***	.529***
Deep				-	.452***	-.244***
ETL					-	-.426***
Trait						-

Table 37 Pearson correlation between components (n=408)

CFA

Model	$א^2$	df	$א^2$/df	AGFI	TLI	CFI	RMSEA (90% CI)	p (close)
First-order: One factor	0.388	2	0.194	.998	1.014	1.000	.000 (.000 - .058)	.930

Table 38 CFA model fit data (n=408)

Individual item summary

Highest and lowest mean item score by subscale as shown:

Subscale	Response profile (frequency and percentage)			
	Agree	Neutral	Disagree	Mean score (SD)
Intrinsic				
E1 I hoped the things I would learn would help me to develop … broaden my horizons	383 (93.9)	21 (5.1)	4 (1.0)	4.42 (0.638)
E5 I wanted to study my subject in depth by taking interesting … modules	364 (89.2)	34 (8.3)	10 (2.5)	4.34 (0.735)
Other individual items (for comparison)				
E6 I mainly needed the qualification to enable me to get a good job when I finished	316 (77.4)	63 (15.4)	29 (7.1)	4.08 (0.917)
E8 It was a course I thought would be interesting rather than easy	305 (74.8)	68 (16.7)	35 (8.6)	3.96 (0.963)
E2 Opportunities for an active social life and/or sport	244 (59.8)	116 (28.4)	48 (11.8)	3.66 (0.983)
E7 When I look back, I sometimes wonder why I ever decided to come here in the first place	84 (20.6)	78 (19.1)	246 (60.3)	2.40 (1.232)

Table 39 Intrinsic value subscale item summary statistics (n = 408)

Predictive validity

Correlation measures the linear relationship between any two variables. A detailed correlation matrix is presented as shown (Table 40). All correlations were in the directions predicted (e.g. positively between academic trait boredom, class boredom, study boredom, surface ways of working and lack of purpose; negatively between academic trait boredom, organised effort, deep ways of working, course demand in terms of information and self-study; and not significantly in the main between academic trait boredom, career intrinsic motivation and course demand in terms of academic). Academic trait boredom also correlated negatively with the final percentage course marks or grades of participants.

Cluster analysis has the advantage of exploring structural associations between two or more variables. With both academic trait boredom and ways of working correlated as indicated, and known from within the research literature to exert influence over academic achievement and performance, these were entered into a hierarchical cluster analysis of data using Ward's method involving the standardisation of variables to z-scores to a common scale (with a mean of zero and a standard deviation of one). Details are presented as shown (Figure 3, Table 41).

Path analysis (Figure 4), as an extension of multiple regression, is a statistical method used to provide simultaneous magnitude and significance estimates between a number of observed variables and the inferred directional relationships between them. It serves here as an exploratory modelling technique in-keeping with the work as a whole. Located within C-VT, and guided by the working hypothesis presented in the introduction, a small number of indicative models were constructed and tested. In terms of the final model presented, model fit indices were good ($א^2(34)=67.368$, $א^2/df=1.981$; TLI=.950; CFI=.974; RMSEA=.049 with 90% CI=.032-.066 and pclose=.509). Simplified to show only significant relationships, academic trait boredom emerged as one of the most important variables and a strong and positive predictor of both study-related boredom and surface ways of working (path coefficients of .52 and .28 respectively), with study-related boredom a strong and negative predictor of organised effort (path coefficient -.29). Academic trait boredom, lack of

purpose and study-related boredom also emerged as strong and positive predictors of surface ways of working which, together with course demand (information), accounting for 40% of the observed variance in surface scores alone. Interest emerged as a strong and positive predictor of the participant experience of teaching and learning (course and clarity) which, in turn, and alongside intrinsic value, positively predicted deep ways of working.

	Trait	Class	Study	OE	Deep	Surface	ETL	Academic	Information	Intrinsic	LoP	Career	Self-study	% Grade*
Trait	-	.480***	.521***	-.365***	-.244***	.529***	-.426***	-.087 ns	-.236***	-.136**	.422***	.051 ns	-.208***	-.257***
Class		-	.646***	-.281***	-.107*	.348***	-.286***	-.020 ns	-.141**	.005 ns	.249***	.016 ns	-.194***	-.042 ns
Study			-	-.398***	-.145**	.456***	-.252***	-.157**	-.201***	-.016 ns	.302***	.009 ns	-.139**	-.189**
OE				-	.342***	-.269***	.333***	.181***	.349***	.242***	-.207***	.213***	.330***	.193**
Deep					-	-.258***	.452***	.201***	.257***	.367***	-.226***	.066 ns	.145**	.101 ns
Surface						-	-.289***	-.206***	-.343***	-.123*	.450***	.013	-.106*	-.287***
ETL							-	.209***	.302***	.328***	-.382***	.079 ns	.218***	.169*
Academic								-	.505***	.066 ns	-.115*	.029 ns	.022 ns	.128 ns
Information									-	.124*	-.214***	.054	.104*	.138*
Intrinsic										-	-.247***	.191***	.174***	.079 ns
LoP											-	-.009 ns	-.106*	-.216**
Career												-	.110*	.046 ns
Self-study													-	.088 ns
% Grade*														-

Table 40 Pearson correlation (n=408, *n=215 grades; ns not significant, * p<.05, ** p<.01, *** p<.001)

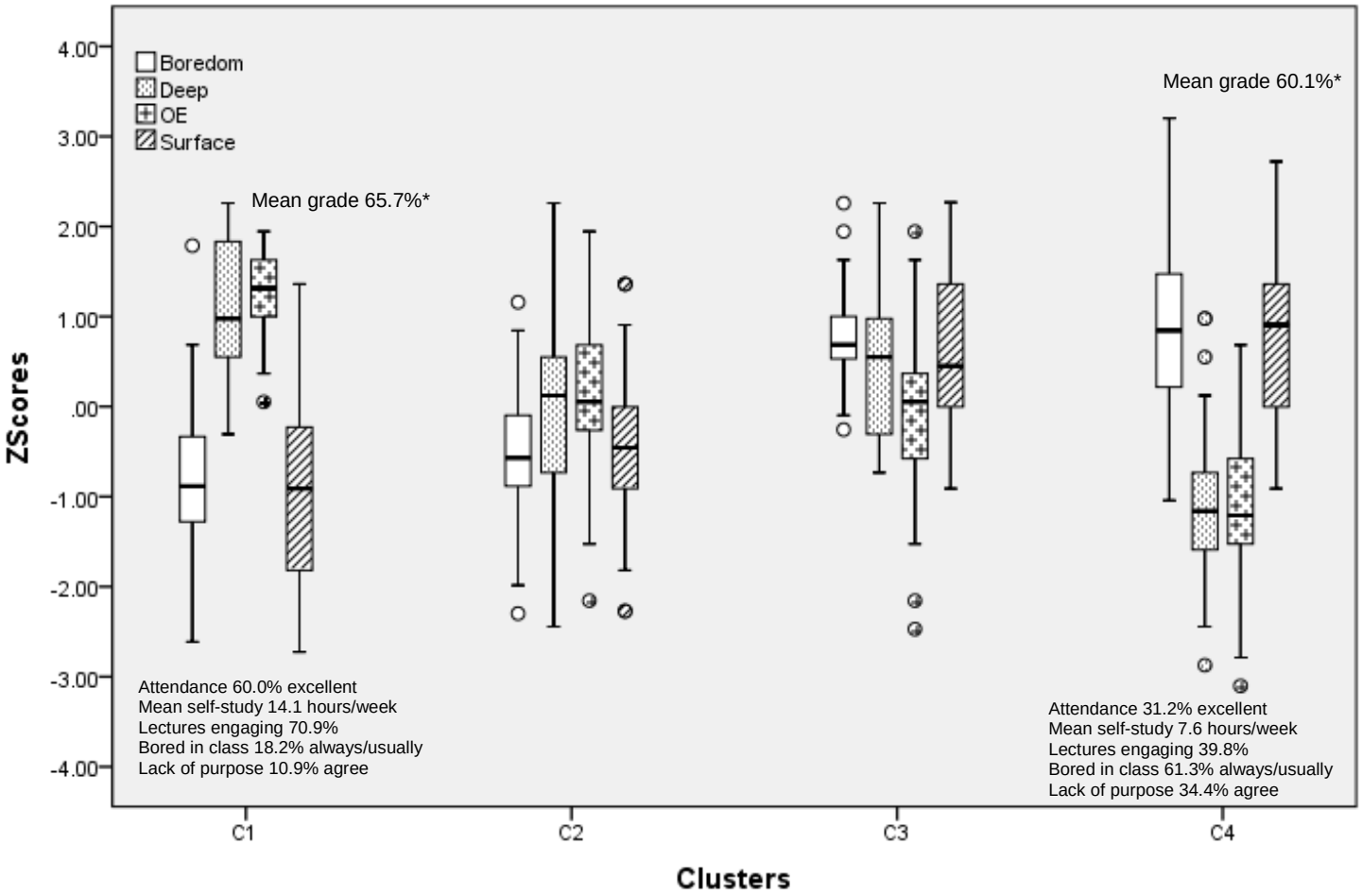

Figure 3 Project clusters (n=408, *n=215 grades)

Cluster 1 variables	Mean/%		Cluster 4 variables	Mean/%
Degree outcome			*Degree outcome*	
Mean grade*	65.7%		Mean grade*	60.1%
Academic boredom scores			*Academic boredom scores*	
Mean trait	2.17		Mean trait	3.22
Mean class	2.67		Mean class	3.46
Mean study	2.39		Mean study	3.42
Frequency and percentage bored in class			*Frequency and percentage bored in class*	
Always/Usually	18.2%		Always/Usually	61.3%
Mean time bored	30.6%		Mean time bored	57.6%
Nature of feeling			*Nature of feeling*	
Feel anxious, worry missing something important	34.5%		Wishing somewhere else	38.7%
Wishing somewhere else	18.2%		Feel anxious, worry missing something important	23.7%
Frustrated, angry, waste of time and effort	14.5%		Actively looking for other things to do	23.7%
Actively looking for other things to do	12.7%		Frustrated, angry, waste of time and effort	8.6%
Average approach profile			*Average approach profile*	
Organised effort	4.55		Surface	3.56
Deep	4.38		Deep	3.09
Surface	2.36		Organised effort	2.69
Experience teaching and learning			*Experience teaching and learning*	
Mean score	4.32		Mean score	3.45
Level of interest and engagement			*Level of interest and engagement*	
Lectures	70.9%		Lectures	39.8%
Coping strategy			*Coping strategy*	
Daydream	50.9%		Daydream	68.8%
Switch off	29.1%		Switch off	52.7%
Work on something else	27.3%		Social media	48.4%
Doodle	27.3%		Doodle	44.1%
Talk to friend	18.2%		Internet	33.3%
Text	16.4%		Text	28.0%
Internet	7.3%		Talk to a friend	28.0%
Leave	5.5%		Work on something else	20.4%
Social media	2.7%		Leave	16.1%

Table 41 SEQ boredom variables (n=408, *n=215 grades)

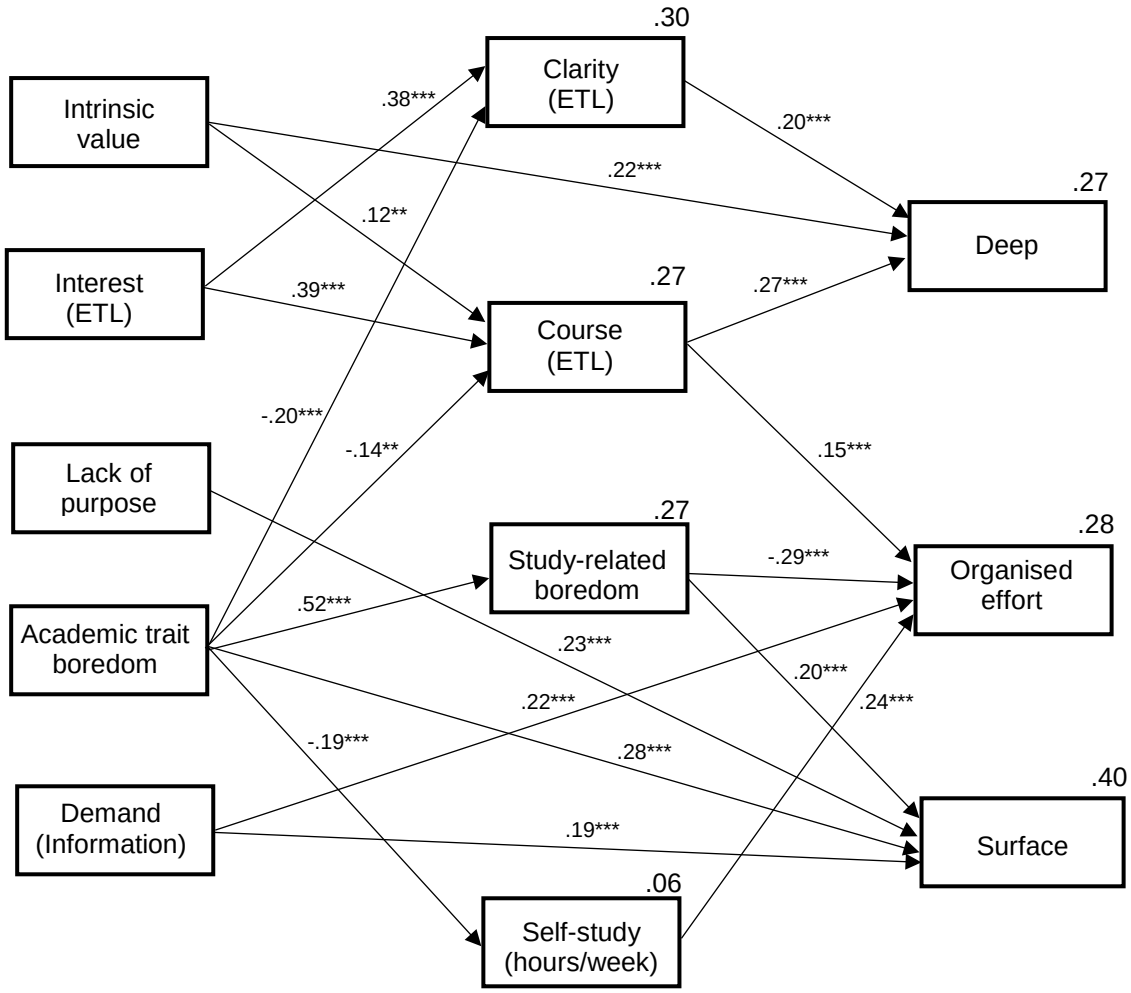

Figure 4 Simplified path diagram (n=408; *p<.05, **p<.01, ***p<.001)

Summary and conclusions

The work presented here was undertaken in order to develop and validate a Student Engagement Questionnaire (SEQ) considered sufficiently robust and reliable for use across the higher education sector as a whole. To that end, the reference data and source guide presented would suggest that the work has been successful in achieving that aim. Know from the theoretical framework provided by CVT that achievement-related emotions are of critical importance for motivation, self-regulation, metacognitive awareness and overall academic performance. As an achievement-related emotion of some importance, the ability to measure both academic trait and academic state boredom together, with an indication of relevant sites and triggers, the frequency with which boredom occurs and strategies to cope makes a unique contribution to the field. CVT maintains that achievement-emotions are induced when individuals feel in or out of control of certain activities and their outcomes, in anticipation or retrospectively, suggesting that how control and value are appraised by individuals is not only a determining factor in how they react but that intervention and remediation might also be possible. With incorporation of the conceptual framework provide by the ETL Project and the SETLQ, considering academic boredom alongside student expectation, approaches to learning, experiences of the teaching and learning environment and course demand, the SEQ therefore has immediate potential and application in a number of different situational contexts. From identifying students at risk of failing to progress or dropping out to monitoring and evaluating the appropriateness and effectiveness of modules and courses. Certainly the case when being able to measure and evaluate student emotions like academic boredom when students may not be aware of their emotions or their impact. The psychometric properties of the SEQ suggests its availability for use in future research.

Despite all of the recent international attention, theoretical advances, methodological developments, instrumentation and a growing sophistication in analytical techniques, the study of academic boredom and student engagement is not without its limitations. At its most basic, and in terms of representativeness, generalisability and portability, the majority of studies considered broadly typical of the field and represented here were undertaken by psychologists with samples of mostly full-time and first year psychology students attending universities in Germany, Canada, China and the United

States and sometimes participating for credit (some variation in location and participants is evident including the involvement of education students in more recent works). Even then, different authors have often approached their work in different ways and at different levels of abstraction, making direct comparisons more problematic than might normally be expected. As such, programmes of more inclusive and expansive research from across a wider range of disciplines employing a range of designs are certainly required in order to better capture and reflect the heterogeneity of higher education provision and the nature and diversity of the student population as a whole, as well as to help clarify some of the uncertainties surrounding academic boredom and human behaviour such as it is. This is particularly pertinent if findings are to be replicated and extended or otherwise across different cultural and situational contexts. Similarly, the majority of contributions available, including our own, were also quantitative in nature, with numerical data obtained using different instruments or different variations and translations of the same instrument largely in the form of questionnaires. As such, the collection and subsequent handling, modelling and interpretation of quantitative data also relies upon a number of assumptions each of which introduces uncertainty. Among those often overlooked include how individual items are received and understood by participants also across different cultural and situational contexts, the memory and recall of events sometimes long gone, a reliance on self-reporting, questionnaire fatigue and how ordinal data from Likert-scales are transformed for descriptive as well as inferential purposes. Qualitative and mixed-methods approaches are certainly essential if the field is to become more fully informed. Both questionnaires and interviews can also suffer from other unwanted effects including social desirability bias, image management, integrity and honesty and the general emotional state of respondents at the time of participation. Interestingly, those students more prone to academic boredom than others are also more likely to absent themselves from participation as a result of self-selection, assuming, of course, they are present and able to participate at all.

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Appendix: Student Engagement Questionnaire (SEQ)

Section 1: Respondent characteristics

Year of study, Degree type, Named award, Sex, Age, First in family to go to university or subsequent generation, Perceived attendance, Time spent studying/revising (hours per week), Entry qualifications, Work to earn (hours per week), Occupational or work-related family background.

Section 2: Academic boredom

Trait (Scale: 5 – Always, 4 – Usually, 3 – Occasionally, 2 – Rarely, 1 – Never)

T1	I find myself at a loose end, not really knowing what to do next
T2	I find myself trapped in situations having to do really meaningless things
T3	I find that that the things we have to do are really repetitive and monotonous
T4	It takes more to really stimulate and get me going than most other people I know
T5	I find it really difficult to get very excited about my work
T6	I find myself just sitting around on my own doing little of any real value
T7	I find I struggle to occupy my time or to use it really productively
T8	I get quite restless or even frustrated unless I'm doing something really engaging
T9	We seem to do the same things over and over again - it's a really familiar and tiresome routine
T10	I find most of what we do really tedious, I'd rather be doing something far more useful somewhere else instead

Alpha (α) = .850; χ^2/df = 2.530; CFI = .961; RMSEA = .061 (90% CI = .045 to .078)

Class (Scale: 5 – Always, 4 – Usually, 3 – Occasionally, 2 – Rarely, 1 – Never)

C1	Because everything just drags on by I find myself just clock-watching more and more
C2	I have real problems staying focused and alert, particularly if there's no way to make a contribution
C3	I get really tired and sleepy or start yawning
C4	I start to really slump or sink into my chair
C5	My mind begins to really wander
C6	I think about what else I'd rather be doing instead of just sitting here
C7	I start to really lose my concentration
C8	My brain just 'switches off'
C9	I feel stuck in the room and unable to escape.
C10	As time goes by I get more and more irritable and frustrated, particularly if I can't get involved

Alpha (α) = .896; χ^2/df = 2.474; CFI = .974; RMSEA = .060 (90% CI = .044 to .077)

Study Scale: 5 – Always, 4 – Usually, 3 – Occasionally, 2 – Rarely, 1 – Never

S1	When I'm bored I have no real desire or motivation to learn
S2	I'd rather put the work off until later and be doing something completely different instead
S3	I get really fed up just sitting at my desk
S4	I really struggle to stop my mind wandering on to other things
S5	I get more and more moody and down.
S6	Time seems to slow down to a complete standstill
S7	I get really tired and start drifting off to sleep
S8	I get more and more impatient and irritable
S9	I find it really hard to concentrate and get easily distracted as a result
S10	I get really bored because the work is too challenging, I don't understand it or know what to do
S11	I feel really isolated and cut off from everyone else

Alpha (α) = .903; χ^2/df = 2.443; CFI = .970; RMSEA = .060 (90% CI = .045 to .074)

Section 3: Perceived course experiences

Initial expectations (Scale: 5 – Strongly agree, 4 – Agree, 3 – Neutral, 2 – Disagree, 1 – Strongly disagree)

E1	I hoped the things I would learn would help me to develop as a person and broaden my horizons
E2	Opportunities for an active social life and/or sport
E3	I hoped the whole experience here would make me more independent and self-confident
E4	I wanted to learn things which might let me help people and/or make a difference in the world
E5	I wanted to study my subject in depth by taking interesting and stimulating modules
E6	I mainly needed the qualification to enable me to get a good job when I finished
E7	It's not what I expected at all … I sometimes wonder why I ever decided to come here in the first place
E8	It was a course I thought would be interesting rather than easy

Alpha (α) = .739; χ^2/df = 0.998; CFI = 1.000; RMSEA = .000 (90% CI = .000 to .058)

Ways of working/Approaches (Scale: 5 – Strongly agree, 4 – Agree, 3 – Neutral, 2 – Disagree, 1 – Strongly disagree)

A1	I often have trouble making sense of the things I have to remember
A2	I generally put a lot of effort into my studying
A3	A lot of what I learn seems no more than lots of unrelated bits and pieces in my mind
A4	In making sense of new ideas, I often relate them to practical or real life contexts

A5 On the whole, I'm quite systematic and organised in my studying
A6 Ideas I've come across in my academic reading often set me off on long chains of thought
A7 I look at evidence carefully to reach my own conclusions about what I'm studying
A8 I organise my study time carefully to make the best use of it
A9 It is important to me to follow the argument or to see the logic behind things
A10 I'm pretty good at getting down to work whenever I need to
A11 I just go through the motions of studying without really seeing where I'm going
Alpha (α) = .790 (oe), 663 (dp), .594 (sfc); χ^2/df = 2.684; CFI = .930; RMSEA = .064 (90% CI = .050 to .079)

Teaching and learning *(Scale: 5 – Strongly agree, 4 – Agree, 3 – Neutral, 2 – Disagree, 1 – Strongly disagree)*

L1 It's always clear to me what I'm supposed to be learning during the course
L2 The topics always seem to follow each other in a way that makes sense
L3 What we are taught seems to match what we are supposed to learn
L4 The handouts and other materials we are given help me to better understand the course
L5 I can see how the coursework fits in with what I'm supposed to learn
L6 We are given a lot of choice over how we go about learning
L7 We are given lots of choice over which aspects of the subject to concentrate on
L8 On this course I am prompted to think about how well I am learning and how I might improve
L9 The teaching on this course encourages me to rethink my understanding of the subject
L10 The teaching on this course gives me a sense of what goes on 'behind the scenes'
L11 The teaching on this course helps me to think about the evidence underpinning different views
L12 I am always encouraged to think about how best to tackle the coursework
L13 The feedback given on my work helps me to improve my ways of learning and studying
L14 Staff give me the support I need to help me complete the work for this course
L15 The feedback given on my work helps to clarify things I haven't fully understood.
L16 Staff try to share their enthusiasm about the subject with us
L17 Staff are patient in explaining things which seem difficult to grasp
L18 Students support each other and try to give help when it is needed
L19 Talking with other students helps me to develop my understanding
L20 I find most of what I learn on this course really interesting
L21 I enjoy being involved in the course
Alpha (α) = .920; χ^2/df = 2.538; CFI = .935; RMSEA = .061 (90% CI = .055 to .068)

Demand *(Scale: 5 – Very easy, 4 – Easy, 3 – Neutral, 2 – Difficult, 1 – Very difficult)*

D1 What I was expected to know to begin with
D2 The rate at which new material is introduced
D3 The ideas and problems I have to deal with
D4 The skills or technical procedures needed for the subject
D5 The amount of work I'm expected to do
D6 Organising and being responsible for my own learning
D7 Communicating my own knowledge and ideas effectively
D8 Tracking down information for myself
D9 Using information technology and computing skills
Alpha (α) = .816; χ^2/df = 2.567; CFI = .962; RMSEA = .062 (90% CI = .044 to .081)

Additional information also collected:

Level of interest in traditional whole-year lectures, seminars, individualised or very small group tutorials, specialised practical input, online/use of VLE (Blackboard/Moodle); Most interesting and engaging including why; Most dull and boring including why; With reference to choice, frequency of boredom and frequency expressed as a percentage; Nature of boredom: I find myself wishing I was somewhere else, I get anxious worrying that I might be missing something important, I start actively looking around for other things to do, I get frustrated or angry as it all feels like a waste of time and effort, other (specify); Coping strategy: daydream, just 'switch off', doodle over my notes or handouts, talk to the person next to me, text a friend, go to social media, browse the Internet, work on other university 'stuff', leave at the break; Exploration of boredom associated with assignments and examinations.