
2023

Exploring disruption through the lens of an adapted Five Senses Framework

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Recommended Citation

Ashford, T., Innes, P. A., Hands, K., Casey, S., & Blake, J. (2023). Exploring disruption through the lens of an adapted Five Senses Framework. *Journal of University Teaching & Learning Practice*, 20(7).
<https://doi.org/10.53761/1.20.7.09>

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Exploring disruption through the lens of an adapted Five Senses Framework

Abstract

This quasi-experimental research design surveyed 688 students through a self-administered online survey to specifically explore relations between student self-assessed capabilities (Lizzio Five Senses, 2006), overall program satisfaction, withdrawal behaviours, demographics and year of study in their university courses during an emergency COVID-19 lockdown experience. Importantly, this research offers a more nuanced view of the *Five Senses* and confirms their importance as a university strategy for student success. These findings offer further granularity into the complex set of relations that impact decisions around satisfaction, persistence, and capability in higher education and support previous research by Lizzio and Wilson (2008) indicating students' perceptions of *purpose* is the strongest predictor of satisfaction, lower anxiety and lower course withdrawal. Ultimately, the paper suggests as higher education looks towards future possible disruptions due to climate, health or political realities, equipping and fostering a strong sense of purpose, connectedness, and resourcefulness as well as sense of capability and academic culture will buffer and support students to persevere. In addition, this research suggests that those students who may have weak associations with these senses merit additional attention.

Practitioner Notes

1. Overall students transitioned remarkably well during the emergency move to online during the COVID 19 response period.
2. This research cohort bifurcated into two groups: those who associated strongly with the Five Senses and those who had weaker connections to the Five Senses.
3. Weak associations were associated with lower satisfaction, higher anxiety, and greater chance of dropping one or all courses.
4. Surprisingly, cohorts did not change their (high or low) association to the sense assembly – (capacity, resourcefulness, connections, purpose, culture) across first, second and third year.
5. Developing and explicitly exposing students to these Five Senses early in their degree should increase their satisfaction and resilience during disruptions but also lock in long term associations with the five senses over their degree period.

Keywords

Lizzio; academic competencies; student satisfaction; disruption, COVID-19

Introduction

In this paper we explore the complex array of issues that arose for students at a university located in regional Australia because of the rapid transition to online learning during the first COVID-19 lockdown that occurred between March to July 2020. This was a unique and unprecedented period in the Higher Education (HE) experience (Tice et al., 2021). Prior to COVID-19, the planned and careful movement of HE courses and programs to the online environment had been occurring for more than a decade. While transitioning to a fully online and distributed learning environment could be construed as a natural evolution of the technology-supported learning trajectory, as predicted by pro-technology pundits (Perelman, 1992), the move to technology-*dependent* learning was prompted by the health and welfare restrictions created by the COVID-19 pandemic. This forged uncharted territory for online learning and teaching at the regional Australian university where the research and survey took place. New student competencies were called upon including personal flexibility, patience, courage, and self-discipline combined with unstable internet connections, new information technology (IT) applications, and having suitable caring arrangements for children and family in place while studying outside of the traditional learning spaces. These were challenging times not only for individual students; indeed, these times tested the entire Higher Education sector.

Due to the urgency underpinning the transition to online learning during 2020, the planning and design processes that would typically be undertaken to ensure seamless transition to a new teaching and learning environment were abandoned. The global crisis demanded quick activation of the technology-enabled learning and teaching (TELT) space. At the university where the student survey took place, teaching staff had one week to shift entire courses online and most of these courses had been designed for face-to-face delivery. This pivot impacted approaches to teaching and learning generally and created significant difficulties for some laboratory and human interaction-based disciplines (high-resource programs). This was particularly the case in courses such as chemistry or performance and courses designed around fieldtrip data collection.

The COVID-19 pandemic disruption set up a novel backdrop to study student resilience in a period of transition from a known study configuration to an unknown one. Williamson et al. (2020) described this education response as an “emergency matter” where educational technologies were “positioned as a frontline emergency service” (p.107). Arguing that while distance education is certainly not a novel approach, we suggest that the pandemic was an extraordinary circumstance that provided an opportunity to study affective relations generated in tumultuous times. There is a significant amount of research suggesting HE institutions need to plan for future disruptions such as climate change or pandemics (Fang et al., 2023; IPCC, 2022; Peters, 2022; UNESCO, 2021). In our geographical region, successive floods, and repeated lock-downs characterised learning experiences across six consecutive university semesters from 2020 – 2022. Clearly, how

Academic Editors

Section: Student Experience
Senior Editor: Dr Sally Ashton-Hay
Associate Editor: Dr Yvonne Moogan

Publication

Received: 13 May 2023
Revision: 26 July 2023
Accepted: 7 Sept 2023
Published: 1 November 2023

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students manage disruption is important research for Higher Education. Our research extends work on transition, disruption and student satisfaction and investigates some of the key factors that may have influenced outcomes during the COVID-19 lockdown context. The framework that we used as a lens for this study was the Five Senses Model first proposed by Lizzio (2006).

Rationale for employing the Five Senses for Student Success Framework

The *Five Senses* (FS) framework used in this study is a strategy that was developed by Alf Lizzio (2006) to support first-year student transition to university, a transition that is recognised as having specific and significant challenges for the student and the institution (Crisp et al., 2009; Kahu & Nelson, 2017; Larsen et al., 2019; Zimmerman et al., 2019). The senses include perceptions around capability, connectiveness, purpose, resourcefulness, and academic culture, and they place the student at the centre of their own higher education ecosystem. The FS is a framework and an orientation that assists many university departments to support students' transition to university life, such as shaping student support services and clarifying academic expectations (Larsen et al., 2020; Lizzio, 2006; Sidebotham et al. 2015; Zimmerman et al., 2019). Lizzio's initial research proposes that these senses are predictors of first year student satisfaction and resilience (2006), with a higher correlation of resilience seen in students with a stronger sense of purpose (Lizzio & Wilson, 2004). Resilience is seen as being a critical characteristic of those who can overcome obstacles in pursuit of their goals and has been associated with academic success (Ayala & Manzalo 2018; Hwang & Shin 2018; Kannangana et al., 2018).

This framework's focus on *supporting transitions* from the 'known' to the 'unknown' was a critical reason for its selection in this research. Our goal was to explore the complex stories and the impacts of the sudden and unplanned move online. We were interested in identifying if the FS were applicable to a university-wide cohort experiencing a shared stressful and disruptive event. According to Lizzio's philosophy, Higher Education institutions must acknowledge and support socio-emotional growth and the development of affective domains such as connectedness and personal sense of agency, which he deems crucial for fostering student success. This is particularly pertinent when we consider a future with disruption drivers such as climate change, post-pandemic-related anxieties, and changing political, economic, and technological contexts (Selvaratnam & Sankey, 2021).

Literature Review

This research fits within the broader domains of student transition and student success research in post-secondary education. Within this body of work there are five key student socio-psychological characteristics that are associated with Lizzio's FS that have been identified within the success literature namely: sense of connection, sense of capacity, sense of resourcefulness, sense of purpose, and sense of academic culture. These characteristics merit their own story as each one comes from a specific research focus. They are mutually generative and independently vital.

University student transition strategies fit within a broad spectrum of work concerning student success, attrition studies, and efforts to both broaden accessibility of higher education to 'non-traditional cohorts' and meeting the needs of an ever-increasing diverse student entrant (Kahu & Nelson, 2017; Larsen et al., 2019). The origins of transition work could be described as deficit

focused, asking 'why so many students withdraw or fail in first year' and looking for answers within student demographics and academic experience (Kahu & Nelson, 2017). Kift et al. argued back in 2010 that there was an "inordinate amount of interest" in this transition period which was clustered within a First Year Experience (FYE) focus (p. 2). Further, Kift et al. (2010) and later Larsen et al. (2020) have extended this scholarship beyond deficit modelling towards viewing transition within a complex student-curriculum-institution-governance context. Key highlights here are exploring the nexus of roles and responsibilities that circle academic success. Kahu and Nelson's (2017) work exemplifies this move with the introduction of the 'educational interface'. This well-known model proposes four psychosocial constructs that provide mediating mechanisms that include self-efficacy, emotion, belonging and well-being (Kahu & Nelson, 2017, p. 64). Moreover, and relevant to our survey across year levels is that adaptation, attrition, and struggle are not limited to first year cohorts. Kahu and Nelson (2017) suggest that the experience of higher education is an ongoing 'transformation of being'. Further Kahu and Nelson's pre-pandemic scholarship pushed this envelope further to acknowledge the "dynamic and evolving lived realities" of students (Kahu & Nelson, 2017, p. 62). Arguably, COVID-19 has not only enhanced the dynamic nature the educational interface but demanded an immediate evolution in HE digital pedagogical practice.

Within the body of transition work there is a particular focus on student connections to peers, educators and to the institution (Farrell et al., 2018). Key here is the confluence of connection and engagement. Early work by Garrison et al. (2000) note that education has long been acknowledged as comprising both psychological and sociological points of connection, including enjoyment and fulfilment through the course material (Dewey in Garrison et al., 2000, p. 20). Recognition of this affective connection to university studies is important as it shifts thinking of education as a commodity that can be neatly designed and delivered towards thinking about education as a relational experience. Students must connect with the content and must feel some level of connection or belonging with the enterprise and people (Larsen & James, 2022). Belonging is seen to be a cure for alienation and may reduce anxiety associated with embarking on a new set of relations associated with study at university (Gravett & Winstone, 2022). Further, Larsen and James (2022) suggest, focussing on sense of belonging or connection with peers, educators and the university will positively impact studies and student experience. This complements recent research looking into students' online experiences during the pandemic which has found that student belongingness (Tice et.al., 2021) was a critical factor in student resilience especially during disruption.

Self-efficacy or sense of competency is also connected to student success and university transition models. This research is often connected explicitly with the social cognitive work of Bandura (1977, 1982) who proposed that individuals can control their thoughts and feelings regarding self-efficacy, and this has an impact on their perceptions and behaviours (Larsen & James, 2022). In his 1977 seminal paper, 'Self-efficacy: Toward a Unifying Theory of Behavioural Change', Bandura established measures of self-efficacy were able to predict performances in new and or threatening activities. This simple proposal that perceptions can lead to performances has gained significant interest in HE student success circles. Significantly the work of Tinto (2017) indicates this is difficult and research-intensive work where institutions need to see through the student's eyes. Building self-efficacy within student cohorts, in particular, diverse and typically

marginalised cohorts such as first in family, regional and rural students, and those from low social economic status (SES) cohorts is essential.

Related to connection, belonging, self-efficacy and capability is the area of research that is emerging around developing a sense of purpose as a driving attribute in student persistence and success. Kuh et al.'s (2006) systematic literature review of postsecondary student success literature mentions sense of purpose, and educationally "purposeful activities", being related to student investment in the learning process (Alexander & Murphy, 1994, p. 12 as cited in Kuh et al., 2006, p. 31). Kuh et al. (2006) determined 'educationally purposeful' activities were those defined as having a specific skill or competency outcome such as writing improvement, personal development, or organisational skills. Similarly sense of purpose is associated with goals, outcomes of degrees and a sense of vocation (Calica & Paterson, 2023).

This vocational orientation of purpose is clearly evidenced in the Australian Federal Government's emerging *Australian Universities Accord* discussion process (February 2023) which is reviewing the sector and identifying challenges and opportunities. Clearly within this document, university outcomes must attend to meeting the market demand for labour and skill development (p. 13). Within this lens universities are pushing this alignment into program design and development by explicitly labelling work ready course components and the development of embedded high-quality generic skills for future employability. This work is exemplified by Dawn Bennett's (2020) research on employability and explicitly discusses the purpose of higher education. Research indicates that students having a sense of purpose and a clear rationale of *why* to invest in the struggle associated with university study supports persistence. Ma and Bennett's (2021) work in China indicates that a sense of purpose related to vocational outcomes improved academic engagement and reduced stress.

Lizzio's (2006) fifth sense is 'academic culture'. This is both a culminating value of all the other senses and a unifying umbrella term for the framework. For Lizzio, this is the gathering of values, ethics and practices that make up going to university. It includes knowing the "value of learning and 'how things are done'" (p. 2). Kahu and Nelson's (2017) work also leans into the view that there is a distinct 'academic culture' and some students acculturate more easily than others. Nakata (2007) proposed the idea of a 'cultural interface' for Indigenous students as a space of negotiation between different systems of thought (cited in Kahu & Nelson, 2017, p. 63). For our research, we followed this sense through exploring student views of academic integrity and asking students about perceptions of doing assignments ethically within the new digital and distanced environment.

Of interest to us was how the FS influenced student satisfaction, levels of anxiety, and dropping courses during the unprecedented move home. Acknowledging the parallels between early modes of online education that emerged in the 1980s – 1990s where 'distance learning' was the only option for those geographically remote from universities (Moore, et al., 2011), COVID-19 equally presented online 'distance learning' as the only safe and practical option (Dinh & Nguyen, 2021; Turnbull et al., 2021). Fortunately, there has been significant research and Web 3.0 advancements since these early experiences. There are now innumerable tools that support teacher presence, learning design, interactivity, and peer-to-peer connections online (Aljawarneh, 2020; Borup et al., 2012; Şahin & Yurdugül, 2022). However, despite the new functionality of these powerful platforms, challenges persist around students feeling isolated, maintaining

motivation, and limited social connections between peers and teaching staff (Dumford & Miller, 2018).

During the 2020 COVID lockdown, the emergency shift to online education was rationalised as a mechanism to reduce disruption to students' university experience (Daniels et al., 2021; Omar et al., 2021). For universities in the southern hemisphere, the pandemic-induced transition took place in week four or five of the first semester in the teaching year, a critical time for student engagement and correspondingly, the point at which students decide whether to continue in their studies and pay for their courses. Arguably this pivot to online learning was driven by economic necessity for the institutions and providing an ideal experience for students may have fallen in priority given the emergency nature of the situation (Kamssu & Kouam, 2021; Nash & Churchill, 2020; Plontikof & Utoft, 2022). Therefore, coupled with the known historic trials of learning online, the unique factors that emerged during the pandemic introduced a new set of challenges. While comfort and convenience offered by the new 'learn from home' experience were identified in some studies (Dinh & Nguyen, 2021), the quick shift to online learning also introduced several uncontrollable variables within the student's learning environment. These included appropriate at home quiet learning spaces and access to technologies including suitable internet speeds and computers equipped with cameras and microphones (Donham et al., 2022). The following research traces these compounding issues of moving to an emergency online dependent learning model and explores student experiences and satisfaction through the lens of the FS framework.

Method

The research methods and data used for this paper, which is a subset of a larger project, are framed by a mixed-research technique (Onwuegbuzie et al., 2010) and is set within a COVID research Community of Practice (Denscombe, 2008; Lave & Wenger, 1991). This marriage of methods and researcher collaboration has produced a multi-dimensional research instrument that captured both qualitative and quantitative data. Critically this collaborative research configuration harnessed mutually beneficial insights that are associated across qualitative and quantitative approaches and are well described by Denscombe (2008). The key stages were collaborative research instrument design with specific questions aligned with the FS framework (14 questions); working with the University protocols to survey students and the University Executive who were interested in this study; receiving Human Ethics approval; survey deployment and then qualitative and quantitative analysis (*crossover analysis* re Onwuegbuzie et al., 2009). The researchers, who were from diverse disciplinary backgrounds, followed a pragmatic and iterative analysis recognizing intersubjectivity across the data fields. We understood making sense of the student experience during the emergency shift home was a complex and multifaceted undertaking that would take a diverse team with specialization in either quantitative or qualitative data analysis techniques.

The larger study was conducted at a small regional Australian university (the sampling frame comprised 12,017 EFTSL; 10,304 domestic and 1712 international) during the 2020 lockdown period from April to October. All university students were contacted through email and were invited to complete an anonymous online survey (50 questions with cascading branches). The survey instrument was long; however, it was reviewed by an internal peer group for validity and approved through the University's Institutional Ethics process. In total 688 students completed the

survey. Missing data tended to increase incrementally as questions progressed in the online survey. We had 85% of the survey cohort finishing the relevant portions of the survey ($n = 588$). An analysis of participants with missing data over those remaining in the analysis showed that there were no significant differences or associations with age, degree type or level or study status (full time or part time), but those with missing data were over two times more likely to be male. Similarly, those with missing data were twice as likely to experience withdrawal of at least one course in the previous semester than those not missing in our FS scale data collection.

Despite the relatively large sample size, the sample was disproportionately representative towards domestic students (99%, $n = 631$), being female (73%, $n = 504$), but having a more even spread of ages with 40% ($n = 259$) were thirty years or older; 82% ($n = 533$) studied as full time. The sample was relatively proportionately representative of degree level with first to fourth year comprising 45%, 30%, 21%, and 4% respectively, and postgraduates taking up only 7% of the sample overall. Thirteen percent ($n = 84$) indicated they had withdrawn from at least one course and 81% ($n = 496$) indicated agreement with experiencing anxiety in relation to studying during the COVID period. Prior to COVID, 83% of respondents agreed they were satisfied with studying arrangement, which dropped dramatically to only 43% agreement with studying from home during the COVID period. For the same questions, at the other extreme, prior to COVID only 5% of respondents indicated dissatisfaction, which grew to 38% during the COVID study from home period.

Research Questions

A key research question was how the FS, widely recognised as supporting student persistence and satisfaction in the difficult first year transition (Harris-Reeves et al., 2022), were evidenced within this student cohort who were *collectively* experiencing high levels of stress and change due to the transition to home-based learning. We proposed that using an affect-based transition framework that has been empirically tested and relevant for identifying key traits to support students navigating a new university environment and expectations would be relevant to explore in this new COVID transition setting. This was a strategic opportunity to trace how these different senses correlated with outcomes like learning experience satisfaction, and withdrawal behaviours. Overall, our intent was to map the system of interdependent relations that emerged for students during the COVID-19 transition regarding student progression, satisfaction, and anxiety through the lenses of sense of purpose, connectedness, resourcefulness, capability and sense academic culture. In addition, we were interested in how students' background factors and year level had an impact on this experience.

Specifically, this study explores three research questions (RQ):

RQ1: How do students cluster on the basis of their responses to the *Five Senses* framework, and are all domains of the Five Senses equally important in differentiating student cohorts?

RQ2: To what extent do demographic and background factors profile in the 'sense assemblage'(SA)?

RQ3: To what extent do the 'sense assemblage' (*high/low associations*) relate to student satisfaction, anxiety, and withdrawal behaviours during the COVID-19 response.

The following Table 1 outlines the survey questions developed to fit the COVID-19 context for each FS domain.

Table 1

Survey Questions Developed and Aligned with Five Senses

Five Senses Domain	COVID-19 Context Operationalisation	Specific Question Content
Sense of capability	<i>Perceives to have the skills and approaches of what is needed in the online adjusted content delivery period.</i>	<ul style="list-style-type: none"> • In the study from home period, I understood how to approach my studies • I have had previous experience in successfully studying online
Sense of connectedness	<i>Feels connection with peers; staff; and supports offered.</i>	<ul style="list-style-type: none"> • I felt connected to my fellow students when university moved online • During the online study period, I was able to contact my fellow students to discuss learning content or assessment items • During the online learning period, I was confident that my tutor/lecturer/supervisor would respond to queries in a reasonable amount of time
Sense of purpose	<i>Perception of engagement; sense of vocation; motivation and personal goals</i>	<ul style="list-style-type: none"> • I was committed to continuing my studies during the online learning and teaching period • I was excited about what I was learning online during the online learning period • I found it easy to remain motivated to study during the online learning period
Sense of resourcefulness	<i>Ability to manage challenges; navigate university systems; speak up for help and equipped to study online.</i>	<ul style="list-style-type: none"> • This COVID-19 period was a chance for me to develop new ways of learning • Thinking about the last semester, did you feel equipped to study from home in regard to: IT equipment; Internet connectivity; Having a suitable space to study in • During the online learning period, I knew who, or which area of the university to contact about: help with my course; help with counselling/wellbeing; academic skills support; enrolment, how to apply for

Sense of
academic culture

*Understanding the
core values and ethical
principles of the
university and thinking
about how technology
may change academic
performances.*

- emergency support; how to access free meals
 - I understood the change of grade arrangements that were put in place to ensure that my GPA would not be adversely impacted by the changes that took place
 - I feel connected to the University's core values and ethical principles of academic endeavour: Please read this very short extract from USC's Academic Integrity Plan: "it is vital you act with honesty, trust, fairness, respect and responsibility in all your academic activities". I feel the above statement and ethical principles of academic endeavour are important
 - While students were working at home in their courses, I think there **may have been an increase in cheating,** plagiarism and collusion on assessment tasks
-

Results

Before evaluating the relations between the survey elements (demographics, COVID context, and academic experience) and the FS questions, we first needed to test the internal consistency of the adapted FS questions. Onwuegbuzie et al. (2010) outline eleven areas of validity evidence within a mixed method framework and in particular we were interested in whether the questions appear to represent the measurement of the *intended* Five Sense content area (item validity) and whether the questions corresponded logically to the construct domain (structural validity - do students interpret the question clusters consistently) (Onwuegbuzie et al., 2010). Item validity was determined through a sequence of feedback and internal peer review stages to develop the survey questions. This process included research team members, selected academics familiar with the Five Senses body of work, and review by internal learning and teaching experts. Structural validity was demonstrated using a Cronbach's alpha which tested for reliability for the FS internal consistency, with a domain-item score of $\alpha = .7$ or higher typically taken to indicate appropriate. Reliability alphas, across the five domains of the FS items, ranged from a low of .10 to .83 with an average of .58 (see Table 2). Three of the Senses (Resourcefulness, Connectedness, and Purpose) all had strong internal consistency with Cronbach's alphas from .76 to .83. Capability had an alpha of .44, which appears low, but underscores the tendency of Cronbach's to report low alphas for scales with few items and higher alphas for more items. We

examined the correlation of the two items in the Capability scale as a significant weak-moderate positive linear relationship, $r(614) = .28, p < .001$, as evidence of adequate consistency. These two capability survey questions are logically related and relevant, but not internally dependent. It is logical that students may feel capable to be working online but have no prior experience. Looking at the individual question regarding prior experience we found that 27% agreed they had previous experience studying online, while a larger 53% agreed they understood how to approach their studies “from home”. The last question set associated with Academic Culture presented a different (inconsistent) picture with only two items and reporting an alpha of .10, with follow-up bivariate correlation showing a non-significant linear association, $r(587) = -.03, p = .496$. Because the two Academic Culture items were unrelated, we suggest that academic culture is a complex sense, it resides at the centre of the Lizzio’s model, and the two questions addressed different logical elements within this configuration. The most relevant question in the set was students’ association with Academic Integrity, which we label herein as Academic Culture 1 (Integrity). In hindsight their perceptions of *others* cheating afforded by the new technology configuration is associated with the second question, herein labelled Academic Culture 2 (Cheating), but arguably not with their *own* individual performances. Because of this complexity, and lack of consistency across the two items, Academic Culture 1 and 2 remain in our analyses as separate measures.

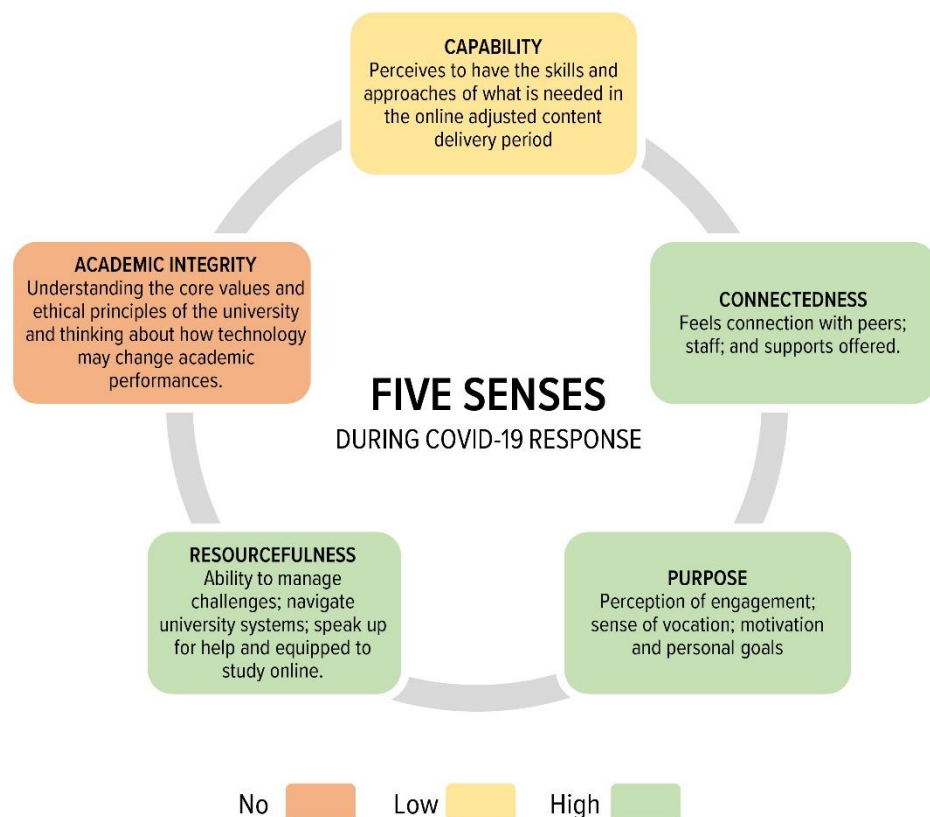
Table 2

Cronbach’s Alpha Reliability for Five Senses

Senses	Reliability α	Items
Capability	.44	2
Connectedness	.76	5
Purpose	.83	4
Resourcefulness	.80	9
Academic Culture	.10	2
Mean (Exc. Academic Culture)	.71	

Figure 1

Reliability across the Five Sense Domains



The next step once we established the validity and internal consistency of the FS Scales/Items was to investigate the Descriptive Means (Table 3). The skewness indicators are also provided, showing that while most of the scales/items were not skewed, two showed some level of negative skew (tails towards disagreement). Because the scales are bound between 1 and 5 (Likert) and because of the large sample size, we did not attempt any further variable modification or transformation. Therefore, we can conclude at this highest level of analysis, overall positive association with the Senses.

Table 3*Descriptive Statistics for the Five Senses (5-Point Likert, agreement is higher)*

Senses			Mean (5-point Likert)	SD	N	Skewness	Std. Error of Skewness
Capability			2.96	0.95	618	0.05	0.10
Connectedness			3.22	0.75	609	-0.09	0.10
Purpose			3.28	0.96	602	-0.17	0.10
Resourcefulness			3.54	0.68	594	-0.42	0.10
Academic (Integrity)	Culture	1	4.54	0.65	591	-1.75	0.10
Academic (Cheating)	Culture	2	3.20	1.02	589	-0.10	0.10

The first research question was to investigate how students cluster based on their responses to the FS framework, and are all domains of the FS equally valuable in differentiating student cohorts? To do this work we performed an SPSS Hierarchical Cluster analysis where similar “groups” of cases based on the FS were evaluated. Due to the lack of reliability of the Academic Culture domain we split that domain and dealt with the two questions as independent measures. Justifying what defines an adequate cluster is typically based on the examination of the dendrogram which visually displays clusters of students consecutively combined from left to right as similar to dissimilar respectively. This horizontal distance is also provided in the cluster output in numeric form as a cluster coefficient. Using either the relatively large change in coefficients (representing larger “steps” in the degree of similarity in a cluster step) or the visual analogue of the coefficients in a dendrogram as relatively “longer” horizontal lines, a justified number of groups can be estimated. We compared results from two SPSS clustering approaches (SPSS Hierarchical and k-means), selecting SPSS Hierarchical Cluster (SPSS IBM Statistics v28) based on being able to remove unique cases which did not “fit” into dominant clusters, in comparison to the k-means procedure. In our data, two groups (Group 1, $n = 437$; Group 2, $n = 134$) represented clear divisions in the similarity to dissimilarity of the clustering algorithm results, with sixteen cases

forming three smaller clusters. The latter cases were removed for the purposes of proceeding analyses, comprising five hundred and seventy-one cases in the final FS scale analyses.

Table 4 presents the formal tests of the difference between the two clusters (now named a High and Low ‘sense assemblage’ (SA) of respondents on each of the internal Five Senses scales/items. It is clear from the results that each of the two clusters represents significantly higher and then, lower means on all Five Senses scales/items. Simply the *t* values suggest these groups exist and the Cohen’s *d* help us to know how much they matter. The effect sizes reported in Table 4, show strong effects (e.g. Purpose, Cohen’s *d* = 1.94) where there are considerable differences between the two groups, to weak effects (e.g. AC2 Perceptions, Cohen’s *d* = 0.26) which, while statistically significant, are less impactful. This relation is illustrated graphically in Figure 2.

Table 4

Internal Profiles of the Two Dominant Sense Assemblage (SA) Clusters of Respondents: Mean Five Senses (Scales/Items) (RQ1)

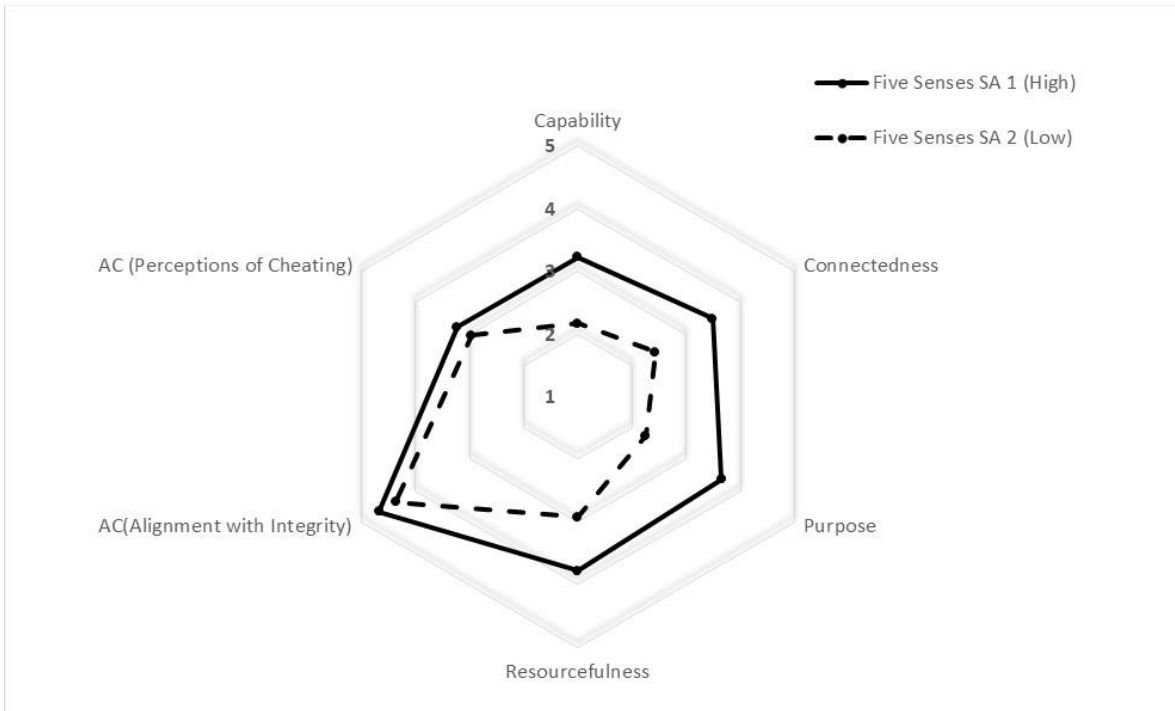
Sense Domain	High	Low	<i>t</i>	<i>(df)</i>	Effect Size Cohen's <i>d</i>
	SA Group 1	SA Group 2			
	Mean	Mean			
Capability	3.23	2.17	12.81***	(569)	1.27
Connectedness	3.48	2.43	20.91***	(273)	1.83
Purpose	3.65	2.25	21.85***	(266)	1.94
Resourcefulness	3.78	2.92	16.71***	(569)	1.65
AC 1					
<i>Alignment with Integrity</i>	4.67	4.36	5.15***	(183)	0.59
AC 2					
<i>Perceptions of Cheating</i>	3.22	2.96	2.65*	(569)	0.26

Notes. AC = Academic Culture

*** *p* < .001; ** *p* < .01; * *p* < .05

Figure 2

Mean Five Senses (Scales/Items) for High and Low Sense Assembly Radar Chart (RQ1)



The identification of the High and Low SA groups is a significant finding for this research. It indicates that students can be grouped into these macro capability clusters and that we need to find out more regarding what other variables, such as the influence of demographic variables like Age and Gender, or other background factors, such as students' year of study or whether they are in a high or low resource (risk) program has any relation to this bifurcation of the student group. Table 5 presents the results examining the upstream influence of these factors on High or Low SA memberships.

Overall, the most significant factor was Gender with females more likely (79%) to be in the High SA group than their male counterparts (69%) (Table 5). While the Age category is non-significant, it however descriptively indicated the older category (30yrs+) to be more likely to be members of the High SA group (80%) compared to the younger (<30yrs) age group (74%). Interestingly, being in a "high-resource" program (risk) or in different years of study did not appear to impact on SA group membership. These results indicate that association with either high or lower SA is program agnostic but more interesting, is that as students progress in their degree they do not seem to shift in their connection to the FS. Students' relation and perceptions of senses like connectedness, purpose and resourceful remains stable across their program in this research snapshot.

Table 5*Demographic/Background Factor Profiles of the High and Low SA Clusters of Respondents*

Demographic Factor	High SA Group 1	Low SA Group 2	Statistics (X², df, p)
Gender Female:Male	79%: 69%	21%: 31%	X ² (1) = 5.23*, p = .022
Age Category <30yrs: 30yrs+	74%: 80%	26%: 20%	X ² (1) = 3.06, p = .080
Resource Risk Low:High	77%: 76%	23%: 24%	X ² (1) = 0.33, p = .855
Year of Study 1 st :2 nd : 3 rd : 4 th	77%: 73%: 75%: 86%	23%: 27%: 25%: 14%	X ² (3) = 2.25, p = .523

*** p < .001; ** p < .01; * p < .05

The third research question traces the extent to which the High or Low SA relate to student satisfaction and withdrawal behaviours during the COVID-19 response period. This is a consequential research question for this project, as we proposed the FS model would be relevant and transferable to this context of educational transition from a known learning environment to an unknown and disrupted learning environment. We wanted to trace downstream impacts such as overall satisfaction, anxiety, and withdrawal as performances that may be related to either High or Low SA groups.

For the overall satisfaction measure we collected data for before and then after COVID-19 changes. These results, presented in Table 6, supported our assertions that the High and Low SA groups were relevant to predict student perceptions as they transitioned to the new learning environment. The Low SA group scored significantly lower on post-change satisfaction and were also significantly higher on anxiety than the High SA group. A key finding here relates to building resiliency for students to manage disruption. Noteworthy there were no significant differences between the High and Low groups on student satisfaction *before* the COVID-19 shift to study and work from home. Satisfaction dropped dramatically for the Low SA group and the Low SA group was also twice as likely (18%) to withdraw from courses than the High SA group (9%).

Table 6*High SA v Low SA and Outcomes: Satisfaction, Anxiety, and Withdrawal (RQ3)*

Outcome factor	High SA Group	Low SA Group	Statistics
Satisfaction: <i>Before move online</i>	4.12(0.76)	3.98(0.95)	$t(561) = 1.70$
Satisfaction: <i>After move online</i>	3.48(1.14)	1.83(0.84)	$t(291.95)^{\pm} = 17.99^{***}$
Anxiety	3.91(1.08)	4.56(0.77)	$t(304.05)^{\pm} = -7.68^{***}$
Withdrawal (Yes: No)	9%: 91%	18%: 82%	$X^2(1) = 7.34^{**}$

*** $p < .001$; ** $p < .01$; * $p < .05$

\pm Adjusted t test used for violation of homogeneity of variance, equivalent to a Welch test.

Discussion

It is critical that HE institutions learn from the substantial and emerging research on institutional, student and staff experiences during the 2020 COVID-19 disruption (Fang et al., 2023). This is an unprecedented period where Australia and the globe has collectively experienced a sudden and unplanned move to deliver education online. For this research we understood the experience of suddenly moving online as a transition from a known or expected learning and teaching arrangement to a new unknown arrangement. Accordingly, we wanted to investigate the characteristics and perceptions of those students who were able to manage that change. It is equally beneficial to develop better insights into those students who struggled during this period. Following this logic, we used a well-known Australian HE transition strategy framework, which identified key *senses* that underpin being successful at university (Lizzio, 2006). These senses include purpose, connectedness, capability, resourcefulness, and academic culture. Keeping in mind the regional context of the student cohort, the non-random nature (and time period) of our data collection, of which sample frame biases were partly described in the methods' section (e.g. 73% female), our findings demonstrate important insights in regards to success or resiliency in student cohorts during the COVID emergency response. This is crucial research as the world is becoming more susceptible to disruptions including climate-related crises such as fires, heat waves and floods. The methods of the research were multi-tiered, first testing the robust nature of the FS question set and then to explore how either a high or low association with the FS could help us to understand how students perceived and managed the significant transition that they navigated as a result of an institutional pandemic response.

Our findings further acknowledge the validity and power of the FS student model as a framework to support resiliency in managing significant change and external disruption. Students associated with High SA had higher satisfaction ratings before and after the disruption to their learning, lower anxiety, and lower withdrawal rates. Overall, we were happy to report that 76% of the students ($n = 437$) fell into the High SA group membership. This could lead to targeted work identifying those associated with Low SA, while systemically supporting and advancing awareness and connections to the Five Senses benefiting all students.

While all FS were essential in discriminating between the “high” and “low” groups of students, in order of greatest discrimination, ‘purpose’ and ‘connectedness’ were most critical for distinguishing between the High and Low SA groups, followed by ‘resourcefulness’ and ‘capability’ with marginally lower, but still strong effects, and then the two ‘academic culture’ measures with weak-to-moderate effects. There is a substantial body of research supporting these high-level claims that student sense of ‘purpose’, ‘connectedness’, and ‘resourcefulness’ are valuable to foster student success (Kahu et al., 2017; Lizzio & Wilson, 2004; Tice et al., 2021; Zepke et al., 2014; Zimmerman et al., 2019). In particular, Wilson and Morieson (2022) suggest the importance of cultivating connection and belonging as an insulating factor to support students navigating complex and changing times. This research gives additional granularity to this proposition by suggesting a hierarchy of importance with ‘purpose’ (vocational direction and disciplinary engagement) being the most significant point of difference between High and Low SA (Table 4); this then supports the notion that students who have a strong sense of purpose can withstand novel and stressful educational disruptions. This finding mirrors the earlier work of Lizzio and Wilson (2004) on first year students’ perceptions of capability.

Equally, it is interesting that we found that ‘academic culture’, as it was framed in our survey, did not have the same impact on High or Low SA membership and was not related to whether students were satisfied, withdrew or anxious. This demonstrates that perceptions of ethics and integrity are relatively independent of student outcomes; and in our study, we document a high level of agreement with the University’s academic integrity statement across both High and Low SA groups. The inclusion of the Academic Culture in the Lizzio (2006) FS model focused on cultural competence and understanding core values and ethical principles of the university. Arguably academic cultural competence is essential in the success for students at university, but it was not an indicator for resilience or satisfaction in our study. Lizzio (2006) places cultural competence in the middle of the FS Framework as a sense that draws and connects the other senses together. It is a unifier, and in this research, it tended to take up the space of commonality across both the High and Low SA groups. We contend that our questions did not capture the complexity of this sense well enough, but we were pleased to see the shared belief in academic integrity. After having a better understanding of the relations across the FS model, we then turned to question what factors were paramount in influencing High and Low SA group membership.

Interrogating the High and Low SA across gender, age, resource risk, and year of study gave further insights. We found that gender identity was the strongest predictor, followed by marginal patterns relating to age. We found females were more likely to be in the High SA group with males more likely to be in the Low SA cluster. Older students appeared to be more likely to be members of the High SA group, perhaps logically representing the greater accrual of capabilities, resourcefulness, and purpose that individuals gain with age. Our results are supported by a 2009

UK longitudinal study that found female students reported higher ‘hardiness’ commitment levels compared to male students, and in general found older students outperforming their younger counterparts (Sheard, 2009, p.198). We suggest further research using a qualitative approach, focusing on the contextual and socially-constructed performance of gender identity (Butler, 2009), would give a fuller picture of our quantitative patterns.

One of the more surprising findings in this analysis was the relatively stable SA results across the year of study (Table 5). We found that year of study did not impact student association with the *Five Senses*. For the High SA we found 77%, 73%, 75% and 86% for first year through to fourth year. Once again, more research needs to be done to understand this relatively stable association with the senses and year of study. Reasonably we would have imagined an increase in perceived confidence and understanding of purpose, connectedness, capability and resourcefulness as students progress in their study. Clearly honours and fourth year students experience this. This is related to the mixed findings associated with longitudinal research into student learning gains in generic skills across their degree in college and university settings. Mathers et al. (2018) show negligible increases in competencies of US students during their degree, including generic skills like critical thinking, reading and writing. While Chow et al. (2020) show increases in perceived learning gains (still small) in a Hong Kong student study. More research is needed to explore this finding. This data indicates that student’s association with the SA remains stable as they progress in their studies.

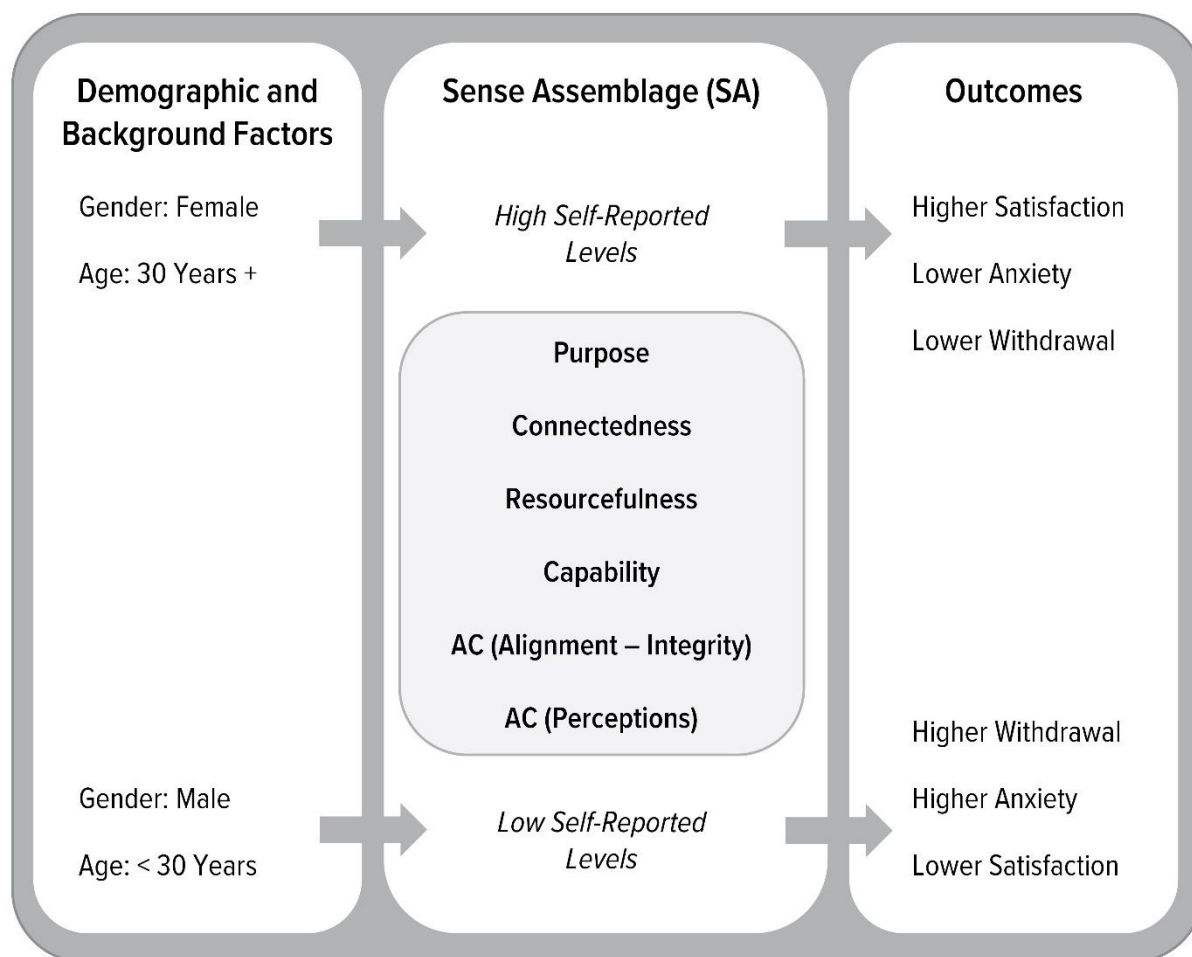
Our last aspect to investigate was whether student cohorts who were associated with high values across the five senses had higher satisfaction, lower chances of withdrawing from a course and lower levels of anxiety. Our results unequivocally demonstrate the links between Low SA membership and lower satisfaction, higher anxiety, and higher withdrawal rates. Students who were members of the Low SA were twice as likely to withdraw from courses than those students in the High SA. Student satisfaction appears to be a key point of differentiation between the High and Low SA group membership, while the survey data shows that anxiety was high among all students (High SA 3.91; Low SA 4.56). However, we note that the Low SA group membership had increased anxiety during this period by a weak to moderate extent. In examining the configuration of satisfaction, anxiety, and behavioural withdrawal more closely, we know that satisfaction takes a central role. In making this assessment we measured satisfaction both before and after the COVID-19 transition home, and we found no difference in rates of withdrawal with the *Satisfaction: Before* the COVID-19 impact (Table 6). However, *Satisfaction: After* the COVID-19 response was a significant factor when relating to either higher or lower levels of withdrawal. Pulling these findings together it suggests that the *FS* (e.g. High SA) has a protective influence against withdrawal through its association with increased satisfaction.

The Australian Government Department of Education, Skills and Employment set up the Quality Indicators for Learning and Teaching (QILT) in 2011 and measures and monitors a suite of survey instruments driving quality improvement across the educational sector. Key in this suite of metrics is student satisfaction. The connection being made here is the explicit link between student perceived ‘senses’ and their perceived satisfaction with their educational experience. This could shift focus on exogenous factors such as ‘teaching quality’ or the ‘learning resources’ towards supporting and exploring endogenous factors, such as student motivation in their studies or having a clear understanding of how to approach their studies. Additionally, our research has

implications for resilience, protection from both anxiety, and ultimately from withdrawal from educational pursuit. Drawing together the results, Figure 3 presents the model relating socio-demographic factors, High and Low SA membership, and key student outcomes for policy consideration.

Figure 3

Connecting the Sense Assemblage to Background Factors and Student Outcomes



Conclusion

The findings for this research project elicited both expected and surprising results. Clearly this research gives support to those universities that are working with the FS framework for first year transition programs. In addition, these findings indicate that these senses continue to play a long-term important role in a student’s life throughout their degree and are a valuable character set moving forward into future disruptive times. These findings additionally advance our understanding of the student experience in an online learning context. The setting for the study was an “emergency education response”, as described by Oliveira et al. (2021), with the online

nature of the response as the critical backdrop to the issues, struggles, demands and underlying competencies that the students needed to demonstrate, develop, or manage. As a group of academics, we commend these students for undertaking such a radical pivot. Through our interactions with this data, we found that beyond the technology platform's demands, this was very much a human experience. Clearly a keen sense of purpose, connectedness and resourcefulness are crucial for students navigating difficult educational transitions and disruptions. This is in line with Wu (2016) who indicated that there is a complex gathering of affect factors that include intentions and motivations that drive student behaviour and satisfaction in online environments. Continued research in student resilience in post-pandemic higher education environments is vital, and additional work to explore those students who fall into the weak association with the sense assemblage is necessary.

Acknowledgements

We would like to recognise the students who participated in this survey during this difficult time and our institution that understood the importance of collecting this novel data set. We are grateful for the substantial feedback from the Associate Editor enabling us to clarify our findings. The authors declare no use of any generative artificial intelligence to produce this manuscript.

Conflict of Interest

The author(s) disclose that they have no actual or perceived conflicts of interest. The authors disclose that they have not received any funding for this manuscript beyond resourcing for academic time at their respective university.

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