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Investigating teacher influence on student engagement in high schools

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Abstract
Student engagement is a pivotal contributor to academic achievement, retention, and well-being, and yet the role of teacher influence on engagement is poorly understood. This is in part due to the contextual and 'hidden' nature of student engagement, and as such, levels of student engagement are assumed through observable factors such as attendance and conduct. It is also due to the difficulty in mapping student engagement simultaneously with understanding the teacher practices used to influence it. This article reports on a pre-post case study in which student survey and teacher focus group data were analysed together, revealing the nature and depth of association between the practices adopted by teachers and student engagement. By comparing the change of engagement at a class or homegroup level, it was possible to identify how approaches used by teachers impacted various elements of engagement. Furthermore, it found a high correlation between teacher practices and change in student engagement at a class or homegroup level, providing the opportunity for teachers to learn what practices were effective in their specific context.

Keywords Engagement · Cognitive · Affective · SEI · Teacher practice

Introduction

In an Australian high school context, securing a high Year 12 attainment rate for the students is an important objective since it is closely linked to developing national productivity and increasing human capital (Council of Australian Governments

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2009; Keating et al., 2013). However, over 25% of young people across Australia (and over 40% in the state of Tasmania) do not complete Year 12 or its equivalent (Lamb et al., 2015). Furthermore, over one-third of the young people in Australia (aged between 15 and 19) are stressed about school (Bailey et al., 2016), and over 40% are disengaged from learning (Goss & Sonnemann, 2017). The main factors predicting students' propensity to drop out of school are their performance in core subjects, attendance rates, and level of disengagement in classrooms (Kennelly & Monrad, 2007). A useful way of understanding such factors is by viewing them through the prism of student engagement and its constituent interrelated cognitive (what the student thinks about school), affective (what the student feels about school), and behavioural dimensions (what the student does at school) (Archambault et al., 2009; Christenson & Reschly, 2012; Thomas, 2019). Teachers and school staff have often found it difficult to ascertain why, or how much, their students are engaged in school (Yazzie-Mintz & McCormick, 2012) and therefore tailoring teaching practices to increase engagement has been challenging. In the absence of a structured way to frame and measure student engagement, teachers have often relied on their intuition or observations and prior experiences to inform their attempts in designing interventions to promote it (Kahu, 2013). Since students' engagement influences their educational outcomes (Finn & Zimmer, 2012) and sense of well-being in school (Pietarinen et al., 2014), a deeper understanding between the connection between teaching practices and engagement is timely (Strambler & McKown, 2013).

Several explanations and theoretical frameworks have been provided regarding student engagement (Christenson et al., 2012; Fredricks et al., 2004; Skinner & Pitzer, 2012). In the context of high schools, student engagement can be viewed as school engagement (Fredricks et al., 2004), specific learning area engagement (Wang et al., 2016; Wigfield et al., 2008), or social engagement in schools (Cash et al., 2015). By focussing on the contexts that schools can influence, teachers can guide their intervention efforts (Christenson, 2008; Finn & Rock, 1997) by informing themselves with data-backed conversations around student engagement (Lovelace et al., 2017).

To understand what to measure in student engagement, it is essential to distinguish among its dimensions, influencers, and manifestations (Sinclair et al., 2003). Student engagement can be viewed as multidimensional and can be deconstructed into its interrelated cognitive, affective, and behavioural dimensions (Reschly & Christenson, 2012; Thomas, 2019)—the first two being internal or 'hidden' dimensions and the third external or more observable (Appleton, 2012). Influencers are what causes student engagement to fluctuate in the school context—they could be student-related (Hulleman et al., 2010; Rimm-Kaufman et al., 2015; Yeager et al., 2014), or school and teacher-related (Downer et al., 2007) or family and peer support related (Cash et al., 2015). On the other hand, manifestations result from students engaging in school, such as academic performance, educational attainment, enrolling in industry apprenticeships, or enrolment in higher education (Lam et al., 2012). Often, school data include easily observable behavioural engagement dimensions such as attendance, truancy, participation in school activities, and student conduct

(Attendance Works, 2014), and neglect to understand the effects of the engagement influencers on its manifestation (Lam et al., 2012).

Student engagement can be measured through student self-report surveys, teacher ratings, interviews and focus groups, observational methods, administrative data, and even technology-aided real-time measures (Hofkens & Ruzek, 2019). Student self-report surveys appear useful to understand the cognitive and affective dimensions of engagement (Appleton et al., 2008), however, might not align with the more observable behavioural dimension in real-time or through observation (Greene, 2015). The other methods mostly suffer from either observer or reporter bias (Mason et al., 2014; Skiba et al., 2002; Turner & Meyer, 2000), or issues of validity and reliability (Fredricks & McColskey, 2012; Skinner et al., 2009; Wang et al., 2016), or may be obtrusive, time-consuming and expensive (Henrie et al., 2015; Waxman et al., 2004; Wood et al., 2016). Student self-reported engagement is purported to predict high school completion or dropouts significantly better than just using other easily observable and commonly used behavioural data such as attendance or academic achievement data (Kearney, 2008; Lovelace et al., 2017).

While conceptually it is helpful to separate engagement into the three dimensions of affective, cognitive and behavioural, it is essential to note the interconnectedness of each dimension (Fredricks, 2014). Archambault et al.(2009) explain that engagement is both a psychological state and behaviour, and ever since the seminal work of Finn and Voelkl (1993), the causal link between affective and cognitive engagement with behavioural engagement has been made clear—put simply, if students feel safe and emotionally connected to a school, and able and interested in the work, they are more likely to participate effectively in the learning programme (Thomas, 2019).

Methodology

The methodology adopted was one of mixed-method, pre-post case study (Zepke et al., 2014) where datasets were compiled at four different points in time – Term 1, Mar 2021, Term 2, June 2021,Term 3, September 2021, and Term 4, November 2021. The focus of this study was the Year 7 cohort at a large (400 student) diverse suburban public school in the island state of Tasmania, Australia. The data collection method included two parts. First, the Year 7 cohort ($n=94$) were surveyed to measure dimensions of cognitive and affective engagement. Second, focus groups with Year 7 teachers were conducted to elicit specific practices adopted to promote student engagement.

The Student Engagement Instrument (SEI) 4-point version (Appleton & Reschly, 2019) was used as an instrument for student survey (Appendix 1). The SEI has been refined over time to improve its validity and reliability, concurrently with behavioural engagement measures (Lovelace et al., 2014), across a variety of teaching and learning contexts (Pearson, 2014), and various geographies (Moreira & Dias, 2019; Virtanen et al., 2018). In its current form, the 35 items of the SEI are further organised into three affective engagement influencers (Teacher-Student Relationships, Peer Support at School, Family Support for Learning) and three cognitive

Table 1 Research timeline for data collection. (Color Table online)

	Feb '21	Mar '21	Apr '21	May '21	Jun '21	Jul '21	Aug'21	Sept '21	Oct '21	Nov '21
Focus Groups with Year seven Educators										
Student self-survey (SEI)										

Table 2 Student responses to surveys Term 1–Term 4

	W	X	Y	Z	Total respondents	% Of cohort
Term 1	25	21	23	22	91	83%
Term 2	25	21	24	24	94	85%
Term 3	26	22	20	22	90	82%
Term 4	19	22	16	18	75	68%

engagement influencers (Control and Relevance of Schoolwork, Future Aspirations and Goals, and Intrinsic Motivation) (Appleton & Reschly, 2019).

The second part of the research was used to understand the interventions, or practices used by teachers across the time of the investigation. Focus groups with the Year 7 teachers and support staff were conducted each term, the first prior to the Term 1 SEI to understand the baseline educator context and the remaining three post the completion of the student SEI surveys to isolate the practices (if any) adopted in the interim periods to promote student engagement. The transcripts from the focus groups were analysed thematically using deductive logic. The research timeline for data collection is as outlined in Table 1.

The data analysis aimed to evaluate the practices adopted by the Year 7 educators (to promote student engagement) by observing their impact on the cognitive and affective student engagement dimensions (Christenson et al., 2012). The analysis was conducted first by noting the statistically significant variations in the student engagement and its constituent dimensions and influencers across different classes or homegroups and then by attributing their causation by using quantitative methods (t-tests) and then validating it using qualitative methods (thematic analysis of focus group discussions).

As the school collected data on student engagement using the SEI instrument on a voluntary basis, i.e. students decided whether they wanted to participate in the survey or not, unequal samples per term per homegroup were collected. Also, only a portion of the students repeated the survey every term. Consequently, the t-tests used for data analysis were two-sample unequal-variance. The responses are illustrated in Table 2.

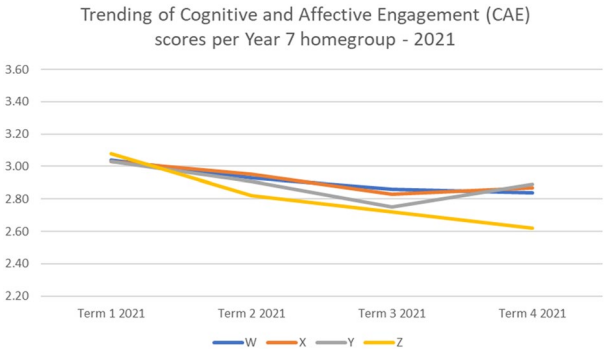

Fig. 1 Trending of CAE scores per Year 7 homegroup in 2021

Table 3 Statistically (t-test) significant drops in CAE scores for Year 7 homegroups across terms in 2021. (Color Table online)

	T2 vs T1	T3 vs T2	T3 vs T1	T4 vs T3	T4 vs T2	T4 vs T1
W Drop in CAE						
X Drop in CAE						
Y Drop in CAE						
Z Drop in CAE						

	statistically significant drop in scores (t-test)
	statistically stable scores (t-test)
	statistically significant increase in scores (t-test)

Results

Cognitive and affective engagement (CAE)

In this section, we report on the results from the survey data. Since teacher practice is unique to a classroom context, it is useful to view the cognitive and affective engagement (CAE) scores per homegroup. The trending of the students' CAE scores per homegroup for the four terms in 2021 are outlined in Fig. 1:

Figure 1 indicates that homegroups Z is "doing its own thing" with regards to students' cognitive and affective engagement (CAE), while homegroup Y dips in Term 3 but corrects itself in Term 4. T-tests for statistical significance on the CAE scores of the homegroup samples validate the observation, as outlined in Table 3.

In order to understand what are the underlying factors behind the fluctuating CAE scores in each of the homegroups, it is useful to view the CAE movement across its individual cognitive and affective dimensions. Such a view is outlined in Fig. 2.

Figure 2 shows that homegroup Z dropped in the affective dimension throughout the year, while also dropping in cognitive engagement in Term 4. Homegroup Y, on the other hand, dips in Term 3 in the affective dimension but recovers in Term 4. For the other two homegroups (W and X), the variations in affective and cognitive dimensions appear to balance each other out across the year. T-tests for statistical significance on the cognitive and affective engagement scores of the homegroup samples validate the observation, as outlined in Table 4.

Changes in engagement Influencers

Investigating further into the variations in the cognitive and affective engagement dimension scores in each of the Year 7 homegroups, it is useful to view the individual CAE influencer scores in each of the homegroups. Starting with the affective influencers, *Teacher-Student Relationships* (TSR), *Peer Support at School* (PSS), and *Family Support for Learning* (FSL) as seen in Fig. 3.

Figure 3 shows that homegroup Z declined in all three affective influencers throughout the year. Homegroup Y decreased in all areas until Term 3 but appeared to recover well in all three influencers in Term 4. Homegroup X declined in the *Peer Support at School* influencer score throughout the year, and with *Family Support for Learning* and *Teacher-Student Relationships* in Term 3 while recovering in Term 4. Finally, homegroup W maintained engagement in all three affective dimensions throughout the year.

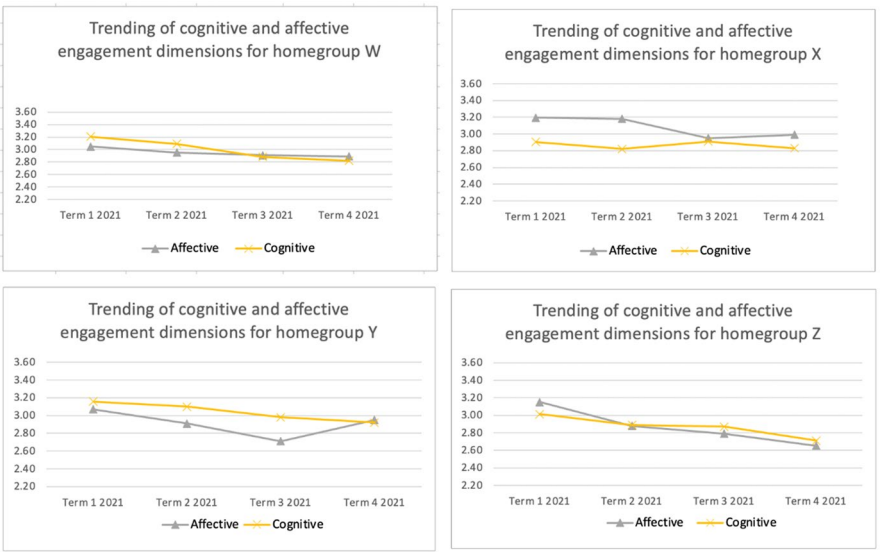

Fig. 2 Trending of cognitive and affective scores per Year 7 homegroup in 2021

Table 4 Statistically (t-test) significant drops in cognitive and affective engagement scores for Year 7 homegroups across terms in 2021. (Color Table online)

	T2 vs T1	T3 vs T2	T3 vs T1	T4 vs T3	T4 vs T2	T4 vs T1
W Drop in Cognitive						
X Drop in Affective						
Y Drop in Affective						
Z Drop in Cognitive Drop in Affective						

	statistically significant drop in scores (t-test)
	statistically stable scores (t-test)
	statistically significant increase in scores (t-test)

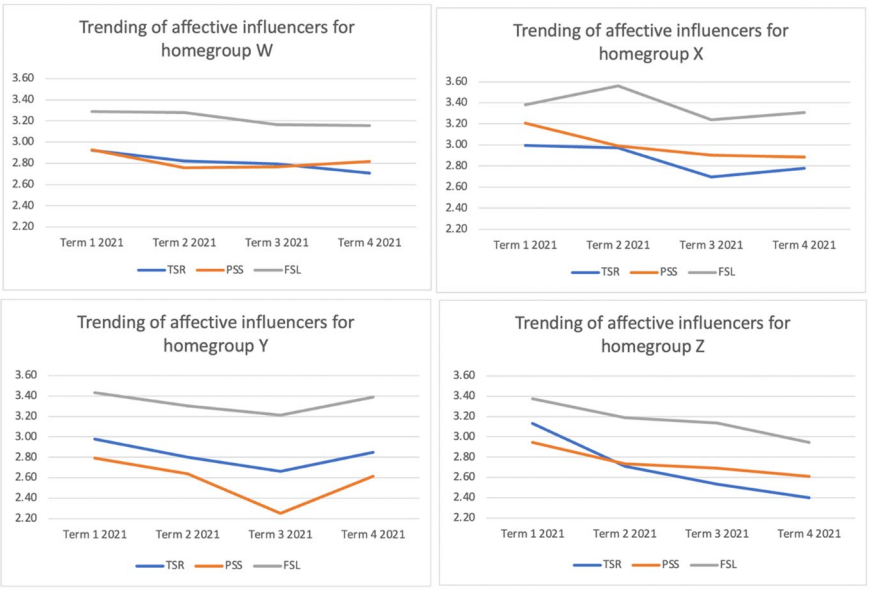

Fig. 3 Trending of affective influencer scores per Year 7 homegroup in 2021

Similarly, Fig. 4 illustrates the cognitive influencers, *Control and Relevance of School Work* (CRSW), *Future aspirations and Goals* (FG), and *Intrinsic Motivation* (IM) scores for each of the homegroups.

Figure 4 shows that homegroup Z had the greatest drop in the *Control and Relevance of School Work* scores throughout the year, mirroring the drop in its affective influencer score of *Teacher-Student relationships*. A decline in *Intrinsic Motivation* was observed for homegroup Y in Term 4. Homegroup Y recovered

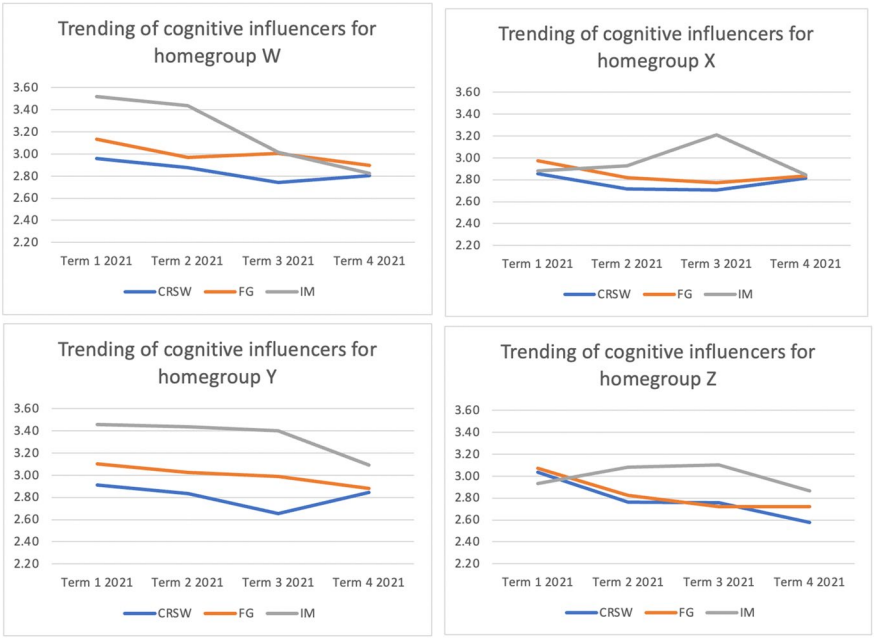

Fig. 4 Trending of cognitive influencer scores per Year 7 homegroup in 2021

from declining *Control and Relevance of School Work* scores in Term 4. Homegroup W displayed a consistent decline its *Intrinsic Motivation* scores throughout the year.

T-tests for statistical significance on the cognitive and affective influencer scores of the homegroup samples shows that out of all the variations observed in the cognitive and affective influencers in homegroups the ones indicated in Table 5 are statistically significant.

Analysis of the classroom context

In the next section we attempt to identify the causes of the significant changes in student engagement. We do this by identifying where the change happened at the question level, and by analysing the qualitative data from the focus groups. While some of the observations from the focus groups were universal across the cohort, we have organised the observations at a homegroup level to highlight the importance of specific contexts.

Table 5 Statistically (t-test) significant influencer to be investigated further for each of the Year 7 homegroups. (Color Table online)

Homegroup W

The classroom context in homegroup W is characterised by a very stable affective engagement throughout the year, with a significant drop in its cognitive engagement dimension scores in the second half of the year (Table 4) due largely owing to the drop in the influencer scores of *Intrinsic Motivation* (Table 5).

The focus group data gave insight into both homegroup W's strong affective engagement scores, and a possible explanation for its decline in Intrinsic motivation. Relational pedagogy was the forefront of Teacher W's approach. This homegroup teacher focussed on getting to know the students, and on supporting students resolve conflict. Teacher W was able to provide a protective environment in the class by meeting the students' need for connection: "lots of one-on-one talking" and "[student] feels happy here and he likes to have a chat with us". However, Teacher W acknowledged, that while this connection helped in class, it did little to prevent problematic behaviour outside the classroom "whether like that stops him from lighting someone on fire is another question", or "she's busy bashing people all the time".

Teacher W put class routines in place from early in the year as a priority and they were seen as a requirement "to be able to teach effectively" (Teacher W, Term 1). It was apparent that these routines were needed to be re-established regularly, as Teacher W explained in Term 1 "we need to go back and do lining up practice, and we have to do moving down the corridors practice, we have to have locker expectations…".

It is possible that this very close attention to the classroom culture had the unintended consequence of declining student *Intrinsic Motivation*. This item comprises two questions, one of which *I'll learn but only if the teacher gives me a reward* directly relates to teacher practice. Teacher W's careful attention to routines, monitoring of student conflict and regular check ins may have come at the price of student autonomy.

Homegroup X

Teacher X's homegroup X also maintained strong affective and cognitive engagement over the year (Table 4). Similar to Teacher W, Teacher X placed student teacher relationships as key in his teaching approach and implemented class routines as a matter of priority early in the year. As explained by Teacher X in Term 2 "Yeah, like last couple of weeks, I've re taught [routines]. Practice …, like the other day, we practiced walking around the school quietly and all that sort of stuff, practice doing it". Within the classroom, one example of Teacher X's organisational strategy was that of seating. Both Teacher X and Teacher W were able to equate changes in engagement to deliberate alterations to the seating plan "I try to make sure I've got a kid that generally really knows what they're doing on each table. At least they can kind of act as a guide for the other ones. It gives peer support" (Teacher X). Teacher X also responded to student need by introducing physical 'recognition boards' in his classroom.

> so, someone is thanked every Friday for just something they're doing in class. For example, [student] got one thank you for "your big smile and positive attitude". … [another example] was [student name] who's a non-attender was here for four days in a week. So, she got one. So yeah, it's just like a little, it's a chance to, you know, say thank you. (Teacher X, Term 3)

Interestingly, the physical board displaying the "thank you" cards became a key component of the success of the strategy "once the display went up and then the kids were like looking at me like oh, that's me. Hold on. I've got two!" Teacher X reported. Recognition of student's positive behaviour and achievement was seen by Teacher X as a very powerful strategy.

While homegroup X was able to maintain high *Teacher-Student Relationship* scores across the year, there was a statistically significant drop in *Peer Support for Learning* in the second half of the year (Table 5). By drilling down to a question level in the survey data, it was apparent that this centred around two items; *Other students like me the way I am*, and *I enjoy talking to the students here*.

Possible explanations for this drop in the *Peer Support for Learning* scores were reported in the focus groups when discussing class rearrangements, where students were moved out of one class into a new one to increase engagement. Most of the time teachers reported these moves had positive effects: "[Student]'s easy to explain, because he's come out of this class with the bad boys. And he's happy as a lark in my class" (Teacher W, Term 3), and "we made [Student change class]. …and that was about friendship issues. That has gone okay (Year 7 co-ordinator, Term 3). In the case of homegroup X, the result was not as they had hoped "so two new students have come in and they've made the class dynamics very different…, you just don't get to [the quiet students] because of everything else going on" (Teacher X).

There was also a noticeable drop in the *Family Support for Learning* influencer in Term 3 for homegroup X (Table 5). This drop coincided with a change of attention of parental communication from Teacher X. At the start of the year, Teacher X explained how keeping in regular contact with parents was an essential part of his practice, but in the Term 3 focus group he admitted that it had slipped off his list of priorities. On this realisation he reverted to regular contact and consequently students reported higher scores in this influencer in Term 4.

Homegroup Y

Overall, homegroup Y recorded lower engagement than groups W and X in Terms 2 and 3 (Fig. 1). This is possibly due to the higher number of students with behavioural needs compared with those classes. Unlike, groups W and X, however, group Y demonstrated a remarkable recovery in its affective engagement dimension scores in Term 4 (Table 4) and in its *Peer Support for Learning* and *Teacher-Student Relationship* scores after declining sharply from Terms 1 to 3 (Table 5). This decline, and subsequent recovery, was acute in all questions relating to peer support indicating a clear change in the social cohesion of group Y from Terms 3 to 4. On close inspection of the survey items, it was noticed that the only question that did not recover (Q6) pertained to the perception of other students caring for the respondent, whereas all of the other items were more controllable from the teacher perspective.

The focus groups gave insight into the types of approaches the homegroup teacher took to social support in class. As previously mentioned, the class restructuring resulted in a decline in *Peer Support for Learning* scores for group X as the

recipient of some students from class Y. Notably, Teacher Y, was also able to be flexible with class structure, on one occasion, reversing the move:

> …it actually wasn't a good decision, right. It just seemed to bring out the worst in her in terms of like, ganging up with the wrong crowd, even though she wanted to move because she had no friends. Yeah. So, mum supported the decision to move her back. And it looks like it has paid off. (Teacher Y, Term 3)

There was also a statistically significant drop in *Teacher-Student Relationship* question scores for homegroup Y from Term 1 to Term 3. A closer look at the questions revealed items pertaining to the perception of the teacher being able to create a safe and supportive environment for the students in the class. Thus, perhaps there was a change in the classroom context that might have occurred in Term 3 which was then subsequently addressed somewhat in Term 4.

Students with very challenging behaviour were seen as a major factor in the overall ability of the class to perform, with the observation that when there were several high needs students in the class at any one time it would prevent the whole class from operating. One solution for this was the use of modified timetables, as the Year 7 co-ordinator explained to one parent "So the only way that we can aid him is that he leaves at lunchtime" (Term 3). While these students clearly found the whole school day overwhelming, one of the main drivers for reduced contact was teacher exhaustion "I really struggle to turn up here day after day and have to deal with him" (Teacher Y, Term 3) and behaviour that damages relationships, especially with Teacher Assistants, "He has burnt bridges and people refuse to work with him". A modified timetable was used proactively, where students would only attend until lunchtime, and reactively where there was a place for students to go if their behaviour was a problem. Teacher Y (Term 1) explained,

> We do see the difference that makes in the classroom when certain students are aided outside of the classroom. So, say if someone's really struggling that day, having the ability to say, look, oh, it's not working at the moment. Can you go and regulate in [the learning support] room?

Homegroup Z

The classroom context in homegroup Z in 2021 is characterised by its significant drop in CAE throughout the year (Table 3), primarily led by the affective dimension of *Teacher-Student Relationships*, and the cognitive dimension of *Control and Relevance of School Work* (Table 5). The dramatic decline in engagement from Term 1 to Term 2 was certainly noticed by the Teachers of Class Z. The composition of the students in the class was problematic, "we've got these great kids, but …, they just don't outweigh the kids that come from the lower socio economic [backgrounds]" (Teacher Z, Term 1). Teacher Z continued, "you need [more highly engaged students] to be in the room to boost—to balance it out." When the engaged girls left the class to go to a cocurricular activity, the result was difficult "Yeah, it's just like the blokes [remaining] and it's chaos".

One of the key distinctions of Class Z, compared with the other three groups was that there was significant teacher instability in the beginning of the year. The home room teacher role in Class Z was shared for the first part of the term, and then one teacher went on extended leave, compared to a single home room teacher in the other three classes. When the main class Z home room teacher returned consistently in Term 2, the decline in *Teacher-Student Relationships* slowed to the pace experienced by the other groups, but never recovered (Table 5).

In addition, there is also a significant dip noticed in the affective engagement score in Term 4 (Table 5). This pattern, showing all questions pertaining to the *Teacher-Student Relationships* influencer showing a significant degradation, in somewhat equal measure, was not observable in the other three homegroups. Similarly, the statistically significant drop in the *Control and Relevance of School Work* influencer question scores for homegroup Z across the year show a significant degradation (Table 5), in somewhat equal measure, for this homegroup across the year. These data indicate that there might be a unique classroom context that is appearing to negatively impact both *Teacher-Student Relationships* and *Control and Relevance of School Work* throughout the year.

In addition, group Z had the highest statistically significant drop in *Family support for learning* over the year (Table 5). The benefits of regular contact were explained by Teacher Y.

> all the teachers in Grade 7 have taken ownership of getting to know the families, the parents and the carers and everything that goes with that … when these really difficult situations have arisen, we've already established that contact, it hasn't been such an abrasive call. (Term 1)

Further, Teacher W explained "I really try hard to contact [parents] lots … because it gives you the parental support that, you need". Teacher Z mentioned that the App '*class dojo*' allowed him to address small issues as they arose, and while this added to his workload, Teacher Y noted.

> the parents probably wouldn't be contacting you unless you had contacted them earlier. You've done your part by reaching out. I think now they're feeling comfortable with that they can reach out to you, go the other way. (Teacher Y, Term 1)

Class Dojo as a method of communicating with parents was seen as a key strategy by all staff, an improvement on the previous system:

> Traditionally, you have to go onto the computer, go into Triple S, do a contact log, ring them, half the time they don't pick up. So, it's like a waste anyway. So, all this work. But now if you just message on your phone in the app, this is so much easier and sharing photos about what you're doing and stuff. (Teacher W Term 1)

The concern for some was that sometimes contacting parents was difficult – or nonexistent in some situations, despite the efforts made by teachers. This was particularly problematic with some students with very challenging behaviour "I've never

spoken to her [mum]. … I mean, I've tried!" (Teacher Y, Term 3) and when discussing a different disengaging student "Home was impossible to contact" (Teacher Z, Term 2). Teacher Z made the observation that there appeared to be a pattern with students who had maintained engagement as those with "a fairly stable home life … And supportive parents" (Term 2).

Summary and implications

The analysis of the focus groups provided explanations for many of the statistically significant changes in engagement in each homegroup across the year. As seen in Table 6, much of the qualitative data affirmed the teacher practices that maintained engagement. The focus group data also highlighted the structural, pedagogical and student factors that contributed to a decline in engagement.

The main teacher practices that maintained cognitive and affective engagement were strong relational pedagogy, highly consistent and structured routines, regular praise, and overt recognition of positive behaviour, consistent communication with parents, and the movement of students with challenging behaviours away from triggering environments.

Structurally, we found that engagement was impacted when staffing was not stable, the class composition was unbalanced resulting in an absence of consistent teacher presence and involvement, when the introduction of "unruly" students into a class was not managed well, and when while implementing rules and routines rigorously in the class the individual student autonomy was negatively impacted.

In terms of factors that reduced student engagement, the data largely pointed to factors outside of the teachers' control. A decline in family support over the year, challenging social contexts in the class, and influences of individual students with very challenging and disruptive behaviour. We did find that teachers may have stemmed some of the decline by being reflective and responsive to

Table 6 Teacher practices list per Year 7 homegroup in Terms 2,3, and 4, 2021. (Color Table online)

Teacher Practices	Term 2				Term 3				Term 4			
	W	X	Y	Z	W	X	Y	Z	W	X	Y	Z
Teaching and Learning												
Involving Parents/Carers in students' learning	FSL	FSL	FSL	FSL	FSL	FSL	FSL	FSL	FSL	FSL	FSL	FSL
Loss of student autonomy over their learning					IM				IM			
Behaviour Management												
Relational pedagogy (building student connections)	TSR	TSR			TSR	TSR			TSR	TSR		
Routines and Consistency (in structure and expectations)	TSR	TSR			TSR	TSR	TSR/PSS		TSR	TSR		
Positive behaviour support	TSR	TSR			TSR	TSR			TSR	TSR		
Modified timetables											TSR/PSS	
Structure and Staffing												
Redistribution of 'unruly' students from Z to W and X						PSS		PSS		PSS		PSS
Absence of stable teacher presence and involvement				TSR/CRSW				TSR/CRSW				TSR/CRSW

IM	Intrinsic Motivation
TSR	Teacher-Student Relationship
CRSW	Control and Relevance of SchoolWork
PSS	Peer Support at School
FSL	Family Support for

Statistically significant drop in the attributable CAE influencer scores (t-test)
Statistically stable scores for the attributable CAE influencers (t-test)
Statistically significant increase in the attributable CAE influencer scores (t-test)

the data (Phillips, 2013; Zyngier & Gale, 2003). Going forward, we suggest that this data-driven reflective approach might be a useful tool in improving student engagement.

For example, the issue with the *peer support at school* influencer may be addressed by creating and maintaining intentional peer groups that foster a sense of connection among students (Brown & Larson, 2009; Sodha & GuGlielmi, 2009), practising and modelling good communication skills (Pratama et al., 2019; Sugito et al., 2017), and creating collaborative environments (Allensworth, 2012; Wallace et al., 2002). Similarly, the issues of *teacher-student relationship* and the *control and relevance of schoolwork* in homegroup Z were directly correlated with the constant change in the homegroup teacher. Thus, it would seem prudent to secure a stable teaching and learning environment for this homegroup so that the students get a safe, enabling space where "they can form respectful relationships and derive a sense of meaning, connection, and control over their lives" (Wyn, 2014, p. 7).

Conclusion

Teachers continually look to improve their practice by relying on their collective experience, judgement, and observable student engagement data such as attendance rates, suspensions, and academic performance. Inquiry using a pre-post case study, conducted in a reasonably large and diverse suburban public school, finds a valid causal link between teacher practices in a high school classroom and their students' relatively less observable cognitive and affective engagement indicators. This finding supports the notion that the role that teachers play in how students feel at school, and how they think about themselves as students, is crucial. Such a causal link also empowers teachers to adapt their practices in response to the individual teaching context they find themselves in and provides a method for feedback. This study demonstrates that student engagement, measured by the SEI, is a very effective way for teachers to evaluate the impact of their practice.

Limitations

There might be variations in using such a method across year levels and varying educational contexts. However, given the proven validity of the SEI instrument used in this research, the propensity of the student cognitive and affective engagement data to measure student engagement is purported to be reasonably accurate. Further, given that student data such as attendance rates, suspensions, and academic performance are not being used in this method, it may be assumed that the variation across year levels and educational contexts can be accounted for mainly by regarding the type of teacher practices. Finally, it may be proffered that the causal link between teacher practices and students' cognitive and affective engagement may vary across contexts but is likely to remain statistically significant. The actual variations in which aspects of the student engagement are significantly impacted by

which specific teacher practice across educational contexts may be the subject of future research.

Appendix 1 Student Engagement Instrument (SEI) items (Appleton & Reschly, 2019)

Item #	SEI factors and item text
TEACHER–STUDENT RELATIONSHIPS (AFFECTIVE ENGAGEMENT)	
3	My teachers are there for me when I need them.
5	Adults at my school listen to the students.
10	The school rules are fair.
13	Most teachers at my school are interested in me as a person, not just as a student.
16	Overall, my teachers are open and honest with me.
21	Overall, adults at my school treat students fairly.
22	I enjoy talking to the teachers here.
27	I feel safe at school.
31	At my school, teachers care about students.
CONTROL AND RELEVANCE OF SCHOOL WORK (COGNITIVE ENGAGEMENT)	
2	After finishing my schoolwork, I check it over to see if it's correct.
9	Most of what is important to know you learn in school.
15	When I do schoolwork, I check to see whether I understand what I'm doing.
25	When I do well in school, it's because I work hard.
26	The tests in my classes do a good job of measuring what I'm able to do.
28	I feel like I have a say about what happens to me at school.

Item #	SEI factors and item text
33	Learning is fun because I get better at something.
34	What I'm learning in my classes will be important in my future.
35	The grades in my classes do a good job of measuring what I'm able to do.
PEER SUPPORT AT SCHOOL (AFFECTIVE ENGAGEMENT)	
4	Other students here like me the way I am.
6	Other students here care about me.
7	Students at my school are there for me when I need them.
14	Students here respect what I have to say.
23	I enjoy talking to the students here.
24	I have some friends at school.
FUTURE ASPIRATIONS AND GOALS (COGNITIVE ENGAGEMENT)	
8	My education will create many future opportunities for me.
11	Going to school after high school is important.
17	I plan to continue my education following high school.
19	School is important for achieving my future goals.
30	I am hopeful about my future.
FAMILY SUPPORT FOR LEARNING (AFFECTIVE ENGAGEMENT)	
1	My family/guardian(s) are there for me when I need them.
12	When something good happens at school, my family/guardian(s) want to know about it.
20	When I have problems at school, my family/guardian(s) are willing to help me.
29	My family/guardian(s) want me to keep trying when things are tough at school.
INTRINSIC MOTIVATION (COGNITIVE ENGAGEMENT)	
18	I'll learn, but only if the teacher gives me a reward. *(Reversed)*
32	I'll learn, but only if my family/guardian(s) give me a reward. *(Reversed)*

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Declarations

Conflict of interest There are no known conflicts of interest associated with this publication.

Ethical approval The fieldwork has been conducted in accordance with the strict guidelines laid out as per the ethics approval from the research committees at the University of Tasmania (HREC23719) and the Tasmanian Department of Education (EPR0082307).

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