A tale of two cohorts: The identification and impact of student engagement in a South Australian high school.

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Declaration

This dissertation contains no material that has been accepted for the award of any other degree or diploma in any educational institution and, to the best of my knowledge and belief, it contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

Signed: .....

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Abstract

School completion is a major factor that contributes to student success at school. It has been reported that young people who do not complete secondary schooling are at higher risk of underemployment, incarceration, and decreased wellbeing for the remainder of their lives. The main factors that contribute to student drop-out and non-completion are academic failure, low attendance, socio-economic status, cultural heritage and identity, and behavioural difficulties including delinquency. Student engagement is a high priority for most schools and is often cited in the Vision and Mission objectives to ensure that students general wellbeing is paramount and can therefore have short and long term gains both at school and beyond. Feeling well, happy and engaged in school life can improve a student's academic achievement, social and emotional engagement through attendance and participation, and overall values and attitudes to life and learning. This study investigated two cohorts, the 2016 and 2017 graduates, throughout their schooling at one College in South Australia. Student grades, attendance data, 'attitude' grade as determined by their teachers, and multiple wellbeing surveys were analysed to determine perceived levels of engagement. The data reported quite different final completion results for each cohort. It was found that neither the academic achievement or the attitude grades indicated any significant difference in engagement; but the attendance data suggested that the cohort who had the lower school completion were more consistently behaviourally engaged. The results suggest that schools should focus on how to specifically identify engagement levels in their students before assuming that it is a primary factor in a specific cohort's success. However, due to the limitations of this study, further research is needed to develop tools and methodologies that can better measure the identification of student engagement to happen.

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Introduction

The problem

Students who do not complete their schooling are more likely than their peers to experience underemployment, unemployment, and incarceration (Lehr *et al.* 2004:7). In 2004 in the U.S., approximately 1 in 8 students never finished their high schooling (Lehr *et al.* 2004:7) and Australia's school completion rates are not dissimilar (Lamb *et al.* 2000:13). For those who begin their SACE in South Australia (which begins with a single subject offered in Year 10), completion rates have been stable over the last 3 years with 96-97% completing statewide; however, the situation for those who do not complete their schooling is getting worse with fewer and fewer full-time employment opportunities being available for 15 to 19 year olds (Lamb *et al.* 2000:10). Due to all of these reasons, one of our primary aims as educators should be to retain as many students as possible until the end of their schooling and support them in the completion of their relevant high school qualification. A lack of engagement in education is often posited as a primary reason for students dropping-out, with failure to graduate being described as the most 'severe and overt symptom of disengagement from school and learning' (Lehr *et al.* 2004:280).

Academic achievement is one of the key factors in school and university retention. This is not just in the direct sense of students failing and thus not being allowed to continue, but also in that academic failure demotivates students (McMillan & Reed 1994:137). In addition, academic success as far back as elementary school can be used to determine final school completion rates (Lehr *et al.* 2004:279). Similarly, attendance throughout early schooling can be used to estimate school completion rates due to the tendency for poor attendance to spiral out of control as students get older (Lehr *et al.* 2004:279-280). Balfanz was able to identify 60% of high school dropouts from sixth-grade attendance, behaviour, and academic scores (Balfanz *et al.* 1969), and Reschly and Christenson report similar success in identifying school dropouts from school data from Years 1-3 (Reschly & Christenson 2012:4-5). Some studies have even suggested that poor attendance can be identified prior to the student beginning school based upon poor attendance to doctors appointments and other scheduled activities (Jimerson *et al.* 2000).

An Australian study on cyberbullying with a sample of 1530 male students in various stages of their schooling found that 11.5% of those students had been the victim of cyberbullying within that school year (Sakellariou *et al.* 2012). Delinquency rates among students in the U.S have been declining (Payne *et al.* 2003), and a 2007 study found that Australian rates of delinquent behaviour were comparable to the U.S. (McMorris *et al.* 2007:634). Where Australia and the U.S. differed was in substance abuse, with Victorian students reporting high rates of alcohol abuse, smoking, and inhalant use and students in the U.S. reporting higher rates of cannabis use (McMorris *et al.* 2007:634). Poor student behaviour, like poor academic achievement and attendance, can be reliably used to predict drop-out rates in high school (Lehr *et al.* 2004:279). In addition to suggesting low engagement in education, behaviours such as vandalism and violence in school also have a detrimental effect on the rest of the student body, resulting in the development of a negative culture and fear as well as impacting the school's ability to do its job. (Payne 2008:429)

In all of these areas, minorities such as culturally and linguistically diverse students and students with disabilities are more negatively represented and impacted. In 2002 in the U.S., those of Hispanic descent had lower retention rates than their peers with 64% of Hispanic high school students graduating compared to 84% African-American, and 92% Caucasian graduates (Lehr *et al.* 2004:7). In addition to lower retention rates, these minorities were also found to be less likely to return to complete their schooling later than life when compared to Caucasian students who dropped-out (Anderson & Zeith 1997:259). Regarding academic achievement, the gap between these particular ethnic groups appears to be closing with generally increasing academic scores; however, Anderson and Zeith describe a substantial and growing disparity between the academic achievement of Caucasian and Asian students, and Hispanic and African-American students in the U.S. (Anderson & Zeith 1997:259). Beyond school, for those who do graduate, ethnicity can also be a factor in a young person's success at university (Vuong *et al.* 2010:50). Socio-economically disadvantaged students are another minority that are disproportionately affected by poor academic achievement and high drop-out rates (Anderson & Zeith 1997:259). On average, students from low-income families are at increased risk of not completing school with a drop-out rate of 10% for low income students, 5.2% for middle income, and 1.6% high income (Lehr *et al.* 2004:7). Low socio-economic status is generally also a feature in the lives of many culturally and linguistically diverse students (Finn & Rock 1997:221) and so it is difficult, if not completely unnecessary in certain contexts, to distinguish between the two. In addition to this, students with learning and behavioural difficulties and disabilities are not only at a higher risk of disengaging, but the impact of their disengagement on their learning and future success is more profound (Reschly & Christenson 2006; Sinclair *et al.* 1998:7)

Nearly 80% of individuals in prison in the U.S. do not have a high school diploma (Lehr *et al.* 2004:7). For those who do graduate and enroll in tertiary study, the majority of them, especially those who go to university, drop out before completion (Parker *et al.* 2004; Gerdes & Mallinckrodt 1994). Feldman and Newcomb described the 'sophomore slump' (1969) that was the result of dissatisfaction with university life, and is directly attributed to students struggling to develop autonomy, identity, and purpose (Vuong *et al.* 2010:50). All of the factors that contribute to this such as attendance, achievement, and motivation to succeed all can be linked to student engagement. Henry and colleagues describe disengagement as a process that begins in early childhood and education that compounds on itself throughout the student's schooling to reach the final result of lower earnings, poorer health, and a higher likelihood of engaging in crime (Henry *et al* 2012:157).

Setting the scene

Increasing student engagement in our schools has the potential to remedy a lot of these problems. The literature shows a correlation between increases in student engagement and increases in academic achievement (Appleton *et al.* 2006; Nystrand & Gamoran 1991; Whitson & Consoli 2009:40) and attendance is not only linked to academic achievement, but is also the primary indicator of behavioural engagement (Reschly & Christenson 2012:8; Klem & Connell 2004). There is also an established correlation between high engagement and school completion (Christenson *et al.* 2001; Reschly & Christenson 2006) and student engagement strategies have formed the backbone of drop-out prevention initiatives for decades (Finn & Rock 1997:222; Wehlage *et al.* 1989). High delinquency and 'rule-breaking'

rates have been shown to correlate with low student engagement, and student engagement research has a history of being undertaken in the U.S. in order to provide a solution to these problems (Newmann 1992; Fredricks *et al.* 2004:59; Archambault *et al.* 2009). For decades, the poor outcomes of students in minority groups such as culturally and linguistically diverse students, low-income students, and students with learning and behavioural difficulties and disabilities were attributed to lower cognitive abilities, however it is now known that a lack of engagement resulting from a lack of resources and low attendance is a primary factor (Ready 2010:272). Students who are highly engaged throughout their schooling are also more likely to succeed both academically and vocationally later in life (Shernoff and Hoogstra 2001), and it is for all of these reasons, optimising student engagement should be a priority for educators at every level.

There are currently many strategies, both for within the classroom and schoolwide, with the aim of increasing student engagement. The problem is that objectively identifying periods of high and low engagement in students has been difficult to say the least (Rosenshine & Berliner 1978:5-6; Jerald 2006), with many studies deciding to measure the results of low engagement (attendance, academic achievement, behaviour reports, etc.) to determine engagement levels (Balfanz *et al.* 2007:225). Lehr and colleagues described other emotional indicators of engagement levels such as 'feelings of alienation, a poor sense of belonging, and general dislike for school' (Lehr *et al.* 2004:280), thus suggesting that surveys that measure the prominence of these feelings are another possible method for identifying high and low student engagement.

Issues related to student engagement have been explored in the present study which was conducted in collaboration with a school that has collected both of these types of data. Consequently, peaks and troughs in student engagement are objectively identified and highlight trends within particular cohorts across their schooling.

Rationale for the project

The school in this study had observed that there was a significant difference in SACE (South Australian Certificate of Education) completion for their 2016 and 2017 graduates. The 2016 graduates had a SACE completion rate of 95.1% (compared to 96.6% completion statewide for the same year), while the 2017 graduates had a completion rate of 100% (compared to 97.3% completion statewide). This means that not only was there a 4.9% difference in SACE completion, but that the 2017 graduates were 2.7% above the state average while the 2016 graduates were 1.5% below the state average. The primary hypothesis of this study is that the differences seen in SACE completion rates between the 2016 graduates and the 2017 graduates is due to a difference in student engagement; that the 2016 graduates experienced lower levels of engagement throughout their schooling than the 2017 graduates which resulted in lower school completion for the 2016 graduates. In addition to this hypothesis, this study also has the goal of developing a methodology for identifying points of high and low engagement in a cohort of students using the data that schools regularly collect that will be able to be conducted on a regular basis. The attainment of this goal, at least in part, is required to be able to support the hypothesis as no primary research will be conducted. Whether this goal has been reached, as well as any additional

recommendations for schools regarding the use of this methodology in their own contexts, will be discussed in the Conclusions and Recommendations section.

The key terms in the analysis of this data will be 'attendance', 'achievement', and 'attitude' as these are the terms that the school that has contributed its data have used, and definitions of these terms will be discussed in the Literature Review. The theoretical framework that this study incorporates will be similar to Astin's Involvement Theory, which interprets student engagement as being two-fold; existing both as engagement within a particular task, as well as more broadly in schooling in general (1984:318). Astin's theory also states that engagement exists on a spectrum and that the concept is much more complicated than being simply engaged or disengaged, which will be another key theme in this study (Astin 1984). This study will also focus on behavioural engagement as it is the predominant form of student engagement reflected in the data, although some elements of emotional or psychological engagement will also be included in some of the surveys to be analysed (Sharkey *et al* 2008; Harris 2011:377).

This study will not incorporate any primary research; all of the data that will be analysed has already been collected by a single school. Therefore, the main limitation that this presents is that causation will not be able to be inferred, only correlation. In addition to this, this study will look at various aspects of school life for two cohorts throughout their schooling to look for trends in that data that can be attributed to fluctuations is student engagement. The results may indicate that a particular time of year or a particular grade level experiences higher or lower engagement, however the scope of this study sits firmly in identifying these points, and it is beyond the scope of this study to determine why these fluctuations are occuring. The aim of this study is to determine whether engagement had a role in the two different outcomes for two different cohorts and provide the tools for schools to conduct the same analysis themselves, and so causation between the different variables and factors measured as well as identifying factors which determine engagement levels are areas that are recommended for future research.

Outline

The Literature Review will discuss the history of engagement discourse to give context to the study, before describing the definitions and theoretical frameworks that have been used to understand and measure student engagement in the past. Gaps in the literature will also be identified in the Literature Review to describe how this study fits in with the rest of student engagement research. The Methodology will then outline which definitions and theoretical frameworks will be used in the interpretation and analysis of data in this study, as well as give details regarding analytical methods as well as any other considerations such as ethics and costs. The Results will contain an evaluation of each of the datasets to be analysed before a discussion of the results and the conclusions that can be drawn. The Conclusions and Recommendations section will discuss the results of the analysis in regard to the hypothesis and goal of this study, as well as discuss in depth the limitations of this study and recommendations for schools and teachers in identifying periods of high and low engagement within their own students, as well as for researchers in areas for future research.

Literature Review

History of student engagement

The idea of students being focussed and 'engaged' in a learning task first started gaining traction in the mid-1970's, with Rosenshine and Berliner (1978) describing 'academic engaged time' as a key factor in determining whether a student would meet learning outcomes. Bloom's 'Human Characteristics and School Learning' was particularly influential around this time (Bloom 1976; Rosenshine & Berliner 1978:4; Harvey & Horton 1977). Bloom posited that there was as little as 1-2% difference in students' inherent biological and intellectual ability to learn and master all that school aims to teach, and that it is external factors which create the significant variability in success observed in schools. One of the key variables in this being the history of the learner and their psychological state when presented with a task as determined by previous tasks or experiences. (Harvey & Horton 1977:189-190). Similarly, Carroll's popular Model of School Learning (Carroll 1963) suggests that aptitude for learning as a variable is nothing more than a measure of the time required for a particular student to learn, and not an inherent, biological, and insurmountable barrier to student success (Carroll 1973:2). Therefore, according to Carroll's model, the central variable in student learning is time (Bloom 1974:683), an idea which became a preoccupation in student educational discourse during the 1970s (Bloom 1974; Bloom 1980; Rosenshine & Berliner 1978; Anderson 1976). As an extrapolation of this idea, Anderson (1976) conducted a study with the hypothesis that students with varied 'aptitudes' according to Carroll's definition, could all master a specific criterion within the same amount of 'time on task'. They found that despite a difference in aptitude, students did master the criterion in a statistically similar amount of time on task, provided that they had all undergone the same preparations (Anderson 1976:233).

Time available for school and learning is a relatively fixed variable; it would require a great deal of effort and planning for a teacher to change the length of the school day, the number of school days in the year, or even the length of a particular lesson. However, as Mosher and MacGowan stated in 1985, you may be able to legally force students to attend school, but you cannot legislate engagement (Mosher & MacGowan 1985). Therefore, the method that teachers must employ in order to achieve equality in achievement within their classrooms according to Carroll's theory is to maximise 'time on task' (Bloom 1980:339). The idea of 'time on task' was a popular notion in the 1970s (Corno & Mandinach 2004:298; Berliner 1979). 'Time on task' describes only part of what is now defined as student engagement; it only concerns the amount of time that students spend actively completing tasks, developing skills, or cognitively engaging in an academic topic (Berliner 1979) as opposed to the later definitions of student engagement that also describe a student's involvement in their broader school life and experience as a student, such as that of Astin (Astin 1984:318).

The 1970s also saw a shift in focus from the strategies and pedagogies that teachers employ in the classroom to facilitate learning towards the cognitive activities of the students and their effects on the students' own learning and achievement (Rosenshine & Berliner 1978:4). This is a shift in focus that would eventually lead to Corno and Madinach's theory of self-regulated learning (SRL) that was one of the first theoretical frameworks regarding cognitive student engagement (Corno & Mandinach 1983). SRL drew together developing theories of both what student engagement means and how the phenomenon develops,

claiming that learning is an active process undertaken by the subject; that the students have agency over their own engagement (Corno & Mandinach 1983:95). Corno *et al.* (1982) further elaborates on 'self-regulation', describing it as the key to increasing academically engaged time both within the classroom as well as at home; that the student needs to regulate and motivate themselves in order to achieve engagement. This theory is still widespread today, however pedagogies resulting from this theory manifest very differently depending on interpretation (McMahon & Zyngier 2009:164); for example, if the student is the primary agent of their own engagement, whose role is it to ensure engagement in a task? Is there anything that teachers can do to elicit academic engagement in a student according to the theory of self-directed learning?

Corno's work during the 1980s delved further into the psychology of learning and engagement in an attempt to explain student engagement and SRL in more depth. In 1981, Corno linked engagement to a psychological process known as cognitive organisation. Bower describes the process of cognitive organisation as processing new information to make meaning by grouping and relating, and that 'grouping and relating… I think they are inevitably involved in specifying what is learned and how it is learned' (Bower 1970:19). Corno explained that while there is no clear causational relationship between cognitive organisation and academic engagement, the two 'clearly seem to promote each other' (Corno 1981:369). The definition of student engagement that was prolific at this time meant that it was often compared to Flow theory, to the point where many researchers deemed them to be synonymous (Corno & Mandinach 2004:298). However, other definitions of student engagement go beyond the short-term cognitive, conative, affective, and physiological state known as flow (Corno & Mandinach 2004:298; Landhäußer & Keller 2012:68) to instead describe these factors over time and include behavioural and psychological reactions to academic tasks, outcomes, and student life (Astin 1984:318). In 1984, Astin described one of the earliest theories specifically relating to student engagement; Involvement Theory. Involvement Theory introduced several key ideas into student engagement discourse; that 'involvement' (engagement) occurred along a 'continuum', with an individual's level of engagement fluctuating over time and in response to stimuli; that student involvement can be reliably measured both quantitatively and qualitatively; and that student involvement, both in quantity and quality, is a key determining factor in student learning and that educational policies and pedagogies should be judged by their effect on student involvement (Astin 1984:519).

The early nineties saw a string of investigations and studies into performance indicators in tertiary education (Johnes & Taylor 1991; Linke 1991; Kells 1993; Davis 1996; Cave *et al.* 1997; Coates 2010:1). This correlates temporally with the development and dissemination of the first National Survey of Student Engagement (NSSE) in 1998; a U.S. survey of tertiary institutions that was intended to measure student engagement. One of the key motives in the development and implementation of this survey was to use student engagement as a measure of the quality of an educational institution, and was the culmination of several attempts (Kuh 2009) to assess university quality in a more student-focussed way than traditional methods relating to 'prestige, staff qualifications [and] academic selectivity' (Hagel *et al.* 2012:478). The Australasian Survey of Student Engagement (AUSSE) was developed in 2007 and admittedly has 'formative links' with the NSSE (ACER 2018).

The use of the U.S. NSSE as a benchmark for the AUSSE (ACER 2018) is problematic due to a stark difference in context. Most of the tertiary institutions that take part in the NSSE are small community colleges with the majority of students residing and working on campus, which is in contrast to the relatively large institutions that take part in the AUSSE where few students work and reside on campus (Hagel *et al.* 2012:479). This coupled with the cultural differences that have been identified worldwide as having an impact on interpretation of student engagement and implementation of engagement pedagogies (Zyngier 2007; McMahon & Zyngier 2009) have left many questioning the legitimacy of the AUSSE, especially as it serves a common purpose as the NSSE in that it is used to determine an institution's quality (Hagel *et al.* 2012:475; Coates 2010:2). However, the impact of the AUSSE on Australian education has gone beyond its intended purpose. Trowler (2010:3) suggests that the reason the the idea of student engagement has become so 'entrenched' in Australian educational discourse is the appearance of annual national surveys such as the AUSSE. These surveys bring the idea of student engagement to the forefront for both academics and teachers as well as provide consistent and easy access to data. The legitimacy of the AUSSE is still being questioned, with a recent study finding it's methods reliable and rigorous, although a modified version of the survey was used (Tadesse *et al.* 2018), however the AUSSE has had a great positive impact on student engagement research and pedagogy implementation in Australia due to the value that it has placed on understanding and improving student engagement at the institution and classroom levels (Coates 2010:1-2).

Student engagement in Australia

Student engagement has been identified as a serious issue in Australian schools (Zyngier 2008:1766) which has been at the forefront of Australian educators' minds since the mid 1990s (Trowler 2010:2). Student engagement has been on the minds of Australian educators and policy makers since the beginning of the 21st century for similar reasons to other Western nations such as the U.S. and U.K; as a means to remedy poor retention and achievement (Zyngier 2008:1766); however individual institutions (and to a degree, teachers) have the added motive of their perceived educational quality being judged by the engagement of their students (Hagel *et al.* 2012:475; Coates 2010:2). The Department of Education and Training (VIC) stated that one of their key department priorities in 2002 was the 'development of a policy framework for systemic reform of the middle years of schooling to enhance student engagement and achievement' (Hamilton 2002:19). In addition to this, despite there being suggested limitations in the AUSSE regarding its relevance in its context and the use of engagement scales (Hagel *et al.* 2012), the Australian Government plans to factor student engagement (as determined by the AUSSE) into its decisions regarding allocation of funding (Hagel *et al.* 2012:483). All sources suggest that there is a huge focus in Australia on student engagement not only for educators and academics, but also for governments, stakeholders, and policy makers; however there is a distinct lack of communication between different parties (Smyth 2006). Smyth found that there were different definitions used by different parties and that some governments directly and completely disregarded student engagement research when developing educational policies, including those centred around the idea (Smyth 2006:285). This lack of communication and collaboration has created not only confusion, but also policies and strategies that simply do not work. All parties seem to realise the power and importance of

student engagement, and an increased understanding between different stakeholders and the educational community could see student engagement research being implemented in Australia in a way that benefits all students.

Impact of Culture

Various nations around the world have recognised a distinct lack of student engagement as being a key barrier in their educational systems. Despite facing a similar problem, our understanding and interpretation of what student engagement is and how to facilitate high engagement within our students appears to change depending on economic, social, political and physical context. Many U.K. studies about perceived nature and reasons for student disengagement support the idea that teachers are working within a deficit model; the teachers are far more likely to explain student disengagement as 'laziness' (Ravet 2007:341-342; Cothran & Ennis 2000) and there is too greater focus in the educational community around disciplining and correcting negative behaviours, as opposed to promoting high engagement and facilitating students' engagement in their studies and lives as a student (Vibert & Shields 2003:222). Australia's 'conventional' perception of student engagement is that it is up to the students, and so a lack of engagement is the students' fault (McMahon & Zyngier 2009:164), leading to the conclusion that it is the students who must fix the problem and that there is little that the teachers, school leaders, or policy makers can do. This fits into the theory of Self-Regulated Learning (SRL), which is often applied to student engagement research (Corno & Mandinach 1983); however in contrast to this, Zyngier found that in the Australian context, teachers were much more willing to identify themselves and their own engagement and enthusiasm in their teaching as primary factors in determining the engagement of the students (Zyngier 2007:332). This still fits within theories of SRL and student agency, however also involves the additional element of the teachers recognising themselves and their actions as stimuli that can influence their student's motivation and ability to become engaged.

It is difficult to conclusively say what teachers think about student engagement and how they interpret it yet alone whether these understandings and interpretations change based on culture and geographic location when so few studies have been conducted on teacher perceptions of student engagement (Harris 2011:378). There is also a trend in the academic literature that, although particular studies may discuss student agency, they also often objectify the student and ignore their voice (McMahon & Zyngier 2009:167). Some studies have even prioritised the parent voice in studying student engagement in the classroom; a party who, while certainly important in the students' lives, usually only know what occurs in the classroom second-hand (Ravet 2007:336,341). Because of these suggestions of the importance of context in the effective implementation of engagement policies and pedagogies, as well as the inherent problems with past studies on the perceptions of student engagement within teachers and students, more work needs to be done in this area.

Contemporary Studies

The more recent literature shows further development in definitions, applications, and theory in regards to student engagement. There is a prevalence of studies conducted in the tertiary education context (Farr-Wharton *et al.* 2018; Hatun Ataș & Delialioğlu 2018; Kahu & Nelson 2018; Schulz *et al.* 2018; Tadesse *et al.* 2018; Zepke 2018; Uztosun *et al.* 2018), although this could be due to the impact of studies in this context rather than a quantitative prevalence and with the use of more specific search criteria, many studies conducted in the secondary education context can also be found (Ansong *et al.* 2018; Bartholomew *et al.* 2018; Chung *et al.* 2018; Patall *et al.* 2018; Plasman 2018; Pöysä *et al.* 2018; Schmidt *et al.* 2018). Many recent studies feature the use of technology and how it can be used to improve student engagement (Farr-Wharton *et al.* 2018; Hatun Ataș & Delialioğlu 2018; Chung *et al.* 2018) as well as the detrimental effect that it can have (Junco *et al.* 2011). Studies are being conducted in different cultural and socio-economic contexts with culture being an increasingly important factor in determining student engagement as well as the impact of engagement levels on student outcomes (Kahu & Nelson 2018; Schulz *et al.* 2018). Some studies are also taking Australian and generically Western pedagogies and strategies and testing them in vastly different contexts (Tadesse *et al.* 2018; Ansong *et al.* 2018; Uztosun *et al.* 2018). In addition to testing out new hypotheses, old theories are also continuing to be tested in new contexts (Bartholomew *et al.* 2018) and researchers are investigating subject-specific influencers on engagement and which pedagogies promote engagement in different subject areas (Pöysä *et al.* 2018; Schmidt *et al.* 2018). One of the concepts that is gaining clarity in more contemporary literature is the reasons why certain pedagogies and initiatives promote high student engagement; that student engagement comes from two different mechanisms: engaging students in the moment (getting students to focus and see the value in a task), and perhaps the more important mechanism of generating hope for a future that the students want to work hard to achieve (thus creating engagement in schooling as a whole) (Plasman 2018; Ansong *et al.* 2018). Traditional thinking regarding teachers' perceptions and use of the academic literature suggests that teachers are not using evidence-based pedagogies in their practice, however Zepke suggests that this is not the case. Zepke (2018) suggests that today, the problem with teachers using the literature is that they lack a critical approach; that teachers are using literature that is 'popular' or that confirms the pedagogies and methods that they already use. Zepke extends this lack of critical analysis to academics, positing that student engagement is actually far more complex than anyone realises and that there is a lot more hard research to be done (Zepke 2018).

Definitions

Student engagement

> 'Engagement is difficult to define operationally, but we know it when we see it, and we know it when it is missing'
>
> (Newmann 1986:242)

This quote from Newmann succinctly explains the primary problem that has historically plagued student engagement research; the lack of a proper definition. For years, Csikszentmihalyi's Flow Theory was defined in such a way that it was often regarded as synonymous with student engagement, Flow being:

> "The state in which people are so intensely involved in an activity that nothing else seems to matter; the experience itself is so enjoyable that people will do it even at great cost, for the sheer sake of doing it."
>
> (Csikszentmihalyi 1990:4)

Student engagement has also been defined as a description of the behaviours arising from motivation to complete a particular task (Wellborn 1991:35) and there are multiple definitions that require the successful completion of that task (Kuh *et al.* 2007; Krause & Coates 2008). Consider one of the earliest definitions that explicitly describes what would now be called student engagement;

> "a highly involved student is one who, for example, devotes considerable energy to studying, spends much time on campus, participates actively in student organizations, and interacts frequently with faculty members and other students."
>
> (Astin 1984:318).

It is clear that the definition of student engagement has changed somewhat. Astin does recognise the task-specific qualities of engagement (Astin 1984:318), however Astin emphasises the importance of school culture and social structure in ensuring a holistic engagement in a student's life as a student, and suggests that this is the root cause of task-specific engagement.

Definitions of student engagement are also affected by culture. On the most basic level, different geographical regions have different terms to describe the concept, from the term 'student engagement' which is typical of North American and Australasian discourse, to 'student feedback' and 'student approaches to learning' which are often used in the United Kingdom and are largely defined as being synonymous with student engagement (Trowler 2010:3). Something as superficially observable as differing terms reflects a fundamentally different approach and mindset regarding student engagement, even if these differences are not significant in practice. In addition to this, there are numerous studies that define student engagement by what it is not. They do this by either measuring 'alternatives' to engagement such as apathy and disillusionment (Krause 2005:7) or directly present a dichotomy where students are either engaged or they are not (Mann 2001). This engagement dichotomy is particularly prevalent in other fields of research such as business where Schaufeli and colleagues, when discussing engagement in employment (Schaufeli *et al.* 2002a; Schaufeli *et al.* 2002b), have 'defined engagement by what it is not: burnout' (Steele & Fullagar 2009:5-6). Another common business definition of engagement is that it is a direct reference to an employee's commitment and use to an organisation (Saks, 2006; Steele & Fullagar 2009:5-6), sentiment which is mirrored in educational discourse by the Higher Education Funding Council for England which has defined student engagement as a 'process' enacted by an institution upon the student, removing all student agency and involvement in the process (HEFCE 2008).

Attendance

The school that has collected the data to be analysed in this study has repeatedly used three key terms in their collection of data: attendance, attitude, and achievement. In order to

interpret and analyse this data, it is essential that these key terms are discussed and defined in order to understand the aspects of student life and success that are being measured. Attendance has had a relatively stable definition throughout the history of educational discourse as simply showing up to school or class, however the understanding of the importance of attendance to institutional education is becoming increasingly turbulent. Attendance is a feature of traditional education (Selim 2007) and in the context of traditional education, it is a requirement, regarded as the epitome of behavioural engagement (Sharkey *et al* 2008; Harris 2011:377); however, with the move towards competency based or online learning, achievement of learning outcomes is now becoming the primary requirement (Spady 1977:12) with attendance often not being at all relevant. Attendance is not only no longer compulsory, but not necessary in an increasing number of tertiary courses that employ e-Learning and long-distance pedagogies (Selim 2007:409), and a meta-analysis of 14 studies with a combined sample size of 7561 students in the K-12 context found that distance education can be as effective as in-class education in the K-12 context (Cavanaugh *et al.* 2004:16). Distance education has been successfully implemented to improve poor enrollment rates in rural areas (Cooze & Barbour 2005:3) and Spady has called for schools and other educational institutions to become 'less preoccupied with the formal custody and control of students' as the skills that this specific type of education develops result in more independent and responsible learners (Spady 1977:12). Attendance is not required in a traditional sense in this context as communication does not need to be real-time, however it must be stated that communication does still need to take place and engagement still needs to be facilitated (Rice 2006:426). Distance education also requires its own pedagogy (Selim 2007) and so a student's non-attendance in a program which is designed to be in-class will not suffice. While attendance cannot be defined as something that is essential for learning and engagement with current technology and pedagogies, in the context of this study, it will be defined as such.

Attitude

Psychologists define attitude as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (Eagly & Chaiken 1993:1), a concept which is as simple as an evaluation of an object or stimulus (Eagly & Chaiken 2007:582). In the educational context, attitude can be defined as a one-dimensional, two-dimensional, or multidimensional construct. One-dimensional interpretations are consistent with the given psychological definition and consist simply of an affective element; that attitude has to do with a feeling towards a stimulus. Two-dimensional interpretations generally consist of an affective and cognitive element, a feeling towards a stimulus as well as an identification and evaluation of its characteristics. Multidimensional definitions involve the affective and cognitive, with the addition of a connotative element relating to behaviour towards the stimulus (Subramaniam & Silverman 2000:30). Using these definitions, the multidimensional approach is perhaps the most convenient for the purposes of identifying attitude due to the behavioural aspect; this definition contains an observable element and is therefore more likely to be the definition used by teachers when they are instructed to give an 'attitude grade' in the context of this study.

Achievement

Achievement can be defined as relating to a 'standard of quality', whether this standard is defined by the student, teacher, or institution (Pekrun *et al.* 2007:15). Fan and Chen emphasise that while indicators of achievement include successful school completion, GPA, and standardised test scores, a student's academic aspirations play a significant role in what should be defined as achievement (Fan & Chen 2001:4). The idea of an 'achievement gap' has become a cornerstone of educational discourse and, as Gutiérrez explains, is a rather damaging one due to the focus on the 'gap' between the achievement of different social groups and that a more holistic and dynamic picture of student success and growth needs to be adopted. (Gutiérrez 2008:257). Achievement gap analysis has been immensely successful in attracting government attention and prompting policy change, but the definition of such an impactful idea needs to be carefully considered as it been shown to affect the way that the public views education and achievement as well as how students view themselves (Carpenter et al. 2006:123). A holistic definition of achievement that is dependent on the student's aspirations is not a workable definition in this context without knowing each individual teacher's (and student's) definition of the word. Therefore, in the context of this study, achievement will be defined in the most basic way as simply meeting criteria or standards set by the institution, as any deeper interpretation in the collection of data cannot be assumed.

The Gap in the Literature

Low student engagement is particularly evident in middle and high school (Wigfield *et al.* 2008). Despite this, the majority of primary student engagement research has been conducted in the tertiary context, with it commonly being applied to secondary school in order to remedy problems with poor academic results, delinquency, and drop-out rates (Newmann 1992; Fredricks *et al.* 2004:59; Archambault *et al.* 2009). This study will not include primary data collection, however it will aim to adhere to principles of positive psychology and improving wellbeing as opposed to simply improving academic results and preventing poor behaviour.

The hypothesis of this study is relatively standard: that the difference seen in the successful completion rates between two cohorts at the same school is due to a difference in engagement throughout their schooling. This is a hypothesis that has not only appeared in the literature, but is also often posited in schools both by leadership as well as around the staffroom. What is different about this study is the goal regarding the methodology; this study will aim to provide a method that schools can use to conduct their own analysis in their own context to answer similar questions. This methodology will not be validated until a direct connection between the indicators measured and student engagement can be confirmed beyond reasonable doubt, however this study represents another step in the direction of further empowering schools to identify trends and analyse data themselves in order to make an informed decision regarding student engagement.

Methodology

A wide range of data sets have been supplied by a school in South Australia. These data sets describe the schooling experience of two cohorts; the 2016 and 2017 graduating classes. The data sets that will be analysed are:

- Attendance, Attitude, Achievement (AAA)
- South Australian Certificate of Education (SACE) Report data
- NAPLAN
- High Achievers data
- Diagnostic Inventory of School Alignment (DISA)
- What's Happening In This School Survey (WHITS)
- Classroom Climate Questionnaire (CCQ)
- Students At Risk (STAR)
- Bullying Report Summary

These different data sets will be compared for the two cohorts of students, as well as to the mean of the last several cohorts is certain cases, to determine if there are any patterns that could indicate points of high or low student engagement as supported by the literature. Any findings or trends will be commented on and be deemed as a result, however the hypothesis cannot be supported unless there is a strong enough correlation between fluctuations in different indicators of student engagement. It is understood that more research will need to be done to support causation as opposed to correlation, however this is beyond the scope of this study. Any other patterns, trends, or outliers of interest in the data will also be commented on and recommendations given for the school or further study as necessary.

Definitions and theoretical frameworks

Steele and Fullagar warn against defining engagement too broadly and allowing student engagement become a synonym for the 'student experience' (Steele & Fullagar 2009:6). For the purpose of this study, student engagement will be defined similarly to Astin (1984:318) who described student engagement beyond engagement in a single task; that an engaged student is one who is engaged in their role as a student, and that this core engagement leads to engagement in particular tasks. Student engagement in the context of this study will also refer only to what is referred to as 'behavioural engagement' (Sharkey *et al* 2008; Harris 2011:377), which refers specifically to attendance, rule-adherence, and other observable behaviours related to student engagement. This is opposed to the other identified aspects of engagement such as psychological, cognitive, and academic, which are more abstract and difficult to identify yet alone quantify. The primary benefit of the using this definition (and excluding other task-specific definitions of engagement) is the availability of data and development of methodology; there has historically been many issues with identifying engagement (Rosenshine & Berliner 1978:5-6), and it is in the interest of this study to keep the definition succinct, clear, and workable in this context.

The theoretical frameworks that will be referred to in this study are Astin's Involvement Theory (Astin 1984) as well as elements of Self-Determination Theory (hereafter SDT) (Reeve 2002:183) and Self-Regulated Learning (hereafter SRL) (Corno *et al.* 1982). Astin's concept of a continuum of engagement will be utilised throughout every stage of the analysis and discussion, as well as the concept of learning being a product of student

engagement. Therefore, this study will not attempt to determine whether or not any student or cohort is engaged, but rather to what degree they are engaged, and how these different levels of engagement over time are reflected in the data. Self-Determination Theory and SRL will be employed to a lesser extent as theories describing the concept of intrinsic motivation and engagement coming from within the student as opposed to being created or influenced by an external force. However, Self-Determination theory in particular recognises the need for a catalyst for this intrinsic engagement (Appleton *et al.* 2008:378), and it is certainly the case the schools can play a large role in motivating students in their studies (Zyngier 2008:1767). This concept will be the key in forming conclusions and recommendations; high and low periods of engagement will not be attributed to specific pedagogies or extrinsic pressures placed upon students per se, but rather to initiatives within the school to promote community, build motivation and self-esteem, and enthuse students about their possibilities for the future.

Flow is historically one of the key theories in student engagement research (Csikszentmihalyi 1990; Whitson & Consoli 2009; Shernoff *et al.* 2014; Newmann *et al.* 1992), however it will not be used in this study. Neither will any of the theories specifically discussing engagement in employment be discussed. Both of these exclusions are due to a lack of relevance in this context; this study will not discuss the in-class 'time on task' referred to in Flow Theory and the many studies that utilise it, nor will it be relevant to adapt theories from a different field of research to this context. The definition of student engagement that is recognised by this study does not require any analysis of data where Flow would be evident, and this study is not deep or far-reaching enough to require any more nuanced theoretical framework beyond Involvement Theory, Self-Determination Theory, and SRL.

Identifying student engagement

Bloom outlined an early methodology for 'appraising the level of time-on-task' (Bloom 1980:339) that included a sample of intervals, at which students will be determined to be either on-task or off-task. Alternatively, Bloom also suggested measuring the results of engagement after a period of learning such as 'stimulated recall, interviews, or questionnaires' to determine an individual's level of engagement throughout the period (Bloom 1980:339). This second method in particular is a product of the time; it is dependent on the prevailing theory that all students have similar potential with motivation and engagement being the defining variable in the quality and quantity of learning (Carroll 1963).

A severe limitation was identified early on in student engagement discourse; that there are too many compounding factors the affect engagement in homework and other out-of-classroom tasks that cannot be observed or accounted for (Karweit & Slavin 1980:7). Because of this, only time in-class could be reliably used for analysis. Karweit and Slavin found that sample size and length of observation greatly impacted the reliability of the data (1980:24). Even within this sample, other variations in methodology and definition of what constitutes engagement were found to significantly affect the data, such as whether

momentary lapses in concentration or activity were to be counted as 'off-task' (Karweit & Slavin 1980:12).

More contemporary studies, especially moving into the age of e-Learning, have benefitted in that many online learning environments can quickly and easily quantify how much time students are spending explicitly on-task. Despite this, there is still often conflict in the results (Romero & Barbera 2011:2). Romero and Barbera have considered that this could be due to differing methodologies and interpretations, a limitation identified in earlier literature, but also suggested that time-on-task was not necessarily equivalent to engagement and effective learning; that the quality of the time-on-task played a far greater role (Romero & Barbera 2011:3).

These longstanding issues with identifying and measuring engagement in individual tasks (as well as an under-developed concept of exactly what time-on-task is and its role in learning and achievement) has led to the focus of this study shifting to firmly focus on the results of engagement. The results of high student engagement, especially high behavioral engagement, are widely agreed upon to be increased academic achievement, increased attendance and school completion, and higher motivation and success later in life. These are the variables that will be analysed using the available data.

Analysis

The literature shows a correlation between increases in student engagement and increases in academic achievement (Appleton *et al.* 2006; Nystrand & Gamoran 1991; Whitson & Consoli 2009:40). This increase in academic achievement can be attributed to an increase in focus and time-on-task during classes, thus increasing the quality of the student's time in class. In addition to this, engaged students generally have higher attendance (Klem & Connell 2004) and so spend more time actually in the classroom (Wang & Holcombe 2010:633-634). For the purposes of this study, none of the variables in isolation can be said to indicate high or low engagement; rather it will be a combination of several different factors for each cohort that will support the presence of high or low engagement at that point in time. Student grades will also not be used on their own; they will be compared to NAPLAN data and other standardised tests to quantify how the students' grades reflect their abilities and whether they are learning and developing skills at a faster or slower rate when compared to their peers. The aim of this method is to not base results on how academically successful a student is, but how well they are doing in school compared to their baseline; whether they are putting a significant amount of effort into their school work or whether they are just getting good grades because they are already highly capable. For example, the NAPLAN and SACE data both discriminates between literacy and numeracy proficiency and occur in Year 9 and Years 11 and 12 respectively; these data sets can be used to determine progress in a cohorts abilities in this area and determine if development is generalised or focused on particular skills and disciplines.

There is also a correlation between high engagement and school completion (Christenson *et al.* 2001; Reschly & Christenson 2006) and attendance (Klem & Connell 2004). Attendance has a high impact on many measures of success in school such as grades, standardised test

scores, and graduation rates (Balfanz & Byrnes 2012:3), and Lawson & Lawson present student engagement as the primary factor in retention rates to the point where they are almost synonymous (2013:432). In this study, the attendance rates of each cohort will be analysed as opposed to attendance of individual students. As with every other variable which will be analysed in these data sets, attendance and retention rates will not be said to indicate high or low engagement on their own, but will contribute to an overall trend that can suggest points of high or low engagement. The literature supports the idea that this variable has a stronger correlation to engagement than academic success, and so will be weighted accordingly.

In addition to these two primary factors, there are a number of other factors which may influence the valid identification of student engagement levels. These factors may only play a small part in determining student engagement due to a lack of support in the literature or by the number of additional confounding variables, or simply due to a lack of evidence of these factors being present in the data analysed in this study. High delinquency and 'rule-breaking' rates have been shown to correlate with low student engagement, and student engagement research has a history of being undertaken in the U.S. in order to provide a solution to these problems (Newmann 1992; Fredricks *et al.* 2004:59; Archambault *et al.* 2009). Wellbeing survey data and report summaries will be analysed to glean any information regarding behaviour. If behaviour can be determined, it will be used as another factor in identifying high or low student engagement. Students who are highly engaged throughout their schooling are also more likely to succeed both academically and vocationally later in life (Shernoff and Hoogstra 2001). Many students are not prepared for higher education due to low skill development, knowledge acquisition, and engagement throughout school (Complete College America 2012). This factor is closely linked to school retention rates, however it is distinct as it concerns the success of students beyond school despite variances in retention; for example, a student may drop-out of school but go on to have a successful career while another student attends university for a week before dropping out. This will be particularly difficult if not impossible to determine in this study as few schools get any information beyond tertiary education offer rates.

In regards to the quantitative analysis of data, there will be three main analytical methods conducted. They will be correlation analysis, mean analysis, and basic ANOVA analysis. All of these analyses will be used to compare the two cohorts being studied as well as to compare them to a baseline when applicable. Significance and strength of correlation will be measured both between the two cohorts being studied to determine if there is any significant difference in their experiences of schooling. An r-value will be given to indicate strength of the correlation with $r=1$ indicating a strong correlation and $r=0$ indicating no correlation. A p-value will also be given to indicate significance of the correlation, with $p<0.05$ being considered a significant correlation. The mean for particular data sets will also be compared and significance of difference determined using a t-test. A p-value of $p<0.05$ will indicate that the difference observed between the means is significant. Finally, variance analysis will also be conducted where applicable and a variance given for each set of data. An f-test will be conducted and comparison of the f-value and f-critical value will be used to determine significance. Significance will be given as a p-value however (either $p<0.05$ or $p>0.05$) to maintain consistency. $p<0.05$ will indicate a significant difference in variance.

Ethics, costs, and limitations

There will be no data collection undertaken as a part of this study. All of the data that is to be analysed has already been collected by a local school as a part of their regular data collection and analysis. One of the aims of this study is to determine how confidently student engagement can be identified using only data that schools regularly collect, and this means that there are no ethical concerns surrounding the collection of data. There are however ethical concern surrounding the use of this data, and as such the data will remain on-site and will only be able to be accessed on-site, the data must be de-identified for the purposes of this study, and the student information and privacy policies of both the school and association must be adhered to. These policies were read prior to the study and will be referred to throughout its duration.

No part of the product of this data analysis will be published online during any stage of the process apart from being sent to representatives from the school and supervisors via private email without the school's consent. There are no expected costs involved in this research project as all of the data has already been collected. Minimal time will be required from contact people at the school involved.

Results

Nine distinct data sets were analysed as a part of this study. They are:

- Attendance, Attitude, Achievement (AAA)
- South Australian Certificate of Education (SACE) Report data
- NAPLAN
- High Achievers data
- Diagnostic Inventory of School Alignment (DISA)
- What's Happening In This School Survey (WHITS)
- Classroom Climate Questionnaire (CCQ)
- Students At Risk (STAR)
- Bullying Report Summary

These nine datasets all have varying degrees of depth, reliability, and relevance to this study as reflected in the analysis. The only dataset which was not analysed after preliminary sorting and evaluation was the Bullying Report Summary due to the identification of a multitude of errors as well as the lack of key information such as sample size and publication date, as discussed further in the Evaluation.

Evaluation

Attendance, Attitude, Achievement (AAA)

The AAA reports are conducted at the end of each term. This data consists of grades that the students have received for attendance, attitude, and achievement each term. Both the attendance and achievement grades given are computer generated based on attendance

rates and school grades, with the attitude grade being the only one of the three in the report based on the direct judgement of the teacher for the report. The Student Handbook states that a good attitude includes behaviours such as 'being punctual to lessons, listening well, contributing ideas, starting work quickly and being prepared for lessons'. In addition to this, different subjects may have specific criteria for assessing attitude.

The school has synthesised summary graphs for each term which show the percentage of students who received the highest grade in each category. It was these summary graphs and percentages of students who are achieving high scores in these areas that was made available for use in this study. There are potentially issues with consistency, especially when considering the attitude grades, as the teacher's judgement is made at the end of the term and based on the students' efforts for the whole term. Despite the teachers' use of criteria for making these attitude judgements, there may still be inconsistencies in teacher interpretation, affecting the reliability of the data; however, this data is still useful as it is likely that the teachers are consistent within themselves, meaning that trends and fluctuations occurring within the two cohorts being studied may still be reliably observed. Because of this, the AAA data will be used for comparison and trend analysis as opposed to analysis of individual points or absolute levels for each of the variables.

South Australian Certificate of Education (SACE) Report

The full school report from SACE for 2017 was used in this study. The report compared the most recent results from the 2017 graduates to statewide averages for the same year. The school developed another report using the 2017 data, comparing it to data from past years (2016 and 2015). The data in this school conducted report comes from past SACE reports, and it is assumed that these other reports are similar to the most recent 2017 report. The SACE data is based on achieved grades by Year 10, 11, and 12 students. Year 10 students are also included in the analysis as there is a single SACE subject, Personal Learning Plan (PLP), which is taken in Year 10. These grades are moderated across the state and so their consistency and comparability to the state average given is reliable.

SACE is only undertaken in Year 11, 12, and one subject in Year 10, meaning that this data does not give the longitudinal perspective of the cohorts throughout their entire secondary schooling. Because of this, this data will be used in conjunction with other data concerning academic achievement to give a better picture of these cohorts' journeys through their schooling. Another major limitation of this data is that the first-hand reports from SACE for 2016 and 2015 were not available for use in this study and so the school conducted report was used, resulting in more chance for bias and human error, however this risk is insignificant.

National Assessment Program - Literacy and Numeracy (NAPLAN)

NAPLAN consists of a standardised literacy and numeracy test conducted during Years 3, 5, 7, and 9. Each student is put into 'bands' according to how they scored on different aspects of literacy and numeracy when compared to every other student in Australia in their year level who completed the test. There is a high value placed on students' performance in the NAPLAN, resulting in pressure on the students as well as the teachers (Shine 2015; White & Anderson 2012). This pressure is placed on students by the schools, parents, and other

students, pressure which may be reflected in their test scores. The only data that is available for use in this study is the Year 9 NAPLAN as this is the only NAPLAN test conducted in high school and primary school NAPLAN data is inconsistently given to the school by primary schools when students enroll.

The school analyses the NAPLAN data of their students every year and have up-to-date reports and presentations comparing the new data to that from previous years. The numbers that they have used to compare different cohorts are the mean score for each cohort for each aspect of literacy and numeracy measured in the test. Analysing individual students' NAPLAN reports is beyond the scope of this study, and so the school's reports and previous analysis will be used to compare to different datasets. The data that will be used primarily consists of mean scores with large sample sizes of close to entire populations, however there are still risks posed by human error that cannot be identified and accounted for. NAPLAN also has the inherent limitation of being a one-time test and so does not necessarily reflect a student's true ability, but rather their ability on that particular day when under the stresses associated with test.

High Achievers

The High Achievers data consists of a sample of students who are to receive academic awards at the end of each term. Students are ranked according to their 'score', a number that corresponds to both grades and number of subjects taken. This means that a student who has taken more subjects during the term has a higher chance of receiving a higher score despite having lower grades per subject. This data set also includes the students' attitude grades, however there is insufficient data across different years to draw any meaningful conclusions.

For use in this study, a sample of the top 50 students was taken from both cohorts each year at the end of the first term. 50 was chosen as that was the smallest total number of student to receive awards from one of the cohorts to be studied. Term 2 awards data was used for 2014 for both cohorts as the term 1 data was not available. In the analysis of this data, the effect of variations in the number of subjects taken will need to be taken into consideration before analysing trends and comparing cohorts according to their score. This was done by dividing the total score given to each student in the sample by the number of subjects that they completed, thus giving a score per subject.

The attitude data will not be used in this data set as other data sets such as AAA and STAR contain more consistent attitude data. As discussed previously, these attitude grades are subject to limitations due to the need for consistency in interpretation of criteria and judgement as well as the fact that the judgement is made at the end of the term and not throughout.

Diagnostic Inventory of School Alignment (DISA)

The DISA is a survey conducted with the aim of identifying 'successes' and 'challenges' regarding school environment and culture. The survey collects responses from students,

parents, and teachers from the school and sends the school a comprehensive report including the mean scores and standard deviations for each question from each group. The school involved in this study conducted the DISA survey between 11/8/2016 and 21/10/2016 and received 76 staff responses, 97 student responses, and 17 parent responses.

The surveys for the students, parents, and teachers are designed to measure the same variables, however are worded differently according to the sample completing each survey. For example, the student and parent survey questions are generally quite similar with the primary difference being the survey being written in the first person for the students and third for the parents, while the teacher's survey questions are often more specific and contain more educational jargon. The participants answer each question according to a five-point scale with total mean responses above 3.77 being regarded as successes and mean responses below 3.27 being regarded as challenges.

One of the primary limitations of this data set in regards to this study is that there is no distinction between cohorts; however, it is still useful as a baseline to compare other data sets to, especially as perception of student engagement is a variable that is explicitly measured in this survey. The other main limitation is that the survey questions varied quite significantly depending on the group completing the survey. This was done in an attempt to respond to the varied understandings of educational concepts, however has the potential to elicit different understandings and interpretations. Because of these limitations, this data's primary use in this study will be to answer questions regarding the overall culture of the school involved and identify challenges that potentially affect all cohorts, as well as discrepancies in the perceptions of the different sample groups.

What's Happening In This School? (WHITS)

The WHITS Survey was developed by Aldridge and colleagues (Aldridge & Ala'l 2013; Aldridge *et al.* 2017) as a part of a longitudinal study on school climate. Each school that participates in the survey is given a report with their results each year as an incentive for participating. The first survey was conducted in 2016, with the second in 2017. The survey was carefully constructed (Aldridge & Ala'l 2013), and a description of the fields of the survey is given in Appendix 1. The survey consists of 78 statements spread over 13 identified areas of school climate; teacher support, peer connectedness, school connectedness, affirming diversity, rule clarity, reporting and seeking help, moral identity, self-anchoring, resilience, wellbeing, life satisfaction, behaviour, and bullying. Each student surveyed used a five-point scale to describe how strongly they agreed or disagreed with the statement given.

This dataset has the benefit of being separated into cohorts, allowing comparison between the two cohorts being studied. The sample sizes in the 2016 survey was smaller than that in 2017 (n=145 over the Year 11 and 12 cohorts compared to 245 over the same year levels in 2017), and the survey is relatively new, resulting in only two years worth of data at this point. Papers have been written using the data from 2016 that showed interesting results that suggest that this will become a high-impact study (Aldridge *et al.* 2017), however this individual school has not conducted much analysis itself due to the lack of longitudinal data and how little time there has been in which to analyse the data.

Classroom Climate Questionnaire (CCQ)

The main aim of the CCQ is to help teachers improve their own practice and facilitate action research by giving progress data that they can use to evaluate the new strategies or pedagogies that they are using. The CCQ is a 5 point survey that focuses on engagement and motivation, and consists of a pre- and post-test that are conducted before altering pedagogy, environment, etc. and afterwards respectively. The survey is intended to be used to measure engagement in a particular teacher's class to inform their practice and so most of the results are personal and confidential. There is no official record of what has been changed between the pre- and post-tests; this information is anecdotal and would require interviews with individual teachers who have employed the use of this survey, which is beyond the scope of this study.

Because the results of the surveys can be interpreted as a direct indication of the quality of a specific teacher's work, the primary reports and data are confidential. What has been used in this study are de-identified reports on statistical trends regarding the results of the entire process. These reports contain the average scores of all the pre- and post-tests to give an impression of what affect the implementation of the CCQ has had on engagement and motivation for the entire school. Because of this, this data has limited use within this study, however there is some data in these summary reports regarding average engagement levels as determined by the students themselves by cohort, and so these values could be compared and used in conjunction with other data.

Another limitation of this data is that only classes that have been nominated by their teachers to undertake the survey have actually undertaken it, and only cohorts that had five or more classes surveyed have been included in the final report that was used in this study. As a result of this, the 2017 graduates were not included in the report in 2017, and so there is data from the 2016 graduates in Year 12, and the 2017 graduates in Year 11. Because the data only represents one year, the two cohorts cannot be compared solely on their scores as they are in two very different stages of their education (Yr 11 vs. Yr 12); however, the difference in their pre- and post-test scores can be compared to determine each cohort's reaction to the implementation of new strategies. Another result of teachers nominating their classes is that some students are represented more than once as different teachers select their classes to undertake the survey. Due to all of these limitations, the CCQ data will have a very small impact in this study.

Students At Risk (STAR)

The STAR data is very similar to the High Achievers data in structure, however this data set consists of a sample of students deemed to be 'at risk' as opposed to those who have the highest achievement for a specific term. The STAR data defines an 'at risk' student as any student who achieved a grade below C- for any subject in their final term report. This means that the students deemed to be 'at risk' do not necessarily have the lowest achievement overall, but have failed in at least one subject for the term.

The STAR data includes both the achievement grade and their attitude grade of every student in the sample. The total population of STAR students was used in the analysis for

Term 1 of each year for both the 2016 graduates and the 2017 graduates. The data used in this study, as with the High Achievers data, is the student list containing the raw data as opposed to a report containing previous analysis of the dataset. Unlike the High Achievers data, both academic achievement and attitude were considered in the analysis of the data. These attitude grades are assumed to be the same grades that are given in the AAA and High Achievers datasets and so carry the same limitations regarding human error and judgement.

Bullying Report Summary

The Bullying Report Summary is the outcome of a survey that went to students, parents, and teachers regarding bullying in the school. It aimed to determine the prevalence and impact of bullying as well as determine risk factors and areas of increased bullying within the school.

There are a plethora of problems with this dataset which made it inappropriate for use in this study:

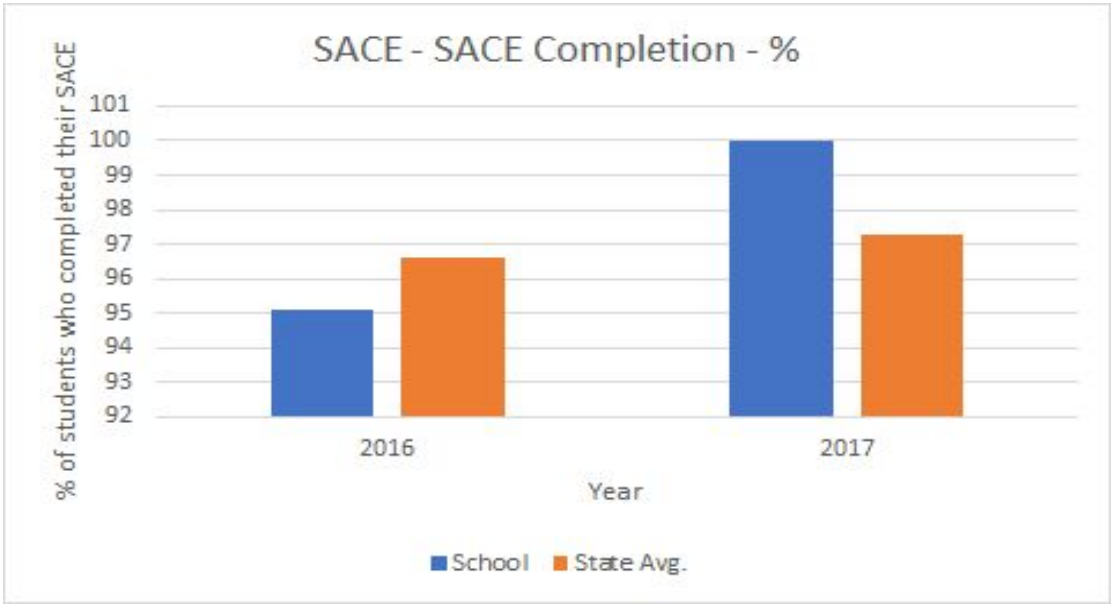
- There is no date or year on the survey indicating when it was conducted.
- Sample size is not known.
- 48 of the 384 data points given (12.5%) were deemed to be unreliable due to percentages being incorrect.
- Report failed to clarify terms used in the survey questions (for example, 'Class BTA').

In addition to this, the report itself does not contain any discussion of limitations besides question marks besides obviously unreliable data points.

Analysis and Synthesis

The analysis will consist of four different sections; general analysis, achievement, attendance, and attitude. The general analysis will include data that directly compares the other three variables to be looked at more closely in later sections. The aim of this structure is to identify possibilities for deeper analysis in the general analysis as well as develop an understanding of the study as a whole before delving deeper. For the purposes of this study, a p-value of $p<0.05$ will be considered to be significant when analysing correlation between two data sets or means. Therefore, if $p>0.05$, the two samples being compared will be described as not significantly correlated and therefore, different.

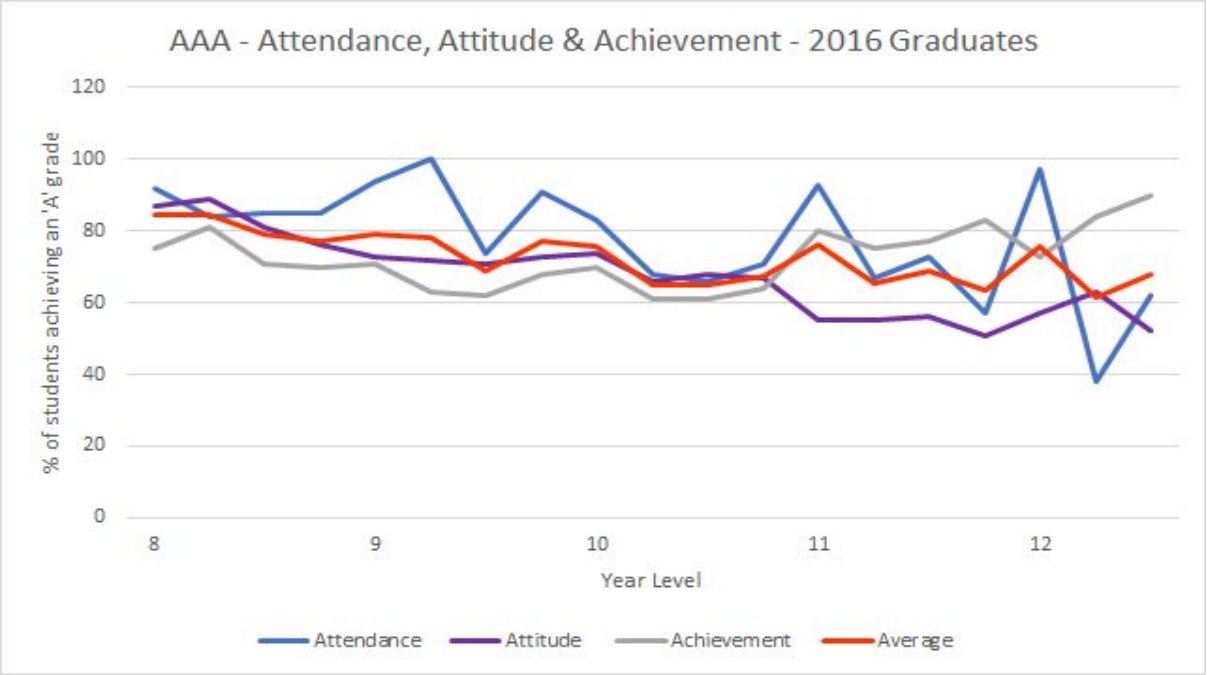
Graph 1



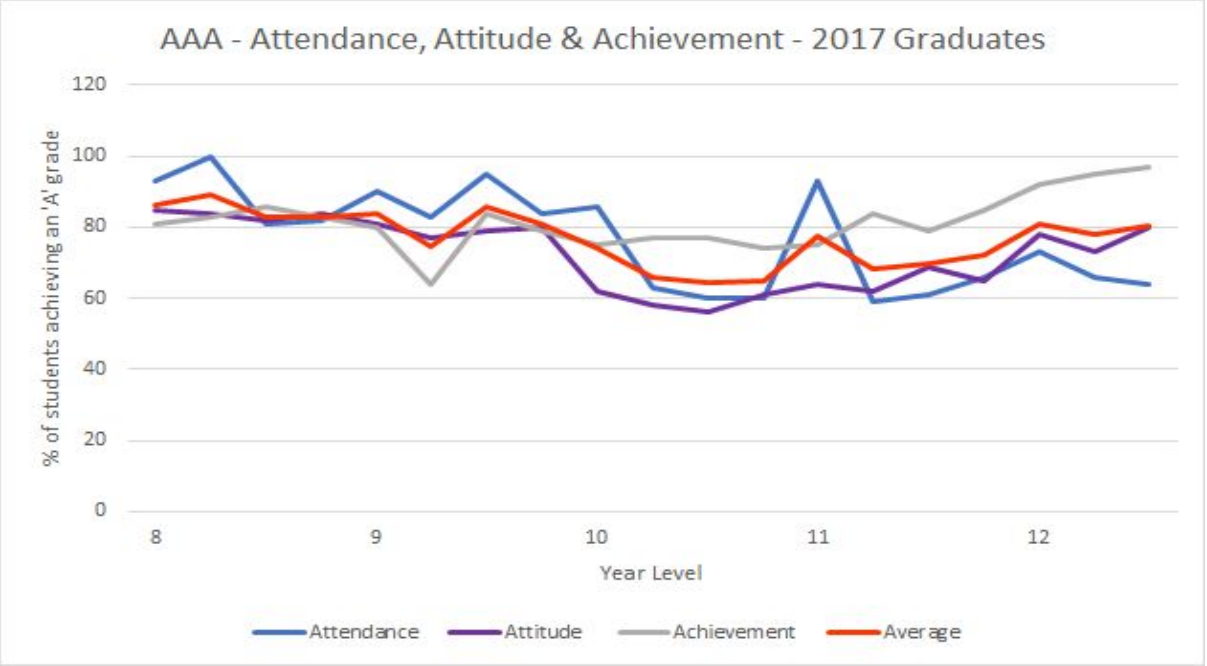
The hypothesis of this study is based on the data represented in Graph 1; not only did the 2017 graduates have a higher percentage of students achieve their South Australian Certificate of Education at the end of Year 12 compared to the 2016 graduates, but the 2017 graduates achieved 100% completion and a smaller percentage of the 2016 graduates succeeded compared to the state average for that year. This led to the hypothesis that the difference in SACE achievement between the 2016 and 2017 graduates can be attributed to student engagement throughout each cohort's schooling.

General analysis

Graph 2

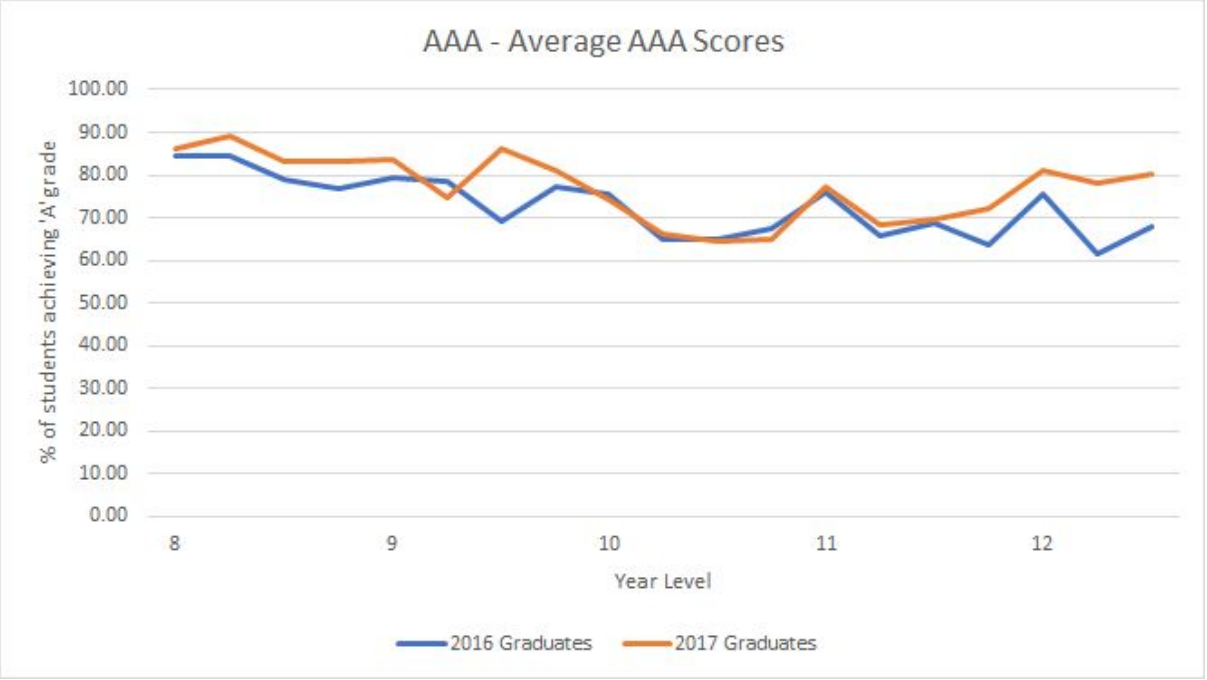


Graph 3



Graphs 2 & 3 show the percentage of students who achieved the highest grade for attendance, attitude, and achievement for each term of each year except for Term 4 in Year 12 as this data is not recorded for any cohort. The red line on each graph is the average of the three variables for each term.

Graph 4



Graph 4 is a more direct comparison of the mean percentage of students achieving the highest grade for attendance, attitude, and achievement from both cohorts. Observable in this graph is a trough in the 2016 graduates where there is a peak in the 2017 graduates during Year 9, and an apparent divergence in the means occurring after the beginning of Year 12.

Table 1

AAA - Correlation		
	r=	p=
Attendance	0.65	0.0026
Attitude	0.51	0.026
Achievement	0.64	0.0032
Mean	0.70	0.0009

Analysis of the correlation between each variable for each cohort as seen in Table 1 resulted in a significant correlation for each variable.

Table 2

AAA - Variance			
	2016 Graduates	2017 Graduates	Significance of Correlation
Attendance	255.65	195.62	p=0.29
Attitude	129.01	98.02	p=0.28
Achievement	71.37	60.26	p=0.36
Mean	51.25	59.15	p=0.38

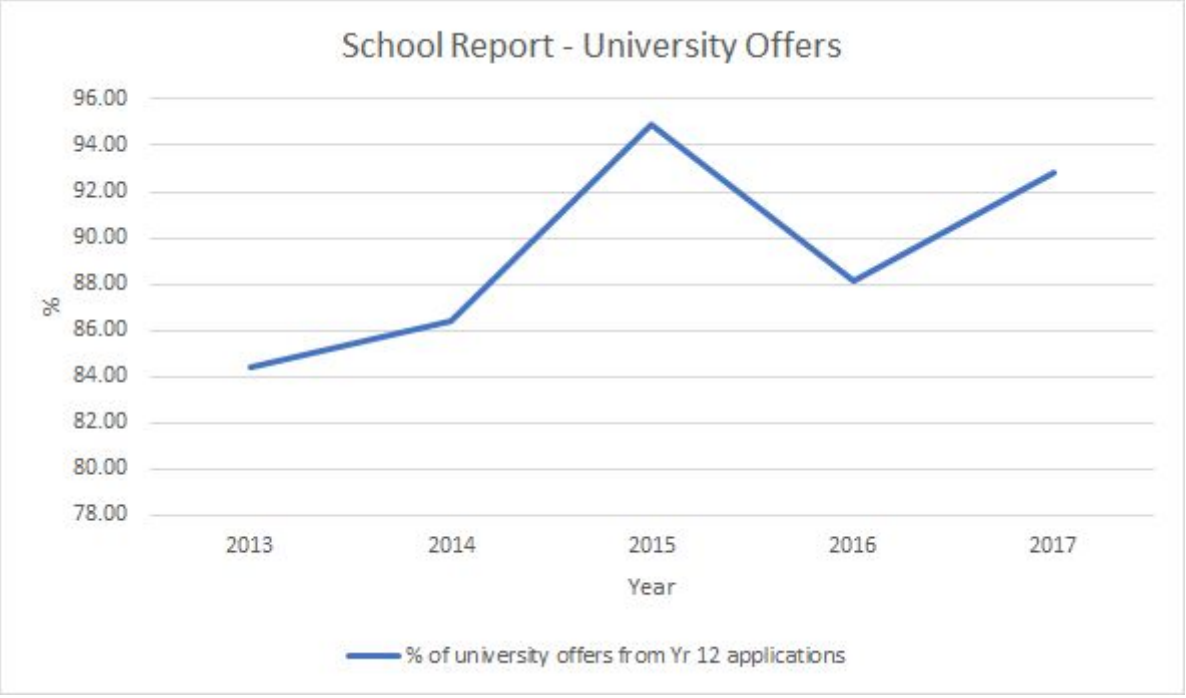
There is no significant difference between the variance of the two cohorts for any of the variables measured.

Table 3

AAA - Mean			
	2016 Graduates	2017 Graduates	Significance of Correlation
Attendance	77.89	76.79	p=0.82
Attitude	67.68	72.63	p=0.015
Achievement	72.58	81.58	p=0.0012
Mean	72.72	77	p=0.077

Analysis of the mean of each variable for each cohort was used to determine which cohort had the overall higher percentage of students achieving the highest grade in attendance, attitude, achievement, and mean AAA score throughout their schooling. Attendance was higher in the 2016 graduates, however the difference between the means is insignificant (as per Table 3), while the average percentage of students achieving the highest grade for attitude and achievement was significantly higher for the 2017 graduates.

Graph 5



Graph 5 shows the percentage of Year 12 university applications that resulted in the student receiving an offer for years 2013-2017. The percentage of university applications that result in the student receiving a university offer has steadily increased between 2013 and 2017 with 2015 being an outlier with a higher percentage of university applications resulting in offers. This outlier has resulted in a decrease between the 2015 graduates and the 2016 graduates, however Graph 5 suggests that the percentage of university offers from Year 12 university applications for 2016 is in line with the general upwards trend if the outlier is disregarded.

The analysis of the AAA data has found that while a higher percentage of the 2016 graduates achieved the highest possible grade for attendance when compared to the 2016 graduates, the difference is not substantial. What is substantial is the difference in attitude and achievement, with the 2017 graduates having a higher percentage of students receiving the highest grade for both. There was no significant difference in variance, and there was significant correlation between the two cohorts, suggesting that both cohorts experienced similar timing and severity of fluctuations in their attendance, attitude, and achievement throughout their schooling. 2015 had an unexpectedly high percentage of students who applied for university receiving offers, and so it is recommended that the reliability of this data point is assessed by the school and an investigation carried out into any underlying factors which could have caused it. This outlier, being a part of a data set with few points, has skewed the data to reflect badly on the outcomes of the 2016 graduates which appear to actually be in line with the general upwards trend.

Achievement

Graph 6

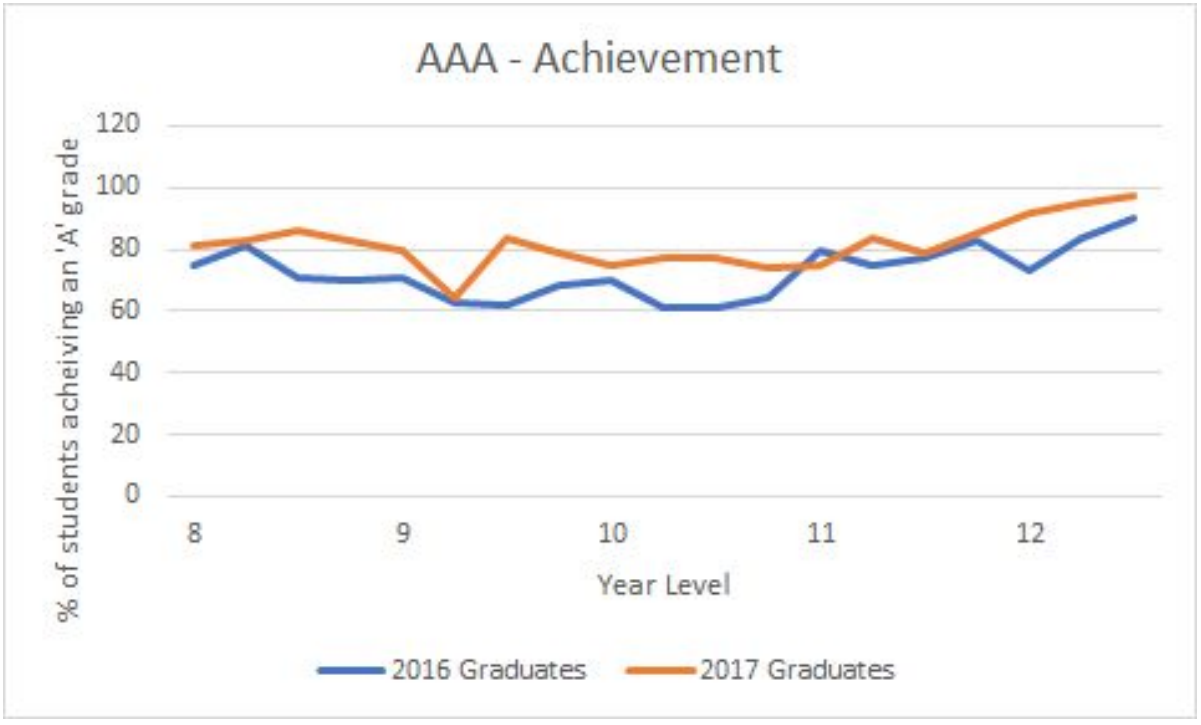


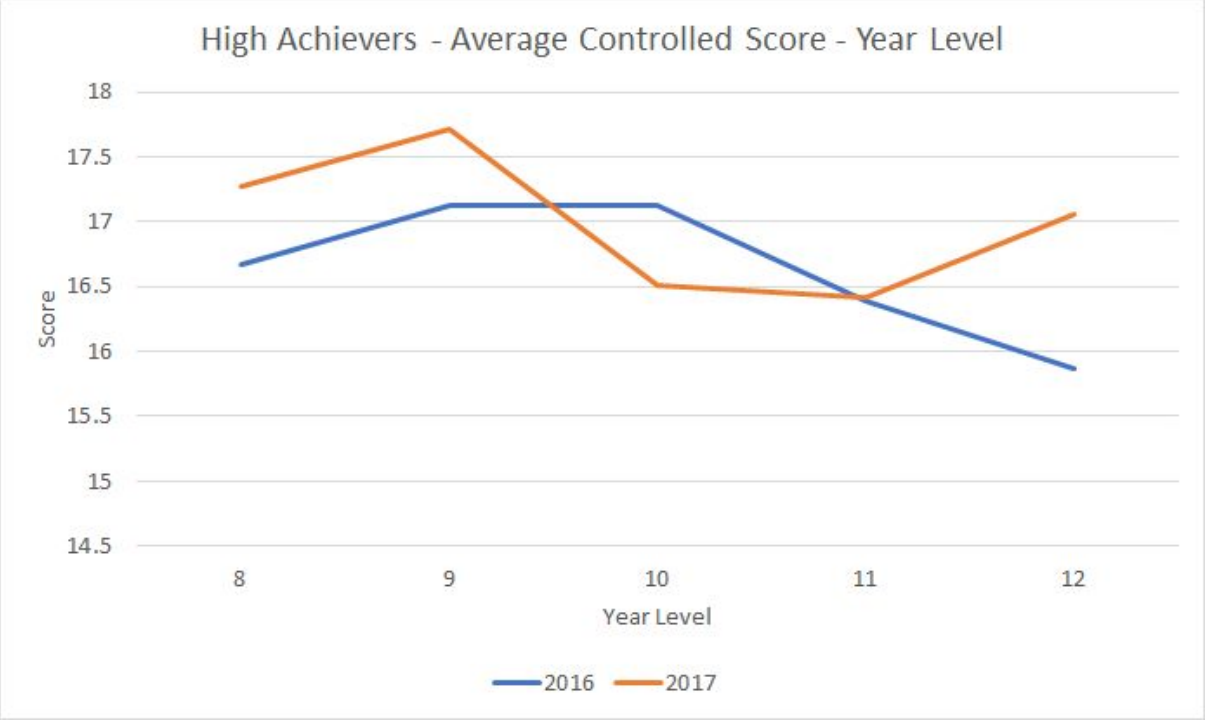
Table 4

AAA - Achievement			
	2016 Graduates	2017 Graduates	Significance of Correlation

Variance	71.37	60.26	p=0.36
Mean	72.58	81.58	0.0012

Graph 6 shows the achievement data taken from the AAA dataset. The data consists of the percentage of students who achieved the highest possible achievement grade for their AAA report for every term for each cohort. The correlation between the two datasets is significant (r=0.64, p=0.0032), and the mean percentage of students achieving the highest grade across each cohort's time in high school (as seen in Table 4) is significantly higher for the 2017 graduates.

Graph 7



Graph 7 shows the average controlled score for each cohort from the High Achievers data set. Each cohort was sampled once per year at the end of Term 1. The scores given in the High Achievers dataset are determined by academic achievement grades and the number of subjects taken. Because of this, the score was divided by the number of subjects taken by each student to get a score per subject. A sample of the 50 highest scoring students was used for each cohort each year. These are not necessarily the same students each year. The correlation between the cohorts is insignificant (r=0.18, p=0.77), however the correlation between the two cohorts during Year 8 is very strong (r=1, p<0.00001).

Table 5

High Achievers - Average Controlled Score			
	2016 Graduates	2017 Graduates	Significance of Correlation
Variance	0.28	0.29	p=0.50
Mean	16.63	16.99	p=0.27

Table 5 shows the variance and mean of both cohort's High Achievers data. There was not significant difference in mean or variances, meaning that the 2017 graduates had statistically similar variance and mean to the 2016 graduates.

Graph 8

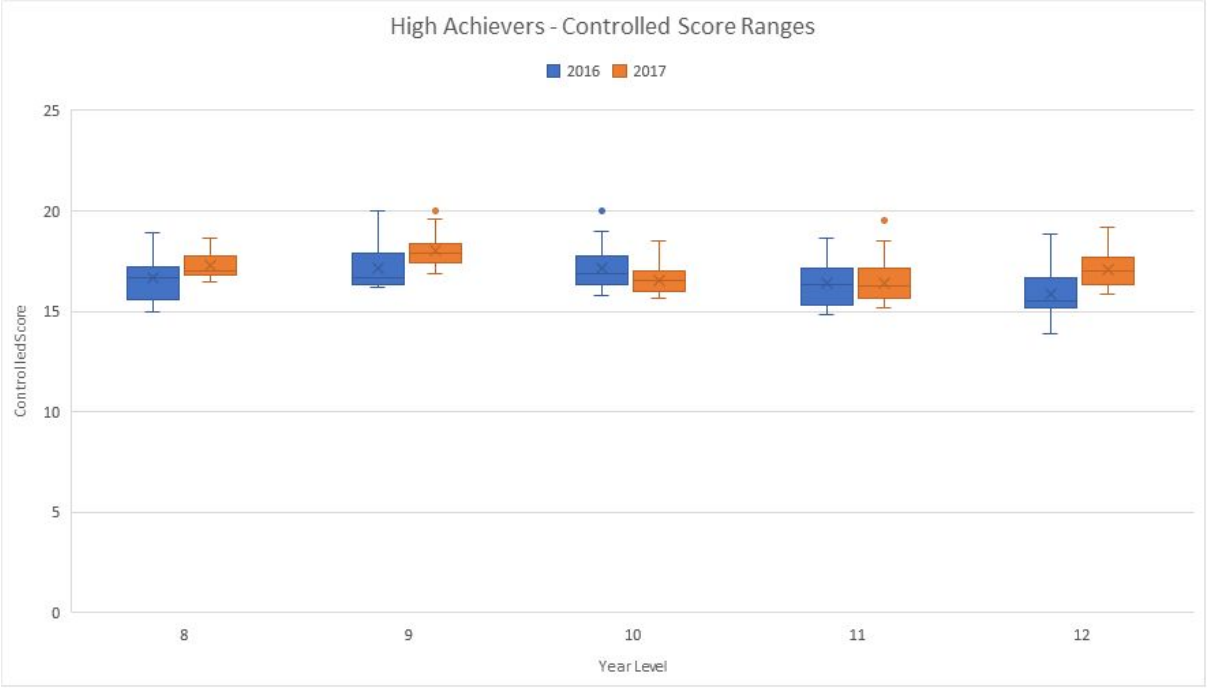


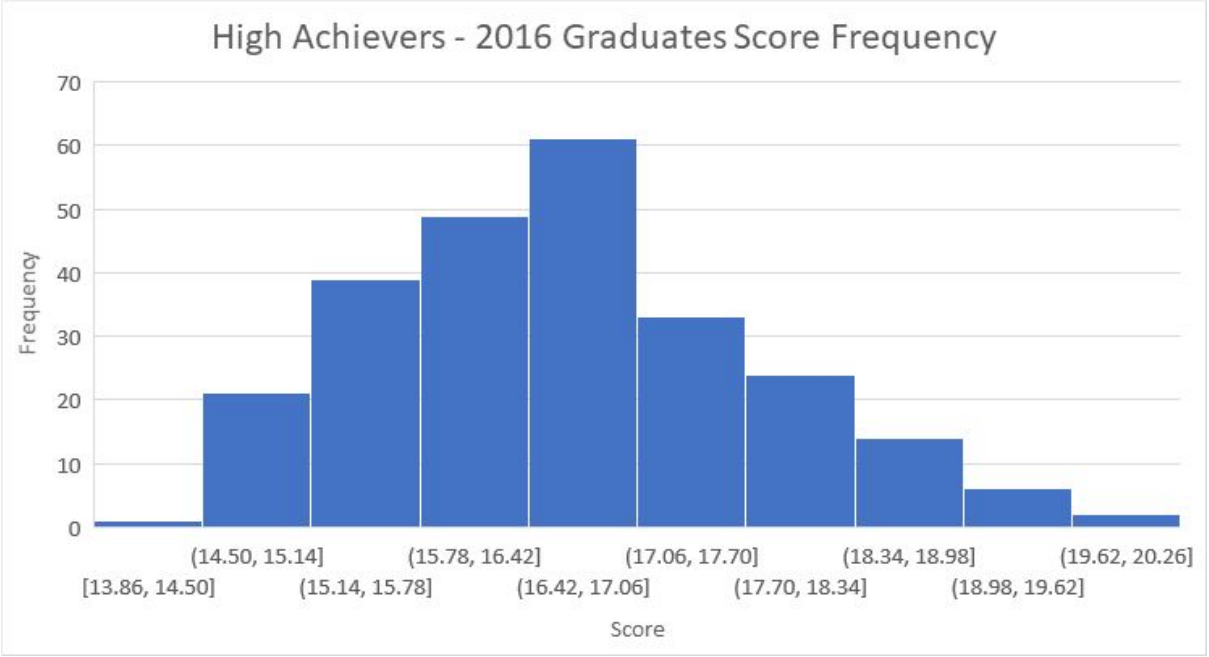
Table 6

High Achievers - Controlled Score Ranges		
	2016 Graduates	2017 Graduates
Sample size	250	250
Standard Dev.	1.15	0.99

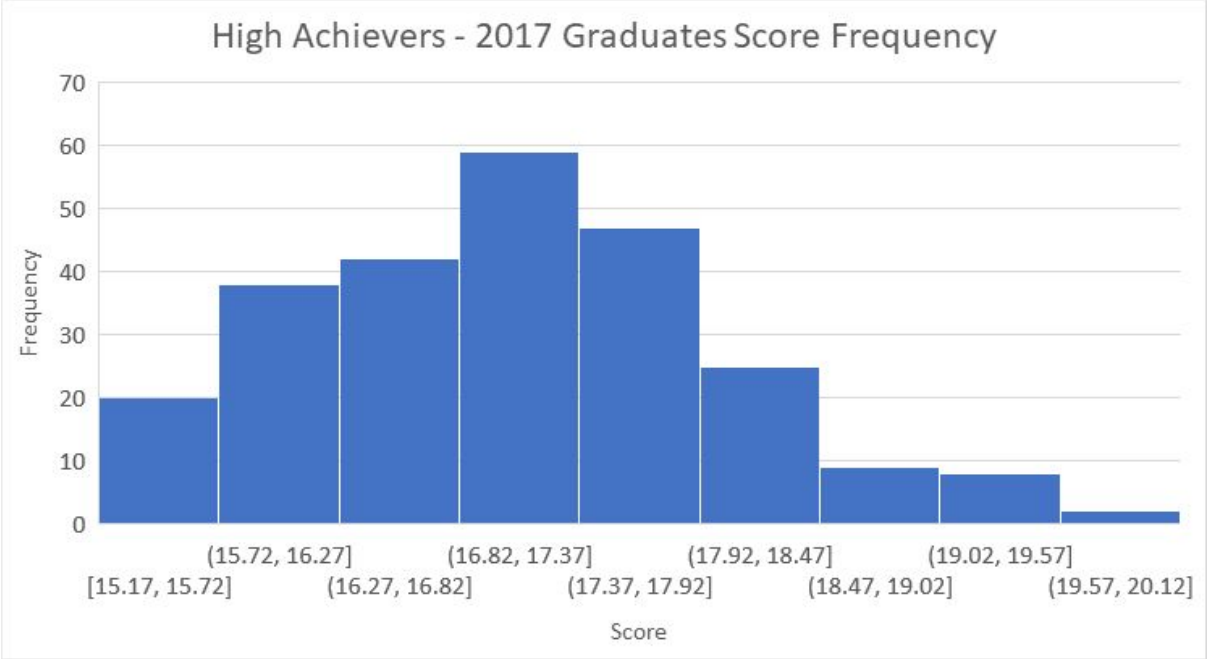
Mean	16.63	17.06
Min	13.86	15.17
Max	20	20
Range	6.14	4.83

Graph 7 and Table 5 were synthesised from the average High Achievers score for each term of each year of the two cohorts' schooling. Graph 8 and Table 6 were synthesised from the total sample of High Achievers scores and so should be used to supplement and confirm the conclusions drawn from Graph 7 and Table 5.

Graph 9

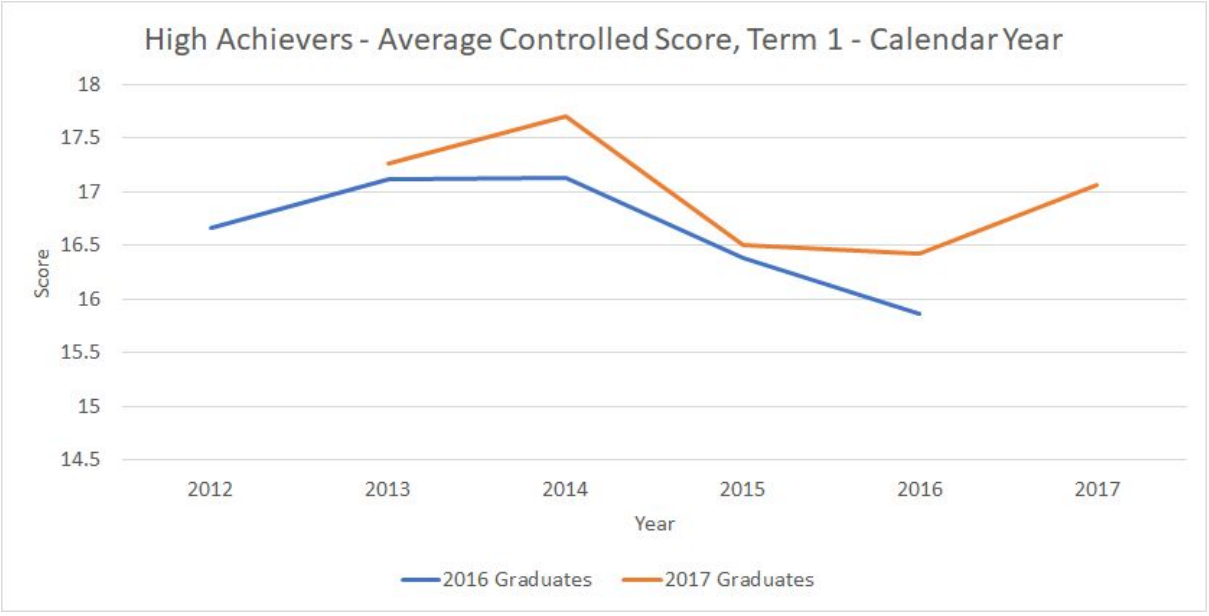


Graph 10



Graphs 9 and 10 show the frequency of High Achievers scores for the whole sample (n=250). There is a significant correlation between the two cohorts (p=0.00001) when school year level is not accounted for. Due to this analysis providing a significant correlation and previous analysis which discriminated according to school year level not correlating significantly (p=0.77), the hypothesis was formed that school year level was less of a determining factor in high achievement scores than calendar year.

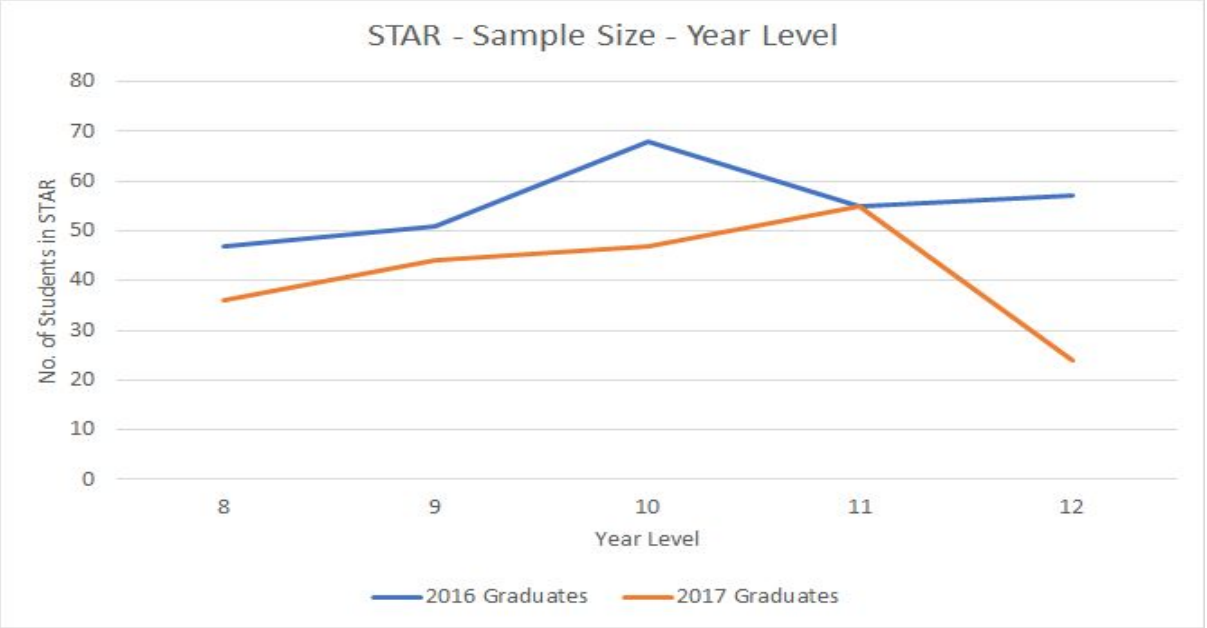
Graph 11



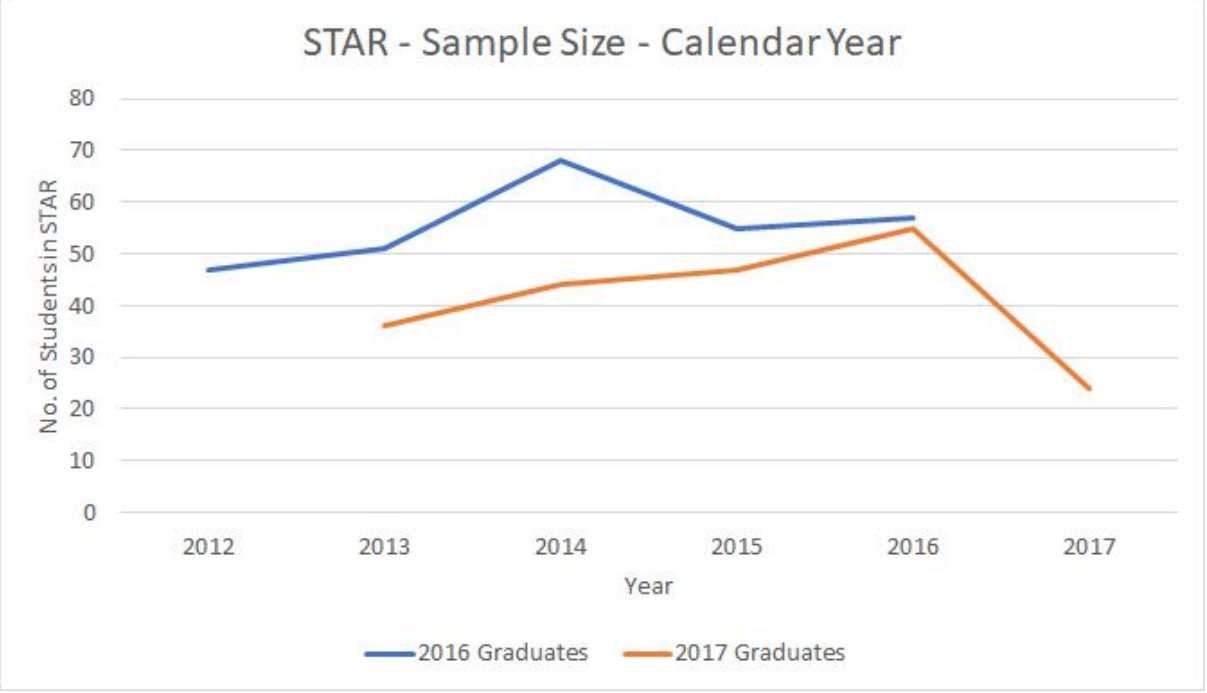
Graph 11 shows the averaged controlled score for the 2016 and 2017 graduates when the independent variable has been adjusted to compare calendar years as opposed to school year levels. The correlation between the two cohorts with this adjustment is both stronger

(r=0.92 as opposed to r=0.18); however, the correlation is still not significant (p=0.08 as opposed to p=0.77). The fact that the correlation is stronger when considering the calendar year as opposed to the school year level means that the hypothesis that the calendar year is more of a determining factor in fluctuations and trends in mean High Achievers score than school year level is supported. Other factors known to be correlated with student engagement such as attitude and attendance as well as more measures of achievement will also be compared across both school year level and calendar year in order to determine whether this effect is limited to the High Achievers data or can be said to be true for other variables and possibly, student engagement in general.

Graph 12

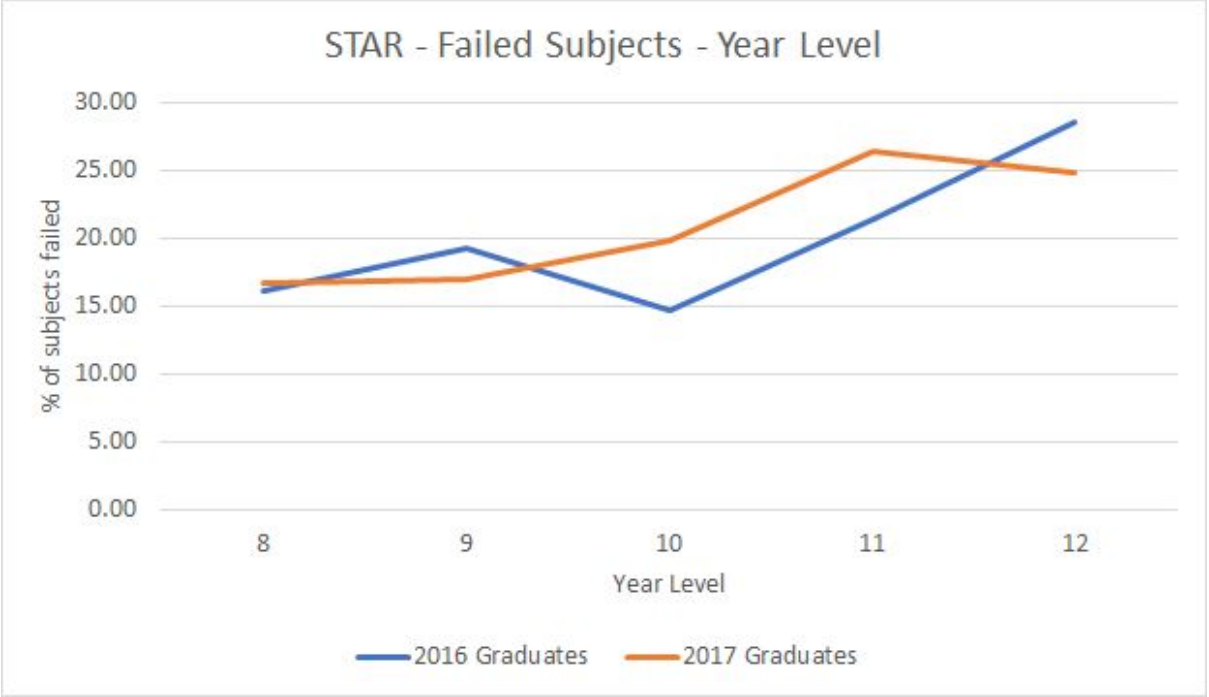


Graph 13



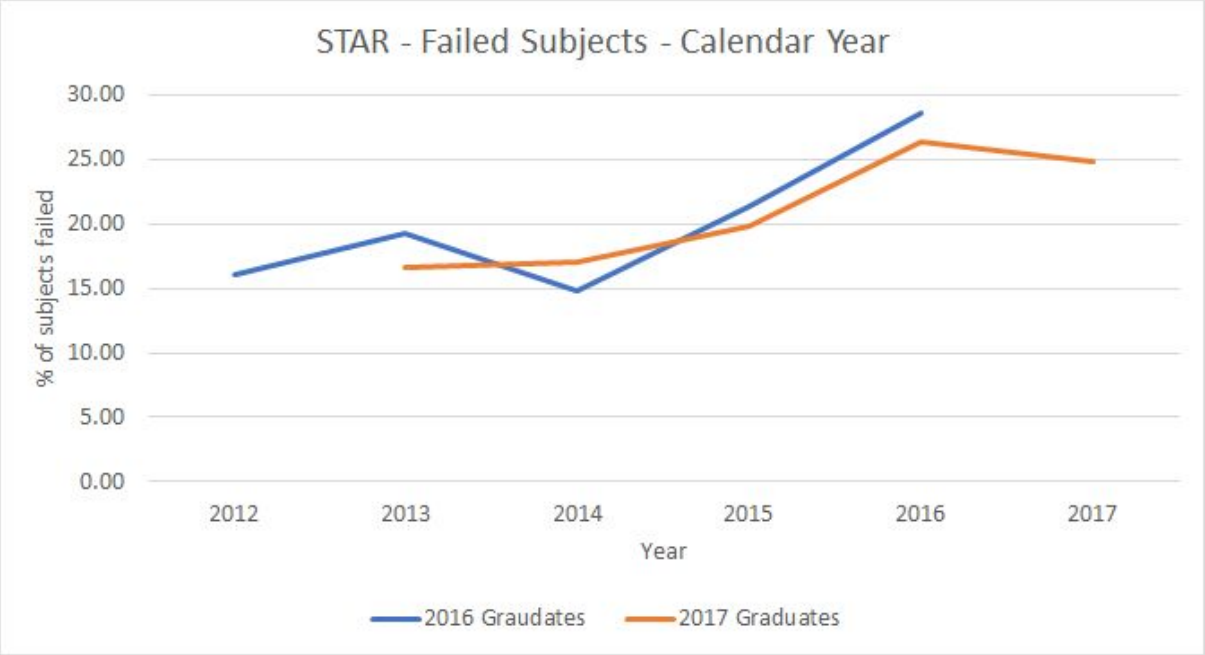
Graphs 12 and 13 show the number of students in STAR for each cohort at the end of Term 1 of each year. The two cohorts do not significantly correlate regardless of whether they are compared according to year level (r=0.19, p=0.76) or calendar year (r=0.22, p=0.78). The mean number of students in the STAR program are significantly higher for the 2016 graduates (p=0.035). One major limitation of this analysis is that the sampling strategy for the STAR program means that there is no distinction in these graphs between students who are failing only one of their subjects and those that are failing several.

Graph 14



Graph 13 takes all of the subjects for every student represented in STAR and shows the percentage of those subjects that were failed. The mean percentage of subjects failed was higher for the 2017 graduates was higher, but not significantly so (p=0.77). The two cohorts correlated more strongly when comparing the percentage of subjects failed in the STAR data when compared to the number of students in the sample (r=0.68 as opposed to r=0.19 and r=0.22), however they still did not correlate significantly (p=0.21).

Graph 15



Graph 14 shows the percentage of subjects failed based on all of the subjects taken by those students deemed to be 'at risk' in both cohorts according to calendar year. The correlation is stronger when compared to the same data compared by school year level (r=0.94), however the correlation is not significant (p=0.06).

Graph 16

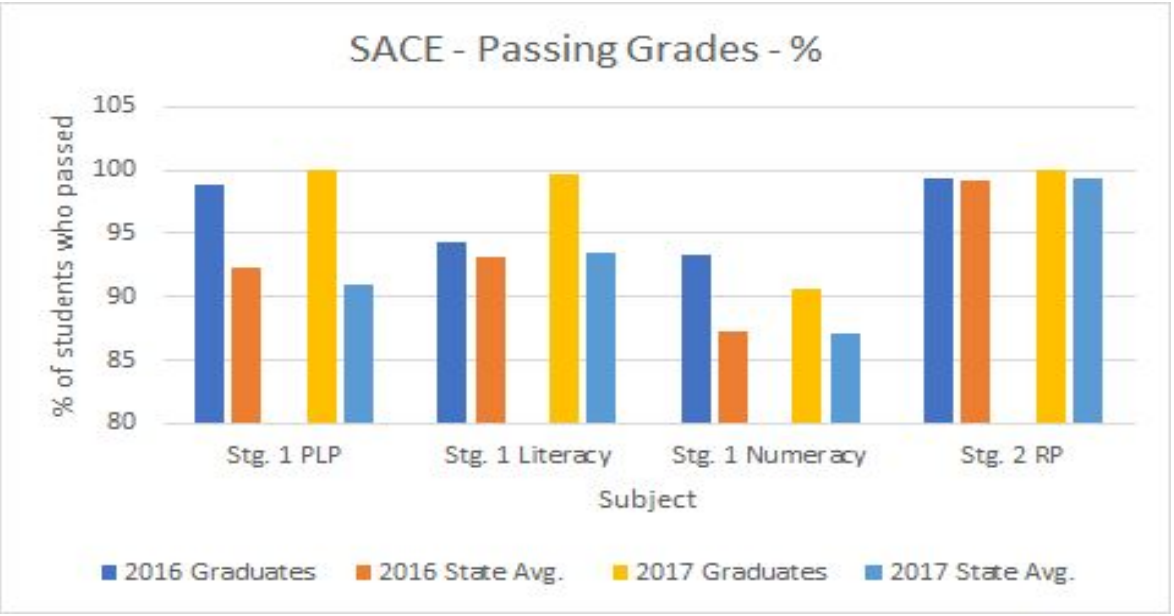


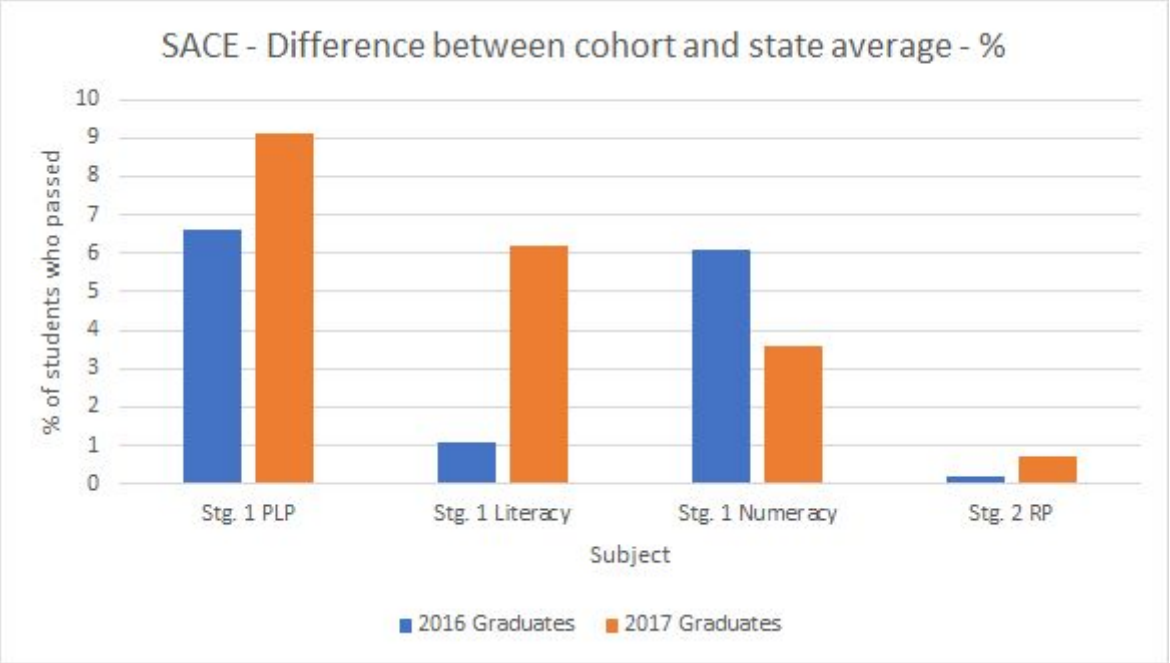
Table 7

SACE - Passing Grades - Correlation		
	r=	p=
2016 Graduates & 2016 State Average	0.75	0.25

2017 Graduates & 2017 State Average	0.73	0.27
2016 Graduates & 2017 Graduates	0.7	0.3

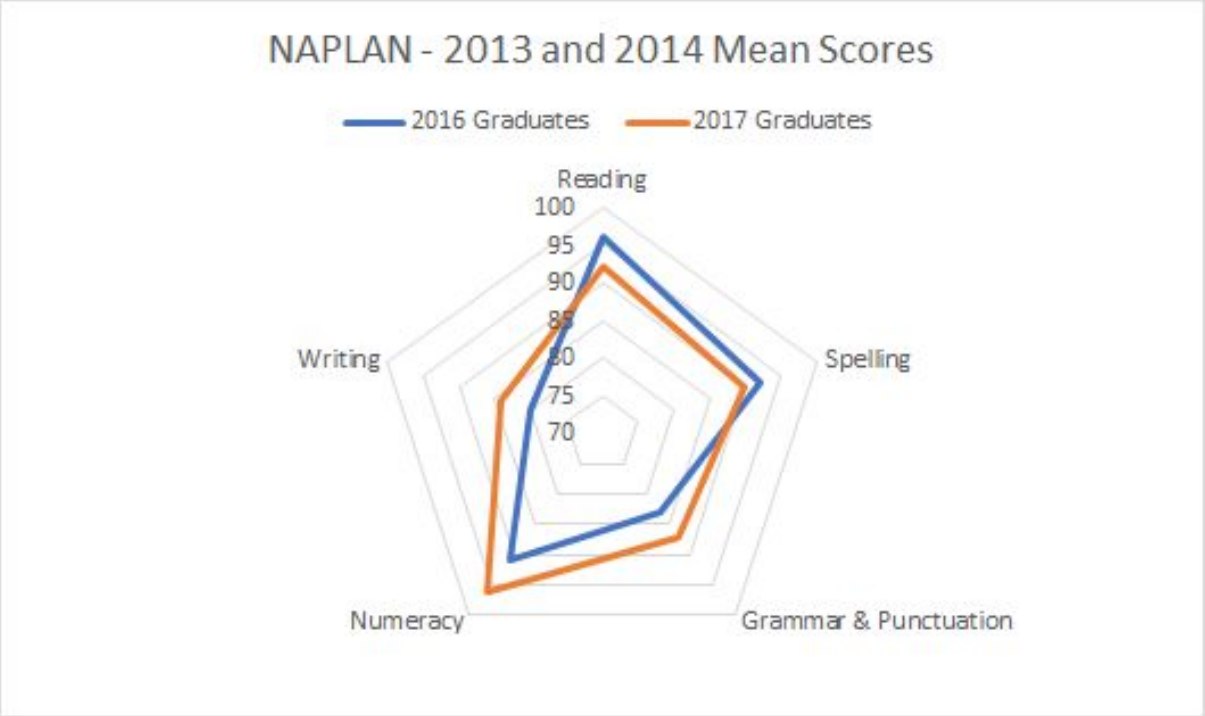
Graph 16 shows the percentage of students who passed Stage 1 Personal Learning Plan, their Stage 1 Literacy subject, their Stage 2 Numeracy subject, and Stage 2 Research Project. These subjects were chosen as they are the subjects that are compulsory for every student. Table 7 shows that neither cohort significantly correlated with their state average, and the two cohorts also did not correlate very strongly with each other.

Graph 17



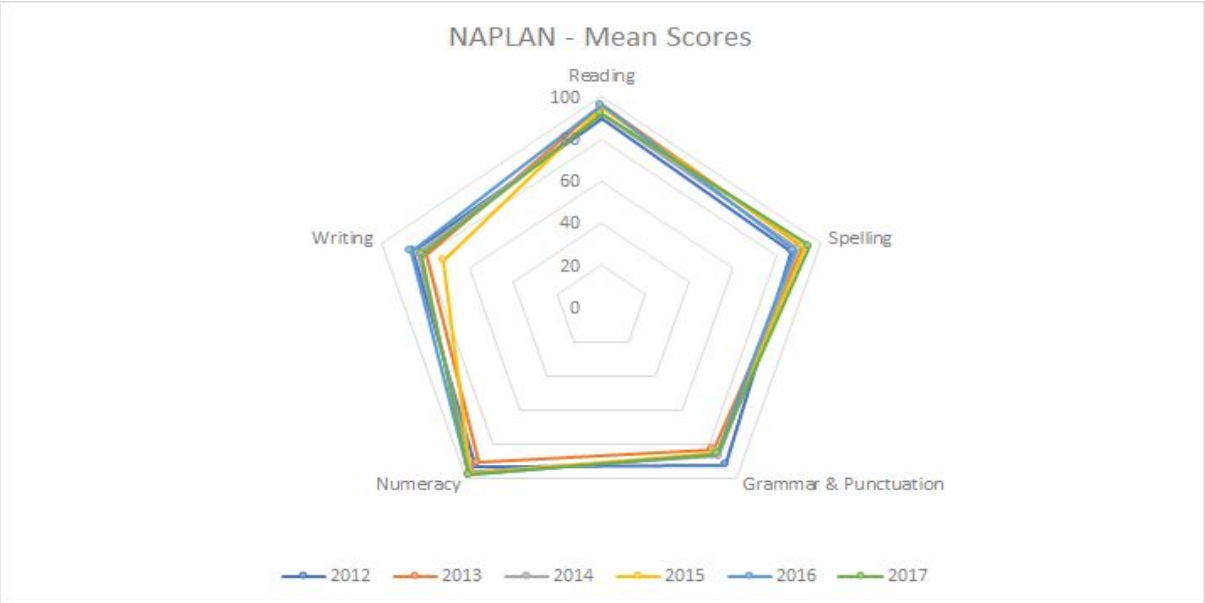
Graph 17 shows the difference in percentage of passing grades between each cohort being studied and their respective state average. For all subjects, both cohorts had a higher percentage of students achieving a passing grade for these subjects when compared to the state average for that year. In all subjects except Stage 1 Numeracy, the 2017 graduates were above their state average by a larger margin.

Graph 18



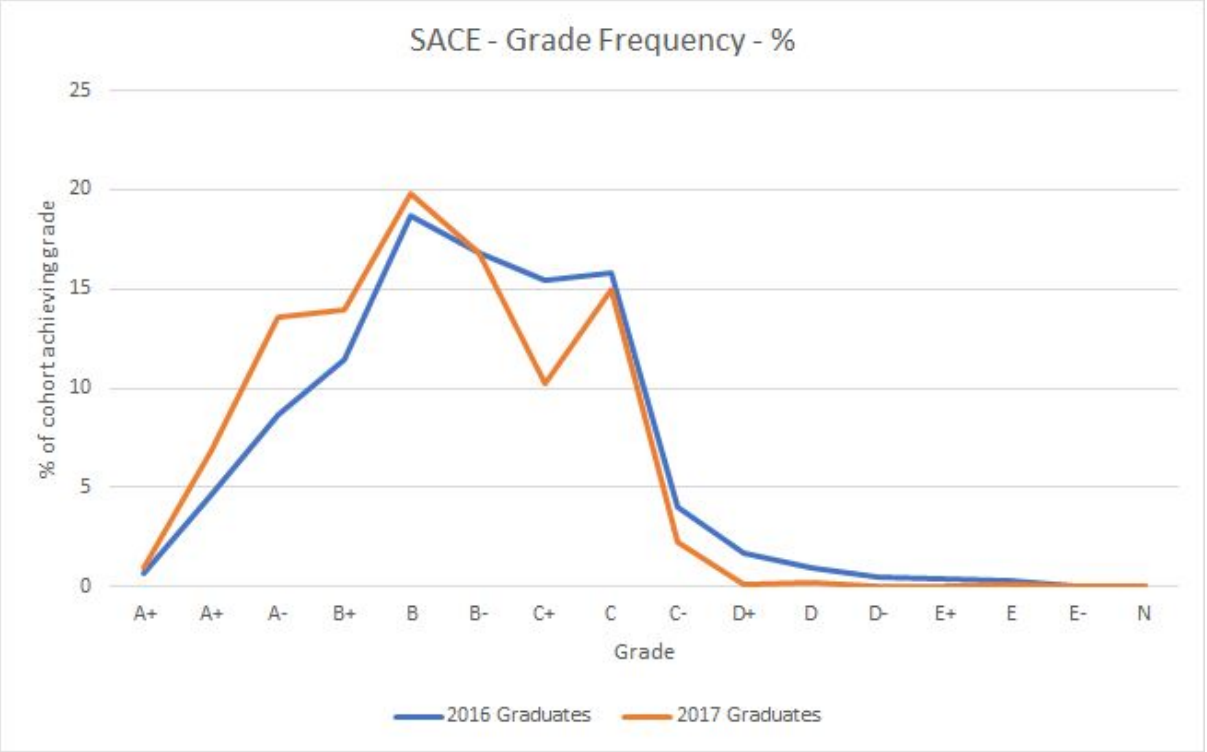
Graph 18 shows the average NAPLAN scores for each cohort when they completed the NAPLAN in Year 9. The mean score across all disciplines was higher for the 2017 graduates (89.8 as opposed to 88.4), and this difference is not significant (p=0.68), meaning that it cannot be said that the 2017 graduates achieved higher scores in the NAPLAN than the 2016 graduates. The correlation between the two cohorts is moderately strong, yet insignificant (r=0.79, p=0.11). Unlike the SACE passing grades analysis, from the NAPLAN data it can be concluded that the 2017 graduates were stronger in numeracy, at least at this point in their high schooling.

Graph 19



Graph 19 shows the average NAPLAN scores from 2012 to 2017 to act as a baseline for the results shown in Graph 18. In Graph 18, both the 2016 and 2017 graduates can be observed to have lower average scores in writing and grammar & punctuation, a trend which can also be observed in Graph 19 in relation to the tests undertaken between 2012 and 2017. It must be noted, however, that this observable trend is less pronounced in Graph 19. Both the 2016 ($r=0.90$, $p=0.037$) and 2017 ($r=0.98$, $p=0.0034$) graduates correlate significantly with the mean scores recorded between 2012 and 2017, supporting the idea that differences between achievement in these specific areas is not cohort specific and it is a trend observable across years and cohorts in the context of this school.

Graph 20



Graph 20 shows the percentage of students who achieved each grade whilst completing their SACE for both cohorts. Both cohorts strongly correlate ($r=0.96$, $p=0.0001$), despite the lack of correlation between the cohorts regarding the percentage of students who passed specific core subjects as seen in Graph 16 and Table 5. The trough in percentage of the 2017 graduates who achieved a C+ grade is observably sharper than that observed in the 2016 graduates, however there is no way to examine this further with the current data.

The concept of the calendar year having more impact on fluctuations in the High Achievers data is something that should be investigated further to determine whether these represent similar fluctuations in student engagement. Unfortunately, the High Achievers and STAR datasets are the only datasets available for which this effect can be measured in relation to achievement as the NAPLAN and SACE data is only collected for each cohort in specific year levels and so do not give comparable data across a number of calendar years. It is also interesting that the school for the last five years has struggled in the same areas of Writing and Grammar & Punctuation in the NAPLAN. This could be a cultural issue such as these areas not given as much focus or attention by students and the wider school community, or rooted in the primary schools as this effect is seen relatively early on in the students' high

school careers. Whether this is a cultural issue or a lack of skills issue will determine which strategies the school will need to employ to combat this problem, and so the determining factors in producing these lower Writing and Grammar & Punctuation scores should be investigated further before deciding a course of action.

The numeracy and literacy when comparing the SACE and NAPLAN is interesting, with the SACE (Graphs 16 and 17) suggesting that the 2016 graduates had higher achievement in numeracy whereas the NAPLAN (Graph 18) suggests that the opposite is the case. There are several factors which could contribute to these results; the NAPLAN and SACE are both one-time measurements of academic success which occur at opposite ends of high school, and the NAPLAN has the potential to be skewed by a few high achievers in the 2017 graduating cohort whereas the SACE is a measure of the percentage of students who achieved higher than a C. This would suggest that either the 2016 graduates improved their numeracy in relation to the 2017 graduates throughout high school, or that the 2016 graduates' results were more consistent with the mean. It cannot be determined whether there was in fact improvement in the 2016 graduate's numeracy from this data due to sampling, and even if that conclusion could be drawn, there would be no indication from this data that this improvement had any relation to student engagement. Regardless, the difference between the two cohorts' overall achievement in the NAPLAN is insignificant, and both cohorts were above the state average for every core subject represented in this data. In relation to the hypothesis of this study, the 2017 graduates did have a higher average High Achievers score, yet the difference was insignificant. The STAR data showed that while the 2016 graduates had a higher number of students represented, the difference between the number of failing grades in each cohort was insignificant. Therefore, from the achievement data, it can be concluded that while the mean achievement scores suggest that the 2017 graduates had higher academic achievement, they also seemed to have the most variation within their cohort; that there may have been students who had very high achievement and those who had very low achievement, as opposed to the 2016 graduates who appear to have fewer students in these categories and are instead more clustered around the mean. This conclusion makes the trough in the 2017 graduates' data in Graph 20 much more interesting.

Attendance

Graph 21

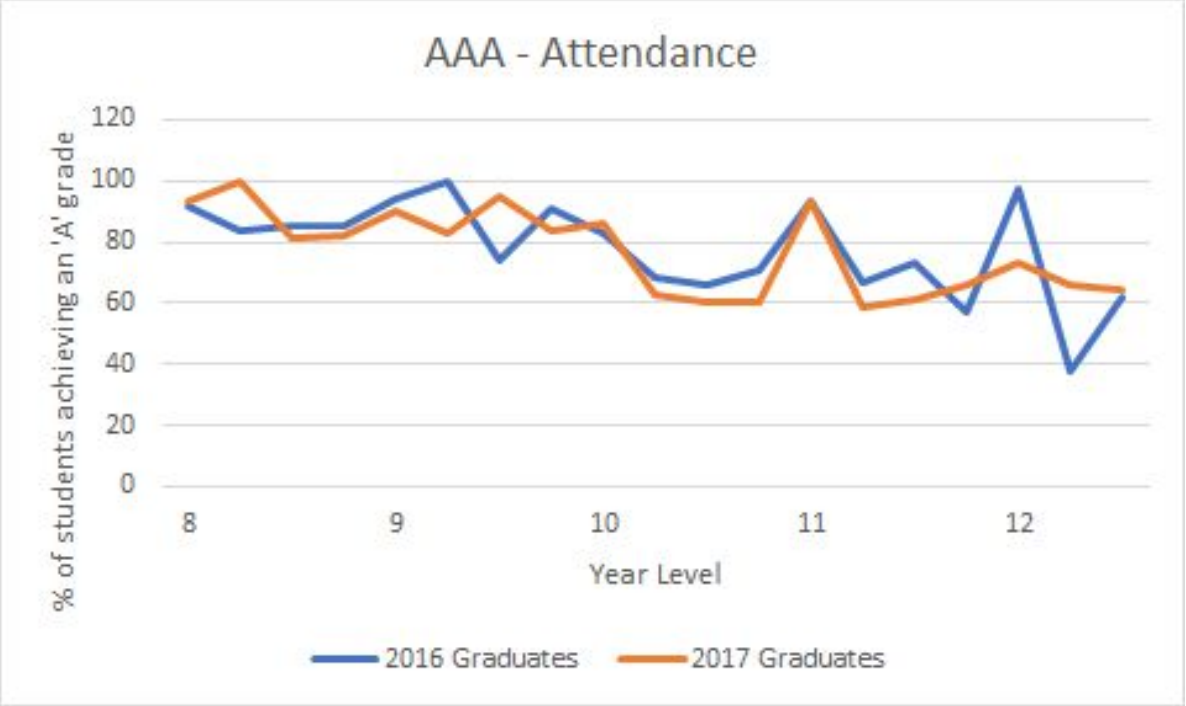
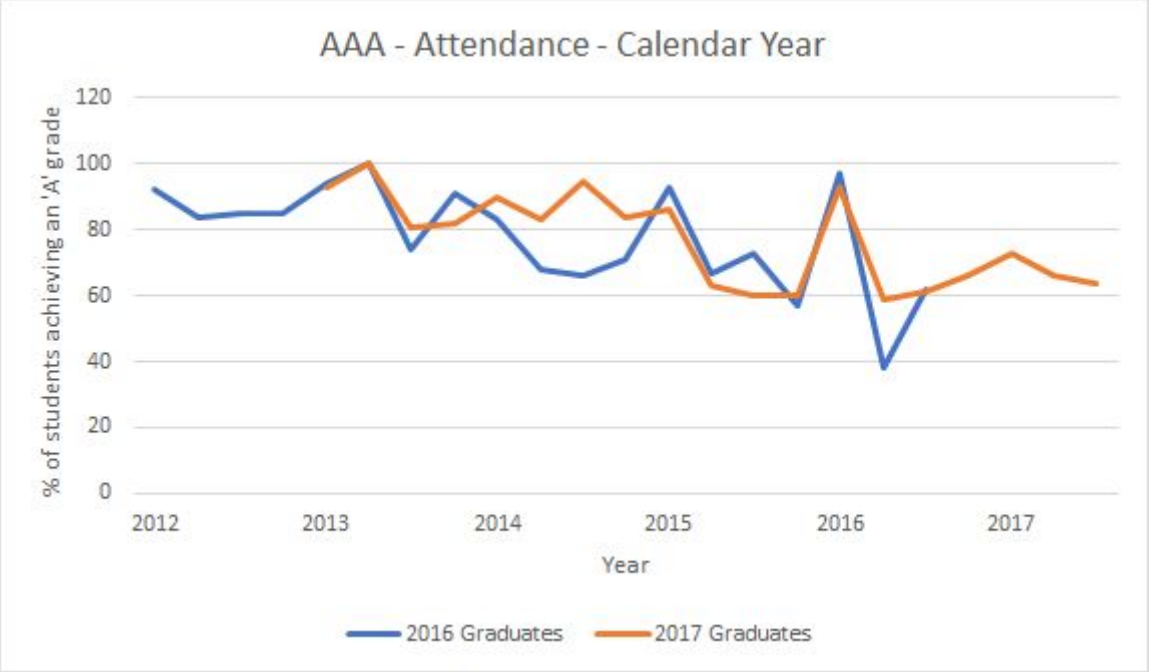


Table 8

AAA - Attendance			
	2016 Graduates	2017 Graduates	Significance
Variance	255.65	195.62	p=0.29
Mean	77.89	76.79	p=0.82

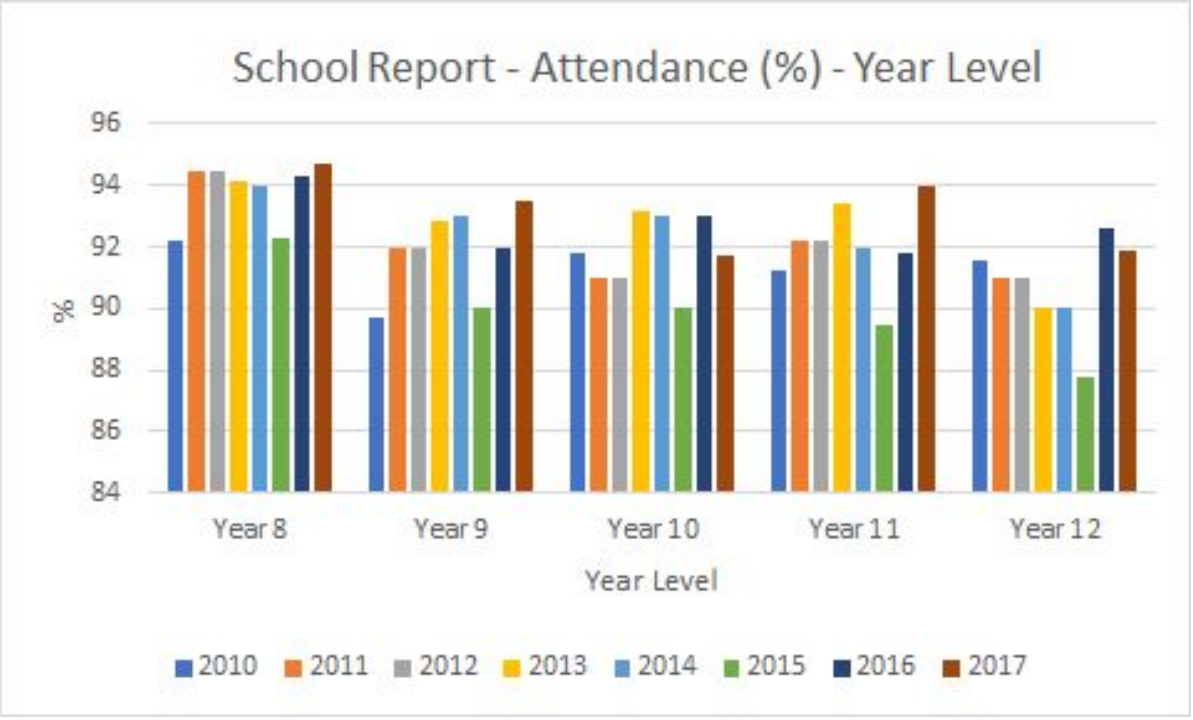
Graph 21 shows the percentage of students who achieved the highest grade for attendance from the AAA data set. There is a significant correlation between the two cohorts (r=0.65, p=0.0026). Table 8 shows the variance and mean of each cohort's attendance data, as well as the significance of the correlation between the two cohorts' variance and mean. The 2016 graduates did not have significantly more variance in their achievement of high attendance scores in comparison to the 2017 graduates, and the difference in mean is also insignificant. Peaks in attendance are observable in Graph 21 at the beginning of most years, with the peak in the 2016 graduates as they began Year 12 before a sharp decline being of particular note.

Graph 22

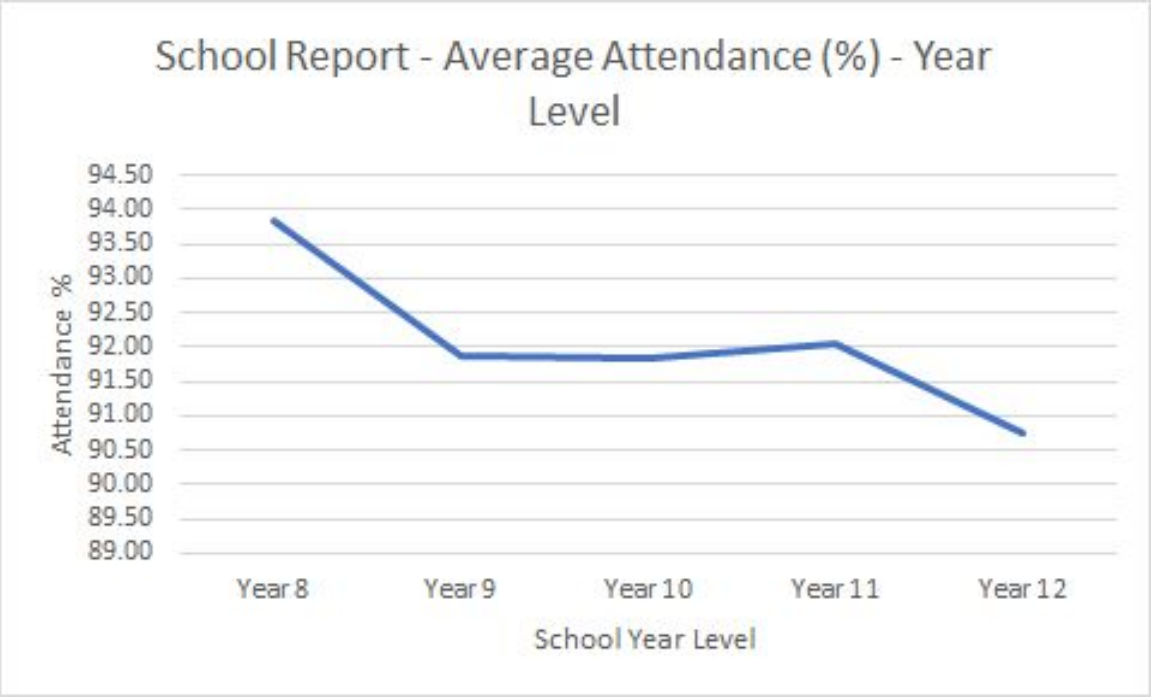


Graph 22 shows the same data represented in Graph 21, except that the two cohorts are compared according to calendar year. The correlation between the two cohorts is stronger when compared by calendar year ($r=0.75$, $p=0.0013$); however, both comparing according to calendar year and school grade results in a significant correlation between the two cohorts. It can also be observed from this analysis that both cohorts reached 100% of students achieving the highest grade for attendance in the same term of the same year; Term 2 of 2013.

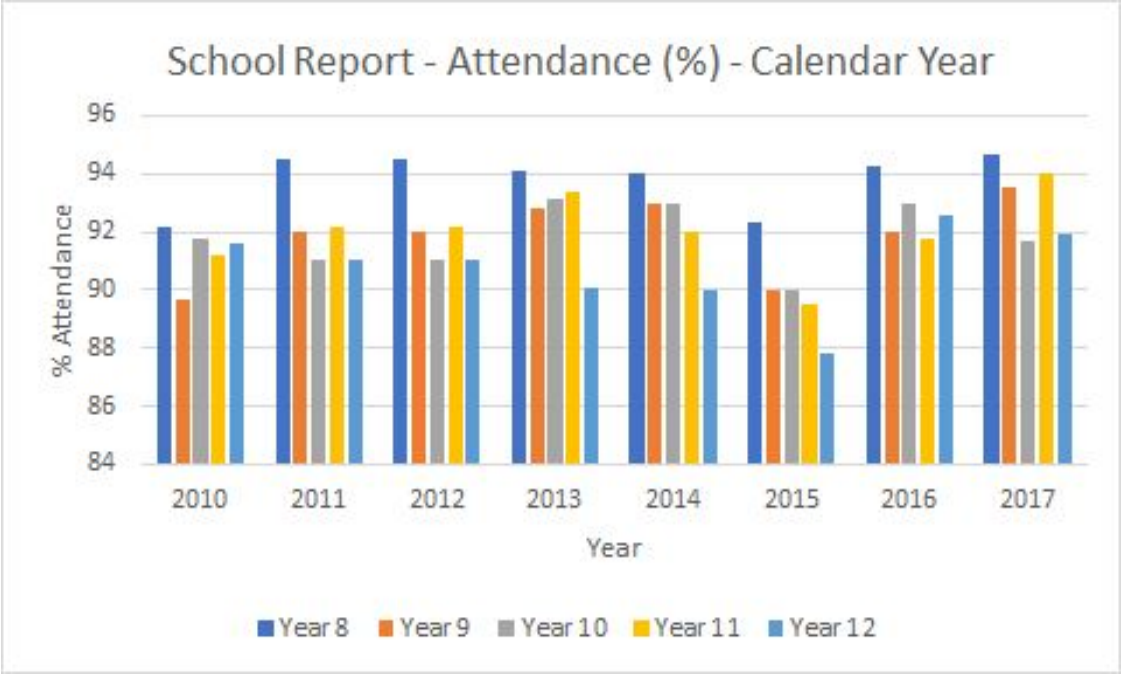
Graph 23



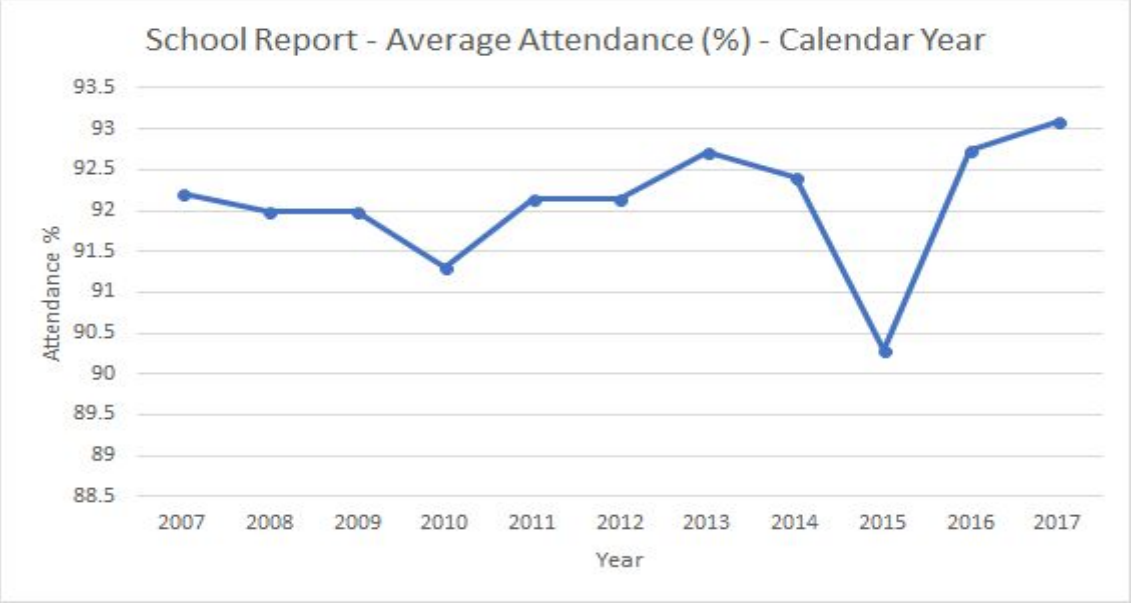
Graph 24



Graph 25

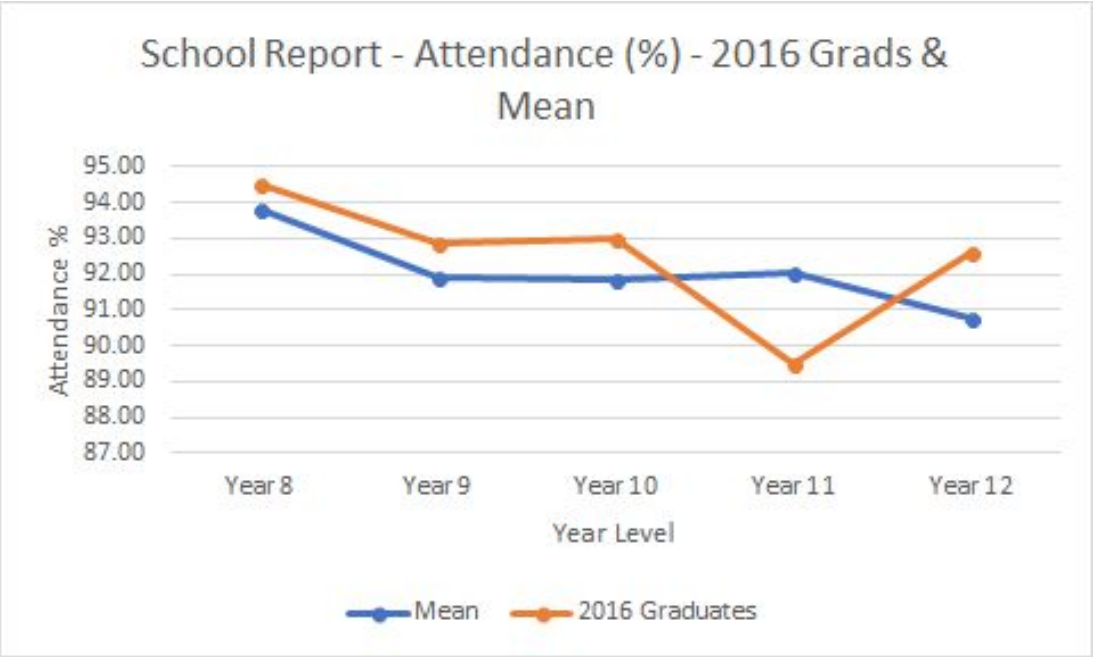


Graph 26



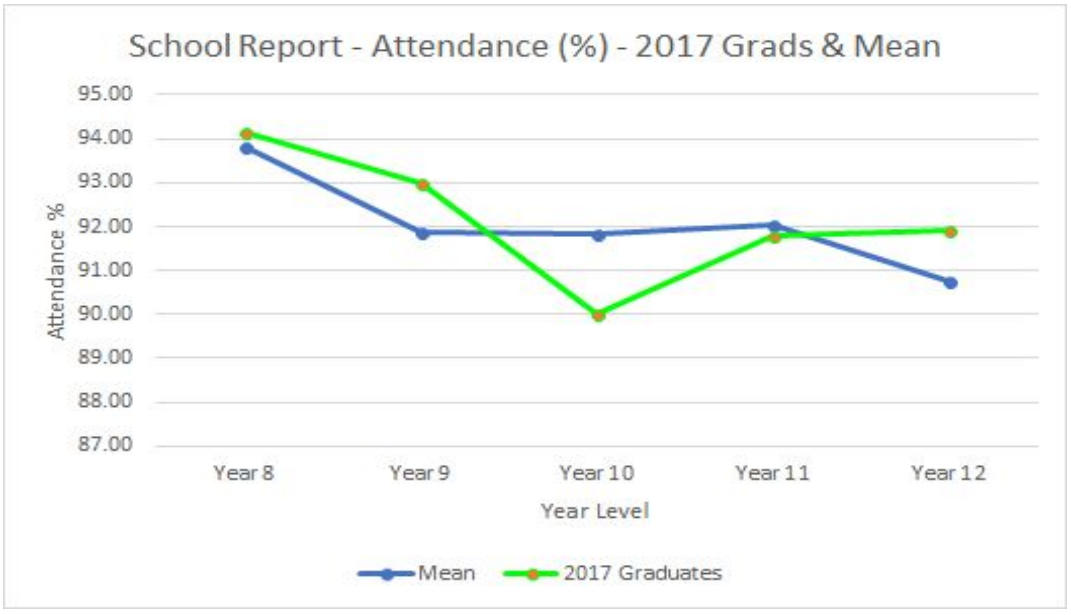
Graphs 23-26 show the attendance of each cohort for each year as a percentage. This percentage represents the percentage of school days each student in the cohort is present. Graphs 23 and 24 are sorted according to school year level, and Graphs 25 and 26 are sorted according to calendar year. Graphs 23 and 20 distinguish between different cohorts, whereas Graphs 24 and 26 show the average attendance percentage for all the cohorts represented. Graph 24 represents data from 2010 to 2016 and Graph 26 represents data from 2007 to 2016, due to years 2007-2009 only having attendance data for the whole school available. From Graph 23, it can be observed that the 2016 and 2017 graduates seemed to have a higher attendance percentage when compared to other cohorts in Year 12. Graphs 25 and 26 reveal a trough in attendance occurring in 2015. It can also be observed that Year 8s consistently have the highest attendance percentage.

Graph 27



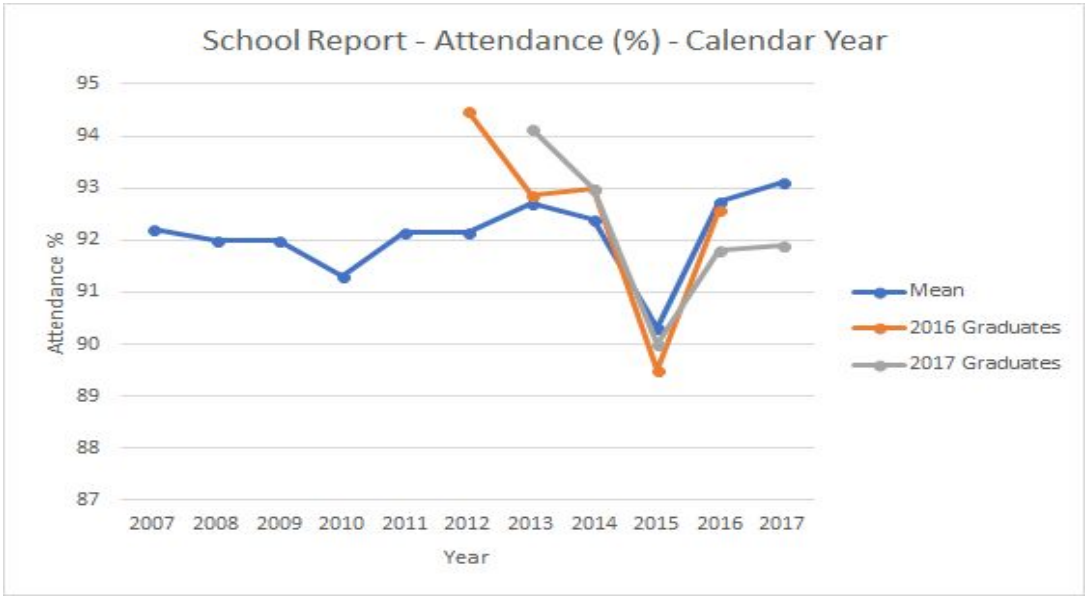
Graph 27 shows the average attendance percentage per school year level as represented in Graph 24 with the addition of the 2016 graduates attendance percentage data. The 2016 graduates' attendance percentage does not significantly correlate with the mean (r=0.41, p=0.49); however, it does correlate if the attendance data from 2015 is disregarded (r=0.98, p=0.0034). Even with the inclusion of 2015 as an outlier, the mean attendance of the 2016 graduates is not significantly different to the mean (p=0.66).

Graph 28



Graph 28 shows the average attendance percentage of the cohorts from 2010-2016 as well as the attendance percentage from the 2017 graduates. The 2017 graduates attendance percentage does not correlate significantly with the mean (r=0.61, p=0.11) and still does not correlate when the outlier of 2015 is disregarded (r=0.79, p=0.11). The mean attendance percentage for the 2017 graduates is also higher than the mean, yet similarly to the 2016 graduates, the difference is insignificant (p=0.36).

Graph 29



Graph 29 shows the mean attendance percentage by calendar year compared to both the 2016 and 2017 graduates, and clearly identifies 2015 as an outlier. Neither the 2016 graduates ($r=0.80$, $p=0.10$) nor the 2017 graduates ($r=0.83$, $p=0.082$) correlated significantly with the mean. When 2015 is disregarded, the 2016 graduates had a significant negative correlation to the mean ($r=-0.91$, $p=0.032$), suggesting that the fluctuations in attendance as determined by school year level have greater influence than calendar year, with the one obvious exception of 2015.

The primary observation from the analysis of the attendance data is that the conclusions that can be drawn in relation to the hypothesis are determined by sampling. For example, analysis of the AAA attendance data which is the percentage of students who achieved the highest possible grade for attendance by their teachers for each term of each year seemed to correlate more strongly across the two cohorts according to calendar year as opposed to school year level, however analysis of the School Report attendance data appears to reveal the opposite. With the exclusion of 2015, the 2016 graduates in particular significantly correlated with the mean when compared according to school year level, however had an almost perfect negative correlation when compared according to calendar year.

The primary conclusion from the analysis of attendance data in regards to the hypothesis is that attendance does not appear to have been an influencing factor in the school completion rates as neither of the cohorts' attendance data from the School Report was significantly different from the mean when 2015 was excluded. This in addition to the 2016 graduates' unusually high attendance in Year 12 as seen in Graph 23 suggests that either attendance as measured in these datasets is not a good indicator of student performance and engagement, or that the hypothesis that the 2016 graduates had significantly lower engagement than the 2017 graduates needs to be rejected.

The major implication of the analysis of attendance data, however, must be in regards to 2015. It is highly recommended that the school in question investigates this further. Whether it is an environmental, cultural, or other factor which resulted in unusually low attendance for every analysed cohort during this year, the results are significant and affect the whole shape of the data.

Attitude

Graph 30

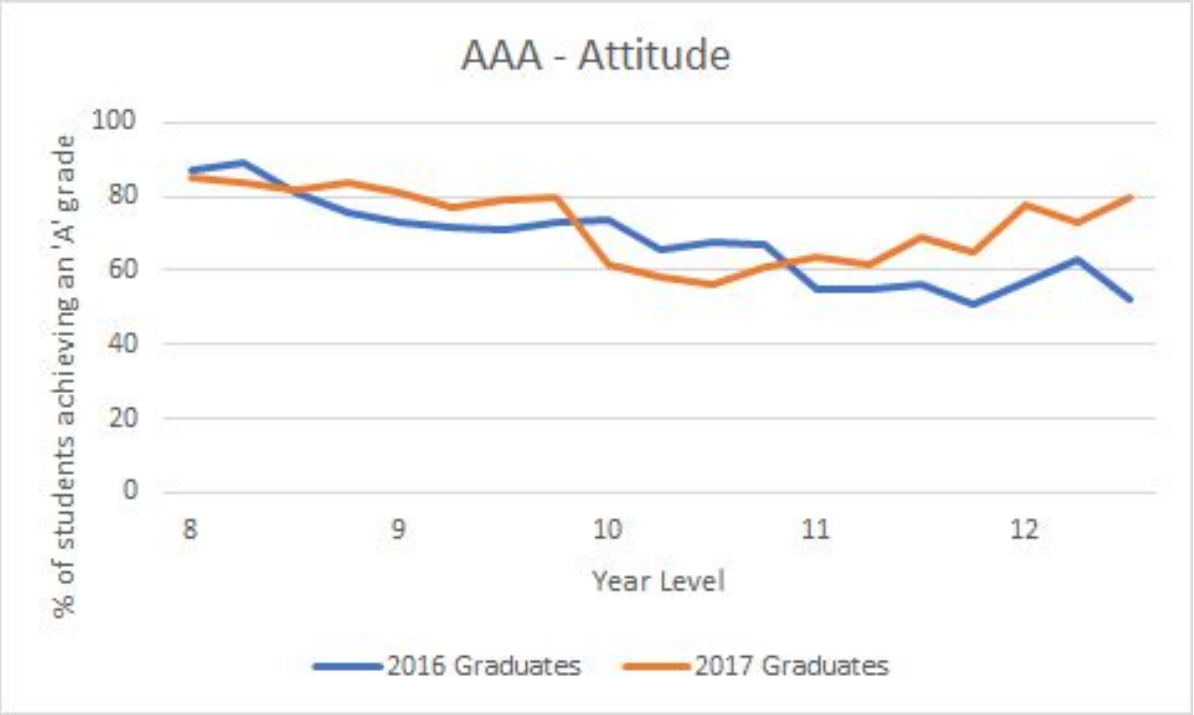
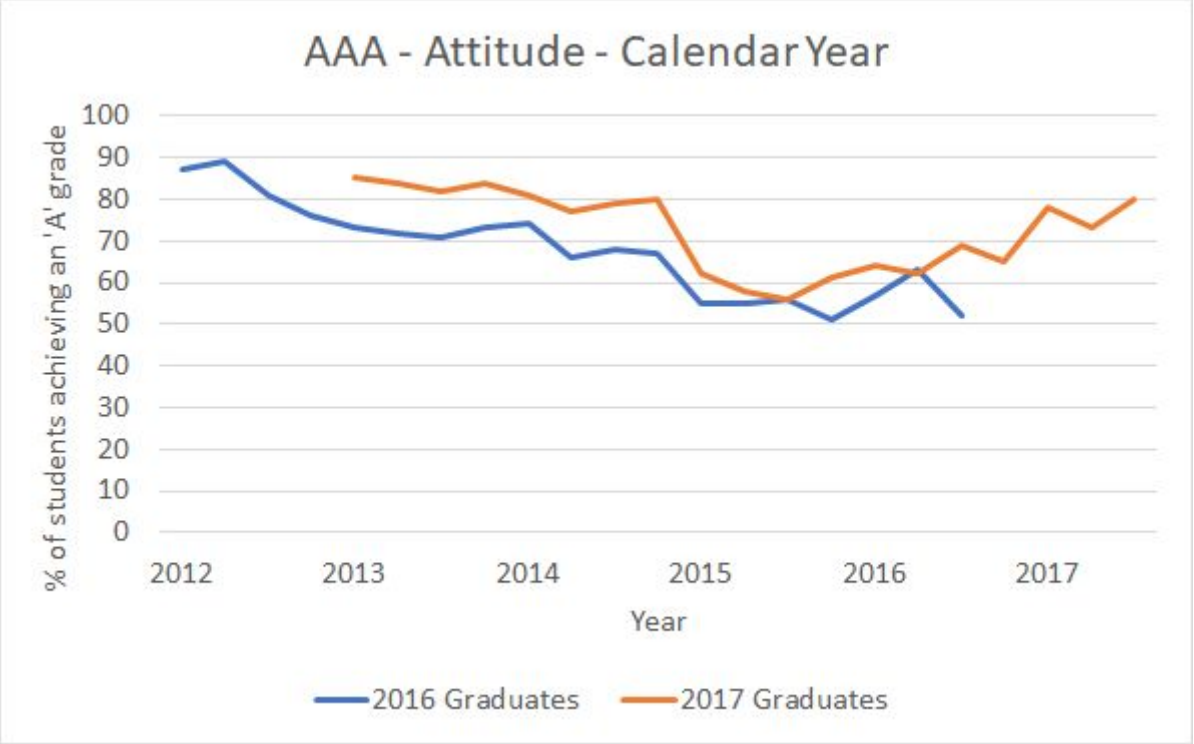


Table 9

AAA - Attitude			
	2016 Graduates	2017 Graduates	Significance
Variance	129.01	98.02	p=0.28
Mean	67.68	72.63	p=0.015

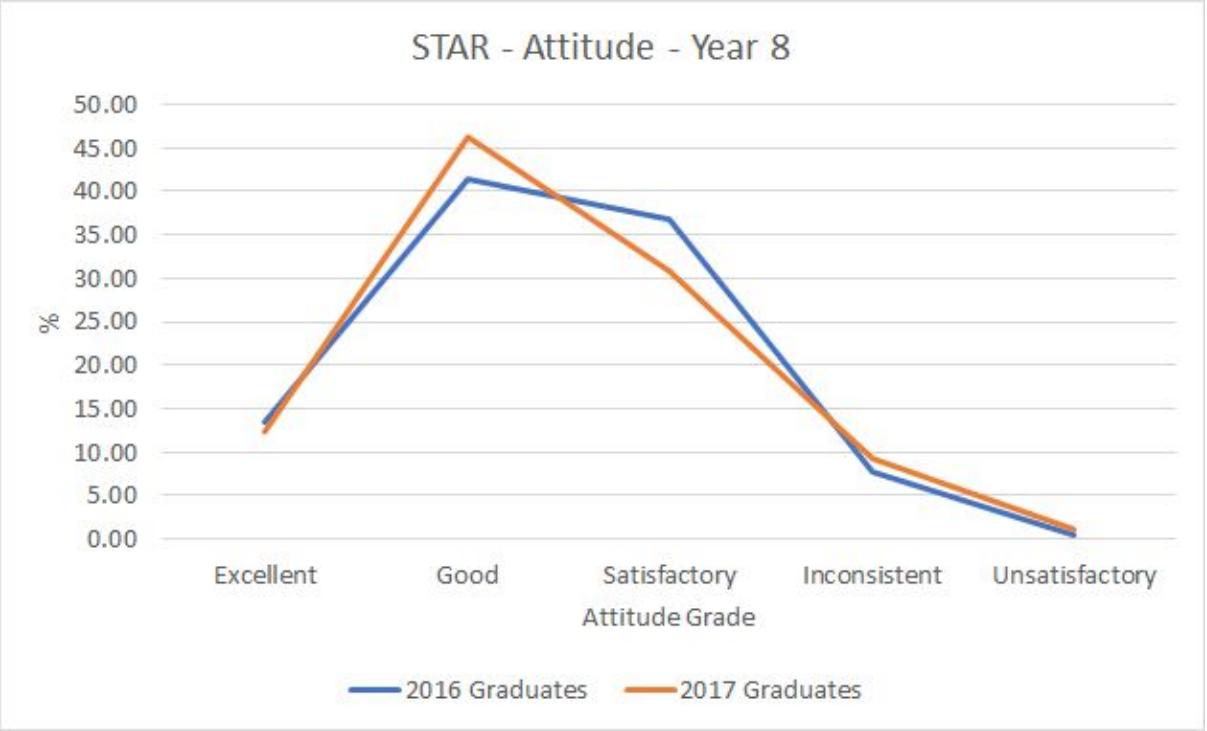
Graph 30 shows the Attitude data for the AAA dataset. The percentages of students achieving the highest grade for attitude are significantly correlated (r=0.51, p=0.026), and the mean for the 2017 graduates is significantly higher (p=0.015) than that of the 2016 graduates. The 2016 graduates did not experience significantly more variance in their percentage of students achieving the top grade for attitude (p>0.05) and as Graph 30 shows, there is an observable divergence in the percentage of students achieving the highest attitude score occurs in Years 11 and 12.

Graph 31

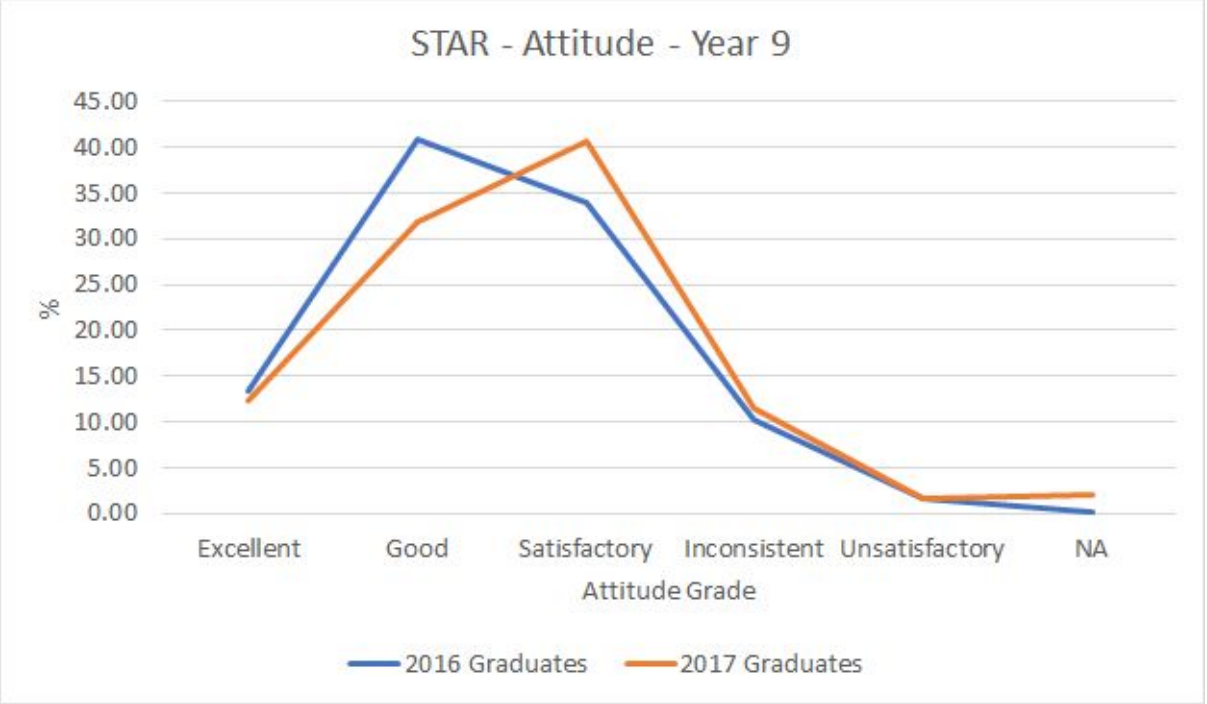


When the AAA attitude grades are compared according to calendar year, there is a stronger correlation between the two cohorts ($r=0.90$, $p<0.00001$). When compared according to calendar year, the 2017 graduates seem to also have a consistently higher percentage of students achieving the maximum grade for attitude.

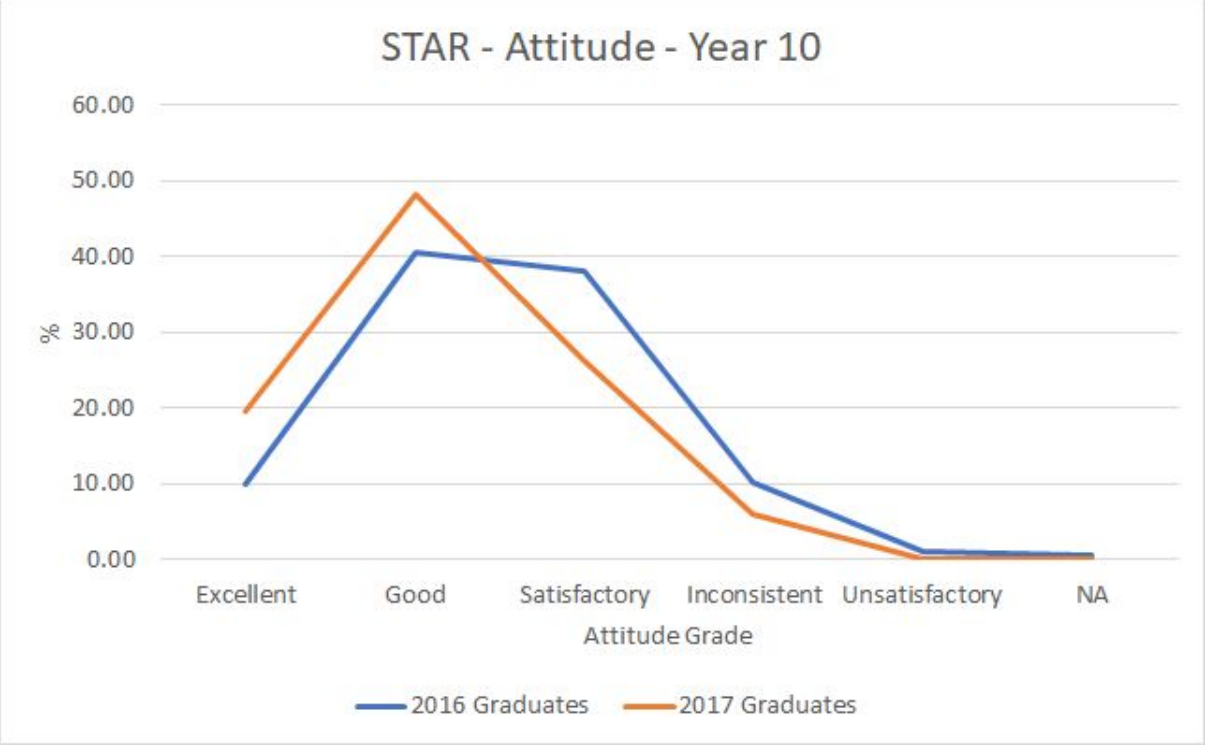
Graph 32



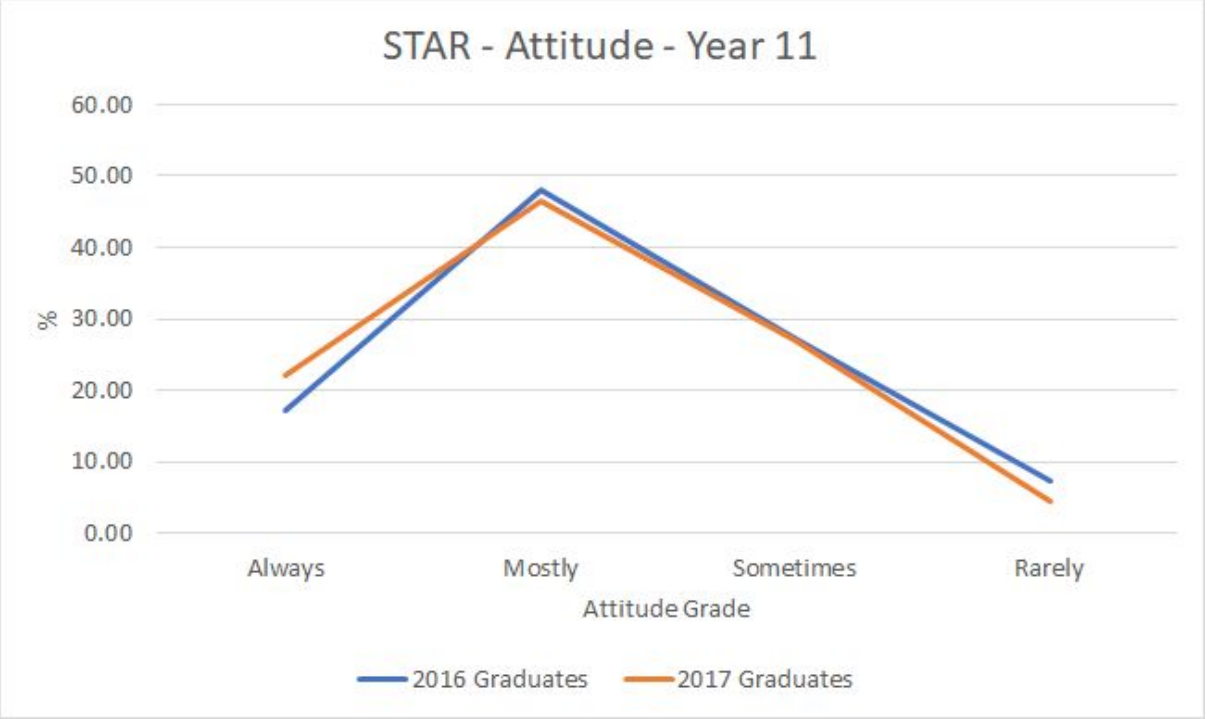
Graph 33



Graph 34



Graph 35



Graph 36

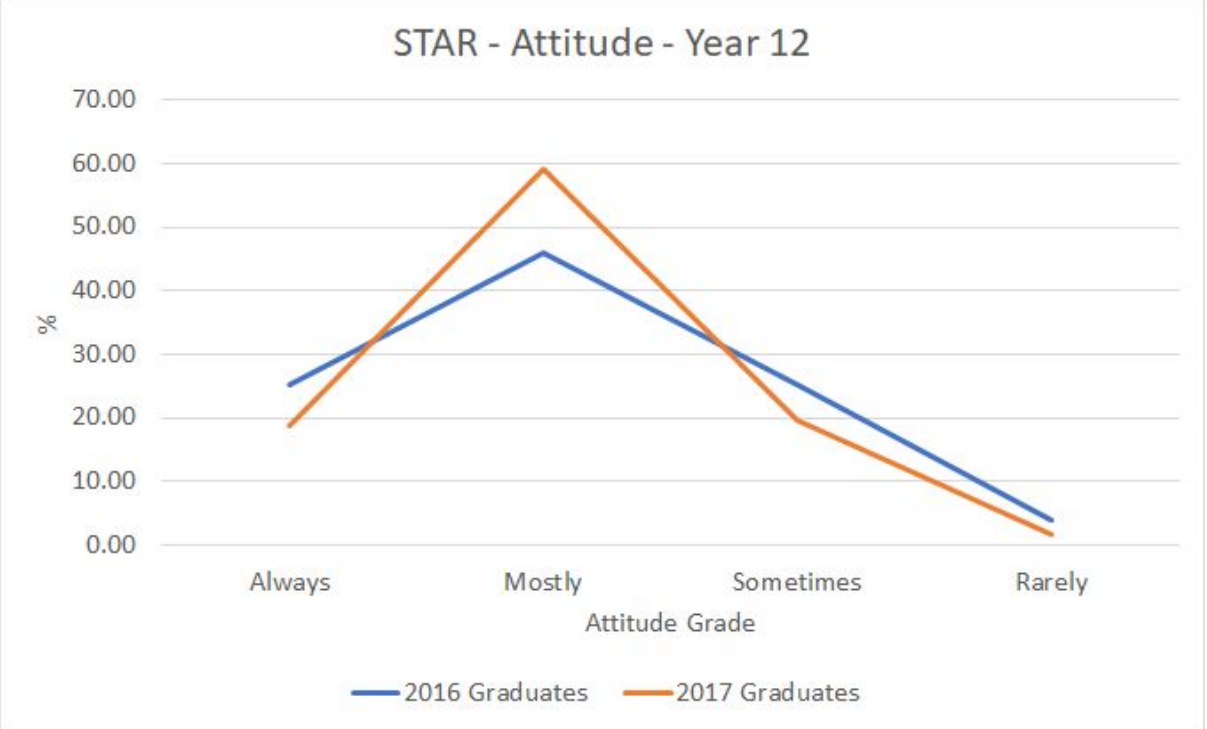
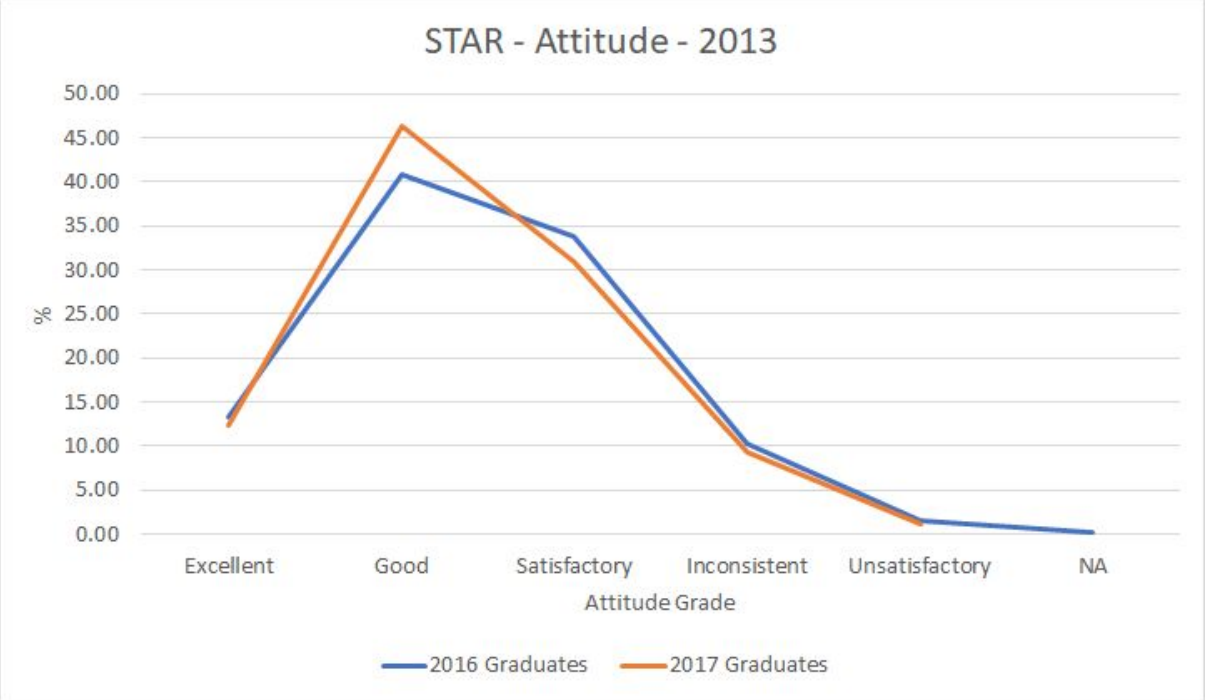


Table 10

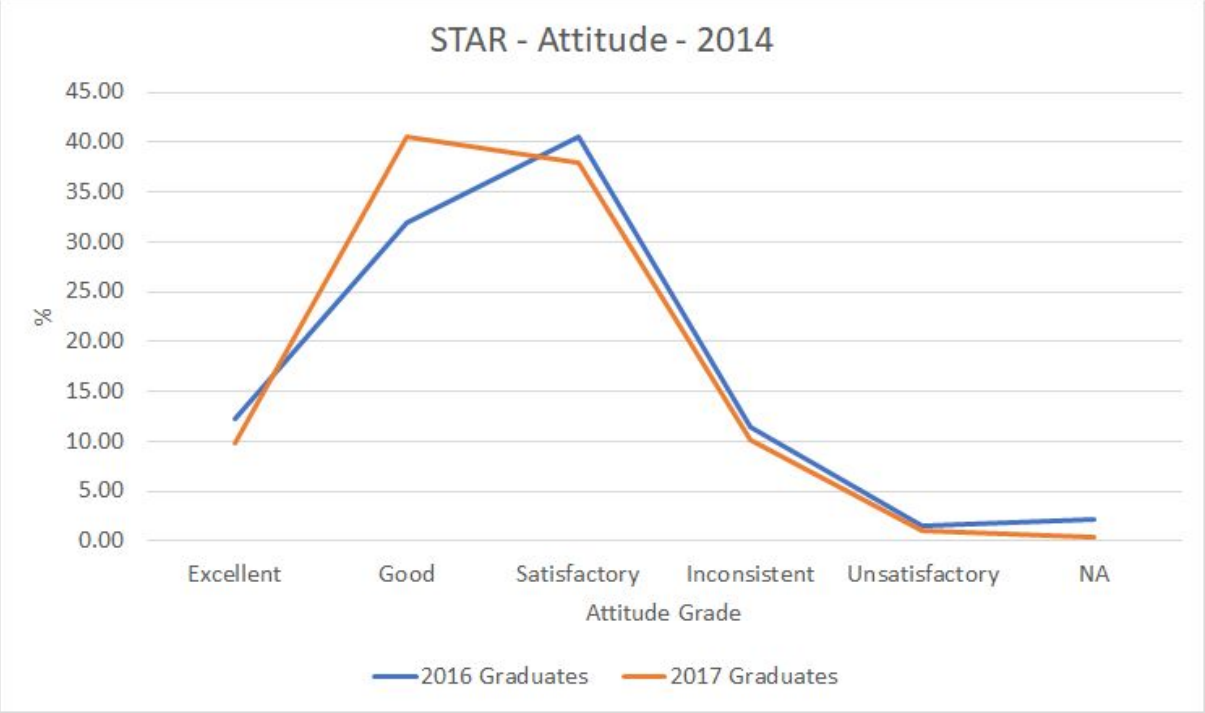
STAR - Attitude Correlation Between Cohorts - Year Level		
	r=	p=
Year 8	0.98	0.0034
Year 9	0.95	0.0037
Year 10	0.91	0.012
Year 11	0.98	0.020
Year 12	0.96	0.040

Graphs 32-36 show the frequency of each attitude grade from each subject for each student represented in STAR. Table 10 shows how strongly each cohort correlates according to their attitude scores for those students classified as 'at risk' for each school grade. For every single year level, the two cohorts strongly and significantly correlated. While different cohorts may have more students represented in the STAR data during certain years, the correlation between the two cohorts is the same; regardless of net frequency, the distribution is significantly similar.

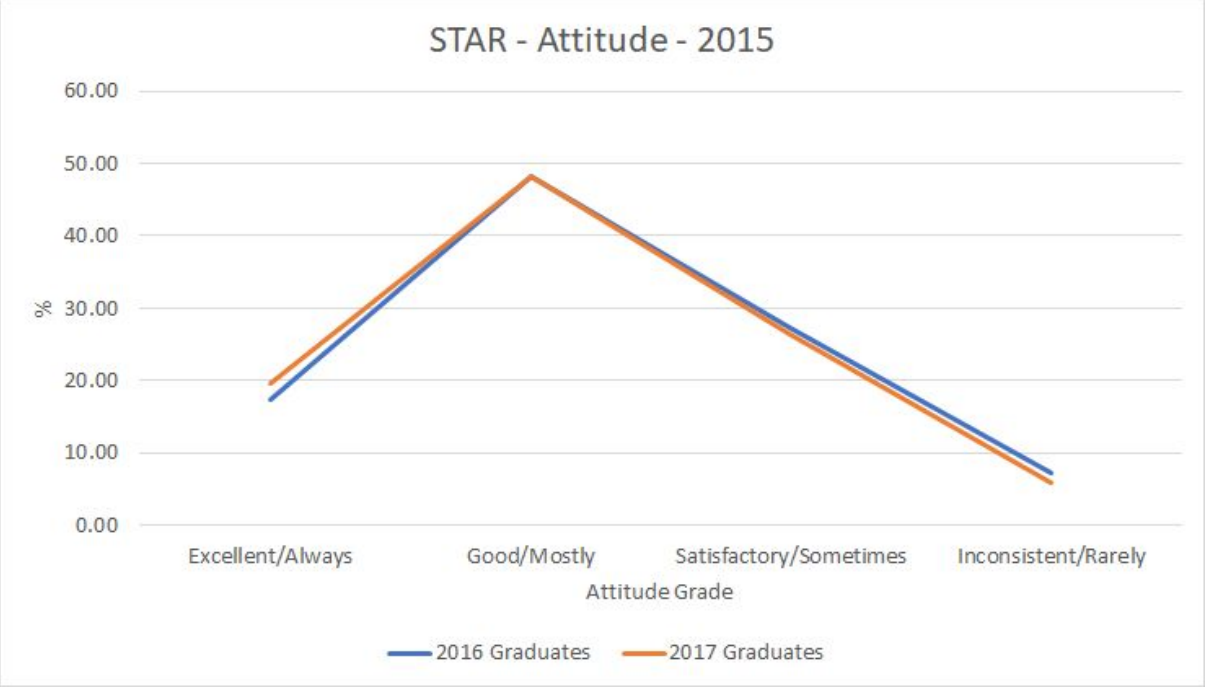
Graph 37



Graph 38



Graph 39



Graph 40

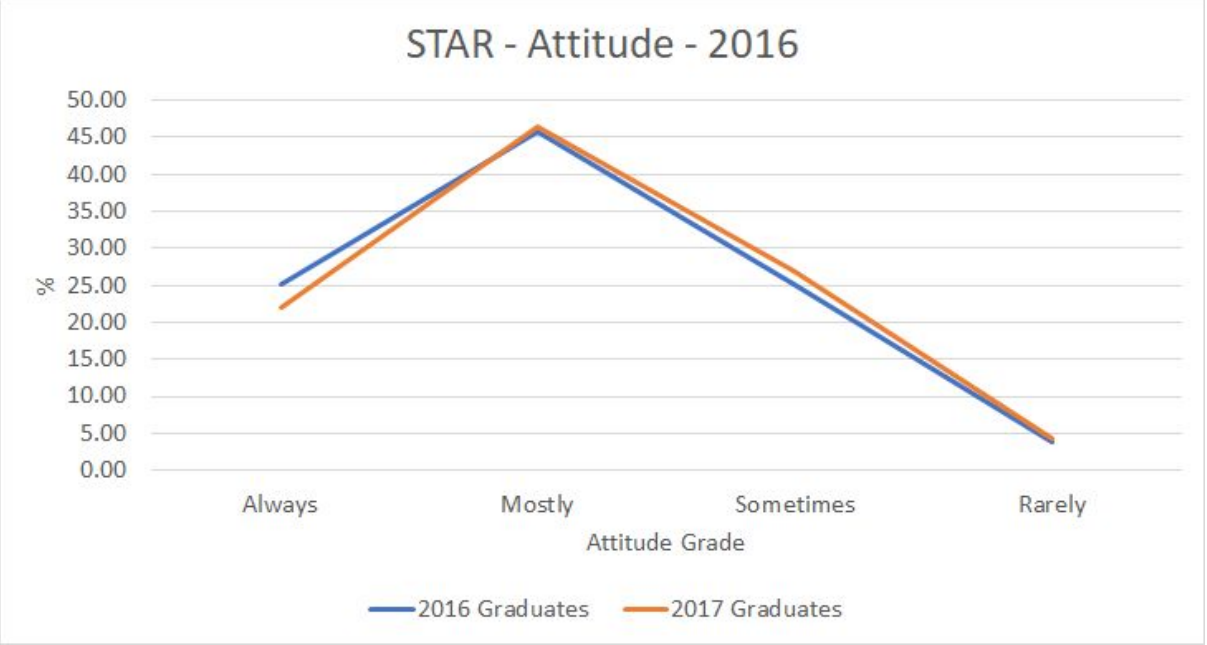


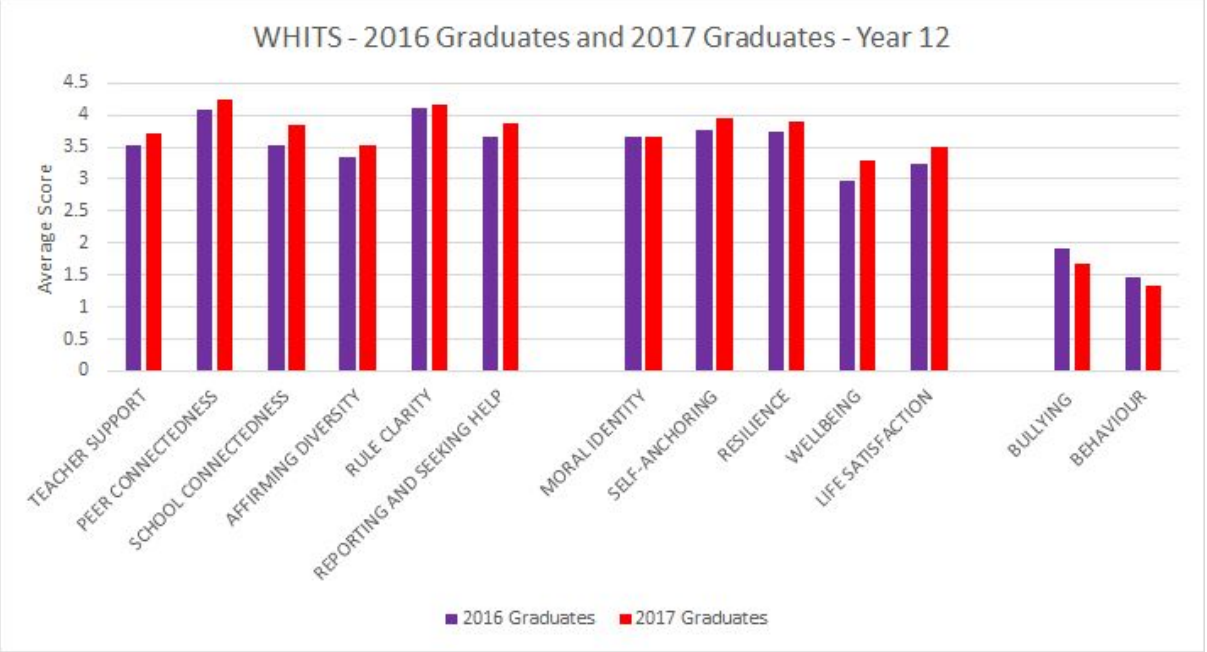
Table 11

STAR - Attitude Correlation Between Cohorts - Calendar Year		
	r=	p=
2013	0.99	0.0002
2014	0.97	0.0013
2015	1.00	<0.00001
2016	0.99	0.01

Graphs 37-40 show the same frequency of attitude grades in the STAR sample, however the two cohorts are compared by calendar year. Table 11 shows the correlation between the two cohorts for each of these graphs, revealing that both cohorts correlated even more strongly when compared by calendar year.

Because the sampling for the STAR data set is determined by academic grades, it was necessary for the attitude grades to also be analysed according to academic grades. The results from this analysis were anomalous and no clear conclusions could be drawn.

Graph 41



Graph 41 shows the average score out of 5 that each cohort gave to each aspect of School Climate (Teacher Support, Peer Connectedness, School Connectedness, Affirming Diversity, Rule Clarity, and Reporting and Seeking Help), Student Agency (Moral Identity, Self-Anchoring, Resilience, Wellbeing, and Life Satisfaction), and Risk Factors (Bullying and Behaviour) in the WHITS Survey. The questions asked for each of these categories are available in Appendix 2.

Table 12

WHITS - Correlation Between Cohorts - Year 12		
	r=	p=
School Climate	0.97	0.0013
Student Agency	0.95	0.013
Risk Factors	1.00	NA
OVERALL	0.99	<0.00001

Table 12 shows that in Year 12, the two cohorts correlated significantly in every aspect of school and student life measured by the WHITS survey, as well as correlating very strongly overall.

Table 13

WHITS - 2016 and 2017 Graduates - School Climate			
	2016 Graduates	2017 Graduates	Significance
Mean	3.71	3.89	p=0.27

Table 14

WHITS - 2016 and 2017 Graduates - Student Agency			
	2016 Graduates	2017 Graduates	Significance
Mean	3.48	3.66	p=0.35

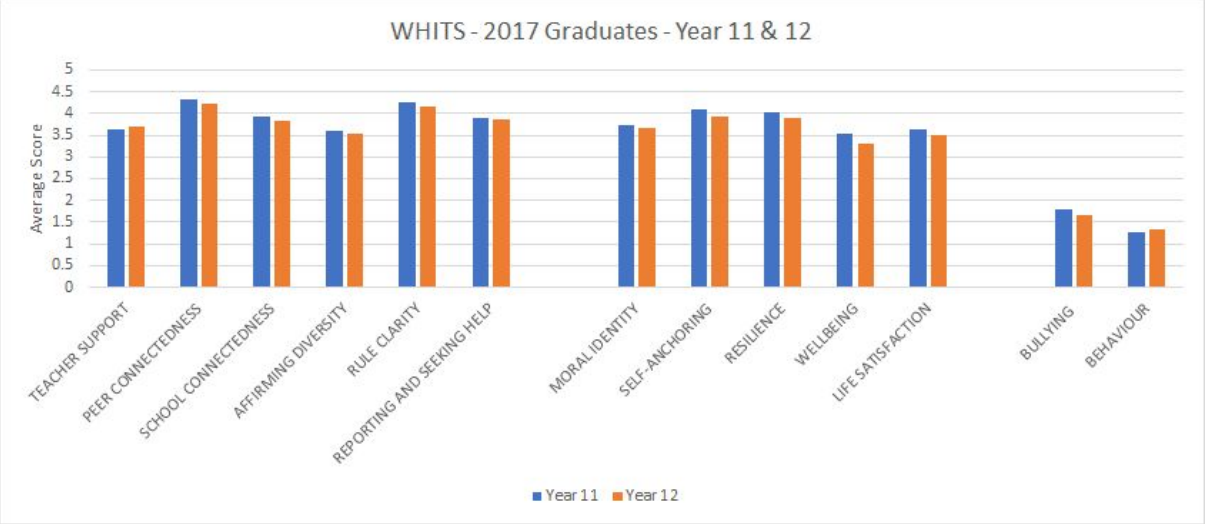
Table 15

WHITS - 2016 and 2017 Graduates - Risk Factors			
	2016 Graduates	2017 Graduates	Significance
Mean	0.70	1.50	p=0.43

Tables 13-15 show the mean and standard deviation for each aspect of the WHITS for each cohort as well as the significance of the difference between the means. The tables show that for every aspect, the difference between the means is not significant.

In addition to comparing the two cohorts during their Year 12 using the WHITS, the same survey was used to compare the Year 11 and Year 12 results for the 2017 graduates. This was only done for the 2017 graduates as the survey only began to be used in the school in 2016 and so the only data from the 2016 graduates is their Year 12 survey results. This analysis between the two different year levels of the same cohort was undertaken in order to assess changes over time as well as to compare with the analysis of the CCQ data. This will aid in providing conclusions regarding observable divergences occurring between the two cohorts between Year 11 and 12.

Graph 42



Graph 42 shows the Year 11 and Year 12 results of the WHITS survey for the 2017 graduates. The graph shows that student perceptions of teacher support and poor behaviour rose, while every other aspect either fell or stayed the same moving from Year 11 to Year 12.

Table 16

WHITS - Correlation Between Year Levels - 2017 Graduates		
	r=	p=
School Climate	0.97	0.0013
Student Agency	0.98	0.0033
Risk Factors	1.00	NA
OVERALL	1.00	<0.00001

Table 16 shows the correlation between the different aspects of school and student life measured by the WHITS. It shows that every aspect in the survey correlated significantly from Year 11 to Year 12 for the 2017 graduates.

Table 17

WHITS - 2017 Graduates Year 11 and 12 - School Climate			
	Year 11	Year 12	Significance
Mean	3.94	3.89	p=0.27

Table 18

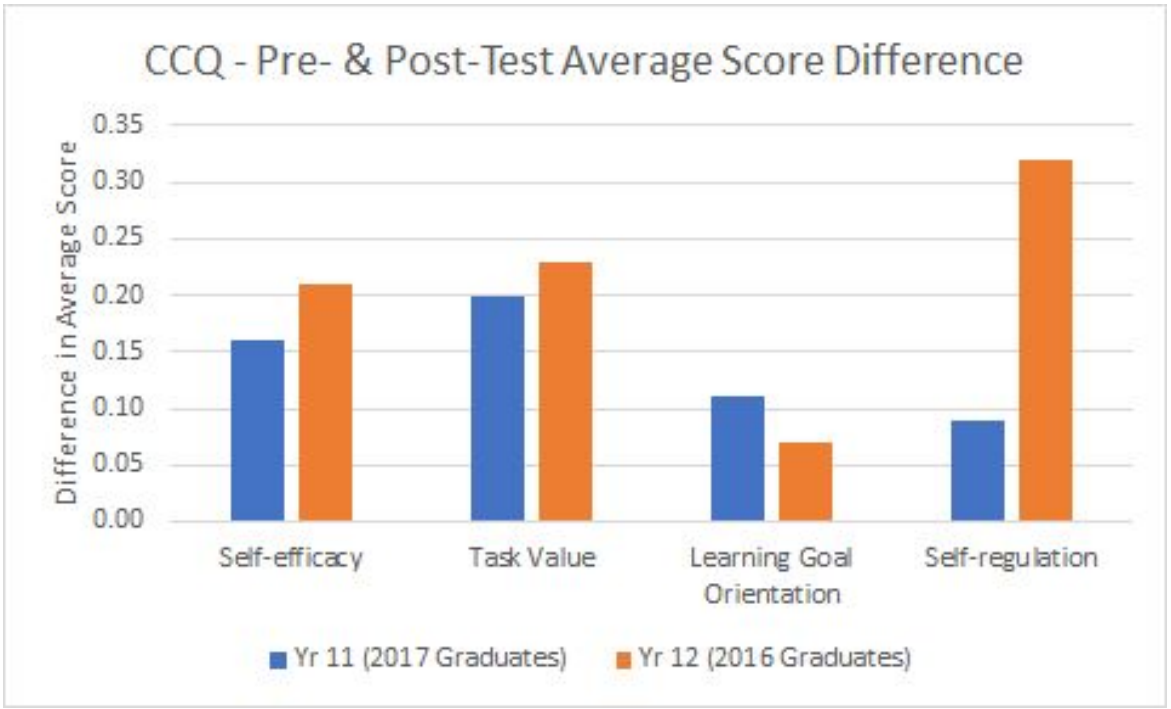
WHITS - 2017 Graduates Year 11 and 12 - Student Agency			
	Year 11	Year 12	Significance
Mean	3.80	3.66	p=0.35

Table 19

WHITS - 2017 Graduates Year 11 and 12 - Risk Factors			
	Year 11	Year 12	Significance
Mean	1.53	1.50	p=0.90

Tables 17-19 show the mean for each aspect measured in the WHITS survey as well as whether or not the difference between the means is significant. For every aspect including Risk Factors, the mean for Year 11 was higher, yet insignificantly so.

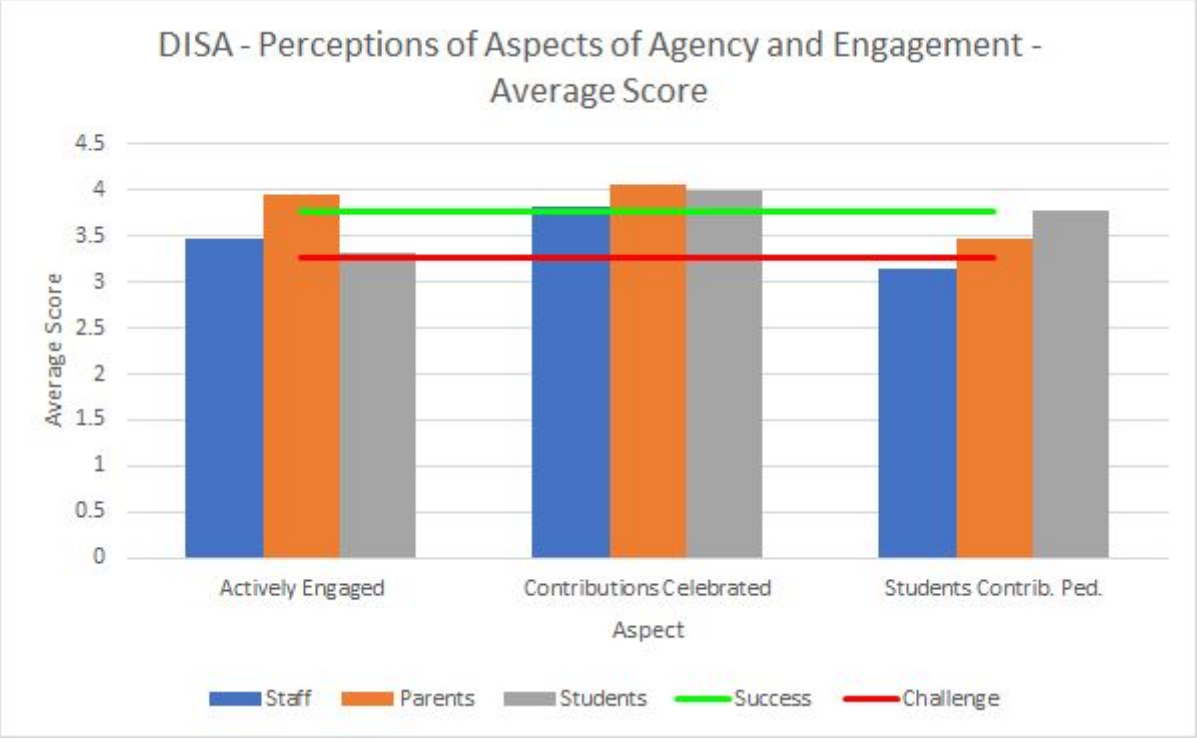
Graph 43



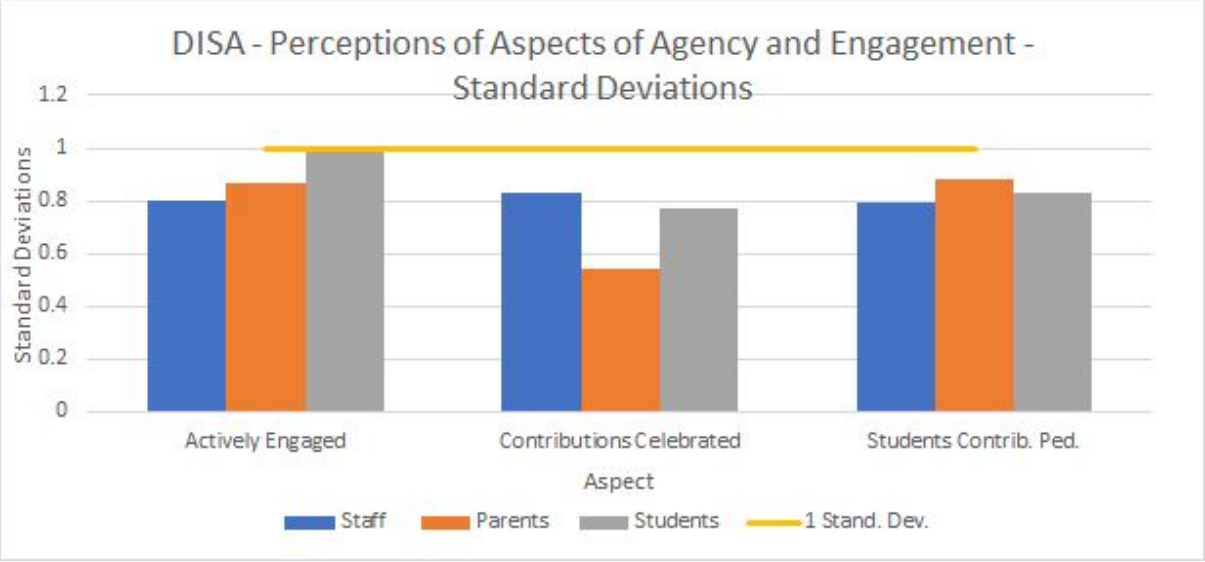
The CCQ data has been analysed to compare to the analysis of the WHITS data represented in Graph 42. The CCQ data was not comparable by school year level as the 2017 graduates were only included in the report in Year 11 and the 2016 graduates were only represented in Year 12. This does mean that there is data from both of the cohorts for the same calendar year, but it is only one year and the two cohorts were in very different stages of their schooling at this time. The difference between the pre- and post-test for each cohort was instead analysed to compare the degree to which each cohort improved throughout the

CCQ process. Graph 42 shows that the 2016 graduates reported greater improvement in every area except Learning Goal Orientation when compared to the 2017 graduates. Self-regulation increased by 8.06% for the 2016 graduates compared to 2.26% for the 2017 graduates. It must be noted that for all these variables, what is measured is the student's perceptions. Also, there is no documentation of what was changed between the pre- and post-tests to determine if the strategies put in place were comparable in any way. However, what can be deduced from this data is that both cohorts respond well to teacher support and have a strong capacity for development in the areas measured by the CCQ. It is possible that the 2016 graduates have greater potential to improve in these areas, however this could be due to these skills being initially underdeveloped.

Graph 44



Graph 45



Graph 44 and 49 show the results of the Diagnostic Inventory of School Alignment (DISA) survey for 2016. The DISA survey does not distinguish between cohorts, and so this data has limited use in this study; however, the results to present a baseline for school climate and engagement within the context of this particular school. The results are analysed and report written externally, and the lines represented on the graphs are thresholds defined in the original report. Student Engagement is of particular interest in Graph 44 as the students' perceptions of their own engagement are just above the lower threshold, whereas the parents' perceptions of the students' engagement is above the upper threshold, representing a significant difference between the two ($p=0.016$). In addition to this, the standard deviation for the students' perception of their own engagement has reached the threshold, suggesting that there is high variance in the students' responses regarding their engagement. In regards to Students Contributions to Pedagogy, based on the original report's thresholds, the students thought that they had significantly more agency in the classroom than their teachers did ($p=<0.00001$). Every surveyed group was above the upper threshold for Students' Contributions are Celebrated.

Analysis of the AAA data for attitude shows that the 2017 graduates had a mean number of students who achieved the highest grade for attitude that was significantly higher than that of the 2016 graduates. However, the analysis of the STAR data which looked at individual grades as opposed to a report which only contained the highest possible grade found strong and significant correlation between the two cohorts, suggesting that there is no significant difference in attitude between them, at least in this sample. The STAR data weakens the conclusions drawn from the AAA analysis as it leans more towards the null hypothesis. Both the AAA and STAR data showed a stronger correlation between the cohorts when the data was considered according to calendar year as opposed to school year level, however analysis of both calendar year and school year level resulted in significant correlation. The WHITS data supports the conclusions of the STAR data: that there is no significant difference, either in correlation or mean, between the two cohorts in regards to their attitude and wellbeing (School Climate, Student Agency, or Risk Factors). A comparison of the WHITS data represented in Graph 42 and the CCQ data represented in Graph 43 shows that both cohorts improved in key areas of engagement and learning skills with teacher support; however, the WHITS suggests that at least for the 2017 graduates there is a decrease in most aspects of the students' perceptions of school climate and student agency and wellbeing moving from Year 11 to Year 12.

Conclusion and Recommendations

This study proposed the hypothesis that the 2016 graduates had lower engagement throughout their secondary schooling which resulted in a lower percentage of students successfully completing their SACE. There was also a secondary hypothesis; that student engagement could be determined by analysing data relating to attendance, attitude, and achievement. In this section, the first hypothesis will be discussed first, followed by the second. Other interesting conclusions drawn from the data will then be explored when discussing recommendations for schools and researchers.

Conclusions

In regards to the AAA data which covered every indicator of student engagement identified by this study, the 2017 graduates had a significantly higher percentage of students achieving the highest score for attitude and achievement across their schooling. However, attendance was not higher for the 2017 graduates, and the two cohorts significantly correlated and had similar variances, suggesting that they were both subjected to similar pressures and reacted to these pressures in similar ways. Also, the sampling of the AAA and High Achievers data sets does not provide a full picture as it only samples the highest achieving students, and analysis of the STAR data found that while there were more students in the 2016 cohort who were deemed to be at risk across their whole schooling, there were a similar percentage of failed grades across both cohorts. This suggests that there was a higher concentration of failed subjects in the lowest achieving students for the 2017 graduates. If achievement can be said to be an indicator of student engagement, the achievement data suggests that the 2016 graduates had a more moderate level of engagement across the whole cohort, whereas the 2017 graduates had both students with very high and very low engagement.

The 2016 graduates had higher attendance according to both the AAA data and the School Report data. The analysis of the School Report data also revealed that the 2016 graduates had more consistent attendance in relation to the mean than the 2017 graduates, however the impact of this cannot be determined due to a lack of literature investigating consistency of attendance as opposed to overall mean. This means that the attendance data is either not a very good indicator of student engagement (which is not supported by the literature: Sharkey *et al* 2008; Harris 2011:377), or it suggests similar engagement levels in both cohorts, if not slightly higher engagement in the 2016 graduates

The AAA data suggests that the 2017 graduates had a significantly higher mean attitude score as opposed to the 2016 graduates, however the AAA has limited use due to sampling. The STAR data which samples the 'at risk' students as well as discriminating between different attitude grades as opposed to simply giving a percentage of those who achieved the highest score, found a significant correlation between the two cohorts regardless of whether they were compared according to school year level or calendar year. In addition to this correlation, there was no significant difference in mean in any of the analysis of the attitude grades in the STAR sample, suggesting that the two cohorts had similar attitude throughout their schooling. The WHITS supports this conclusion; that there is no significant difference between the two cohorts regarding any of the measured indicators of attitude and wellbeing. The CCQ data suggested that the 2016 graduates were also able to demonstrate greater improvement in key areas relating to student agency and engagement, two concepts that are intimately linked through theories of self-regulation (Corno & Mandinach 1983:95). If the data given regarding attitude is reliable and consistent in interpretation, while there may have been more students in the 2017 graduating cohort that achieved the highest score, the majority of each cohort had similar attitude.

In relation to the goal of this study to create a tool or method that schools can use to analyse their own data and develop strategies for better outcomes for their students, the results are unfortunately inconclusive. All of the analysis that was done using this data was possible without any specialist software and could be understood by an amateur statistician

or researcher with some background reading, and so it succeeds in being accessible. The results can be regarded as valid, however the conclusions drawn from them regarding student engagement will require further research to support the correlation between the indicators identified and engagement.

Limitations of this study

The main limitation of this data is that there was no primary data collection conducted to confirm the validity of the methodology. Both of the cohorts studied had already completed their schooling when this study was proposed and it is difficult for schools to reliably collect data from a significant sample of past students. This is also why there was little data concerning post-school success for any cohort that has graduated from this school apart from numbers of university offers, another limitation of a study which concerns an element of teaching and learning which has the potential to affect students for the remainder of their lives. The validity of the results and conclusions of this study are also affected by the vast range of different sampling strategies employed for each data set, a limitation which is an inherent risk in using so many different sets of data. The sampling of different students within each of the cohorts in different data sets was advantageous in that it gave multiple perspectives for each cohort, however because the sampling strategies and the nature of the data available was so fundamentally different in many cases, interpretation of the data and results became difficult.

Another limitation that was identified relates to the division of attention among the different data sets. There is a focus in the literature on how to help ‘at-risk’ students (McMillan & Reed 1994), which is a limitation of past studies that was identified early on in this study. Regarding the analysis of the High Achievers and STAR data, significantly more time was allocated to entering, interpreting, and analysing the STAR data as opposed to the High Achievers data. It was beyond the scope of this study to go into detail with every data set represented in this study, however the data sets that were chosen for this deeper analysis reveal the same bias that is prevalent in student engagement discourse; that improving student engagement is not only primarily to benefit struggling students, but to prevent poor behaviour and lack of academic achievement. This bias does have the potential to colour the analysis and results due to different emphasis being placed on different samples of the population of each cohort and must be considered when interpreting the analysis and making recommendations.

Recommendations for schools

The concept of the calendar year having more impact on fluctuations in the identified indicators of student engagement as opposed to school year level was unexpected. Not every data set was able to be compared by both school year level and calendar year, but the analysis suggests that in every case except attendance, the two cohorts correlated more closely when comparing according to calendar year. In the case of attendance, the School Report suggested that the trends in attendance seen in different year levels was so consistent and significant that comparing cohorts by calendar year, in one particular case, gave a strong negative correlation. This conclusion will have implications for further study as well as future strategies for schools as it appears as though school-wide strategies and

pedagogical changes as well as community and cultural pressures have more of an impact on student engagement than the trends and fluctuations that are dependent on a student's stage in their schooling and psychological maturity. This is something which should be investigated further within the context of this school and be considered when developing and implementing engagement and wellbeing strategies. 2015 appears to be an outlier for many of the cohorts studied in both attendance and percentage of successful university applications. In 2015, this school experienced a significant trough in attendance for all year levels, as well as an unexpected peak in the percentage of successful university applications. Because of this, it is recommended that an evaluation of environmental pressures and implemented school strategies begin with 2015 and the changes that occurred in the years preceding as well as following as it was a year of high interest.

The results of the analysis of the WHITS data suggests that the 2017 graduates experienced a decrease in most of the measured areas of school climate, student agency, and wellbeing after moving into Year 12. Graphs 4, 21, and most of the other graphs relating to the AAA data suggest that a trough in attendance, attitude, and achievement is also something experienced by the 2016 graduates at the beginning of Year 12. According to this data, this decrease in many of the indicators of engagement is more pronounced for the 2016 graduates. Final year high school students are more likely to experience stress, anxiety and depression, as well as experience a decrease in productive study techniques and an increase in self-handicapping strategies (Smith 2009:64). This is a condition that is worsened by poor perceptions of family, peer, and school connectedness and can affect these students for years after graduating (McGraw *et al.* 2008). Because this Year 12 pressure seems to have disproportionately affected the 2016 graduating cohort, it is recommended that more research is conducted into developing strategies to facilitate wellbeing and coping strategies involving "time structure, access to the wider society, and social contact" (Horstmanshof *et al.* 2008) throughout the school, and that the school recognises their potential influence over the wellbeing of their students during this critical time in their lives (Horstmanshof *et al.* 2008).

Recommendations for further study

The final recommendations are for further research into both the hypothesis and goal of this study. Primary research will need to be done in order to confirm the validity of the methodology used in this study to confirm that the indicators identified do in fact correlate with student engagement. It is also recommended for schools to conduct further study; to develop techniques to hypothesise and investigate what they are observing in their own contexts. There is a constant push for teachers to employ evidence-based teaching practices, but there is no reason why teachers and schools cannot use simple analytical and research techniques to provide evidence for their own context to support their decision making, strategy and pedagogy development, and school direction. The goal of this study was to develop a methodology that could be used in schools so that these teachers can learn more about their individual context, and so my primary recommendation from this study as supported by the conclusions drawn from the analysis is to not assume what is happening in your school, but to actually analyse the evidence to validate a theory before taking action.

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Appendices

Appendix 1: WHITS Survey Field Descriptions

Scale	Description
Teacher Support	... students perceive that teachers at the school are supportive and helpful.
Peer Connectedness	... students feel that there is contact and friendship between students regardless of culture and background.
School Connectedness	... students perceive that themselves to be part of a community.
Affirming Diversity	...students with differing cultural backgrounds and experiences are acknowledged and valued.
Rule Clarity	... students perceive the school rules to be clear and promote a safe environment.
Reporting and Seeking Help	... students are aware of procedures to, and are confident that they can, report incidents.

Student Agency

Scale	Description
Moral Identity (agency)	... students have a commitment to lines of action that promote or protect the welfare of others.
Self-Anchoring**	... students feel comfortable to be themselves at school.
Resilience	... students are able to cope with adversity and stress and achieve goals in the face of obstacles.
Wellbeing	... students experience life in a positive way.
Life Satisfaction**	...students are satisfied with their lives.

Risk Factors

Scale	Description
Bullying	... students have experienced bullying over the past two weeks.
Behaviour**	...students consider themselves to be involved in undesirable behaviour.

(National School Improvement Partnerships 2018)

Appendix 2: CCQ Questions

Part 1: Learning Environment

	Scale	Description *The degree to which …*	Included in lower primary survey (Years 2-3)	Included in upper primary survey (Years 3-7)	Included in secondary survey (Years 8-12)
RELATIONSHIPS	Student cohesiveness	… students feel accepted and supported by their classmates and safe to express their ideas.	✓	✓	✓
	Teacher support	… the teacher helps, befriends, trusts and is interested in students.	✓	✓	✓
	Equity	… students are treated fairly by the teacher.		✓	✓
	Young adult ethos	… teachers give students responsibility and treat them as young adults.			✓
ASSESSMENT	Formative assessment	… students feel that the assessment tasks given to them make a positive contribution to their learning.			✓
	Clarity of assessment criteria	… the assessment criteria are explicit so that the basis for judgments is clear and public.			✓
TEACHING DELIVERY	Responsibility for learning	…. students feel that they are given responsibility for their own learning.		✓	
	Clarity of instructions	… students are provided with clear information about the criteria about what they need to do and how they can do it well.	✓	✓	
	Involvement	… students have attentive interest, participate in discussions, ask questions and share ideas.	✓	✓	✓
	Task orientation	… it is important to complete activities planned and to stay on the subject matter.	✓	✓	✓
	Personal relevance	… the subject is relevant to students' everyday out-of-school experiences.		✓	✓
	Collaboration	… students collaborate with one another on learning tasks.	✓	✓	✓
	Differentiation	… teachers cater for students differently on the basis of ability, rates of learning and interests.			✓

Part 2: Student Motivation and Engagement

Scale	Description *The degree to which …*	Included in lower primary survey (Years 2-3)	Included in upper primary survey (Years 3-7)	Included in secondary survey (Years 8-12)
Self-efficacy	… the student is confident and believes in his/her own ability to successfully perform learning tasks.	✓	✓	✓
Task value	… the student perceives the learning tasks to be of interest, importance and utility.			✓
Learning goal orientation	… the student participates in class for the purpose of learning, understanding and mastering concepts as well as improving skills.	✓	✓	✓
Self-regulation	… the student controls and regulates his/her efforts in learning tasks.	✓	✓	✓
Enjoyment of class / subject / school	… students are interested in, enjoy and look forward to coming to class and school (primary) … students are interested in, enjoy and look forward to lessons in this subject (secondary)	✓	✓	✓

* The secondary school and upper primary school versions of the CCQ have been statistically validated. For information on the validation of the secondary school version of the CCQ, please read: Aldridge, J.M., Fraser, B.J., Bell, L.M., & Dorman, J. (2012). Using a new learning environment questionnaire for reflection in teacher action research, *Journal of Science Teacher Education, 23*, 259-290. For further information related to the reliability and validity of the primary school versions of the CCQ, contact ESIteam@curtin.edu.au

(National School Improvement Partnerships 2017)