Volume 23 - Number 1 - June 2022

Australian Journal of Middle Schooling

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Australian Journal of Middle Years of Schooling

Supported by the New Zealand Association of Intermediate and Middle Schooling

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Editorial

HINT

As the clock ticked over into 2022, many made the bold prediction that we would start to release some of the policies and practices that have impacted "upon a child's education in the name of COVID-19 control" (Coatsworth, 2022). However, as we approach the year's halfway point, we find ourselves still adapting, working, and learning with more change. This year has brought new and renewed challenges, but in "learning to live with it", many see an opportunity to take stock. It is an exciting phase where we are learning in a hybrid, a meeting of the new ways with a return to some of the aspects of our old lives that we have missed.

In the lead article, Poskitt gives insights into the impact that COVID has had on adolescent learning and assessment. Her refereed article provides a fascinating insight into COVID's impact on the students and teachers in a New Zealand school. While students may have thrived, survived or dived to different degrees in their academic progress, Poskitt's work highlights the constraints of our traditional measures of assessing achievement.

The second refereed article focuses on the importance of mathematical visuals in the development of mathematical learning. With such a focus on data and visual information in mathematics texts and assessments, we need to ensure that students are given opportunities to develop knowledge and skills to decode and encode a wide range of visual mathematical representations. Quinnell provides several examples to illustrate how visuals can be a key to unlocking mathematical understanding.

In the non-refereed section, two experienced practitioners share their insights on critical thinking. First, Ellerton asserts that critical thinking should be at the core of teaching and learning. He defines critical thinking and provides insights about how we can teach critical thinking from the projects he has led as Curriculum Director of the University of Queensland Critical Thinking Project. Then, Evans shares an evaluation of a school's philosophy program. Her collation of teachers' and students' reflections demonstrates their perception that the program has a positive impact beyond the content with clear benefits to key capabilities such as metacognition.

In *Focus on schools*, Seward-Linger provides an overview of the Ethics Olympiad. Her reflections on the Ethics Olympiad emphasise the program's benefits and advice for getting students involved. Finally, Wood shares a story of student agency, with students owning their data story and collaborating with their teachers to inspire engagement.

Each of the authors in this edition is sharing their practice in text and will share their insights at the upcoming Adolescent Success International Conference being held in August 2022. If these stories and ideas inspire you, the conference will allow you to hear more, discuss with the authors and instigate new conversations, hopefully leading to new projects you may be keen to share.

It's on the strength of observation and reflection that one finds a way. So we must dig and delve unceasingly. - Claude Monet.

Dr Emily Ross
Journal Editor
Adolescent Success

Reference: Coatsworth, N. (2022, January 1). Welcome to 2022, the year this pandemic ends. The Sydney Morning Herald. https://www.smh.com.au/national/welcome-to-2022-the-year-this-pandemic-ends-20211230-p59kzf.html

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Acknowledgements:
Photographs from the following
Hillcrest Christian College
Pembroke School
San Sisto College

CONTENTS

COVID's impact on adolescent learning and assessment

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Abstract

Adolescents thrive in stable environments with new experiences, increasing opportunities for growing competencies and confidence, and wider connections with peers and society. Yet, the COVID pandemic delivered abrupt change, uncertainty and enforced isolation, especially during periods of lockdown. Research interviews with teachers and students in a New Zealand secondary school case study explored the effects on teaching, learning, and assessing.

Teachers spoke of initially striving for normality in the timing, content, and delivery of learning, albeit online. Though some students responded, others were sporadic or did not connect due to difficulties with limited or no internet, inadequate access to devices or familial obligations to care for others, or to seek paid work in the face of parental redundancies. Teachers adapted when, what and how they taught and assessed, focused on student wellbeing, and broadened learning resources to optimise student interest and engagement in learning.

While some students' 'thrived', others' 'survived' or ''dived'. Theoretical and practical principles and practices that optimised adolescent learning are examined, arguing that teachers who build trusting relationships, focus on wellbeing, adapt learning and assessing to respond to 'students' circumstances and wider life learning, enable them to thrive.

Introduction

Adolescent student success is predicated on various factors, including normalcy (Main, 2017), a growing sense of agency (through expanding opportunities to increase competence and confidence), increasing understanding of self (identity), and connectedness to peers, school, and wider society (Pendergast, Main & Bahr, 2017). These factors were threatened with the arrival of the COVID pandemic – a time of uncertainty, restricted opportunities/social interactions, and isolation – creating potential challenges for adolescents.

Schools, arguably primary sites of adolescent social interaction, experienced upheaval with closures and abrupt changes to learning and teaching. Switching to online teaching and learning, while potentially offering exciting affordances for young people (Li et al., 2021), presented barriers for other adolescents who had minimal or no access to devices, limited internet services (OECD, 2020), low levels of support for learning or learning difficulties (Becker et al., 2020). Internationally, inequities in educational access and achievement reportedly rose during the pandemic (OECD, 2020).

Of interest in this paper, are the effects of the COVID pandemic on adolescent learning and assessment. In normal times, principles of effective learning in the adolescent years include 1) multiple means of engagement (choices amongst individual, interactive, and group activities; hands-on and digital forms of learning), 2) multiple representation, (e.g., visual, textual, audio, multi-modal formats) and 3) multiple action and expression (e.g., role play, art, dance, field trips, simulations, videos) in line with Universal Design for Learning principles (Chambers & Coffey, 2019). Application of the principles mean that effective "*teachers provide multiple, flexible ways for students to comprehend and interrogate content, demonstrate skills and understanding, and be more fully engaged*" (Chambers & Coffey, 2019, p. 32). But Gibbs and Poskitt (2010, pp 25-31), argue that nurturing trusting relationships, particularly in expressing care for students, getting to know them, and treating them fairly is the priority in adolescent learning. Once caring relationships are established, attention turns to making learning fun through varied and active learning opportunities (e.g., cooperative learning tasks, class and group discussions, peer tutoring, practical 'hands-on' tasks, and technology integration). Making learning meaningful through choices, explanations of why particular learning is important to 'students' lives and equipping students with skills in self and peer assessment are further means to student engagement. Given the severe disruptions to in-person classroom time and restrictions on social interactions, how were these priorities (building caring relationships, making learning fun, relevant and engaging) affected in the pandemic?

This article explores the lived experiences of students and teachers during the pandemic, and the factors that soptimised adolescent learning and assessment success. It draws on research interview data from students and teachers in a New Zealand (NZ) regional secondary school, and pertinent published research.

Method

A regional secondary school (Years 9-13, students aged between 13-18 years) was invited to participate in the research (with university ethics approval). The school was scategorised as middle decile (socio-economic), with a roll of 1514, 68% European, 26% identified as Māori (Māori comprise 16% NZ population), 4% Asian and 2% Pacific, and included a hostel of 180 boarding students (ERO, 2017). Teachers and students in Years 11 to 13 were invited to participate in research interviews. Fourteen teachers were interviewed, having given written informed consent, and represented a range of experience (from < 5 to >20 years), school roles (teacher, Year Level Deans, Heads of Department, Specialist Classroom), and subject areas (Mathematics, English, Te Reo Māori, Geography, Social Studies, Sport and Physical Education, Sciences, Media Studies and Hard Materials Construction). Semi-structured interviews of 45 minutes duration were conducted, using the same questions for all interviewees, with flexibility to explore ideas expressed by interviewees in more-depth. Teachers were interviewed in-person once, individually or, if they chose to, in pairs. Students were interviewed once, in-person, in small groups. The interviews occurred after the first, and immediately prior to the second, national lockdown.

Interview data were recorded, and member-checked, then collated and analysed, using three cycles of process coding, categorisation, and theme development. The three data analysis cycles contributed to data checking and validation processes as emerging themes progressed from descriptive to deeper analytic levels (Saldana, 2011). Finally, to ascertain the reliability of the emerging themes, trends were checked in relation to national and international research publications

(e.g., Education Review Office, 2020; Organisation for Economic Cooperation and Development, 2020). This final step was to give assurance that the case study ' 'school's experiences were representative of national trends.

Findings: School experiences of teaching, learning, and assessing in a pandemic

The New Zealand experience of COVID-19 occurred in three waves: in March 2020, August 2021 (Delta variant), and February/ March 2022 (Omicron variants). The initial NZ response was to strive for elimination of the virus (2020-2021), which changed to ""living with the virus"" (Ardern, 2021). During the elimination phases, schools were closed at short notice, necessitating swift changes in the delivery and experience of learning. It is in this context, that teachers and students shared their experiences.

Teaching – teacher perspectives

The first section of the findings reports 'teachers' experiences of the rapid switch to remote/online teaching. Illustrative interview extracts reveal initial attempts to resemble normality in adherence to the usual school timetable and synchronous pedagogical approaches.

With the sudden lockdown [which closed schools from midnight for seven weeks], we delivered gear [basic supplies, textbooks and some electronic devices] to 'students' homes with few resources or limited internet access... Initially we met by Zoom at our usual class time, but student attendance 'wasn't great. (T3)

Some did not engage at all. I phoned their homes and spoke with whānau, but there was little you could do. One boy was sent to look after grandma and did not have a laptop. (T9)

It was challenging for visual learners/ thinkers to learn by so much reading, writing, and viewing, rather than our varied demonstrations, interactive group tasks, debates, fieldtrips etc. (T2)

These illustrative interview extracts reveal initial desires to maintain normality through daily interactions with students and attempts to maintain the planned programme. Teachers discovered that student attendance was not dependable. They experienced considerable constraints in drawing on their usual repertoire of pedagogical strategies, but most troubling for teachers were students who had limited access to devices and learning opportunities, or those who chose not to connect.

Some students either had no device or were sharing devices amongst family members and had no quiet space to learn. The start of the year is important for relationship building, which was harder with minimal body language online, and it was harder to teach difficult concepts online compared with multiple strategies I usually use. (T5)

In lockdown I could not have face-to-face conversations with students who needed guidance or reassurance. I srealised about one-third of students will achieve despite of you (motivated by fear or pleasure), one third will learn with guidance; one third have to be dragged along due to learned helplessness, family circumstances and other factors. (T11)

However, teachers experimented and found that interactive teaching sessions were better reduced in duration or focused on Q&A and that students seemed to be more receptive to instructional sessions recorded for later viewing/ re-viewing. Other adaptations emerged to address arising issues:

We learnt how to teach online and enjoyed experimenting with pre-recorded mini videos, students enjoyed the more flexible timeframe (some worked early mornings – others in the afternoons/evenings) and being more active learners. (T11, T12)

When using resources to supplement the f2f environment, given 'it's mostly tactile in the classroom, I realised I could do a format on video and provide feedback online and so I produced a personalised video they could watch repeatedly if needed. (T14)

Changed circumstances necessitated 'teachers' adapting what they taught, how and when. Some teachers commented on high reliance on reading, writing, and viewing type activities onlinecompared with their familiar activities like science experiments, role plays and other performance type learning activities. Teachers realised the need to provide greater choice for students in *how* they learned and *when* they learned. The latter required a different mindset for teachers who were used to students learning in prescribed periods of the school day/week. Recorded instructional vignettes, explanations, demonstrations and brief ''lectures', created potential choices for students in timing when they viewed the material, and opportunities to re-view materials related to more complex concepts. Teachers felt these approaches worked well when supplemented with more discussion type synchronous sessions, but it is students who engage, or not,

in learning, so we turn now to consider 'students' perceptions and experiences.

Learning – student perspectives

Extracts from student interviews reveal a range of experiences and perceptions:

It was so hard – I 'couldn't focus on learning or assessments at home because of noise and distractions. (S1)

Dad was made redundant, so I got a job as an essential worker at the supermarket. It was hard to find time for learning, and I got so tired. (S8)

My mother lost her job so we 'couldn't afford internet. I 'couldn't do online learning (S13)

Some students were unable to learn through: lack of, or inadequate, access to devices or internet connection; limited time (in paid work or caring for siblings); or environments not conductive to learning – such as noise or distractions. Their views aligned with those expressed by the teachers. In contrast, for about a third of the students, online learning from home was a positive experience because of the increased agency (timing, and length of time they could choose to spend on tasks/learning), fewer classroom distractions, and choices to pursue learning in greater depth.

It was cool being able to sleep-in, but I missed my mates. (S6)

I loved having choices about what to learn, when I felt like it and how I wanted to. It was great learning from home without time wasted from teachers repeating instructions or moving on to something else. (S10)

These illustrative interview extracts reveal individual variation in student circumstances and opportunities for learning. 'Sleeping-'in' may indicate avoidance of learning, or greater agency in timing of learning. Teachers responded by greater flexibility:

Freedom at home allowed students to personalise their learning, like working around responsibilities at home, and they learned to work around schedules that were best for them. I tried to make it interactive, so at home they had to be more active learners. (T14)

Nevertheless, implicit across the student interview comments was the spectrum of emotional learning experiences during a pandemic. Students in the above interview extracts ranged from finding learning 'so 'hard', 'so 'tired', 'couldn't do it', to 'loved it'. These aspects are explored further, firstly in terms of assessment and secondly wellbeing.

Assessing – teacher and student perspectives

Along with changed pedagogical circumstances, assessments were also challenged during periods of home learning. Teachers adapted in terms of what was assessed, how much was assessed, and the length of time given for assessments.

I switched topics and assessments around to suit home learning (T6)

There were high levels of anxiety by some students so I reduced assessments where I could (T8)

We had a more relaxed approach to assessment – gave students more time and more directed coaching (T9)

These statements indicated an emphasis on adjusting timing, reducing complexity and amounts of assessment requirements, and provision of greater guidance in response to student learning and wellbeing needs. By switching the sequence of assessments and giving extra time and support, teachers helped ease pressures for some students, though for others it made little difference to family circumstances.

We had family staying with us, so it was noisy and distracting and hard to do my assessments. (S1)

We couldn't afford the technology, so I couldn't do my assessments. (S3)

Assessments were pushed back, so it was hard to catch up when we returned to school. (S7)

Delayed assessments gave me extra time, so I did much better than I would've at school. (S10)

As seen in the teaching and learning section, evident in the assessment section is the range of student experience, from limited capacity to access and engage with assessment tasks through to optimising assessment of learning results. Limited access to learning and ongoing disruptions, worries about the pandemic with consequent health and wealth concerns, led many teachers to a greater focus on wellbeing.

Wellbeing

Wellbeing became a focus of teachers. Not only because the first NZ COVID wave began at the start of the 2020 school year when teachers strived to establish effective teacher-student and student-student relationships, but also because of the Prime Minister's calls to 'be kind'. Parenting and educational experts' advice was similar in the focus on 'getting through', and the school principal's awareness of the priority of supporting mental health, with school learning being of secondary importance.

We were exhorted to be kind and gentle. (T5)

Messaging from our principal was – let us know of students who're not responding, but don't push. Kids who came on [online], a lot of the time was touching base, how are you getting on? (T4)

Under our principal, there was not the pressure to get those good grades to show up on stats. The focus on wellbeing of our kids took pressure off us. N [principal] kept in weekly contact with us and wanted to know how we were. (T9)

Evident in the above extracts is the principal's influence on teachers' own wellbeing in inquiring after their professional and personal health, as well as concern for students. The principal's valuing and support of staff enabled teachers to pass on similar care to their students.

Mental health concerns escalated and continued, even for kids from stable homes. Increased anxiety – perfectionism, fear of failure, fear of putting a foot wrong; increased societal anxiety, some families had stress from continuous time together. (T12)

Kids were in paid work – lots of supermarkets, council – shopping for elderly. Lots of kids acted as parents in their house and looked after siblings while front line workers were out of the house. I was careful not to say school was more important – they had to live their life – so I focused on baby steps, user friendly learning approaches. (T9)

Teachers demonstrated awareness, empathy and understanding for students in their classes, particularly when they had wider knowledge of the school community, and students' individual circumstances. Implicit here, is the value and importance of knowing the student community. Important too, is a willingness to adjust expectations and pedagogical responses to not only accommodate students' realities but to support them through difficulties –as seen in the following interview extracts.

Some kids missed our pastoral care and struggled without access to it and social connections. Home was not a happy place for some students, and they could not exit. At school they get a break and seek advice from teachers on how to cope. We were confident we could fix learning – but knew wellbeing and social interaction could be challenged for students in COVID lockdown. So, we ensured we had regular catchup sessions to find out how they were going. (T11)

It helped talking to colleagues and getting the sense we're all going through it. In Zoom sessions I'd see kids that were tired or stressed. Acknowledging that, helped with relationships because you thought about them in a way you had not thought about before – how's H getting on out in the country with their grandmother? (T9)

Teachers became aware of the need to prioritise time in Zoom meetings for students to socially connect with the teacher as another adult outside of students' households (through additional calls/emails and dedicated 'social' time at the beginning of planned lessons), and with their classmates (such as through social activities in online breakout rooms). On a professional and personal level, teachers found they also appreciated opportunities to talk with colleagues for reassurance.

Pedagogical strategies were adjusted to modify the complexity or size of learning tasks, and to provide additional instruction. Teachers also created opportunities for students to support one another socially and emotionally through more buddy or group learning.

I wrote lots of worksheets and made them easier so kids would have a go and build their belief that they could to it. (T9)

Huge levels of anxiety from top achievers, perfectionists and those who were way behind in their learning. I scheduled extra tutorial sessions for those students (T8)

Priorities changed – greater emphasis on happiness for students but that emphasis has not helped them with learning or with workload. When we came back to school after lockdown, we thought about their increasing anxiety levels... Team working amongst the class made a difference – students became more helpful with one another. (T7)

Acknowledging mental health and wellbeing, openly discussing and addressing it, and creating opportunities to build or strengthen social connections as well as self-beliefs as learners, were amongst strategies mentioned by teachers to deal with wellbeing issues. However, a few teachers worried that time spent on social/emotional priorities compromised cognitive learning – though subsequent school-level achievement results showed percentage increases (NCEA Level 1, 7%; Level 2, 3%; Level 3, 5%) of students gaining qualifications in 2020 compared with previous years, except for Māori students (NCEA Level 2, 0.4% and Level 3, 4.5% reduction).

The findings section has illustrated how teachers acknowledged, listened to, and adjusted teaching, learning and assessment approaches in response to pandemic stresses

and uncertainties for students – seeking to care for, protect or enhance student wellbeing. Students' experiences ranged from no access to school learning, limited or difficult access, through to optimal learning and assessment.

While it is important to explore and understand teacher and student experiences of the COVID pandemic, of greater value to adolescent success are the strategies that made, or would make, a positive difference. Impactful factors and strategies are explicated next.

Discussion –optimising adolescent learning and assessment in a pandemic

The impact of pandemic circumstances on students' learning arguably resulted in about a third of students who noticeably dipped ('dived'), about a third plateaued ('survived') and another third excelled ('thrived'). Factors and pedagogical strategies that influenced the learning for each of these groupings are discussed in turn.

Dived

A minority of students, away from school routines, chose to optimise leisure or paid work time, and subsequently experienced a period of 'learning adjustment/ catchup' when schools re-opened. Most students who struggled to learn during COVID schooling disruptions were largely prevented access due to financial, proximal, or social circumstances such as low or non-availability of devices, and internet services (OECD, 2020). Additional family responsibilities for some students included the care of siblings and/or elderly relatives or seeking paid work outside the home to supplement family incomes. Addressing these economic and familial circumstances is not simple and requires inter-agency action, yet teachers' efforts to deliver print copy learning materials and loan school devices mitigated some of the effects. While in some instances those materials were unable to be used – due to limited knowledge/ skills, time or families coping with more complex or urgent matters – the act of delivering materials to homes conveyed to students those teachers cared for and valued them.

Mergler and Bowman (2020) argue that, "all students, particularly those who demonstrate extreme and negative behaviours, deserve a compassionate response from their teacher and merit further, more targeted support" (p. 231). In this research study, teachers were surprised to learn about difficulties in students' lives, such as the proportion who had limited internet access, family health or complex social challenges, as well as those students who struggled to learn concepts on their own. In return, students said, '*it helped knowing teachers cared – they listened, and they gave us more time to complete work.*' Students deserve support not only as a basic human right that respects their dignity and worthiness as human beings, but also because acknowledging and devoting time and care to students' wellbeing improves their social and emotional skills, reduces the likelihood of depression or disengagement from learning and life, and contributes to more favourable academic outcomes (Mergler & Bowman, 2020). Therefore, teachers and school communities who identify and respond to early signs of mental health difficulties, help build student strengths, hope and resilience.

Fundamental to this process is the establishment and nurturing of caring relationships between teachers and students, and students with other students. "In helping students understand themselves and their emotional and social worlds better, teachers offer students greater opportunities to experience mental health" (Mergler & Bowman, 2020, p.239), because they help students make sense of their life experiences and learn coping strategies from peers. There are simple, practical ways to do this online, as explained by one of the teachers in the research study:

We focused on student wellbeing – had a couple of face-to-face tutorial sessions during the week to touch base, and phone calls for others – what's happening for you, what's going well, what's hard for you? We took the pressure off them. (T9)

It is vital to take time to "check in' with students, ask how they are, what is occupying their time and energy, and listen and help them work through their situation. In short, prioritising time for socio-emotional and relational learning is most important as nurturing caring relationships and building student wellbeing are critical in times of uncertainty or deprivation. Thus, schools striving for optimal adolescent success, particularly for students 'at risk' or 'diving', are encouraged to devote time and material resources to make multiple contacts with students, and partner with them and other helping agencies, to mitigate difficulties.

Survived

Students who 'survive' or 'muddle along' showing minimal commitment to school learning, and whose life circumstances are not prohibitive, may respond to intentionally scaffolded teaching, modelling of self-regulated learning (SRL) and assessment strategies. Teachers in the research study trialled several ideas:

We focused on their patterns of learning – when and how they learn. They have vicarious experiences through their peers – how does learning change when you work with others? We help them see that ipsative assessment (growth) is important - what did you learn and what abilities can you take to the next one? (T14)

We focused on doing less but doing it better. So, we developed more resources to share on the Teams platform, set practical tasks students could do at home, chunked learning into manageable bits for them, used more checkpoints for formative assessment, adapted and shuffled things. (T5)

'Chunking' learning into manageable segments, concise and explicit guidance ('step-by-step'), and visible indicators of success, are some strategies that help 'minimally engaged' students (Gibbs & Poskitt, 2010). It is useful to embed self-monitoring/ assessment, opportunities for interactions with peers, and regular teacher checkpoints, whether they be informal or formal, since self-assessment encourages students to actively reflect on what they are learning, how, and how well so that they can modify subsequent learning (Moss & Brookhart, 2019). Furthermore, engaging in self and peer-assessment "requires students to engage in higher level thinking and disciplined inquiry to review, clarify, and correct one's own or others' work" (Sanchez et al., 2017, p.1049). In the process, "students develop a clearer conception of the assessed material because of increased exposure to it" (Sanchez et al., 2017, p.1050).

The collaborative learning involved in peer assessment appeals to many adolescents. Peer-assessment can be implemented in various ways, such as through pair or teams assessing, reviewing anonymous or named pieces of evidence, one-way or reciprocal assessment, and analysis across self and teacher assessments for learning insights (Sanchez et al., 2017). The process of self and peer assessment benefits from teacher guidance and regular brief monitoring, like using three simple questions, 'What have I learned/done? What am I learning/ doing now? What am I learning/ doing next?'; or 'What is worrying or stopping me? What (and who) might help? What will progress look like?' A respectful learning culture, training in the assessment process and either provision or co-construction of rubrics containing indicators of quality against specified criteria, also improves the quality of self and peer-assessment (Moss & Brookhart, 2019).

However, there are challenges in implementing self and peer assessment, in terms of students' potential discomfort and reluctance to expose gaps or misunderstandings, and the interpersonal skills required of students for phrasing feedback in constructive ways (Neilsen, 2021). Considerable modelling and guidance are required by teachers. In this study, smaller groupings, such as the use of online breakout rooms, helped build social cohesion and more active learning in smaller, psychologically safer environments. Teachers modelled ways to give feedback that built the receiver's understanding and confidence. Xie et al., (2019) argue that once the interpersonal and social aspects are established, better group learning engagement and performance occurs.

In short, breaking learning into achievable social and cognitive segments, providing timely guidance, checking in with students to identify and clear potential blockages, and additional coaching when appropriate, are all strategies for increasing engagement of 'surviving' students and leading them towards 'thriving' as learners.

In summary, strategies that transform 'surviving' students into 'thriving' learners include:

- Breaking learning into achievable social and cognitive segments
- Providing timely guidance
- Checking 'in' with students to identify and clear potential blockages, and
- Additional coaching when appropriate.

Thriving

Students who enjoyed learning and thrived during pandemic school disruptions were characterised by high levels of agency, extended periods of time 'absorbed in learning', and accessing resourceful people or other materials to support their learning. Furthermore, they had sufficient skills, interest, and self-belief to persist with learning – in effect, they demonstrated high levels of engagement.

"Engagement is a multi-faceted construct that encompasses students' sense of belonging and connectedness to their school, teachers and peers; their sense of agency, self-efficacy and orientation to achieve within their classrooms and in their broader extra-curricular endeavours; their involvement, effort, levels of concentration and interest in subjects and learning in general; and the extent to which learning is enjoyed

for its own sake, or seen as something that must be endured to receive a reward or avoid sanction." (Gibbs & Poskitt, 2010, p.10).

The case study findings revealed some of the interconnecting factors (Gibbs & Poskitt (2010, p.24) teachers use to increase student engagement: strengthening relationships with teachers and peers; focusing on relational learning; considering learner dispositions, motivation, and interest; creating opportunities for personal agency/cognitive autonomy; and building self-efficacy. Teachers built strong relationships with adolescents when they were empathetic, encouraged higher order thinking and learning through questioning and informative feedback, and adapted to student differences. Arousing curiosity, interest, and introducing optimal challenges are learner dispositions that teachers can stimulate and scaffold for greater learning independence. Motivation and interest in learning can be fuelled by allocating time for reflection and integrating students' perspectives and ideas into lessons to pique their interest. Creating an expectancy of success, and building the learner's self-worth and beliefs s/he can achieve are additional strategies – whether in-person, synchronous or asynchronously. Finally, involving students in planning and assessing their learning helps them adopt a goal orientation of mastery whereby their efforts positively impact learning progress (Gibbs & Poskitt, 2010, p.15-20).

Teachers shared practical examples of applying these strategies:

I created succinct Powerpoint Slides and Youtube clips, as well as used commercial resources to try to make learning fun. I had regular social catchups with students and put them in breakout rooms to chat with their mates. I used fun discussion starters, some of which they generated. (T7)

I tried to make learning interesting by using photos and videos I created, used my kid's blackboard for teaching points, set up routines to help the students develop learning habits, and kept in regular communication with them. (T13)

In summary, helping students to 'thrive' in their learning requires teachers:

- to know their students (listen and build relationships),
- be responsive to their uncertainties (time to talk, provide reassurance, coaching and strategies),
- be flexible and willing to adapt and try multiple ways of teaching, learning, and assessing, and
- provide students with choices and explicit guidance.

Critical to this success, are the beliefs and support of the school leadership and colleagues in nurturing teacher wellbeing and collaboration, particularly in pandemic times. In the words of the case study teachers:

It has helped having each other (team teaching) to support what we are doing (T11)

COVID highlighted the need for more collaboration and communication across faculties – even in things like assessment timing. (T12)

Conclusion

While the students interviewed were 15-17 years old, the article has been written to be applicable for adolescents of school age (11-18 years). COVID impacted adolescent teaching, learning and assessments, with considerable effects on the wellbeing of teachers and students. During this time, teachers strived to maintain a sense of normality and stability for adolescents in the timing and content of learning, teaching, and assessing. Teachers also made necessary adaptations in what was taught, when, and how. As a result, flexibility increased, and some students' thrived' with more choices and control over the timing and duration of their learning. But other students were less engaged, struggled and were thought to either 'survive' or 'dive' in school (not wider life) learning.

Yet during the time away from school, many of these seemingly less 'school engaged' students were immersed in real life learning. They developed interpersonal skills at home (caring for siblings or older relatives), learned about the world of work (such as essential workers in supermarkets), or deepened understanding of their cultural heritage. Perhaps it is not students, but schooling that is 'diving' or 'surviving' by inadequately recognising learning from broader life experiences and skills? COVID has left schooling with the challenge of enabling all students to thrive by redefining and assessing learning in personally meaningful ways.

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Uncovering the World of Maths with Visuals

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Abstract

Mathematical ideas are communicated in written format as symbols, tables, graphs, and visuals. Visual communication of mathematical ideas is the focus of this article. Familiarity with mathematical visuals is important in the process of decoding or deciphering the underlying messages in a wide range of visuals found in mathematics text and assessments. Further, the process of encoding visuals enables teachers and learners to represent and express mathematical ideas. Visuals have the potential to assist learners to uncover and unravel abstract mathematical concepts and processes, thus enhance their understanding and learning.

Examples of a variety of mathematical visuals are discussed in this article, mostly suitable for use in middle years. Reference is made to previous literature detailing the benefits, uses, and potential challenges of incorporating visuals in mathematics teaching and learning.

Introduction

As evident in mathematics text and assessments, a vast range of visuals typifies the field of mathematics. Mathematical visuals can be a useful tool for presenting and expressing mathematical ideas and aiding mathematical processes. Efficient use of mathematical visuals can play a key role in both decoding (analysing and interpreting) and encoding (communicating, representing, and processing) mathematical ideas.

The extensive use of visuals in mathematics text and assessment suggests their importance in mathematics teaching and learning. Children build the foundation of visual literacy in early years of schooling followed by the middle years during which time visual literacy becomes more challenging, as students are exposed to a range of increasingly diverse and complex visuals in many subject areas (Avgerinou & Petterson, 2011).

Through the discussion of a range of mathematical questions, this article exemplifies and discusses a variety of visuals that can be used to communicate mathematical ideas, particularly in the middle years. Reference is made to previous literature detailing the benefits, uses, and potential challenges of incorporating visuals in mathematics education.

Literature Review

Mathematical ideas can be presented in many ways, including verbal, physical, contextual, visual, and symbolic (see Huinker, 2015). Huinker described representational competence as the ability to effectively present and understand mathematics in a range of formats, to aid the communication and understanding of mathematical ideas. Of particular relevance in this article, visuals are commonly used in mathematics to enrich text, convey information, expose mathematical ideas, and enhance learning, all important in terms of catering for diverse student cohorts.

The theories of influential educator and theorist Bruner (2006a, 2006b) suggest the key role of visuals in mathematics. Bruner suggested that the learning process could be simplified and scaffolded by following a series of steps to assist learning. The steps used increasingly abstract representations: enactive, iconic, and then symbolic representations. Initially, concepts are introduced with reference to concrete materials and specific contexts, followed by representation with diagrams and then as symbols. Following these steps enables learners to develop a degree of understanding of a concept as a precursor to the construction of abstract ideas depicted by symbolic language and formal words. While stressing the importance of concrete materials and visuals is important, a linear progression for scaffolding learning is perhaps an oversimplification. Nevertheless, there appears no reason to doubt that concrete manipulatives, diagrams, and verbal descriptions are useful tools in any stage of learning, with the verbal descriptions and visuals representations becoming more complex and mathematically precise as the learning progresses.

The important role of representations, including visuals, is stated in mathematics curricula in both the USA and Australia. The Representation Standard in USA highlights the importance of selecting, creating, and using representations, including manipulatives, diagrams, symbols, tables, and graphs (National Council of Teachers of Mathematics [NCTM], 2022). Mastery of a range of mathematical representations enables students to increase their ability to model and interpret mathematical processes and understand and solve mathematical problems (NCTM, 2022). There is no equivalent standard in Australia, but the Australian Curriculum contains many references to different representations (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2021). For instance, the Australian Curriculum: Mathematics highlights the importance of students making choices about how best to represent mathematical problems, followed by effective communication of the solutions (ACARA, 2021).

Mastery of a range of ways of presenting mathematical ideas is important for teachers and learners, aiding them to become versatile in uncovering, presenting, and communicating mathematical ideas, and solving mathematical problems. Widely agreed by educators (e.g., Dreher et al., 2016; Hatisaru, 2021; Kula Unver & Bukova Guzel, 2019), varied representations complement each other, supporting different ways of thinking, linking ideas from different topics, and limiting the inherent weaknesses of specific representations. This is linked to the idea that a concept or process can be better understood when viewed from different perspectives. Thus, as part of pedagogical content knowledge, teachers require the ability to successfully implement learning based on a combination of approaches (Flores, et al., 2015). The use of visual representations can aid teachers in presenting concepts and content in comprehensible ways and complement traditional methods of presenting and communicating mathematical ideas. Seemingly evidence of the benefits of varied representations of

mathematics, Huinker (2015) noted a study on sixth-grade students from five countries that indicated that students in countries that achieved well at mathematics were more able to use and move flexibly between a range of representations.

Mastery of a range of ways of representing mathematics contributes to the development of deep understanding of mathematics concepts and processes. The use of diagrams specifically is broadly acknowledged to have benefits in mathematics learning as a way of enhancing learners' conceptual understanding and aiding them in making sense of abstract ideas (Dreher et al., 2016; Flores et al., 2015, Ng & Lee, 2009; Ruchti & Bennett, 2013). Visuals are also acknowledged as an aid to memorising and adding interest and motivation (Debrenti, 2013, Dreher et al., 2016), also keys to successful learning in a diverse student cohort. As evident in the study by Rahmah et al. (2019), visuals can aid students to reveal their thinking and understanding, and incorrect visuals can be an indication of students' misconceptions. As suggested by Ryan and McCrae (2005): "It is the use of representations that may shift procedural behaviour towards conceptual understanding" (p. 647), a statement that highlights the key role of diverse representations in terms of aiding students' learning of mathematics. Thus, effective communication of mathematical ideas in diverse formats, is stressed as a key part of teachers' knowledge (Australian Institute for Teaching and School Leadership [AITSL], 2017; Norton, 2010, 2012), with suggestions that weak knowledge of representations may negatively affect teachers' efficacy (e.g., Norton, 2010). The ability to choose suitable representations of mathematical ideas makes it possible for mathematics teachers to present content in comprehensible formats to address diverse learners' abilities and needs.

Scaffolding learners' ability to use a range of text typical of mathematics is an aid to enhancing the learning of mathematics (Huinker, 2015; Ryan & McCrae, 2005; Terwel et al., 2009). However, as evident in Rahmah et al. (2019), the successful construction of visuals to enhance mathematical problem solving initially depends on understanding contextualised word questions.

There have been suggestions that more time should be spent on the use of representations, including visuals, and less on the use of algorithms (Huinker, 2015). This is seemingly an apt suggestion with the apparent lack of focus on visual representations, even in studies that advocate using a range of representations (e.g., Debrenti, 2013). An increased focus on visuals may also be a valid suggestion considering the lack of focus on understanding when algorithms are used. This has led to models that depict the range of useful representations of mathematical ideas (Rahmah et al., 2019) and has led to educators like Huinker (2015) posing suggestions of how representations, including visuals, can be effectively used.

Views of the use of visuals in mathematics education varies and visuals may pose challenges to some students due to the unique literacy demands of visuals. The study by Dreher et al. (2016), for instance, indicated that teachers' beliefs about the value of using visuals in mathematics may vary. In addition, Lowrie and Diezmann (2005) reported some students' challenges with decoding and encoding visuals, the extent of the challenge influenced by the student's age and the complexity of the visual. Referring to multiple studies, Dreher et al. (2016) stressed that learners' understanding of visuals requires scaffolding, for example, by challenging learners to explain how visuals relate to mathematical concepts or processes.

The varied literacy demands of a diverse range of visuals, graphs, and illustrations in mathematics suggest the importance of teachers including a focus on visual literacy, understanding that visuals may pose challenges to some learners. As evident in the study by Flores et al. (2015), learners need to learn to use visuals, especially if they have previously been exposed to traditional methods with little use of representations. Learners need to be aided to link visuals and conceptual understanding (Zambo & Zambo, 2004). Further, visuals should only be used when useful and relevant (Burns, 2007).

It is useful to assess the diversity of mathematical visual images at this stage. Based on earlier classifications, the range of visuals that typify mathematics have been categorised (Carter et al., 2012). The classification includes six categories (summarised in Fig. 1, with examples for each). More details can be found in Carter et al. (2012). The categories utilise thirteen perceptual elements to convey information. They include position; length; angle (orientation); gradient; area; volume; density; colour saturation; colour hue; texture; connection; containment; and shape. Some of the categories emphasise retinal elements such as colour hue, colour saturation, shape, and texture whereas other categories emphasise measurable elements such as position, length, and gradient (see Carter et al., 2012; Mackinlay, 1999).

Learners should be given opportunities to practise visuals and graphics typical of the various graphical languages in mathematics (Lowrie & Diezmann, 2005; 2007). The examples in this article contain visuals typical of most of the six categories (Fig. 1). More examples can be found in Quinnell (2017a; 2017b).

Examples and Discussion of Visuals to Enhance Understanding of Mathematical Ideas

Below are examples of mathematical visuals that can aid comprehension of mathematical concepts and processes, proceeding from less to more complex examples. Think of the examples as parcels containing mathematical ideas and concepts. You are about to undertake a journey in which you uncover the parcels to expose the depths of the ideas inside.

Example 1. Australia had a total of 472 athletes entered into the Tokyo Olympic Games. A total of 328 athletes flew back to Australia after their events. How many Australian athletes remained in Tokyo?

Example 2. While practising, Australian athlete Peter Bol ran 6 times around a 250 m track. How far did Peter run in kilometres?

Example 3. If a movie was screened from 17:45 to 20:25, how long was the movie?

Example 4. One of the athletes drove 14.9 km from the Olympic village to the shops and then 4.8 km to practise at the hockey fields. How far did the athlete drive in total?

Example 5. One of the Australian Olympic runners came 16th out of a total of 25 runners. What

- *One dimensional: Visuals with a single axis (e.g., number lines, protractors)*
- *Two dimensional: Visuals with two or three axes (e.g., bar and line graphs)*
- *Map: Visuals that show scale and direction (e.g., road or contour maps, building plans)*
- *Shape: Information shown by shape, area, angle, proportion (e.g., pie graphs, geometric drawings, tessellations)*
- *Connection: Visuals showing nodes and connection lines (e.g., flow charts, tree diagrams)*
- *Picture: Visuals with limited emphasis on measurable elements such as angles, distances (e.g., pictures, photographs)*

Notes: In this classification, moving images are placed in the same category as the sequence of static images that they originated from. Also worth noting, at times visuals contain elements of a combination of the categories. For example:

- *tessellations, in the shape category, may incorporate perceptual elements from the picture category;*
- *picture graphs, if drawn to scale, may include elements of the two dimensional category, and elements of the picture category*

Figure 1. Six categories of visual language for use in mathematics (Carter et.al., 2012).

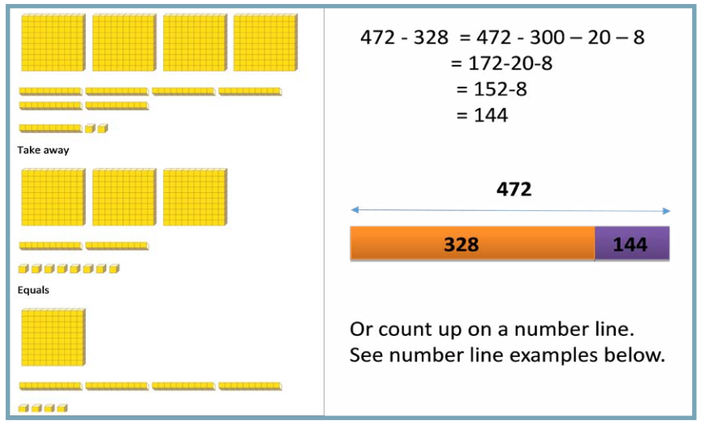

Figure 2. Visuals for example 1 about the Olympic athletes.

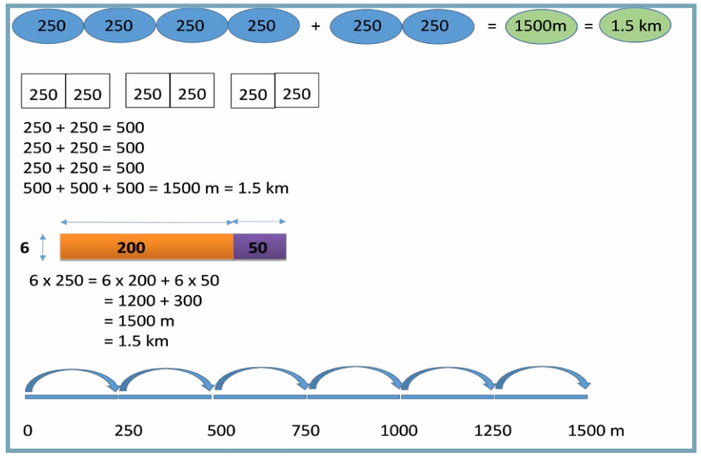

Figure 3. Visuals for example 2 about Peter Bol's race.

percentage of the runners beat the Australian runner?

Example 6. The original price of a pair of shoes was $40 and then there was a price increase of 25%. Later, they were put on sale with a discount of 25%. What was the final price?

Example 7. A recipe requires a ratio of 6 : 3 : 1 for flour : sugar : coconut. How many cups of sugar are needed for every 51/2 cups of flour?

Example 8. Six children had heights of: 100 cm, 121 cm, 155 cm, 134 cm, 140 cm, 160 cm. What is their median height?

Discussion

We have now uncovered many mathematical parcels, exposing mathematical concepts and processes. Use was made of a variety of visuals that are typical of mathematics, examples of Bruner's (2006a, 2006b) iconic category of representations. Visuals are included in mathematics text for varied reasons: for aesthetic purposes, to aid understanding of key vocabulary, to organise and record information, or to aid understanding concepts and processes. Understanding the difference between these categories of visuals is important for mathematics teachers if they aim to choose visuals that aid understanding of mathematics concepts and processes, which is important in terms of enhancing learning.

The visuals in the examples are used as tools to aid understanding the concepts mentioned above and the mathematical processes. A number of different visuals are at times used to illustrate a question. Different visuals present different levels of challenge to students,

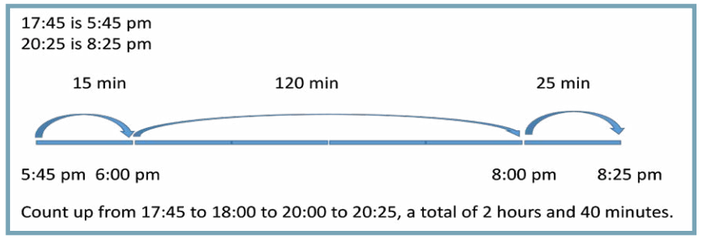

Figure 4. *Visual for example 3 about the length of the movie.*

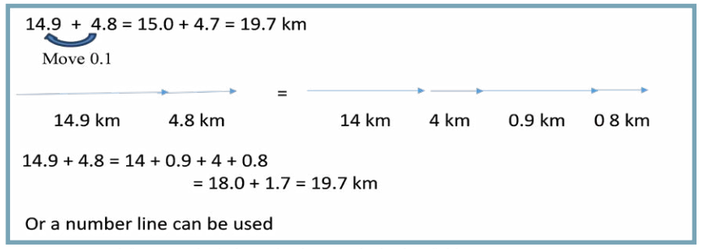

Figure 5. Visual for example 4 about the drive to the hockey fields.

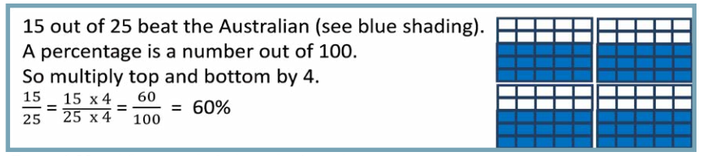

Figure 6. Visual for example 5 about the Australian runner.

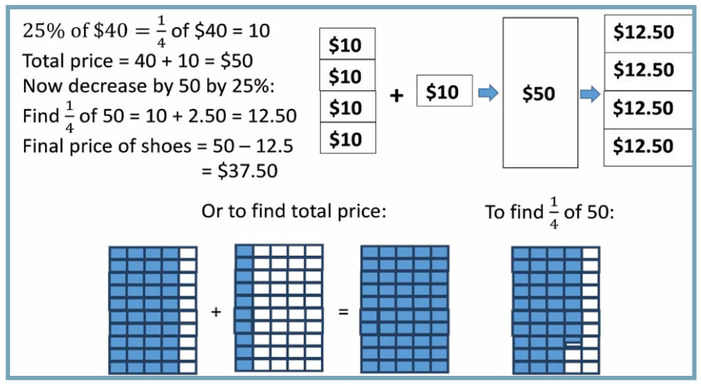

Figure 7. Visual for example 6 about the price of shoes.

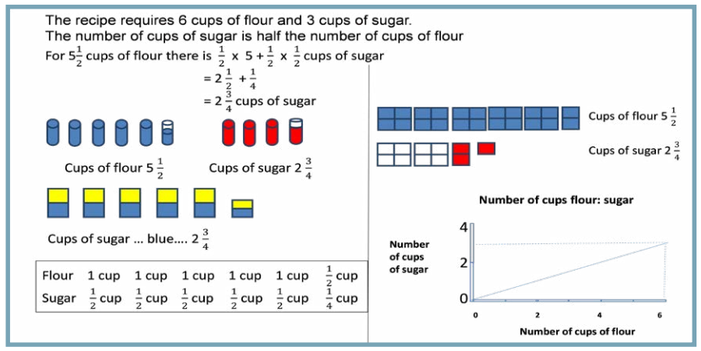

Figure 8. Visual for example 7 about the flour and sugar.

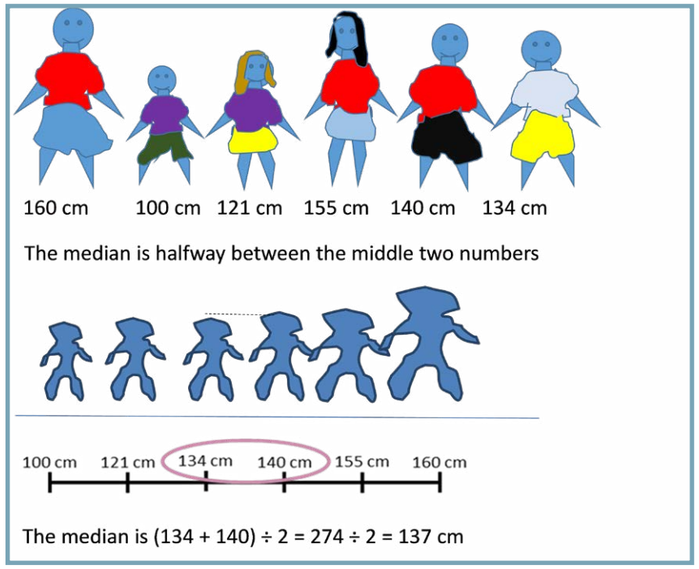

Figure 9. Visual for example 8 about the heights of children.

some simpler and more realistic and others complex, abstract, and mathematical. The contrast can be seen in the visuals used in Huinker (2015), those in this article, and the visuals in Kula Unver and Bukova Guzel (2019). In this article, the first visuals in examples 7 and 8 are the most realistic (Fig. 8; Fig. 9). Other visuals are still relatively 'simple-to-understand', for example, the first visual in example 2 (Fig. 3), the second and third in example 7 (Fig. 8), and the second in example 8 (Fig. 9). In general, the visuals in an example are ordered according to difficulty and become increasingly abstract, with more complex number lines and graphs placed last. Overall, the 'simple-to-understand' visuals emphasise retinal elements such as colour hue, colour saturation, shape, and texture, rather than measurable elements such as position, length, and gradient (see Carter et al., 2012; Mackinlay, 1999).

Also included in this article are complex and abstract visuals, such as the visual representing the number of athletes with MAB blocks in example 1 (Fig. 2). Some visuals such as the first visual in example 6 has an element of the network category discussed by Carter et al. (2012), breaking the visual down into steps to show the mathematical process (Fig. 7). More complex still are visuals in the form of tables, or graphs that contain one and two axes (e.g., Fig. 8), another example being the horizontal depiction of the number of athletes (Fig. 2), which includes one horizontal axis. The table (Fig. 8) provides a means for organising and recording mathematical information and aiding the solving process. However, it relies on an understanding of how a two-dimensional table works. Compared to the 'simple-to-understand' visuals, one- and two-dimensional visuals rely more heavily on measurable elements such as position, length, and gradient (see Carter et al., 2012; Mackinlay, 1999), and on signs, symbols, numbers, and icons, all integral parts of the grammar of mathematical text. Factual details often play important roles in interpreting one- and two-dimensional visuals, arguably two of the more difficult mathematical visual categories to use and understand. One- and two-dimensional visuals (see Carter et al., 2012) are often not read from left to right as is most prose. For instance, encoding or decoding the scales in the graph in example 7 (Fig. 8), requires an understanding that the axes are read in a vertical and horizontal direction spontaneously, in combination with taking note of all the other labels on the graph. Both encoding and decoding such visuals rely on mathematical knowledge, presenting challenges to students. Understanding the features (e.g., labels and scales) and conventions used in visuals with one or more axes can aid encoding and decoding such visuals. Notably, many of the visuals in this article rely on the interpretation of one or two axes (e.g., Fig. 4, 8), inclusion of axes also being a common element of linear measuring scales, measuring gauges, and timelines. Carter et al. (2012) suggested that it appears apt to transfer knowledge between the many uses of axes and scales in mathematics and other subject areas.

Notably, this study and the studies by Debrenti (2013) and Rahmah et al. (2019), suggest the usefulness of one-dimensional visuals in the form of number lines in a great variety of mathematics problems. Number lines are useful in number, fraction, decimal, percentage, and also in algebra and probability problems. Number lines of some sort can be used in six of the above eight questions. Although they require some detail, a high degree of accuracy is not always necessary in visuals with one axis, and simplifying such visuals may benefit students who struggle in mathematics. For instance, a single axis represents the situations in the first two and last questions without focusing on a high degree of accuracy.

The variety and complexity of the included visuals suggest that learners need to learn to use such representations, an issue discussed by Dreher et al. (2016) and Huinker (2015). This is especially true if learners have previously had little exposure to visual methods (Flores et al., 2015). Learners need assistance to link representations, especially the more abstract representations, and conceptual understanding (Zambo & Zambo, 2004). Methods for aiding the effective use of visuals are suggested by Huinker (2015). Exposure to varied representations provides opportunities for students to overcome the challenges of using representations.

The use of various methods, such as those exemplified above, challenges the idea of one correct method for solving mathematical problems. Further, as evident in the examples, questions that are at times solved with complex mathematics can often be solved by simpler visual methods. For instance, in example 7, although a table or graph can be used to represent the situation, simpler visuals can also be used (Fig. 8). It is seemingly apt to discuss simple visual methods to aid the weaker students in diverse student cohorts, although they may also need to learn more complex methods in their middle and senior years. As suggested by Ryan and McCrae (2005), the use of visual representations has the potential to shift learners towards increased conceptual understanding.

Solving the questions depends on several steps. Firstly, encoding visuals rely on an understanding of the problems. After that, visuals can aid in the effective recording of information, understanding of mathematical ideas, and mathematical problem-solving. A knowledge of mathematical concepts and operations is necessary here, in addition to use of suitable visuals.

Not all encoding of visuals is helpful to aid understanding of a question or to help the solving process, some visuals being more powerful than others in this regard. The visuals in this article fall into Burns' (2007) category of visuals that are useful because they add to the understanding of mathematics concepts or processes. However, they vary in complexity and literacy demands, thus, these visuals are not all suitable for all levels. As with other visuals used in mathematics, encoding such visuals places unique literacy demands on learners.

Increased awareness of a wider range of visual representations offers benefits by giving mathematics teachers a greater faculty to exercise choices with respect to their explanations. A greater knowledge of visuals offers teachers expanded ability to present mathematical ideas in understandable formats to a diverse student cohort, potentially enhancing learning. For this reason, effective use of visuals is a key part of teachers' pedagogical content knowledge (AITSL, 2017; Norton, 2010, 2012), part of the literacy demands of mathematics. However, visuals need to be cautiously used to avoid challenges that they may pose to students.

Conclusion

Familiarity with mathematical visuals is important to aid in decoding the wide range of visuals found in mathematics text and assessments. Further, the process of encoding mathematical visuals enables students to express mathematical ideas. Encoding visuals also has the potential to assist students from a diverse student cohort in unraveling abstract mathematical concepts and processes.

Examples of a variety of mathematical visuals are discussed in this article, with reference to previous literature. The included examples are evidence that visuals can provide novel ways of illustrating mathematical concepts and aiding understanding of mathematical processes. Also illustrated in the article, when using varied visuals, learners are exposed to expanded ways of thinking about and presenting mathematical ideas and processes. Use of a toolshed of visuals has the potential to enhance learning by making mathematics accessible and comprehensible to a diverse student cohort.

However, the different literacy demands of mathematical visuals compared to the literacy demands of prose, paint a picture of the challenges that they may pose to students. Effective use of visuals, such as those discussed, depends on visual literacy and mathematical knowledge. This suggests the need for scaffolding of decoding and encoding of varied mathematical visuals through practice and focused support in the classroom. Not only should middle school students be able to work in familiar contexts, but the ability to encode (and decode) visuals in unfamiliar contexts is also beneficial in mathematics.

A wide range of mathematical visuals is an additional tool in a toolshed of ideas to enhance the learning of mathematics for middle school students. Visual stimulation has the potential to scaffold understanding of mathematical concepts and encourage engagement in mathematics learning. However, the diverse literacy demands of visuals mean that they need to be cautiously used to prevent possible challenges that they may pose to students.

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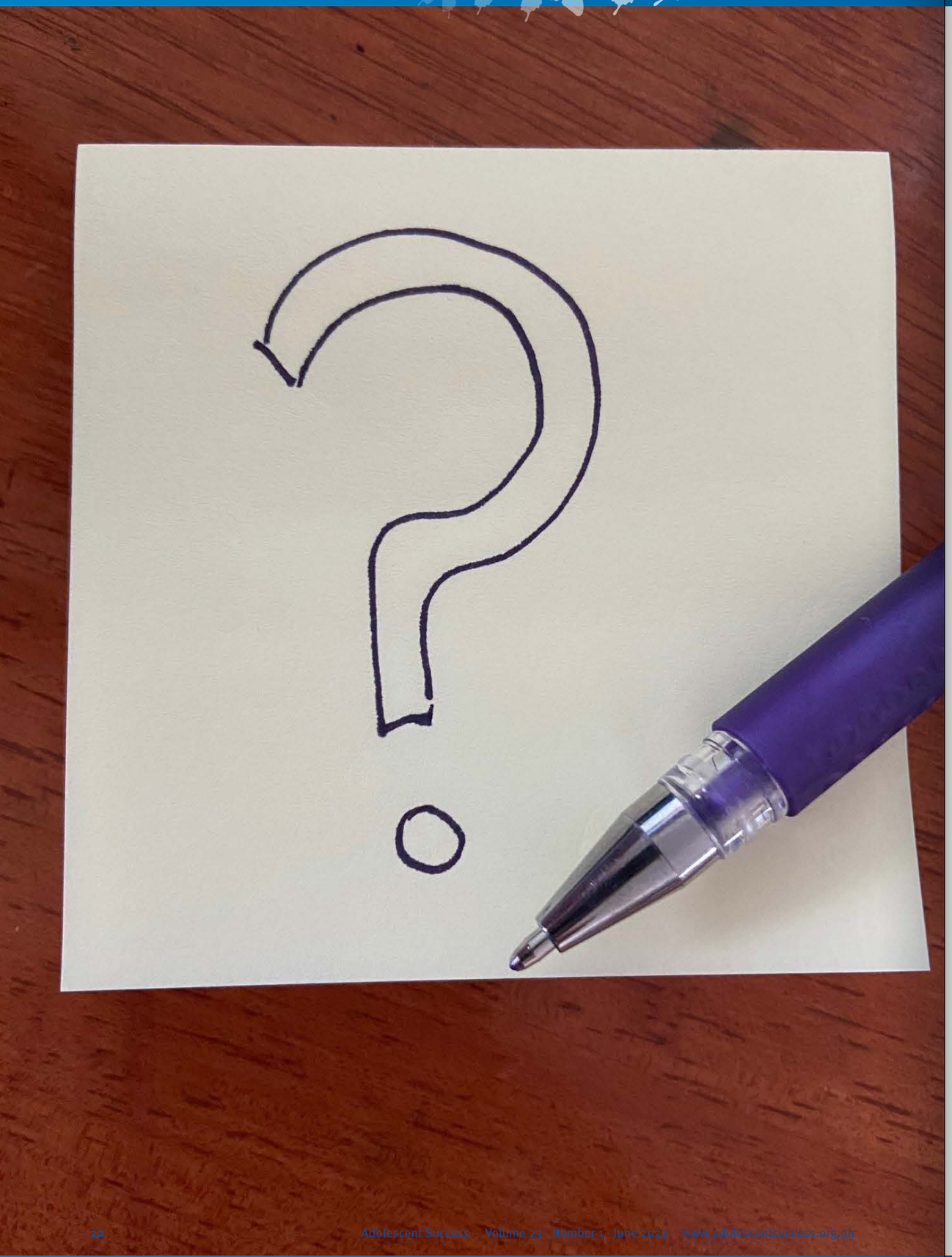


Thinking about thinking helps kids learn. How can we teach critical thinking?

***Dr Peter Ellerton**, Lecturer in Critical Thinking; Curriculum Director, UQ Critical Thinking Project, The University of Queensland*

Few people doubt the value of developing students' thinking skills. A 2013 survey in the United States found 93% of employers believe a candidate's *"demonstrated capacity to think critically, communicate clearly, and solve complex problems is more important [the emphasis is in the original] than [their] undergraduate major"* (AACU, 2013).

A focus on critical thinking is also common in education. In the Australian Curriculum, critical and creative thinking are known as "general capabilities" (ACARA, 2020); the US has a similar focus through their "common core" (Daily News, 2010).

Critical thinking is being taught successfully in a number of programs in Australian schools and universities and around the world (Queensland Government, 2020). And various studies show these programs improve students' thinking ability and even their standardised test scores.

But what is critical thinking and how can we teach it?

What we mean by critical thinking

There are many definitions of critical thinking that are vague or ill-formed. To help address this, let's start by saying what critical thinking is not.

First, critical thinking is not just being smart. Being able to recognise a problem and find the solution are characteristics we associate with intelligence. But they are by themselves not critical thinking.

Intelligence, at least as measured by IQ tests, is not set in stone. But it does not seem to be strongly affected by education (all other things being equal), requiring years of study to make any significant difference, if at all (Huston, 2018). The ability to think critically, however, can improve significantly with much shorter interventions, as I will show.

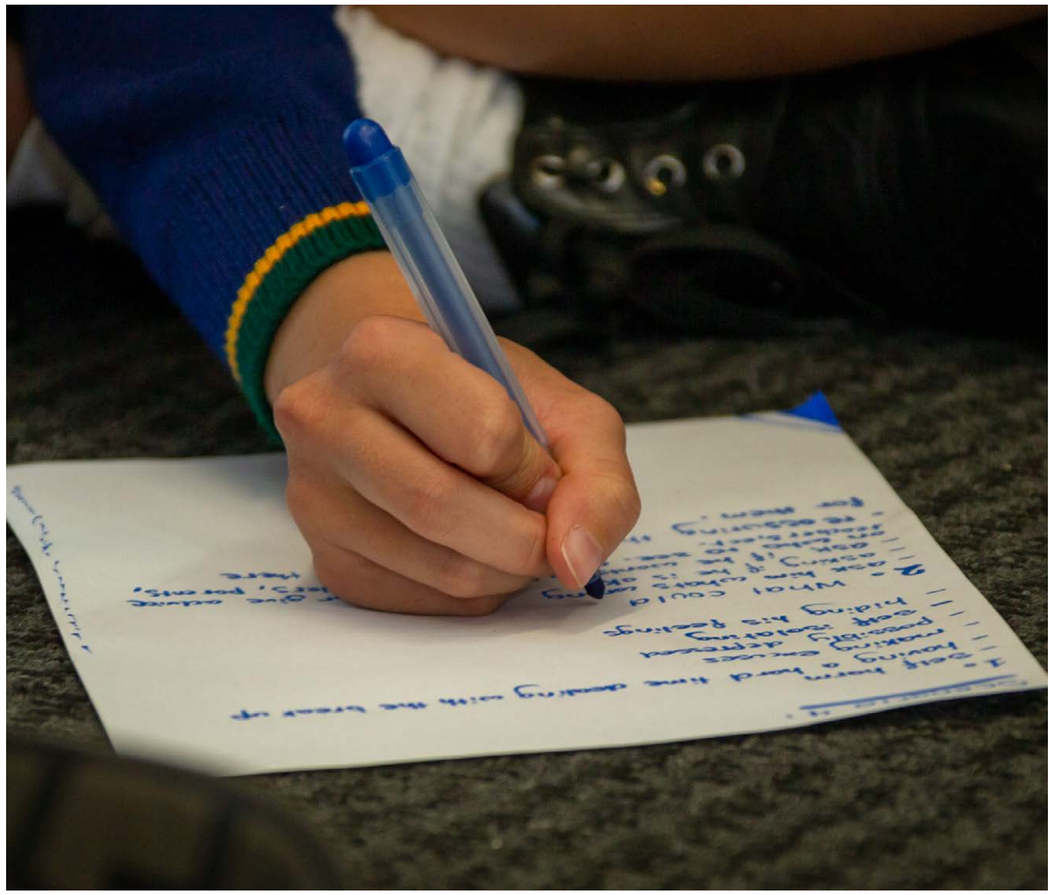
Second, critical thinking is not just difficult thinking. Some thinking we see as hard, such as performing a complex chemical analysis, could be done by computers. Critical thinking is more about the quality of thinking than the difficulty of a problem.

So, how do we understand what good quality thinking is?

Critical thinkers have the ability to evaluate their own thinking using standards of good reasoning. These include what we collectively call the values of inquiry such as precision, clarity, depth and breadth of treatment, coherence, significance and relevance (Ellerton, n.d.).

I might claim the temperature of the planet is increasing, or that the rate of deforestation in the Amazon is greater than it was last year. While these statements are accurate, they lack precision: we would also like to know by how much they are increasing to make the statement more meaningful.

Or I might wonder if the biodiversity of Tasmania's old growth forests would be affected by logging. Someone might reply if we did not log these forests, jobs and livelihoods would be at risk. A good critical thinker will point out while this is a significant issue, it is not relevant to



the question (Ellerton, 2015).

Critical thinkers also examine the structure of arguments to evaluate the strength of claims. This is not just about deciding whether a claim is true or not, but also whether a conclusion can be logically supported by the available data through an understanding of how arguments work (Cook et al, 2018).

Critical thinkers make the quality of their thinking an object of study. They are sensitive to the values of inquiry and the quality of inferences drawn from given information.

They are also meta-cognitive - meaning they're aware of their thought processes (or some of them) such as understanding how and why they arrive at particular conclusions - and have the tools and ability to evaluate and improve their own thinking.

How we can teach it

Many approaches to developing critical thinking are based on Philosophy for Children, a program that involves teaching the methodology of argument and focuses on thinking skills (Pritchard, 2018). Other approaches provide this focus outside of a philosophical context.

Teachers at one Brisbane school, who have extensive training in critical thinking pedagogies, developed a task that asked students to determine Australia's greatest sports person.

Students needed to construct their own criteria for greatness. To do so, they had to analyse the Australian sporting context, create possible evaluative standards, explain and justify why some standards would be more acceptable than others and apply these to their candidates.

They then needed to argue their case with their peers to develop criteria that were robust, defensible, widely applicable and produced a choice that captured significant and relevant aspects of Australian sport.

Learning experiences and assessment items that facilitate critical thinking skills include those in which students can:

- challenge assumptions
- frame problems collectively
- question creatively
- construct, analyse and evaluate arguments
- discerningly apply values of inquiry
- engage in a wide variety of cognitive skills, including analysing, explaining, justifying and evaluating (which creates possibilities for argument construction and evaluation and for applying the values of inquiry)

One strategy that also has a large impact (Butchart et al, 2009) on students' ability to analyse and evaluate arguments is argument mapping (Lau & Chan, 2020), in which a student's reasoning can be visually displayed by capturing the inferential pathway from premises to conclusion. Argument maps are an important tool in making our reasoning available for analysis and evaluation.

This map shows part of an argument in favour of giving artificial flowers over real ones.

How we know it works

Studies involving a Philosophy for Children approach show children experience cognitive gains (Topping & Trickey, 2007), as measured by improved academic outcomes, for

several years after having weekly classes for a year compared to their peers.

This type of argument-based intellectual engagement (Kuhn, 2015), however, can show high outcomes in terms of the quality of thinking in any classroom (Gillies, 2017).

Research also shows deliberate attention to the practice of reasoning in the context of our everyday lives can be significantly improved through targeted teaching (Van Gelder et al, 2004).

Researchers looking at the gains (Butchart et al, 2009) made in a single semester of teaching critical thinking with argument maps said "the critical thinking gains measured […] are close to that which could be expected to result from three years of undergraduate education" (Cullen et al, 2018).

Students who are explicitly taught to think well also do better on subject-based exams and standardised tests than those who do not.

Our yet-to-be-published study, using verified data, showed students in years three to nine who engaged in a series of 12 one-hour teacher-facilitated online lessons in critical thinking, showed a significant increase in relative gains in NAPLAN test results – as measured against a control group and after controlling for other variables.

In terms of developing 21st century skills, which includes setting up students for lifelong learning, teaching critical thinking should be core business.

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Acknowledgements

The University of Queensland Critical Thinking Project has a number of tools to help teach critical thinking skills. One is a web-based mapping system, now in use in a number of schools and universities, to help increase the critical thinking abilities of students. For more information, visit https://critical-thinking.project.uq.edu.au/

A Philosophy Program: Developing Students' Critical Thinking, Communication and Learning Skills

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To build the capacity of their Year 7 – 10 learners with skills of critical thinking, communication, and collaboration and to become more confident learners, two key leaders at San Sisto College in 2018, developed and introduced a Philosophy Program into the weekly learning and teaching cycle. The program incorporates thinking approaches, collaborative problem solving, literacy, and metacognition based on a philosophical inquiry method.

The Philosophy Program appears to have a positive impact on the learners and teachers involved, and so the decision was made to research the perceptions and impact of the program more rigorously. Over three months, during Terms 3 and 4 (2021), data was collected from student and teacher interviews as well as classroom observations. The research aimed to ascertain the perceived impact of the program. The final research report was presented to the College leadership at the end of 2021. It highlighted the significant impact the program appears to have on student learning approaches and teacher practice, not only across Years 7 – 10, but also into the senior years. The report also outlined challenges and recommendations.

This article presents a background of the Philosophy Program (at the College); a brief overview of the research approach used in the study; and key findings of the research. The overarching research question that guided the investigation asked:

"How do teachers and students perceive the Philosophy Program and the impact it has had on student learning at San Sisto College?"

Basis of the Program

The Australian Curriculum's General Capabilities are intended to be embedded across the P -10 curriculum. They encompass knowledge, skills, behaviours, and dispositions aimed at developing in students capacity to apply knowledge and skills confidently, effectively, and appropriately in complex and changing circumstances, in their learning within, and outside of, school (Australian Curriculum and Assessment Authority ([ACARA], 2021). In addition, the Queensland Curriculum and Assessment Authority ([QCAA], 2021) states that all General Syllabuses are underpinned by critical thinking, creative thinking, communication, collaboration and teamwork, personal and social skills, and Information Communication Technologies (ICT) to assist in the development of learners who become, amongst other things, lifelong learners and responsible global citizens.

Knowing the importance of these capabilities for students and recognising that at times their students were satisfied with merely being provided information rather than critically exploring it, the Philosophy Program at San Sisto was born. This program is based on a method of

philosophical inquiry, emphasising collaborative learning through class discussions, working with a partner, and small group work. The program teaches students to think in socially responsible ways, meaning that students become not only critically-thinking individuals but also good team-players, with benefits that extend beyond the classroom to community life and the world of work. The Philosophy Program provides teachers with an effective means of teaching students to think critically and creatively; to use their knowledge to solve problems; to deal with issues; to explore possibilities; and to work with ideas (Cam, 2020).

The Philosophy Program is managed by Peter Barber (Secondary Learning Leader) and Cara-Lee Robinson-Taylor (Assistant Principal) who also formed part of the teaching team. Their roles involve maintaining the Philosophy Program within the college, and working with teachers to ensure that the philosophical inquiry approach is understood and utilised.

The Philosophy Program

As stated, there was belief that the students at the College would benefit from becoming more critical in their thinking, better able to communicate, and to be more active in their own learning, and so, the Philosophy Program for Years 7 – 10 was introduced at San Sisto College in 2018. Through research and connections with and about philosophy programs in other schools, along with participation and connection with the Critical Thinking Project and Aspiring Thinkers Network at the University of Queensland [UQ], the current program was planned, developed and implemented.

The Philosophy Program follows a scope and sequence and developmentally incorporated the General Capabilities (ACARA, 2021) and cognitions (QCAA, 2021), embedding skills and attributes for lifelong learning. Throughout, students engage in collaborative problem solving, critical thinking, communication, collaboration and teamwork, personal and social skills (ACARA, 2021; QCAA, 2021) and they are intentionally taught metacognitive processes including the skills to respectfully question each other, build upon each other's ideas, and critique each other's ideas.

Philosophy units run for approximately five weeks, with two units per term for one hour per week. In most cases, the teacher of the year level Philosophy class also teaches that class for another subject, providing continuity, and the establishment of stronger relationships between teacher and students.The program is not assessed and there is no homework involved. The students seem very motivated, enjoying the "freedom" the program provides.

Initial teacher preparation for the Philosophy Program saw teachers upskilled through the Aspiring Thinkers program at UQ, and some in-house professional learning. More recently, staff have been involved in professional learning to gain deeper understandings of the appropriate and desired pedagogical approaches. This is an ongoing process with the aim of embedding pedagogies across the curriculum.

Methodology

Specific to this qualitative research, the goal was to ascertain the participants' views of the situation being studied, and as the researcher, to seek to understand and make sense of those perceptions (Creswell, 2014; Crotty, 1998). Students were chosen to participate by the Assistant Principal and Learning Leader in the first instance, and additionally, volunteers were asked to be involved. This equated to four student group interviews being conducted, where students were asked a series of questions to garner their perceptions and views on the Philosophy Progam and its impact on their learning and achievement. Groups consisted of students from a variety of year levels, with representation from all years across the college (See Table 1).

Table 1: Interiew Structure for Student Groups

Interview 1	Interview 2	Interview 3	Interview 4
5 students from Year 7 4 students from Year 8 1 student from Year 9	10 students from Years 11 and 12 (with year 12s having only done 2 years of Philosophy)	2 students from Years 11 and 12	10 students from Years 9 and 10

Teachers were invited to participate in individual interviews which were conducted online at a time specified by them. Five teachers of Philosophy and two teachers who had never taught Philosophy but had been at the college for several years were interviewed. Similar questions were posed to garner their perceptions and views around the impact of the Philosophy Program on student learning.

One classroom observation of a Year 7 Philosophy class occurred in 2020 and two full lesson observations were undertaken in 2021 (using a video device). These lessons were captured in segments with the aim of focusing on the whole classroom experience, student engagement and interactions, as well as pedagogical approaches being used.

Classes observed included:

- 1 Philosophy class in Term 4, 2020
- 1 Philosophy Class in Term 4, 2021
- 1 teacher in a Mathematics class in Term 4, 2021 (who teaches Philosophy)

Data Analysis

Both the student group interviews and teacher interviews were transcribed and annotated to identify key themes. Student interview responses were combined to enable the collation and synthesis of the responses provided. Responses from Philosophy and non-Philosophy teachers were combined and annotated according to the themes identified through the student responses. Where responses did not correspond to these themes, additional areas were identified.

Lastly, videos and classroom observations were viewed and analysed through the lens of those key themes to observe the types of skills students were using and the pedagogical practices teachers employed.

Findings

Consistent themes were identified as having significant benefits for student approaches to their learning, and particularly on their ways of thinking, collaborating, and communicating. These themes explicitly link to several of the General Capabilities and reinforce an important aim of Philosophy Programs; that being for students to be developing and strengthening their skills to be active participants and citizens in their world, and to

be developing themselves as lifelong learners. Findings are presented in three sections: student voice, teacher voice and classroom observations.

Key Themes Established Through Student Voice

A Safe and Respectful Environment

A significant finding centred around the notion that the Philosophy class was a safe and respectful space and "different to the other classes". Students stated that they believed that "this is how a classroom environment should be" and consequently, the setting of parameters around the Philosophy class being a "safe space" to have discussions was very important to them. Students recognised that the Philosophy class is built around a positive climate of no judgement, where all opinions are valued, and differences accepted. They further outlined that the justification of opinions through sound reasoning and the opportunity to respectfully disagree are important to the success of the classes.

Critical thinking: Deeper Thinking and Questioning Processes

An important aim of Philosophy classes is to enhance students critical thinking skills. Students on all occasions reinforced that this has (and is) occurring, expressing that they were more able to consider various approaches for problem solving solutions and drawing conclusions, and that they had developed different ways of thinking. Several students commented that they felt more able to critically evaluate and identify "fake things", maintaining that they have developed skills for deeper learning, by outlining that they have more "ways of thinking, and can think more laterally".

Students also commented that they used "bigger picture thinking" which improved their questioning skills, assisted with their own metacognitive practices, and involved learning from and with their peers.

Improved Communication Skills

Another key theme that emerged through this study was that students believed their ability to communicate has been enhanced. On several occasions, students mentioned the protocols that are explicitly taught to ensure that they are "actively listening" with the use of eye contact for interpersonal connection. In each of the student group interviews, they discussed that "stop and think time" is utilised and that they have learnt to build upon other's ideas and viewpoints because of this process.

Other strategies and skills of communication noted as significant and ongoing learnings:

- Student led discussions were highly valued, but need to be facilitated effectively by the teacher, so that students do not feel stifled.
- Problem solving skills were enhanced.
- The process of justification was an important communication strategy and is being practiced often.
- Reflective practices were seen as very important.
- Being cognisant of other's perspectives was identified as a significant area of growth by students.

Improved Confidence

A significant theme identified by students through participation in Philosophy classes was that it helped them to build their [own] confidence. In addition to this, many commented that as they developed the art of speaking, this confidence has transferred into other classes, subjects, and into their assessment processes. Several students from each year level stated that they have "gained significant skills to function out in public and to work with people they had just met".

Transferable skills: Beyond the Classroom

Students across the year levels outlined several skills and attributes they have developed and are using in their lives. Many of these attributes align with the General Capabilities including:

- More self-directed learning;
- Improved listening and negotiating skills which assist with conflict and discussion outside of the classroom;
- Ability to view problems from other angles and to deconstruct questions more effectively;
- Future-thinking focused;
- Better collaboration and teamwork, as better relationships have been built with both teachers and peers;
- Greater awareness of the impact of others' opinions; and
- Understanding that "what you say matters" is important for active citizenship.

Transfer of Skills and Processes to Subjects

There was some evidence that habits formed by students in Philosophy classes were being transferred to other subjects and beyond. On numerous occasions, students mentioned specific subjects and assessments where they used Philosophy skills and topics (particularly at the senior level):

- English and Humanities on many occasions across most year levels
- Maths, Literature, Visual Art (inquiry), Study of Religion (research skills), Fashion (Environmental considerations), and History.
- Instrument Specific Marking Guides (ISMGs).

Further to the transference of skills to other learning areas and school situations, students stated that Philosophy classes have "given school a purpose" by providing opportunity and processes to discuss real world topics and issues.

Teacher Impact and Influence on Learning

Students in all year levels articulated the significant impact their teacher had on their learning experiences in Philosophy. They were very clear in their beliefs that relationships do matter, and some students outlined that they felt that "teachers who are not trained as well did not always allow students to direct conversations", and that those classes are often less engaging. Further comments such as "the teacher's approach impacts the learning", and that "teachers need to be skilled to ensure all voices are heard" reinforced this view.

Key Themes Highlighted Through Teacher Voice

Safe Environment

All teachers commented on the need for a safe classroom environment where students feel valued and respected, and conditions for effective communication can be established. Philosophy teachers noted that they employed specific pedagogical strategies, a consistent language, and systematic processes to establish classroom protocols and ways of working, which builds the capacity of the students to be able to work independently and collaboratively beyond their friendship groups. In addition, teachers believed having no assessments and using topics of interest linked to real world issues for investigation contributed to safe learning environments. Many commented that "stronger relationships between staff and the students" were created.

Critical Thinking

One of the most important aspects of the Philosophy Program is the enhanced development of a key General Capability, critical and creative thinking, and the transference of this skill into other key learning areas. Teachers acknowledged that critical thinking skills take time to develop, and they articulated that Philosophy lessons do allow students opportunities to unpack ideas and move beyond surface level thinking to deepen their understanding. One teacher stated that "the Philosophy Program allows the model to change from mimicking the work to deep thinking". Notably, the benefits teachers identified within the program included:

- More students engaging in deeper thinking.
- Explicit teaching of critical thinking and philosophical inquiry.
- Deeper and critical thinking amongst students, as topics developed and as the students progressed through the year levels.
- Improved questioning skills.
- Students developing the ability to unpack ideas and to respectfully disagree rather than be critical of others' ideas to enrich discussions and opinions.
- Students feeling safe to make mistakes and problem solve through this process.

One teacher discussed (as did a student) that at times, students teach new ideas and ways to teachers in other classes, stating and demonstrating that "in Philosophy we do this!"

The teachers also spoke positively about the intentional thinking processes used within the program and outlined several benefits they witnessed:

- It changes your thinking as a teacher. One commented that, "13-year-olds can be very insightful."
- It is more than just preparing students to "pass an exam," more than just providing them with the answers.
- Allows for flexible thinking and teaches students that "you can change your mind", and that thinking is not fixed.

In addition, teachers commented that the teaching and breaking down of the cognitions, which forms part of the common language used, has enabled and enhanced the thinking process of students in Philosophy classes, and strengthened communication and problem-solving skills in other classes.

Communication Skills

Teachers identified increased development of students' communication skills as a key theme. They articulated that as communication is a central element in the philosophical process, students need to be intentionally taught and guided through effective communication processes. Teachers believed that they have seen growth and development of these skills in students across the college since the introduction of Philosophy classes. They further identified that the development of a common language

helps build this communication amongst students and staff. Key benefits raised by the teachers were:

- The enhanced ability for students to actively listen to others before speaking.
- An increase in student confidence in voicing their own opinions without judgement and without a teacher offering their opinion as an "authority".
- Enhanced collaboration skills using respectful communication.
- Students articulating their points of view more effectively.
- Students justifying their positions more effectively, demonstrating improved ability to break down the cognitions.
- The use of open-ended questions to help students to build empathy and to communicate more respectfully.
- Improved problem solving skills and ability to communicate more successfully.

Specific comments by teachers which reinforce= these benefits and levels of growth include:

"I love that the fact that they have learnt how to listen to other peoples' opinions more deeply and now they are able to respectfully agree or disagree."

"…they are able to communicate their thoughts, build on each other's ideas and test assumptions which is essential in their learning."

"I enjoy hearing the girls' ideas, particularly on the wide range of topics and seeing their critical thinking processes in action."

Confidence Building

The growth in confidence of the students was another key theme articulated by all teachers. As the Philosophy Program progressed, teachers noted obvious development in the confidence of their students from term to term and from year to year, stating that they observed "students who [felt] confident enough to develop their opinions". Other key elements identified by teachers included:

- Observations of deeper thinking processes, which help create and build greater confidence in the students.
- Greater student confidence to speak publicly.
- Student confidence to ask a teacher to stop when they needed more time to think and to slow down.
- More student participating and articulating their thinking, not just students who are high achievers.

Real Life Applications Beyond the Classroom

Teachers felt that one of the major benefits of the Philosophy Program was the improvement in their students' abilities to work collaboratively and cooperatively in and across classrooms. Teachers stated that "students are generally more able to understand that thinking works collaboratively, and Philosophy is steering them to become more capable to interact beyond school", and "as students demonstrate the skill of active listening, they can express their own opinions and work with others effectively in the Philosophy classroom".

One teacher explained that "students are talking to me beyond the classroom and talking about the people they are, about relationships with their bosses and families, and introducing those skills at home. They show concern for the lives of people around them, and for the world".

Teachers also added that they had seen students use Philosophy skills in other classes and areas beyond the classroom. Comments such as, "I see them demonstrating that from a Year 7 level in a positive way", and that "parents report back as well that students are talking about topics discussed in Philosophy at home" and that it has "improved their ability to take on other people's points of view".

These comments added further evidence that students had used the skills learnt in Philosophy classes beyond the school gates.

Transfer of Skills Across Learning Areas and Other School Environments

All teachers noticed a transference of skills learnt and practiced in Philosophy classes to other areas. In many instances, they acknowledged that students do some things automatically, but at times, they need to be reminded by their teachers.

Those teachers who did not teach Philosophy said they believed the Year 12s of 2021 appeared to be more confident and that they often referred to their Philosophy classes, and the skills and topics that had been investigated and discussed. They further acknowledged that these students demonstrated greater capacity for critical thinking, and led discussions and investigations independently. Comments were made that collaboration and cooperation in the classroom had also been notably enhanced.

Philosophy teachers observed various skills that students transfered into other learning areas and situations, either because of the pedagogical approach employed by the teacher, or due to the nature of the topic and activity being undertaken. These included:

- Students unpacking cognitions and demonstrating deeper thinking processes in English and Humanities.
- Students using a philosophical frame of mind when engaging in discussion. For example, Year 9s discussing many topical themes (Covid, Black Lives Matter movement, or the #Me too movement).
- Year 8s using Philosophy skills to develop ideas for dealing with conflict in friendship groups and other issues.
- Students responding at a much-improved level in Year 9 Religious Education. A teacher reported that "groups [were] engaging in conversations at much higher levels than previous years, and that the students were able to sustain this."

Teacher Impact/Influence on Learning

The Philosophy teachers who were interviewed discussed how they utilised the pedagogical skills and processes of Philosophy into their other learning areas. They felt this led to:

- Better questioning techniques;
- Greater use of specific frameworks to develop student thinking; and
- A clearer understanding of the need to assist students to make connections and test assumptions (as well as our own).

Some teachers noted that they incorporated more reflective skills and processes into their classes, enabling students to become more metaconscious in their own learning. Overall, all teachers interviewed believed that teaching Philosophy had a positive impact on their own pedagogical approaches, and ultimately on student engagement with them.

Classroom Observations

Whilst only three full classroom observations were undertaken, they signalled that many strategies and skills used in the Philosophy Program had significant benefits for

student learning. They also showed that skills were implemented and embedded into classroom practice. For example, in the Philosophy classes observed the following strategies were noted:

- Students clearly articulating cognitions
- Effective communication through common language and techniques
- Teamwork and collaboration
- Safety to express own opinions and thoughts (without judgement)
- Confidence to participate and engage
- Routines for developing deeper thinking

Whilst the teacher facilitated the Circle of Inquiry part of the lesson, students confidently guided the process by:

- Expertly guiding and taking turns to speak
- Using respectful language and sentence starters (mentioned above)
- Including all in the discussion
- Having the teacher intervene only to redirect or ensure that all students had a voice in the process

In the mathematics class observed, the teacher explicitly used language and strategies employed in Philosophy classes, and students engaged in the lesson in an enthusiastic and natural way. The teacher used a variety of pedagogies that were outlined by both students and teachers in their interviews, and drew on the students' knowledge and understanding of those skills. Overall, in the mathematics lesson, most students observed appeared:

- to feel safe and confident in the way they worked;
- to communicate freely and clearly, using respectful and technical language;
- to be able to justify their thinking and build upon ideas of others; and
- to demonstrate skills in critical thinking.

Overall Impact on Students' Abilities to Learn

Whilst students were not able to articulate with certainty whether their engagement with the strategies, skills and content of the Philosophy classes had assisted them to achieve better results, many students acknowledged that Philosophy

classes had positively impacted their confidence, self-belief, and ability to learn. Students stated that the topics, skills, and processes taught had assisted them to:

- Transition into Year 7 more smoothly
- Review and reflect upon results
- Improve their ability to recall and retain information
- Improve and refine their thinking processes ("it all relates back to thinking")
- Develop more effective questioning techniques
- Consider more thoughtful and considered ways to answer questions
- Approach research and consolidation of information more successfully
- Approach problem solving more effectively.

Conclusion

It is evident that both teachers and students have gained much from the Philosophy Program at San Sisto College. The most significant benefits of the program included the enhancement of key capabilities such as those listed by Cam (2020):

- Problem solving
- Critical thinking
- Communication, both verbal and written
- Collaboration and teamwork
- Interpersonal and social skills
- Metacognitive processes which are underpinned by a common language

Teachers and students consistently acknowledged the change and improvement of the forementioned skills across the curriculum, and importantly, teachers recognised the growth and development of their own pedagogical practices and skillsets. The findings demonstrate that the Year 7 – 10 Philosophy Program has had a positive impact on student learning for all students at the College, providing evidence that it has been instrumental in building the capacity of their learners to be more confident and capable communicators, and more reflective and deeper thinkers.

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Acknowledgements

San Sisto College is a Catholic secondary girls' high school in the Dominican Tradition located in Carina, Brisbane.

The Principal of San Sisto College – Mrs Shelley Hamilton has provided permission to publish this article as an abridged version of the complete research report.

Acknowledgement goes to Cara-Lee Robinson-Taylor and Peter Barber and their staff for their ongoing work in this area and their commitment to improved student learning.

Thanks also to Fiona Hicks for her partnership with the research and reporting process during 2021.

The Ethics Olympiad Experience

***Rebecca Seward-Linger**, Learning Leader - Inclusive Learning, St Patrick's College*

Adolescents of 2022 live in a climate of information saturation, fake news and hate speech on social media, existential threats caused by climate change, a world still grappling with a pandemic, and growing political polarisation. More than ever, young people need tools to explore and understand issues affecting their world and the skills to articulate their ideas so that their voices are heard within the democratic process (Laughland-Booy & Ghazarian, 2020). One organisation that attempts to build students' critical thinking and communication skills whilst engaging them in dialogue on contemporary ethical issues is the Ethics Olympiad.

The Ethics Olympiad Story

The Ethics Olympiad was founded in Australia by former teacher Matthew Wills in 2013. At the time, Matthew worked as Head of Philosophy, Values and Religious Education at Hale School in Perth, Western Australia. After participating in the Ethics Bowls in the USA, Matthew was keen to launch a similar competition in Australia for secondary school students. The first trials of an Australian Ethics Olympiad involved an online competition between a small number of schools in Australia and the USA. By 2017, the competition had expanded to several Australian states and was run as a full-day, face-to-face event at host schools. By 2019, organisers of the Ethics Olympiad were running competitions for middle years' students (aged 12-15) and senior high school students (aged 16-18) in 10 cities across Australasia. In 2020, with the impact of COVID-19, the competition returned to its original online format, with schools participating in full-day online events via Zoom. In addition, events have expanded further with students in upper primary school (Grades 5 and up) now able to participate in the Junior Division of the Ethics Olympiad.

How does the Competition Work?

Based on the Ethics Bowl format in the USA, the Ethics Olympiad invites schools to enter teams of 3-5 students to engage in philosophical and ethical dialogue. Groups are given a series of eight case studies to explore, containing topical issues of an ethical nature. For example, in one of the cases from the 2021 Middle School Division of the Ethics Olympiad, students were asked to consider whether or not the media have the right to publish the names of convicted criminals after they have served their prison sentences. Another case encouraged students to think about how they give money to charity and whether supporters carry any moral obligations to investigate how charities spend their donations. Public nudity, lying, deciding when jokes are offensive, and how to weigh up environmental action against economic prosperity are further examples of topics explored in last year's competition.

Once familiar with the cases and study questions, students construct a response to each issue. Students meet with teams from other schools on competition day to engage in a full-day online competition. Teams are paired together and take turns delivering and critiquing responses to the case studies. A judge assesses the dialogue between the two teams and can pose further questions to widen students' thinking. The judges employed in the Ethics Olympiad are experts in philosophy, including postgraduate and doctoral students of philosophy and academic staff from various universities.

Following a coin toss to determine which team is Team A and which will be Team B, the case is revealed, and a question is readout. Team A then has 2 minutes to construct a response.

TEAM A	**Gives a 5-minute response to the question.**
TEAM B	**After a 1-minute conference Team B gives a 3-minute critique of Team A's response**
TEAM A	**After a 1-minute team conference Team A gives a 3-minute reply to Team B's critique**
JUDGES	**Pose impromptu questions to Team A**
TEAM A	**Responds to the Judges' questions in a 5–7-minute exchange**
TEAM B	**Team B then take on Team A's role, and the process is continued**

Each team completes four, totaling eight case studies. Judges score both teams per round, and then total points across the four rounds are tallied to find the medal-placing teams. Medals are awarded to the top three teams, and all participants in the competition receive a certificate for representing their school.

How are Teams Judged in the Competition?

Unlike debating, teams in the Ethics Olympiad do not have to adopt a definitively affirmative or negative position when responding to the cases. It is perfectly acceptable for both teams to share the same position or for teams to change their minds when new ideas or new thinking comes to light. Emphasis is placed on the respectful dialogue

between the two teams and students' abilities to engage with other people's ideas civilly. Students are also judged on their critical thinking skills, particularly their ability to construct arguments, assess validity within arguments, defend or modify a position, consider issues from multiple perspectives and test arguments when faced with new questions or new information.

How Does the Ethics Olympiad Support Students' Learning?

The Ethics Olympiad provides an engaging experience for students to develop techniques in critical thinking, communication skills, and awareness of ethical issues. Critical thinking skills and ethical understandings are vital components of holistic education for adolescence. "Critical and creative thinking" as well as "ethical understandings" appear as general capabilities within the Australian Curriculum (Australian Curriculum, Assessment and Reporting Authority, 2021, p. 1). General capabilities represent key skills, knowledge and/or behaviours to be developed across the curriculum to prepare students for life and work in the 21st century (ACARA, 2021). Regarding ethical understandings, it is expected that students will learn to "…value difference in their interactions with others and to develop respect for diverse ways of perceiving and acting in the world" (ACARA, 2021, p.2). Adolescent Success' (2019) position paper shares similar views, stating "ethical understandings are a significant part of the holistic development of young people as they relate to issues that impact their world" (p.2). They advocate for opportunities for students to explore and provide local and global service regarding issues affecting

The clear structure of the Ethics Olympiad and the stimuli provided (in the form of case studies for students to examine) creates an ideal opportunity for teachers and students to explore ethical issues. Students' skills in participating in the Ethics Olympiad (i.e., critical thinking, respectful communication, valuing different opinions, exploring differing points of view) are transferable to a wide range of other curriculum areas. For example, ethical considerations are presented in Science when students design and assess experiments or collect data. Ethical thinking is also encouraged in History, when students are asked to analyse events of the past critically to assess how they may have affected people of the time. Likewise, in their personal lives, students can draw on the ethical thinking skills they develop within the Ethics Olympiad to help make decisions regarding friendships, consumer choices, political choices, beliefs and values.

How Can Schools get Involved?

Teachers who would like to learn more about the Ethics Olympiad are encouraged to visit: https://ethicsolympiad.yahoosites.com/ or email admin@ethicsolympiad.org.

Ethics Olympiads are held across every state of Australia, New Zealand, Hong Kong and Singapore. There are four divisions within the competition: the Junior School division for students aged 9-12 years; the Middle School division for students aged 12-15 years; the Senior High division for students aged 16-18 years; and the Tertiary division for university students. The Ethics Olympiad also runs training workshops for teachers and students who want to learn more about ethics and thinking processes within moral philosophical inquiry.

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Students Matter: A Story of Student Agency

***Sharron Wood**, Senior Learning Leader, St Eugene College, Burpengary*

Students are focused on preparing themselves for an ever-changing workforce and developing transferrable skills and knowledge. Research has shown that when students are given agency in their learning journeys, they are more engaged (Williams, 2017) and more self-motivated (Hannan, 2011). Knowledge, for our students, is easily accessible and can be attained through an ever-increasing number of sources; so why continue to teach in ways where the teacher is the font of all knowledge?

With this understanding in mind, our college has been on a transformative teaching and learning journey for approximately two years, focusing heavily on providing professional development for our teaching staff using a range of activities and strategies. We have been working in partnership with the 4C Transformative Learning group, who have provided a theoretical and practical approach using the 4C's, *the Learning Disposition Wheel,* coherence makers and a variety of other teaching and learning tools (Jefferson & Anderson, 2017; 4C Transformative Learning group).

Through this collaboration with the 4C Transformative Learning group, our college has developed an explicit focus on reflection (both practitioner and student) and engagement. In the contemporary classroom, learning happens when teachers and students are working towards creating a culture of self-directed, engaged learning where students are active agents in their learning journeys'; in essence, transformational learning. When students take ownership of their learning, they are more likely to have "*learned how to learn*" (OECD, n.d., p.1). Students' understanding how they learn and being able to use the language of learning was central to the leadership team's desire to see things change significantly at the college. Initially, we conducted a pilot programme around student agency, where a selection of Year 8 students became involved in designing a unit of work and the accompanying assessment. From this pilot programme, we observed that students were engaged in their learning, had a clearer understanding of what was required to complete the unit successfully, and worked more collaboratively with the staff involved and each other.

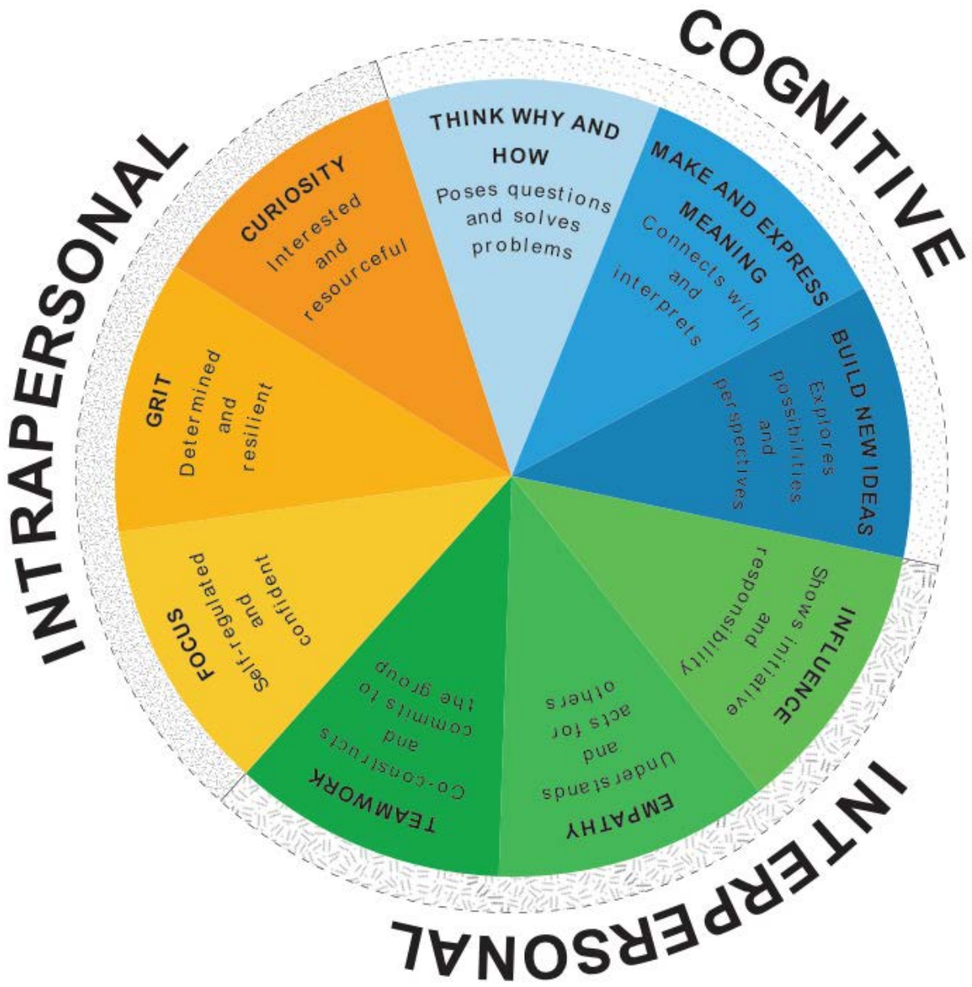
With transformative learning and student agency in mind, the "T Squad" was born. The T Squad comprised students. The author identified potential students for the group from personal experience (anecdotal and systemic evidence) over the last two years at the college. It was important to identify students who were not necessarily the academic achievers but were interested in the idea of developing partnerships with teachers in their learning journeys. Eighteen students from Years 8 to 11 were asked to participate and all were very keen to be involved. The group was initially formed to facilitate a twilight workshop for our teachers. They wanted to focus on how teachers understand and use student data, as well as to encourage teachers to recognise the people behind the facts and figures. As the facilitator of this group of students, it was important for them to first to know their own data stories and not just their current data. For instance, they were given a package of their academic data (e.g., NAPLAN, PAT testing data and writing task journeys), attendance data and behaviour data. They were asked to identify trends, strengths and weaknesses and develop strategies to understand how they learn. They had to construct a story of the person who represented the data in a creative and hands-on form.

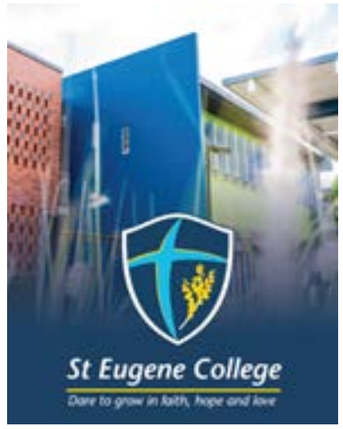
Central to the initial project was the idea that "*students have the ability and the will to positively influence their own lives and the world around them*" (OECD, n.d.), especially when it comes to their learning. By creating an atmosphere of trust and cooperation, these students could create a story of their data, using critical and creative thinking, collaboration and communication. The T Squad was then ready to take teachers through the same journey.

The twilight workshop involved having all of the student facilitator data (de-identified) available for staff at the workshop. The power of this workshop was in the stories that emerged for both the teachers and the students. By encouraging teachers to work collaboratively to transform the facts and figures into an art piece, a Lego model or a playdough creation, an emotional connection and a personal relationship to the data, and therefore the student who represented the data, was created.

The T Squad watched as teaching staff analysed their data and created stories in visual and kinaesthetic ways: transforming the data story into something tangible. They listended to the conversations that staff were having about them and joined in some of the activities to co construct and collaborate. What followed was an emotional journey through reflection. Students revealed who belonged to which data set and they openly and honestly reflected to the whole group about what they observed and experienced in the workshop. Teachers and students were brought to tears as one student outlined why she had become disengaged and why this process mattered.

Following the initial project, the T Squad sought ways to continue to co-construct and collaborate with teaching staff. Overwhelmingly, they wanted to build on the emotional connection they saw teachers have with the data stories in front of them. Through subsequent conversations in the days following the workshop, it was clear that the relationship between student and teacher should be mutually respectful. The students want teachers to know their flaws, strengths and weaknesses, and they want to know themselves beyond their social, cultural and family groups. The students want to take ownership over their learning. This premise has been key to the project's





success as students' engagement as facilitators is fundamental to "*support students' social learning, enhance students' active agency and ownership by giving up control and distributing power in practice*" (Letonen, 2015, p.274). The idea of the teacher as the facilitator of learning, rather than the teacher of learning, has long been the ideal. However, for students to own their learning and understand the way they learn, teachers have to be willing to give away control of the process.

The T Squad's next opportunity came through a teacher professional development workshop. The workshop focused on transformational strategies designed to encourage deep learning. The T Squad were asked to participate, not as observers, but as active participants. What became clear was that the teachers and facilitators involved embraced the opportunity to collaborate with the students. It was heartening to see the students' confidence grow as the workshop progressed. Their contributions were a testament to the idea that students matter.

Their next challenge will be the possibility of facilitating a workshop at the *Adolescent Success International Conference* in August 2022. In designing the session, the T Squad's focus has returned to the story they started in the first workshop, where they bought their own data to life and facilitated the teacher workshop. The session will be titled, The Story of Our Data.

The Story Of Our Data will be a workshop facilitated by students for middle school teachers. The workshop will tell the data journey of a previously disengaged student transformed into a children's picture book, created collaboratively by the students. The same student will then retell their story. This story will include elements from all phases of the T Squad's journey and key moments from the student's learning journey. Students will then guide teachers through creating an artefact using various materials to tell a story of the data before them. The materials can include Lego, playdough, paint/pen/pencil and paper and building blocks. Next, the student facilitators will guide the teachers through an art gallery activity, and groups will have the opportunity to present their stories. Students will reveal who belongs to the different data stories, and the students will then lead a whole group reflection.

We all know, as teachers, how to access data and identify students in our classes who need particular kinds of support or scaffolding. But do we actively collaborate with our students in their data stories? Do we use higher-order thinking strategies with our students and colleagues to transform the data into a personal story? Do we use our creative and critical thinking skills to transform data into a medium that has emotion and shape, personality, and presence?

They look forward to sharing their story with you.

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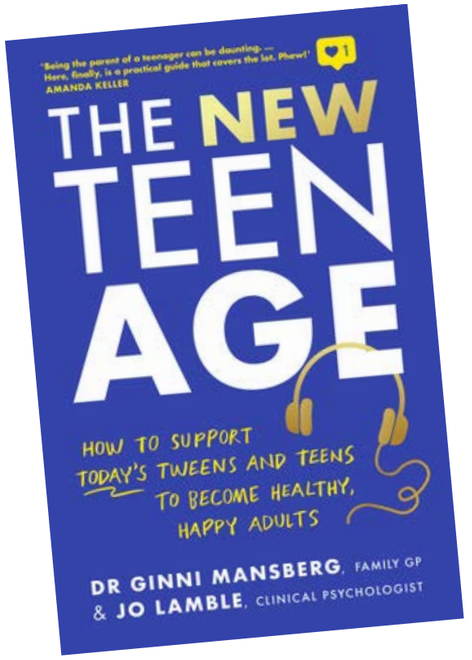
Book Review

Dr Ginni Mansberg & Jo Lamble



The New Teen Age: How to support today's tweens and teens to become healthy, happy adults

***Dr Emily Ross**, Lecturer Curriculum and Pedagogy,*
The University of the Sunshine Coast

General Practitioner Dr Ginni Mansberg and Clinical Psychologist Jo Lamble have worked together to share practical advice about how to support the health and wellbeing of adolescents. Designed for parents and carers, Mansberg and Lamble share evidence-based strategies for addressing the physical and psychological issues faced by teens in this new age of social media and 24-hour devices.

Being clinicians and parents, the authors empathise with people raising tweens and teens. Their writing demonstrates understanding of the struggles and successes of supporting adolescents. Mansberg and Lamble aim to equip parents and carers with sound strategies for navigating a wide-range of issues. In addition to supporting carers to navigate broader aspects of relationships, such as parent-child tensions and peer pressure, they address tricky questions around eating well, sleeping well, exercise, screen time, body image, growing independence, hormones, sexual development, sex, sexuality, social life, academic pressure and communication skills. Each topic is presented with case studies, symptom checklists where appropriate, interviews with specialists and practical strategies.

Their 10 Golden Rules provide a principle-based approach to the advice and ideas that are included in the book. They also serve as a simple way to respectfully work through issues with our adolescents and support them to become confident and independent individuals – the ultimate aim of all that we do at this stage.

The book is published by Murdoch Books and can be ordered through most popular book sites.

Information for Contributors

Adolescent Success welcomes submissions for journal inclusion that reflect the aims of the Association and address issues relevant to the middle years of schooling.
Possible topics include: the developmental needs and interests of young adolescents; family and community partnerships; varied approaches to teaching and learning integrated curriculum; authentic assessment; school leadership and organisational structures in the middle years; information and communication technologies and resources in the middle years; research findings and future developments in the middle years.

Contributions may take the form of:

- academic and research papers that make an original contribution of an empirical or theoretical nature
- literature reviews
- papers of a practical or applied nature
- reports
- viewpoints
- book reviews

Contributions

- The journal has two levels of acceptance of papers for publication: refereed and non refereed. Refereed papers will have two referees selected from relevant fields of study by the editor. Papers must clearly indicate if they wish to be considered for refereed status. Refereed articles will be included in a specific section of the journal.
- Contributions shall be submitted electronically via email to the Adolescent Success email address, as a Microsoft Word document. Articles must be doublespaced, without the use of styles, 12 point font Times New Roman. The submitted article become the property of Adolescent Success.
- All contributors need to complete an Author's agreement form to be submitted with the article.
- Papers should be between 700 and 5000 words in length.
- Each article should have a separate title page that contains the title, the names of all authors, their contact addresses, email addresses, and telephone and facsimile numbers. The names of the authors should not appear on the rest of the paper.
- An abstract of no more than 200 words must accompany each refereed article.
- All references should be placed at the end of text using APA (7th edition). For example:

Journal article
Rumble, P., & Aspland, T. (2010). The four tributes model of the middle school teacher. Australian Journal of Middle Schooling, 10(1), 4–15.

Book
Bandura, A. (1986). Social foundations of thought and action. New Jersey: Prentice Hall.

Chapter in edited book
Ajsen, I. (1985). From intentions to actions: a theory of planned behaviour. In J. Kuhl & J. Beckman (Eds), Action control. From cognition to behaviour (pp. 11–40). Berlin: Springer-Verlag.

- Footnotes are not to be used.
- Figures and diagrams should be professionally prepared and submitted in a form suitable for reproduction, indicating preferred placement.
- Photographs should be submitted separately (not included within the text). All student photographs, art work, poetry etc must be accompanied by copyright release forms, which are available on the website or from the editor.
- If the material has been published elsewhere, details must be included on the author's agreement form.
- The Middle Years of Schooling Association Inc holds copyright for articles published in the Australian Journal of Middle Schooling, excluding those previously published elsewhere.
- It is the right of the editor to make minor editorial amendments without consultation.
- Upon acceptance of contributions for publication, the contributors will be advised of the likely issue and date of publication. A complimentary copy of the journal in which the article appears will be sent to contributors.

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