Independent Schools Victoria

Cognizance Project 2020

Research Report for The Geelong College

Prepared by: Winnie Wong
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Background

2020 is a year like no other. Due to the COVID-19 pandemic, schools were forced to quickly adapt to remote learning while confronting various challenges such as ensuring the health and safety of staff and students, adapting to an online curriculum, communicating with anxious parents, ensuring financial viability and above all, ensuring students continue to learn and grow. These changes requires teachers to reimagine their teaching strategies and students to adjust to new routines to learn through online platforms. Due to distance learning, teachers were forced to gradually release partial responsibility to students to encourage independent learning. Student agency, self-regulation, and metacognition proved to be important skillsets during the remote learning environment. The following is a description of what a successful self-regulated learner looks like (Zimmerman, 2010)[1]:

> *'These learners are proactive in their efforts to learn because they are aware of their strengths and limitations and because they are guided by personally set goals and task-related strategies, such as using an arithmetic addition strategy to check the accuracy of solutions to subtraction problems. These learners monitor their behavior in terms of their goals and self-reflect on their increasing effectiveness. This enhances their self-satisfaction and motivation to continue to improve their methods of learning.'*

In recognition of the importance and value of metacognition and the science of learning, Independent Schools Victoria (ISV) has supported selected Member Schools since 2014 in providing the Cognizance Program.

The Cognizance Program

The Cognizance program was developed with the main aim to understand the science of learning. Since its inception, the project has been reiterated over the years to continually improve the process of providing students with skills to understand their brain and improve their learning. Since 2017, ISV has collaborated with Dr Jared Cooney Horvath, an expert in the field of educational neuroscience, to deliver the Cognizance program, focusing on neuroscience and metacognition.

The program is designed to help students take agency over their own thinking, learning, and self-management practices. In this program, Dr Horvath explicitly teaches students how their brain works, the mechanics of memory, the patterns of attention, the imperative of errors, effective study tactics, self-management and well-being strategies, metacognitive skills, deep learning practices, and much more. Students learn the 'whys' and 'hows' that underpin learning to assist them in taking ownership of the process. Student also learn to reposition their life scripts – how they make sense of themselves, their world, develop narrative on what they can and cannot do.

[1] Zimmerman, B. J. (2010) 'Becoming a Self-Regulated Learner: An Overview', Theory into Practice, 41 (2).

The Cognizance Program at The Geelong College

The Geelong College participated in this program since 2019. Eight teachers including the Project Leader, and 158 students took part this year. The following were some of the goals of the project to feed into the school's strategic direction, for students and teachers.

Why do you want to be involved in the Project? (Max 250 Words)
We had the privilege of participating in the Cognizance Research Project with Jared Cooney Horvath last year. We have a College strategic plan that is seeing us work deliberately and with vision on our learning culture (from Prep - Year 12). One of the drivers of that culture in Years 9-12 is using a shared understanding to set clear learning expectations and build a culture of thinking. Year 9 (the target group for the Project) is the first year of our Senior School and so this is presenting us with an opportunity to work with our Year 9s when they arrive into the Senior School, build a common language and understanding around their thinking and their learning, and then curate our culture through to Year 12. We gain so much from last year's Project and are very keen to leverage that knowledge and the positive way in which it was received, to further develop our students' thinking, learning and metacognition.

How does this project align to your school's strategic direction? (Max 250 words)
Our Learning Culture Project (2019-2021) has as its aim to build a "courageous learning culture" through shaping shared understanding, refining behavioural norms, better tracking achievement and growth, and reviewing our structures. One of the main focus areas in the Senior School, in particular, is that of academic rigour, fostering student agency and responsibility, and enhancing growth measurements. Working with ISV on this Project would enable us to explore the impact of teaching students about metacognition, equipping staff to better understand action research, and igniting a passion in our student body for their own learning.

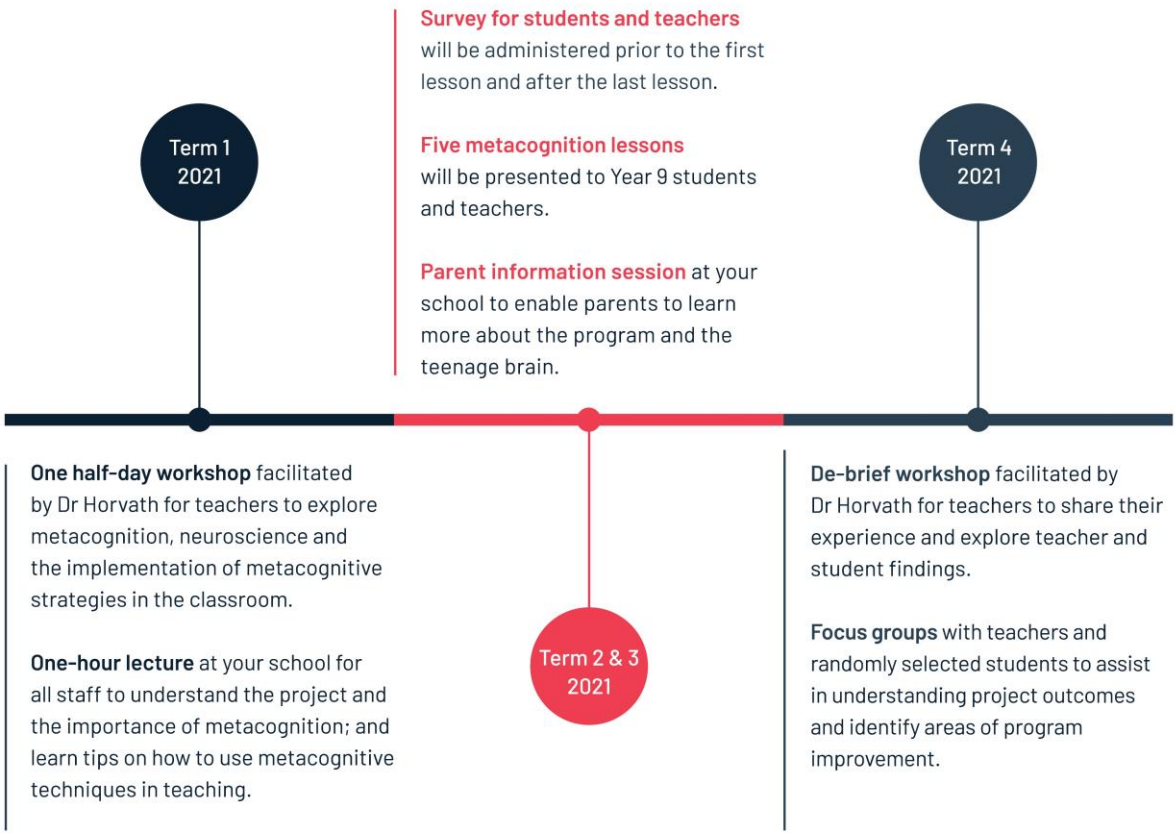
What do you want to achieve? [For Teachers (Max 200 words):]
The staff involved last year learned so much from the project and so this year, we want to expand that knowledge to some new staff. We have been strategic in selection Year 9 teachers from across the different faculties, with different years of experience in teaching. We felt that this provided the greatest opportunities for shaping professional discourse in all subjects and for allowing the project to be embedded in as many subjects as possible.

What do you want to achieve? [For Students (Max 200 words):]
For our students in 2019, one of the most significant impacts was in their newly-found passion for their own brains, the learning journey and their agency in their own thinking. We hope this year to have more students begin this journey and to have more teachers embedding the language and techniques from Jared's workshops. For students to really engage well with it over time, we need to build the structures to allow it to permeate their daily lessons here. Over the longer term, we hope that our students, armed with greater knowledge and surrounded by teachers who speak the same language, will take control of their own learning.

What do you want to achieve? [For School (Max 200 words):]
Culturally and practically, last year's workshops were so successful. We had parents expressing delight at their children's passion for the content, as well as asking "what's next in this space"? A second year in this project would enable us to actually begin working on long-term implementation of programs and perhaps continuing in our measurement of the impact of the sessions. With ISV's help, we could gather longitudinal data and formulate plans for the next few years. We hope to be a leading school in the space of learning and thinking culture.

Couse outline

The program was conducted over the year, with the bulk of it completed in Terms 2 and 3. The following is the project timeframe:



These were the dates for the sessions held. Due to COVID-19 restrictions, only the first two sessions were completed face to face, while the others were conducted via zoom .

Tuesday, 2 June 2020	Lesson 1
Monday, 20 July 2020	Lesson 2
Monday, 20 July 2020	Parent Session
Thursday, 6 August 2020	Lesson 3
Tuesday, 11 August 2020	Staff Session
Tuesday, 18 August 2020	Lesson 4
Thursday, 3 September 2020	Lesson 5

Couse outline

Five 60 to 90-minute metacognition lessons facilitated by Dr. Horvath were conducted with year nine students. The following diagram shows the metacognition lessons and its objectives:

Research design and methodology

Quantitative research approaches were used for this study. A questionnaire averaging 10 minutes was designed for both teacher and student cohorts to measure and establish the project's impact. Only the student survey results will be reported in this report. The surveys were administered prior to the project commencing (pre-survey conducted no more than two weeks before the first lesson), and after the end of the project (post-survey conducted no more than three weeks after the last lesson).

The sample framework includes students who completed both pre and post-survey (n=100). Using the total number of students who completed this program (n=158), sample size (n=100) and 95% confidence interval, the margin of error is six percent. A margin of error shows how many percentage points your results will differ from the real population value. A 95% confidence interval with a six percent margin of error means that your statistic will be within six percentage points of the real population value 95% of the time. For example, if 90% of students indicated that they enjoyed the program, we can be certain that 95% of the time, between 84% and 96% indicated so.

Student demographics

The following tables show the number of lessons attended, which lessons were attended, gender demographic, and level of participation in activities (i.e., writing thoughts/answers to the reflection questions, watching the videos provided).

	%	n
0	0%	0
1	3%	3
2	0%	0
3	2%	2
4	5%	5
5	90%	90

	%	n
1: Stories and Errors	94%	94
2: Neuroplasticity	97%	97
3: Memory	96%	96
4: Metacognition	96%	96
5: Follow-up discussion	96%	96

	%	n
Female	43%	43
Male	57%	57

	%	n
Don't know/ I did not receive the questions or activities	0%	0
I did not participate in any activity (0%)	1%	1
I participated in about a quarter of all activities (25%)	5%	5
I participated in about half of all activities (50%)	14%	14
I participated in the majority of activities (75%)	50%	50
I participated in all activities (100%)	30%	30

Key findings

Overall, students valued and enjoyed the Cognizance program. They rated 7.8 out of 10 for their likelihood to recommend the program and 8.5 out of 10 for their satisfaction with the program.

The biggest impact observed was the shift in students' understanding about the brain, how memory works, and metacognition. For example, there was a significant positive shift in students' agreement that multitasking impairs their learning and memory and that memory has a reliable set of rules they can exploit. Students have also started using the study techniques they learned to perform better.

> *"Getting ready for assignments and tests has changed as I now know how to get better remembering and memorising facts and ideas."*

Students understand the concept of neuroplasticity and metacognition as they were able to provide valid arguments when explaining their answers. They understand the importance of planning prior to an assessment, setting goals, and assessing their performance. These key metacognitive strategies and ability to self-regulate learning will be important beyond the classroom.

> *"I know how I think and I know how I learn a lot more than I used to, this will come in handy in the future. But the thing that I have loved about this course and I will love always is thinking about thinking. How this works and what it all means."*

The majority indicated that they have a better awareness and understanding of their thinking and learning skills and that they are interested to continue exploring them. The overall open-ended responses showed higher confidence in students to be in control of their own learning, a more open mindset and determination to improve. This aligns with the school's aim to develop student's agency in their thinking and ignite a passion for their own learning.

> *"I have realised that I control my brain and it doesn't necessarily control my thoughts. By realising this, I have found it easier to believe in myself and be more open to challenges and new experiences."*

> *"I now know that the brain is passive and plastic, meaning i can change my learning, behaviour and actions, nothing is set in stone."*

Most students also agreed that the school encouraged them to be responsible for their own learning, which is important for independent learning. This climate will further encourage students to be willing and ready to expand their learning capacities.

The survey findings showed that students who have a higher level of engagement (participated in all activities in the program) compared to those who did not were more likely to agree that they have a better awareness of their thinking and learning and are interested to continue exploring them. In addition, some students indicated that they have yet to apply what they were taught at the time of the survey. This suggests that time and opportunity set aside for practical metacognitive activities in the classroom will be beneficial for students. For example, teachers can use growth-minded language to give feedback to students about their progress and results so that students can see growth.

The rest of the report discuss the student survey findings in detail.

Pre and post program statements

Students were asked how likely are they to agree or disagree with the following statements before and after the program. Four questions were asked for each lesson topic.

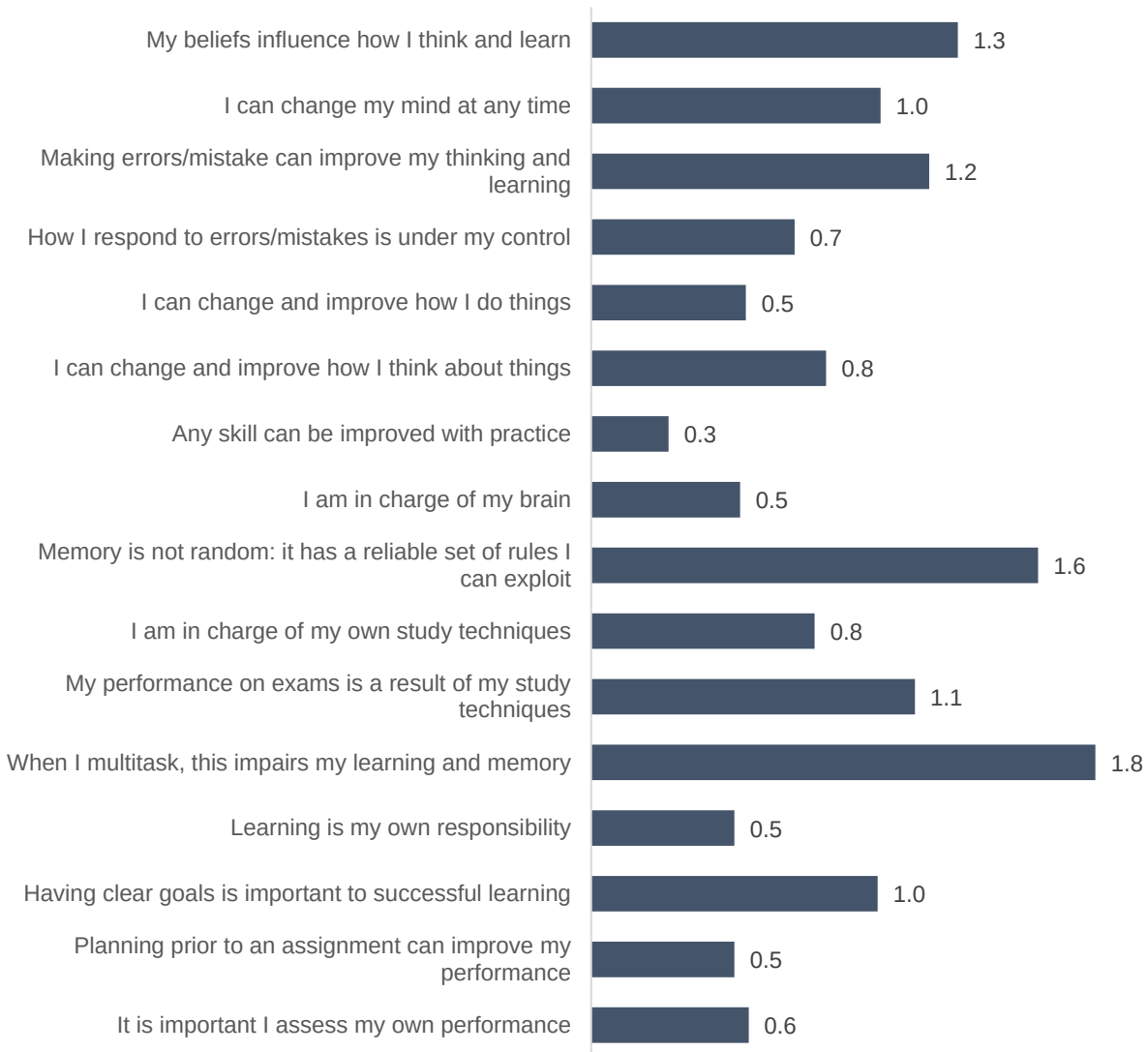
Q. Thinking about yourself in general, please rate how likely you are to agree or disagree with the following statements on a scale from 0 to 10. A rating of 0 means ‘Strongly Disagree’ and a rating of 10 means ‘Strongly Agree’.

1	My beliefs influence how I think and learn	Stories & Errors
2	I can change my mind at any time	Stories & Errors
3	Making errors/mistake can improve my thinking and learning	Stories & Errors
4	How I respond to errors/mistakes is under my control	Stories & Errors
5	I can change and improve how I do things	Neuroplasticity
6	I can change and improve how I think about things	Neuroplasticity
7	Any skill can be improved with practice	Neuroplasticity
8	I am in charge of my brain	Neuroplasticity
9	Memory is not random: it has a reliable set of rules I can exploit	Memory
10	I am in charge of my own study techniques	Memory
11	My performance on exams is a result of my study techniques	Memory
12	When I multitask, this impairs my learning & memory	Memory
13	Learning is my own responsibility	Metacognition
14	Having clear goals is important to successful learning	Metacognition
15	Planning prior to an assignment can improve my performance	Metacognition
16	It is important I assess my own performance	Metacognition

Pre and post program statements

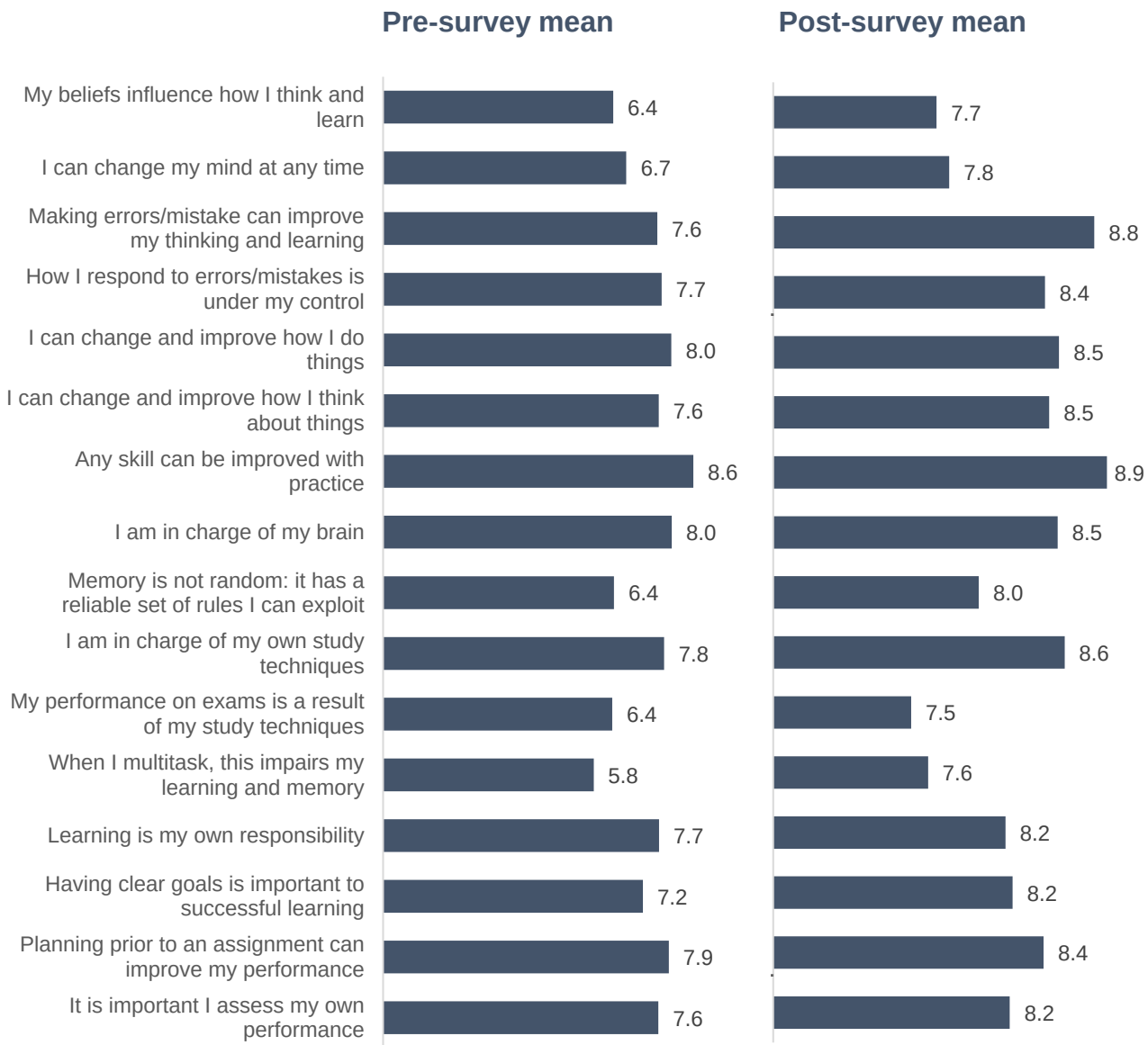
Overall, there was a positive difference in students' answers for all statements after the program. The biggest difference post-program was *when I multitask, this impairs my learning and memory*. There was also a significant shift in the statement *memory is not random: it has a reliable set of rules I can exploit.*

Mean difference between pre and post-program surveys



Pre and post program statements (continued)

While significant improvement post-program can be seen in the statement *multitasking impairs my learning and memory,* this was rated one the lowest (7.6) in the post-survey compared to the other statements. Similarly, *my performance on exams is a result of my study techniques* was rated the lowest in the post-survey (7.5). Revisiting lesson three on memory and study techniques will be beneficial. Students also rated lower on statements around self-belief (top two statements in chart). Further encouragement on the power of stories and life-script is recommended.



Open-ended course questions

In this section, students were asked the following questions in the pre-survey and post-survey.

1. Do you believe skills & intelligence are pre-determined and fixed (unchangeable)? Explain your thinking.
2. What is NEUROPLASTICITY and what does it suggest about learning?
3. If you desire to deeply remember facts and ideas for a long period of time, what are some effective techniques / strategies you could use?
4. What is METACOGNITION, and why is it important?

Each student's response was assessed using the following rubric consisting two parts,

- the utilisation of content knowledge and deep consideration of relevant issues.

	Utilisation of Content Knowledge		Deep Consideration	
	Uses more than two words	Score	Supports a Valid Argument (they use some form of evidence to support the argument being made)	Score
		3		3
Criteria	Uses two words	2	Conceptualizes a Relevant Argument, but lacks Clear Support (they make an argument, but supply no supporting evidence – simply opinion)	2
	Uses one word	1	Answers Question (at least there's ink on paper: answers typically <10 words)	1
	Uses zero words	0	N/A or Don't know	0
Indicator	Relevant Vocabulary Words / Key Concepts (See below)		Conceptualizes & Supports Argument	
Capability	Employs Knowledge of Material		Thinks Deeply about Issue	

Relevant Vocab Words / Concepts used for 'Utilisation of content knowledge':

Q1 and Q2: *Hacking*; *Modularity; Controller; Coder; Predictor; Bottom-Up; Top-Down; Stories; Errors; Mistakes; Engage; Avoid; Error-Alarm; Mindset; Concepts; Updating; Plasticity; Neuron; Synapse; Epigenetics; Genius; Half-Brainers; No-Brainers; Sharon Parker; Goggles*

Q3 and Q4: *Stories; Errors; Mistakes; Error-Alarm; Attention; Elaboration; Linking; Multitasking; Cramming; Spacing; Consolidation; Sleep; Forgetting-Curve; Reminiscence; Stochastic Resonance; Context; State; Encoding; Recall; Access; Review; Re-Written; False memories; Pomodoro; Senses; Highlighting; Summary; Overlearning; Flashcards; Feedback; Meta-Cognition; Aspirations; Purpose; Goals; Analyse; Assess; Adapt; AI; SMART; Goldilocks; Calendar, spreading, retrieve, associate, chunking, Awareness, Owning; In-control*

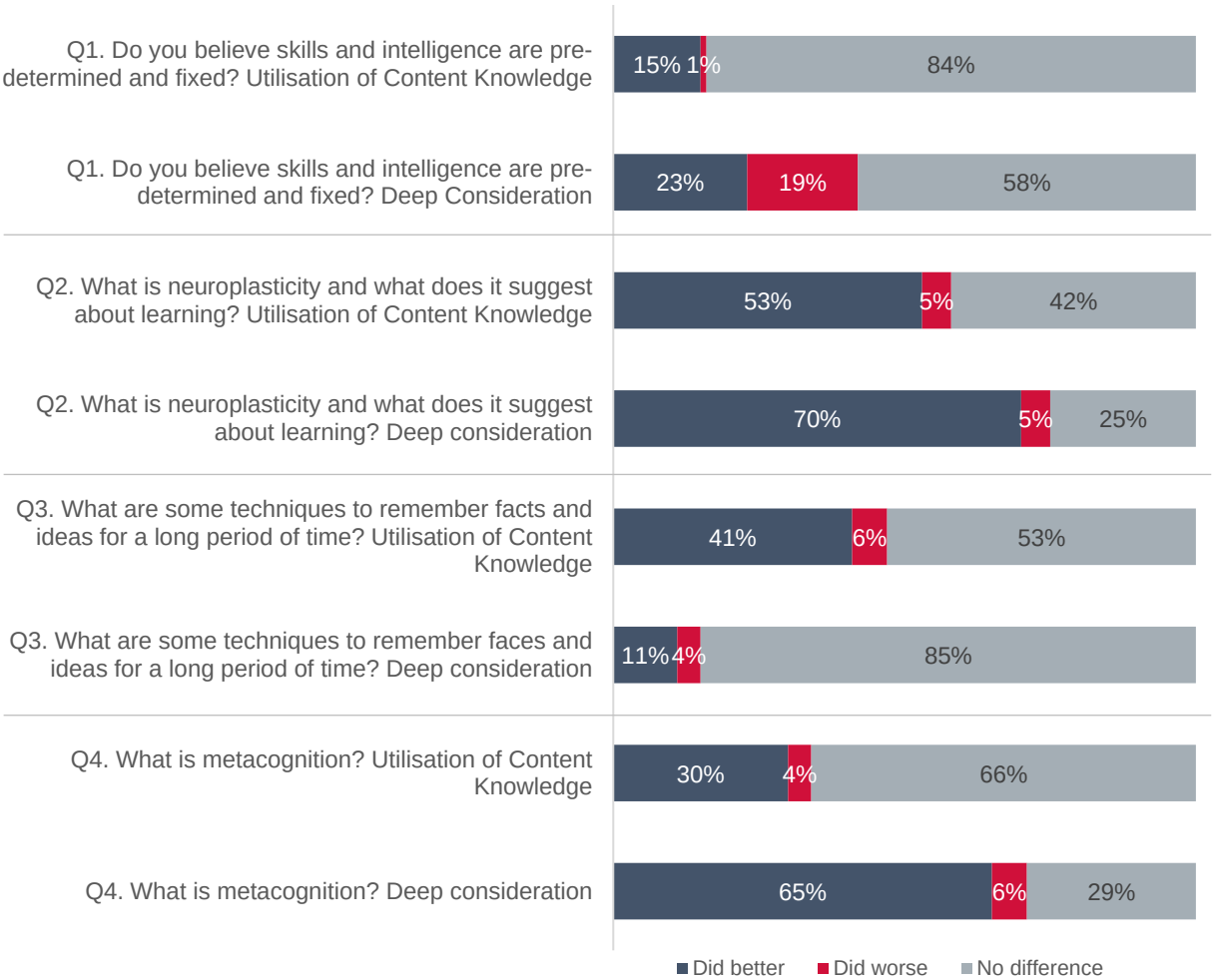
Open-ended course questions

The biggest difference observed was students' ability to conceptualise neuroplasticity and metacognition (70% and 65% respectively). They were able to provide valid arguments to support their answers post-program.

Students were also more able to use key concepts taught in the program in their responses for what neuroplasticity is and what techniques they can use to remember facts for a longer period of time. However, only a tenth provided valid arguments to support their answer for why they suggested those study techniques.

Only around a quarter of students improved post-program when asked whether they believe skills and intelligence are pre-determined and fixed. This is consistent with the lower mean score in statements relating to self-belief as discussed earlier.

Percentage difference between pre and post-program surveys



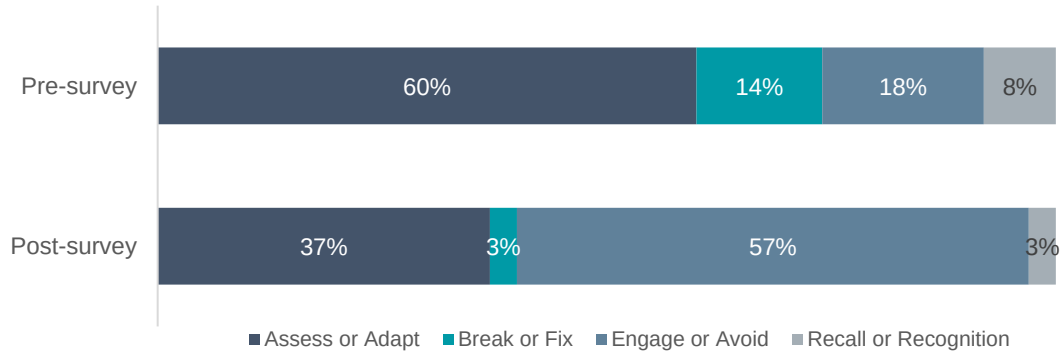
Note: Did better = Did better in the post-survey than pre-survey, Did worse = Did better in the pre-survey than post-survey, and No difference = Did the same both pre and post-survey

Multiple choice course questions

In this section, students were asked the following questions in the pre-survey and post-survey. The correct answer for each question is underlined and bolded. The chart details student's answers in the pre and post-survey.

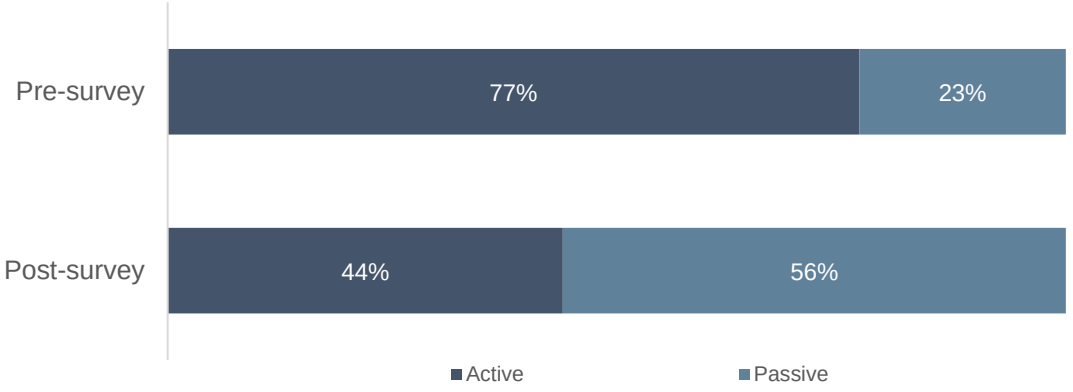
Q1. When you make a mistake or an error, what are your two response options?

a) **<u>Engage or Avoid</u>**
b) Break or Fix
c) Assess or Adapt
d) Recall or Recognition



Q2. Do you believe that the brain is largely **ACTIVE** *(determines and drives our thoughts/behaviours)* or largely **PASSIVE** *(simply responding to and reflecting our thoughts/behaviours)?*

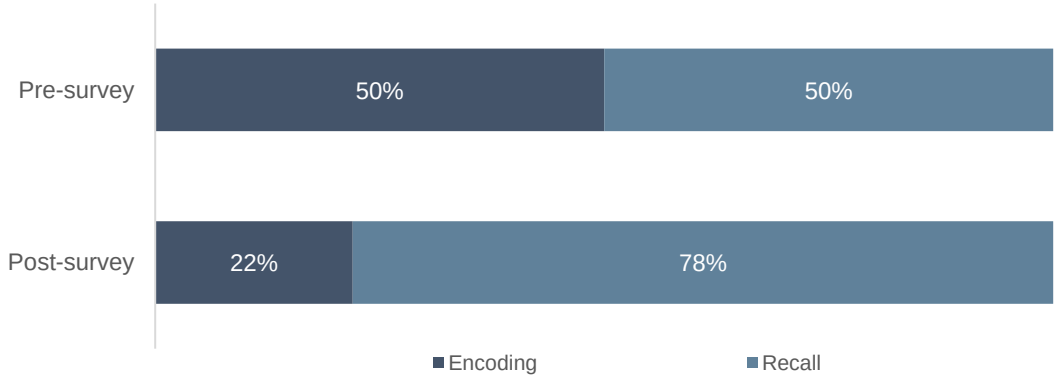
a) Active
b) **<u>Passive</u>**



Multiple choice course questions

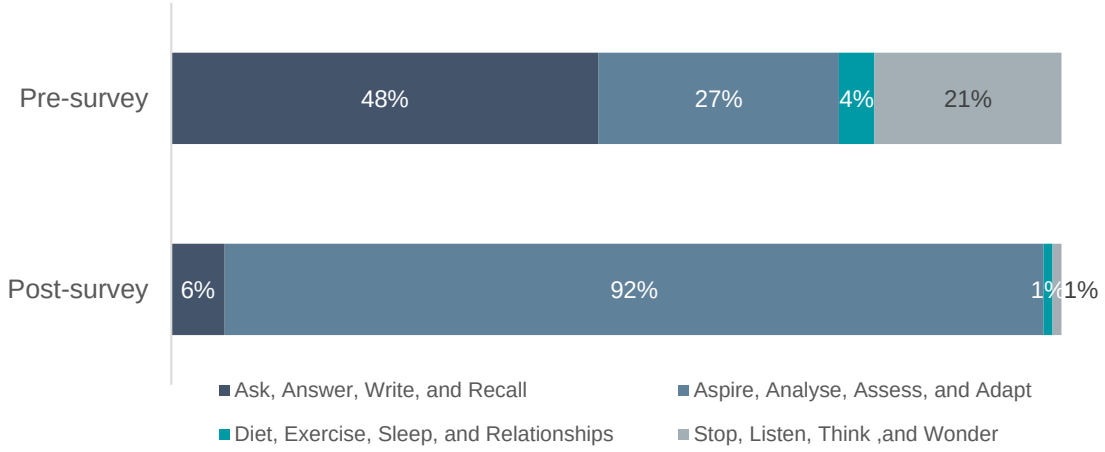
Q3. Which process leads to deeper and longer lasting memories: **ENCODING** (putting memories into the brain) or **RECALL** (taking memories out of the brain)?

a) Encoding
b) <u>Recall</u>



Q4. What are the **4-Pillars of Metacognition**?

a) Ask, Answer, Write, and Recall
b) Stop, Listen, Think ,and Wonder
c) <u>Aspire, Analyse, Assess, and Adapt</u>
d) Diet, Exercise, Sleep, and Relationships



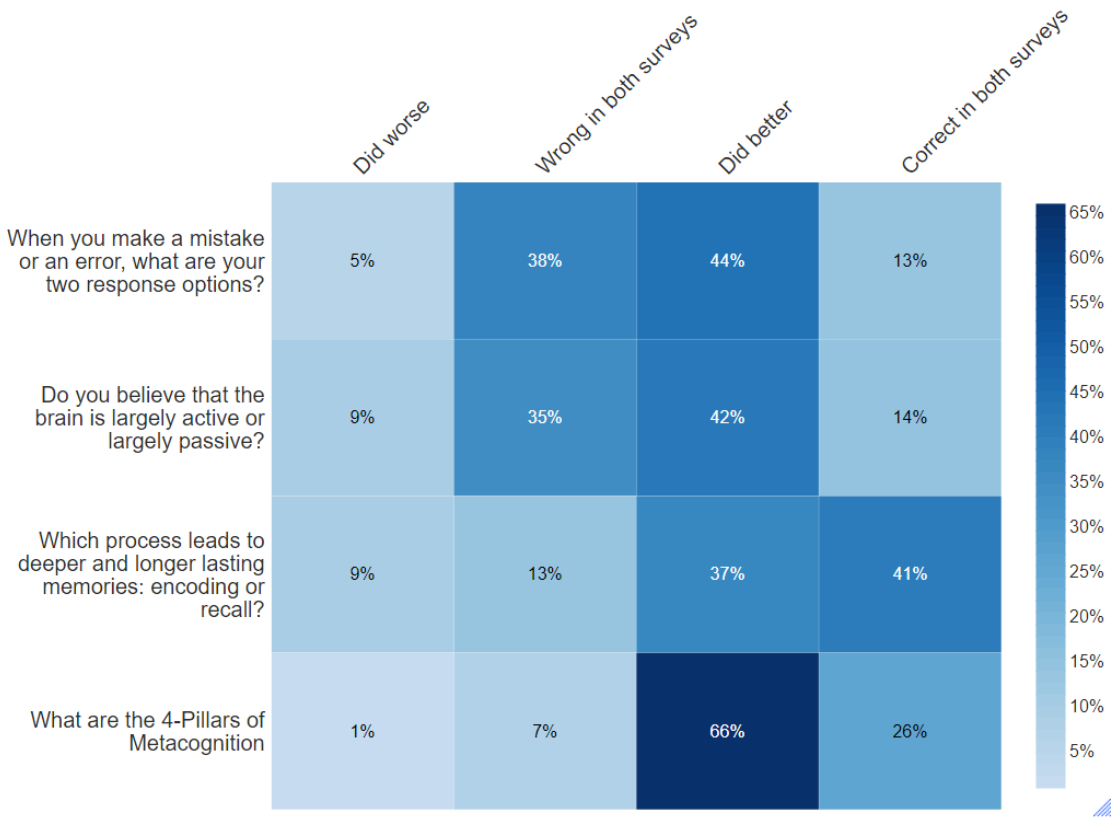
Multiple choice course questions

The heatmap below provides a useful visualisation for depicting the distribution of data for all multiple-choice questions in both pre and post-survey. The darker blue shades represent a higher proportion as indicated in the legend (right of heatmap).

Two in three students (66%) did better when asked what are the four pillars of metacognition (provided correct answer in the post-survey but wrong answer in the pre-survey). Nearly all students provided a correct answer for this question post-program.

While some improvement can be seen, around two in five still provided a wrong answer in the post-survey when asked what are the two response options when a mistake is made (43%) and whether they believe the brain is largely active or passive (44%).

Heatmap - Difference between pre and post-program surveys



Note: Did better = Did better in the post-survey than pre-survey, Did worse = Did better in the pre-survey than post-survey.

Post-program questions

Students enjoyed the metacognition lessons and have a clear understanding of the lessons. The majority agreed that they have a better awareness and understanding of their thinking and learning skills and are interested to continue exploring them. Most students also agreed that their school encourages them to be responsible for their own learning and to develop their thinking and learning skills.

Overall, students rated 7.8 out of 10 for their likelihood to recommend the program and 8.5 out of 10 for their satisfaction with the program. Female students were significantly more likely than male students to recommend the program (8.5 vs. 7.3). Students who participated in all reflection activities were significantly more likely than those who did not to agree that they have a clear understanding of the lessons and that they are more aware of their thinking and learning skills (9.2 vs. 8.4 and 9.0 vs. 8.1 respectively). Students were least satisfied with the post-lesson reflection activities. However, those who have participated in all activities were more likely to have enjoyed them (7.6 vs. 6.2 did not participate in all activities).

Mean for post-program statements

Data Source: Q. Thinking about yourself in general, please rate how likely you are to agree or disagree with the following statements on a scale from 0 to 10. A rating of 0 means 'Strongly Disagree' and a rating of 10 means 'Strongly Agree'.

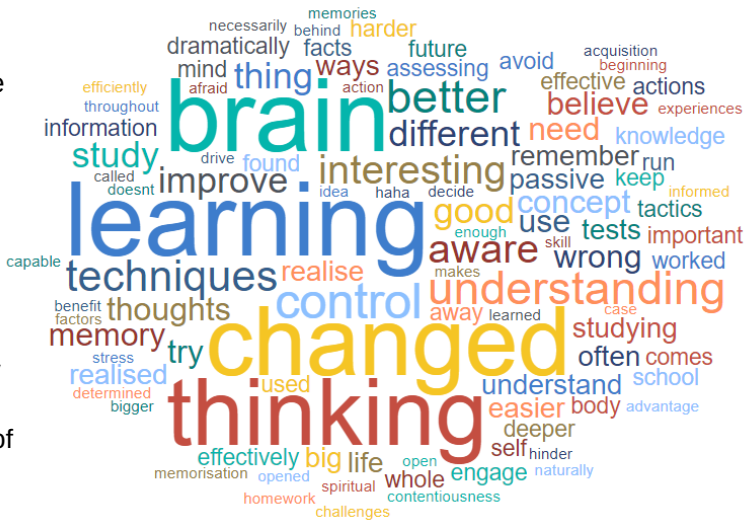
Note: These statements below were adopted from ISV LEAD School Effectiveness student survey. To compare your survey results against other independent schools, the ISV mean (n=45240) is reported in brackets below.

- *My school encourages me to be responsible for my own learning* (7.9)
- *In my school, I am encouraged to develop my thinking and reasoning skills* (7.6)
- *In my school, I am encouraged to think deeply about the important ideas I'm being taught* (7.5).

Open-ended questions

When asked how thinking and learning has changed since the beginning of the course, most students mentioned that they are more interested in the brain, neuroscience and psychology. They are now studying more efficiently as a result of what they have learned in the program. Students also felt more positive, confident and independent as they now understand that they are in control of their brain and learning.

However, some students indicated that they have not seen any difference or have not applied what they have learned at the time of survey.



"The biggest difference I have observed, is I have taken an interest in effective study techniques so I can make more progress with less effort."

"Just knowing it is all in your mind and you can change and improve if you try hard enough."

"I think more about reflection and why rather than how I get certain marks."

"Well, I know have a better understanding of how to control my anxiousness especially when it comes to a test."

"I realize that I am in control of my brain and I can work it to my advantage."

Open-ended coded categories	%	n
More interested/ aware/ understanding of the brain, neuroscience and psychology	22%	22
Better understanding/ more engaged with the learning process	19%	19
Positive mindset / open mindset/ respond to mistakes	13%	13
Better at remembering things/ better understanding and used memory techniques (i.e. spacing our workload, flashcards for recall, etc.)	13%	13
More aware/ take control of own learning/ more confident and independent	12%	12
More aware of thoughts/ think more/ think differently	11%	11
Studying more efficiently/ more motivated and focused	10%	10
More organised/ better time management/ set goals	0%	0
Others/ General response	9%	9
Don't know/ have not applied learning yet/ no difference	12%	12

Q. How has your thinking about yourself, your brain, and your learning changed (if at all) since the beginning of this course?
Note: Percentages may not add up to 100 since each response can be assigned to multiple categories.
Note: The size of a word in the word cloud image represents how frequent it was mentioned.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