Researching Teaching and Learning Essay 1

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'Uncovering students' thinking about thinking using concept maps' (Appendix A).

The aim of the research was to develop and test a tool or instrument (Ritchhart et al., 2009) that would allow the capture of student's ability to think about thinking using concept-maps, similar to using mind-mapping techniques to establish metacognition and learning.

It required a two-phase process where, firstly, teachers in the program used an inductive reasoning approach to code data collected over a period of nine months, by ***qualitatively*** articulating hundreds of concept-maps (Ritchhart et al., 2009, p. 156) prior to coding the information more meaningfully by organizing data into categories for analysis (Kervin, 2016) from the four different sets of responses. Secondly, researchers then examined results by translating the above data using numbers in a ***quantitative*** fashion, enabling them to clearly see differences or similarities between the four sets of responses. Data scoring was done in a way to demonstrate if their collective measure (Shank et al., 2018) could somehow indicate enough statistical significance for their instrument to work or not. This project was the starting point for further investigation into the exploration of students' awareness of the thinking process and students' concept of what it means to think by "focusing on getting students to think as part of everyday learning" (Ritchhart, et al 2009, p. 155), and not teaching them about thinking. The research presented them with an instrument on how to do it.

Ritchhart has pioneered metacognitive awareness testing – a person's capacity to think (Arnett, 2014) about thinking. The development of young people's understanding of the thinking-process through the application of *concept maps* used as a tool (Novak & Cañas, 2008) can help uncover a students' ability to think metacognitively. By deconstructing their own cognitive process through questions and answers, and by means of reflection, (Milne, 2007) students became aware of the various steps in *their own* thinking process. The *purpose* of the project was not only to develop the instrument as indicated, but to create instruction and guidelines on how school teachers can use concept-maps as a tool to help their students learn how to think.

The Method

There were 239 participants in total. 177 from primary grades 3 to 6 with 62 from secondary grades 7 to 11. There were also 6 teachers – 4 from primary, 2 from secondary school. 146 students were male. Students were grouped into "three groups according to curriculum and developmental

differences" (Ritchhart et al., 2009, p. 154). As the first-part of the project required a qualitative approach, it is safe to accept the convenient sample size being *smaller* than normally desired for a quantitative type of research formulated for the second-part of this project. The research required the teachers to facilitate students to mind-map their thoughts on thinking by visually scribing words on an A3 piece of paper (Appendix B) that represented what thinking was to them. These words were collected and arranged to give researches themes they could work with. By forming these *themes*, it made it easier (Shank et al., 2018) to tackle and apply the more complex concept of thinking about thinking to their analysis.

However, the article wasn't *clear* in identifying the design or "the actual plan for answering the research question", (Shank, G. et al 2018, p69) as indicated on page 150, "…here was a 9-month interval between students' first (pre-test) and second (post-test) concept maps…" and "…we have a partial indicator of the effects of the project…" and the explanation of the method as convoluted. The testing of the hypothesis was hard to define due to potential confusion among teachers and students in the project. Nevertheless, the idea of writing words (the data) and getting students to think about what they are thinking about, through mind-mapping techniques, made the testing useable (Ritchhart et al., 2008) by a wide range of learners.

The researchers began by identifying commonality between concept maps gathered and plotted the data collected against twenty types of initial responses to "build up a detailed and comprehensive account of the context", (Shank et al., 2018, p. 74) of the words. They then narrowed the answers into *four-sets* of emerging types of responses: Associative, Emotional, Strategic and Meta - with a minimum 80% score across all sets of post-test maps to confirming the reliability of data. Due to the pioneering nature of the research, they had no existing schemes available for analytically scoring the pre-test data from the maps, so they used an inductive approach (Thomas, 2003) to limit theory building to only the themes discovered in pre-testing.

The Analysis

To decipher the scores, concept-maps where firstly counted by the number of responses against the four categories in both pre-testing and post. The percentages calculated provided a "snap-shot" (Ritchhart, R. et al 2008, p154) against the overall population of participants. Secondly, concept maps received the following *Sophistication* scores:

- 3 points - Thinking *Strategies*
- 2 points - Self-Regulation and Motivation *Strategies*
- 1 point - Knowledge-Based and General *Strategies*
- 0 point - *Associative, Emotion, and Meta* type of responses.

The Sophistication scores above rewarded students' higher points for deep thinking over surface thinking. Each of the themes or categories generated a different set of numbers, enabling researchers to plot the complex data found to establish the standard variation *between* them. This variation was "a measure of the *overall change* that was" (Shank, G. et al 2018, p84) needed for calculations.

While ANOVA allowed them to find the distribution of responses for each grade level in both pre-test and post-test data, the researchers needed to perform a regression analysis to determine the estimate of average yearly growth for the pre-test scores as they did not have anything to compare it against. This simple T-Test method collected the scores "into a distribution so that each group [generated] its own mean - 3.24 - and standard deviation" (Shank et al., 2018, p. 82) was found.

The final outcomes provided significant differences in responses according to developmental stages of students. For both the Associative and the Strategies categories, the chi square tests resulted with significant values of $\chi 2(2)=173.97$, $P<.01$ and $\chi 2(2)=43.75$, $P<.01$ respectively but "no significant difference between grades in either Emotions or Meta [categories] thinking comments" (Ritchhart, R. et al 2008, p155) was achieved.

Conclusion

From a pioneering point of view, Ritchhart and co have demonstrated that it is possible to engage with students in the process of thinking, and their instrument on how to measure the engagement, works – the data demonstrated there was significant changes in the development of thinking about thinking using concept maps. However, the sample size was problematic as it consisted of only 62 students (two classes) from year 9 and only 2 teachers taking up the challenge to make this paper worthy of attention.

Another issue of concern was the selective nature of the school considering the high socioeconomic status of the participants, the essence of the project worked in theory at Bialik College, but could prove difficult in a low SES school such as Ashcroft High in Western Sydney. In addition, the research paper was difficult to follow – convoluted, intricate, and disjointed as it went backwards and forwards in too many directions. The reader, as an example, was not given the research question until page 5 of the document, and confirmation was not made until page 10 that teachers involved in this project did "not actually teach students about thinking or introduce a set of thinking strategies", (Ritchhart et al., 2008, p. 155) to them. Finding this out towards the end, made one re-think and re-read the paper in order to understand the purpose.

The paper also had problems *explaining* how data was translated into numbers, as this wasn't clear. Furthermore, the research was flawed from the beginning as researchers could not establish the necessary control group as this would have made things "politically untenable" considering the uniqueness of Bialik College (Appendix C), where they basically made things up – such as in inventing the criteria for establishing the Sophistication scores. Overall, this research paper was the impetus for the continuation of the project, and the development of additional work by other researchers, universities, organisation and governments to further evolve students' thinking disposition, to develop leadership and motivational skills that inspires action for change in young people, and enhance students' comprehension abilities at school.

Final point for discussion

As a point of concern, the paper included an "appendix" section that failed to mention only 12% of participating students were females, which could skew the essence of the research in favour of boys.

References

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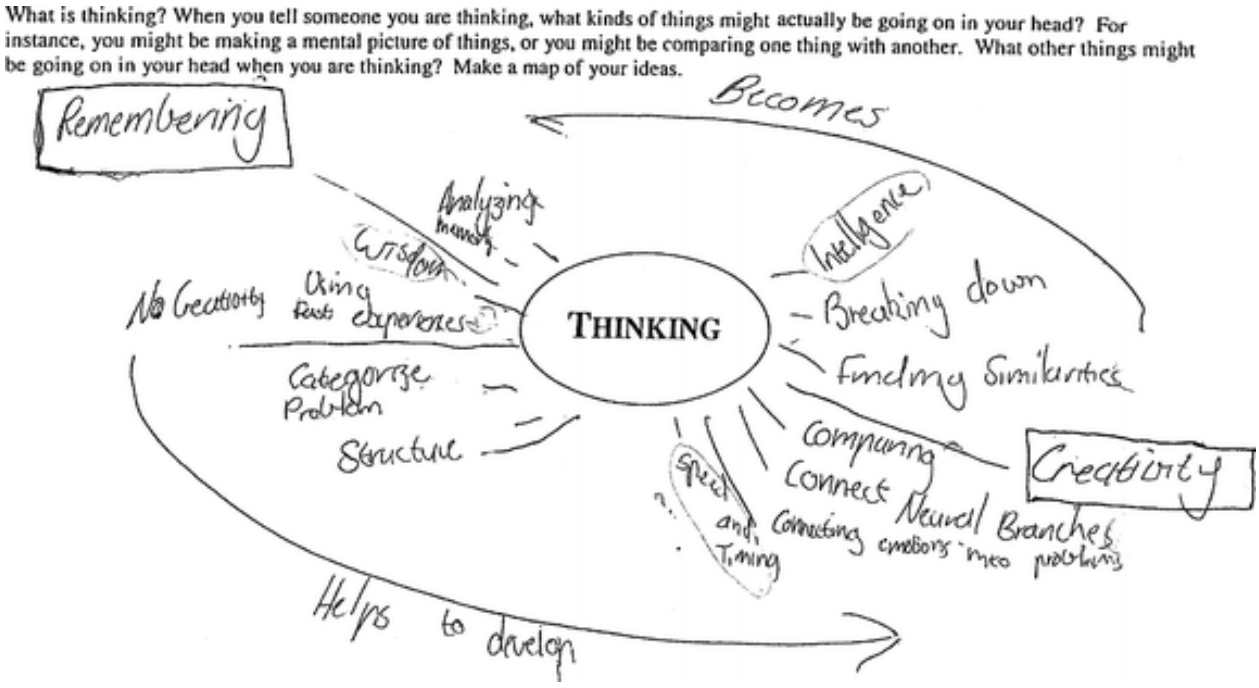
Appendix A

The research article 'Uncovering students' thinking about thinking using concept maps', was published online 31 January 2009 in Springer Science and Business Media, Switzerland, stems from the 5-year professional development Cultures of Thinking Project by Ron Ritchhart, Linor Hadar and Terry Turner from Harvard Graduate School of Education, at the prestigious Jewish Bialik College, Melbourne, Australia.

This project has now grown into a bi-annual 5-day conference event involving key-note speakers and delegates from 4 countries and 71 different institutions, held only at the last week at the college:

https://culturesofthinking.com.au

Appendix B



Student's concept map – source: https://link.springer.com/article/10.1007/s11409-009-9040-x

Appendix C

https://www.bialik.vic.edu.au