Curious Minds Think and Learn by Exploring.

Submission for an interactive workshop: Kimberley Leslie, Sydney, Australia

I am presently working at Barker College, Sydney, Australia in the position of Academic Enrichment Coordinator. This school is a Yr3 to Yr 12 school, for boys from Yrs 3 to 9 and coeducational Yrs 10 to 12. In this position I am specifically responsible for the enrichment of the core curriculum concepts and content in order to address the needs of the boys in Years 3 to 6 who are working beyond the level addressed in the regular classrooms. I design programs:

- to be utilised by teachers in the classroom.
- to be implemented by me within the classrooms in a team teaching situation.
- to be implemented by me in a withdrawal environment, perhaps in the library, science laboratory or specific research room.
- to be used by the student as an adjunct to the core work.

This role, therefore, places me in a position of influence over the implementation of the school’s programs as I am in constant discourse with most teachers as the writing and implementation of these enrichment programs require consistent communication.

As a consequence of my working environment I have been fortunate to have access to professional development which has assisted me in the implementation of the school curriculum according to the teaching learning model adopted for all classes Years 3 to 12. This model was initially developed as a reflection of the 4MAT system developed by Bernice McCarthy (1980) recognising a cycle of learning. More importantly, for our programming, it is based on the premise that different individuals perceive and process experiences in different, preferred ways. As the goal of 4MAT and Barker College is to do more than just fill the students with information, preferring to develop in students an ability to think and learn well, the 4MAT model directed our initial thinking. Having a research base imbedded in current brain research based on the concepts of brain hemisphericity and cognitive neuroscience, it provided an instructional design tool that was practical, flexible and proven. This research is particularly interesting for my own work as many research studies have shown that students of high academic ability think differently to other students. (Sternberg & Davidson, 1990; Tannenbaum, 1982; Westberg & Archambault, 1997, Gardner, 1999, Perkins, 1993). Lovecky (2004) has also suggested that most research in this area has been conducted on adults and has suggested that more research is needed on the thinking processes of children. This is an area that I am particularly interested in researching on a personal level.

Developing the ever important consideration of individual processing of experiences when designing instructional tools and methodology at Barker, we have now accepted the Teaching for Understanding framework (TfU) that developed from the research during Project Zero. This is in recognition of the individuality of the teachers as well as the students. As it is the classroom teacher who, through day to day instruction, assumes the main responsibility for helping our students become better thinkers, it is important that the framework chosen for the implementation of curriculum also recognises the personal characteristics and innovations of those teachers. We recognise:

- The more explicit the teaching of thinking, the greater impact it will have on students.
- The more the teaching of thinking is integrated into content instruction, the more students will think about what they are learning.

Both 4MAT and TfU recognise that effective teaching is the basis of successful learning and effective teaching must recognise the individual. Effective teaching identifies and builds on prior knowledge, makes real-life connections, develops deep understanding and monitors and reflects on learning. Assessing thinking is essential to this...
teaching/learning cycle. It is with this principle that I am developing a presentation entitled The Nut and the Nutcracker to give to the staff at Barker to assist in the understanding of the integration of 4MAT and TfU. As one of the thinking routines of TfU includes the identifying of metaphors I have used the nut and the nutcracker as metaphors for 4MAT & TfU as the title of my presentation. This presentation would form the basis of a presentation I would like to give at the 13th International Conference. I would like to share with everyone the journey that I have taken at Barker over the past 2 years. I say the basis of a presentation as I recently began research for my PhD at the University of New South Wales and would include the preliminary research for this in my presentation. I will be examining Cognitive Load Theory which was developed by John Sweller at the University of NSW.

Cognitive Load Theory is an instructional theory derived from our knowledge of the evolutionary bases of human cognitive architecture and the instructional consequences that flow from that architecture. It recognises that learning occurs most effectively when the delivery of course content is in alignment with individual cognitive/brain architecture. A key aspect of the theory is the relationship between long-term memory and working memory and how instructional materials interact with this cognitive system. While in the past this theory has been applied primarily to technical areas it is now being applied to more language-based discursive areas, web-based design and e-learning models.

I would include my developing understanding of Cognitive Load Theory in my presentation as I believe it is a further enhancement of understanding the development of the instructional model I am using presently based on the research of 4MAT and TfU. The teaching of the thinking routines of TfU would be supported by an understanding of cognitive load as applied to working memory. It is particularly relevant to the theme of the conference “Curious minds think and learn by exploring”. Cognitive Load Theory identifies long-term memory as the “central, dominant structure of human cognition. Everything we see, hear, and think about is critically dependent on and influenced by our long-term memory”. (Kirschner, Sweller & Clark, 2006). This would, therefore, have implications for instructors, as Cognitive Load Theory recognises that if students are instructed to think and explore without being given a bank of personal experiences in which to do the thinking and exploring, the learning will be ineffective. (Sweller, 2006) My presentation will take this understanding further and challenge the audience with a closer look at instructional models such as discovery learning and constructivism.

Earlier in the year I presented an interactive workshop at the Heads of Independent Schools across Australia and New Zealand to showcase the progressive and exciting work being done here at Barker. The abstract was:

Schools are awash with data. We have generations of educational research determining the direction and content of curriculum. However, what really are the major influences on student learning? Despite the daunting complexity of the human brain, neuroscience is progressing rapidly due to a world-wide focus and the advent of tools such as advanced brain imaging. We now know that the wiring pattern of the brain is not fixed but changes with experiences and learning throughout life. We also know that a number of studies indicate that the brain of a mathematically gifted student possesses a functional organisation distinctly different from others. This workshop will begin by looking at the current neurobiological evidence and cognitive-psychological findings and discuss how the 4MAT model utilises this evidence to be an effective framework for a learning cycle that ensures learners have the potential to make meaningful and long-lasting connections to their learning.

I used two questionnaires, two hands-on activities and several interactive activities during this workshop. I would use this structure when assembling a workshop for the Thinking Conference as I found it very successful. By combining this, my new workshop on TfU called the Nut and the Nutcracker, and my research on Cognitive Load Theory, I feel that I could present an interactive workshop that explored and challenged the thinking on thinking in learning.