HIGH COGNITIVE WORK ACROSS THE SCHOOL YEARS

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During 2013 -2014 I have been privileged to be part of a team – along with English Education consultant Jane Sherlock and Joanne Jarvis, Principal of Engadine High School – delivering courses for the Federation's Centre for Professional Learning on *Lifting Achievement for Years 7-12*. In this work, I have reported on findings from a series of my research projects and associated publications since 1997. The projects and associated key publication details are:

- *Successful teaching in the NSW HSC* (Ayres et al, 2000)
- *Exceptional schooling outcomes in Years 7-10 in NSW* (AESOP) (Sawyer et al, 2007)
- *Motivation and engagement of boys*: *Evidence-based teaching practices. (*Munns et al, 2006)
- *Engaging middle years boys in rural educational settings* (Cole et al, 2010)
- *Teachers For a Fair Go: A study of teachers who 'make a difference' to students in poverty* (Munns et al, 2013)

Broadly speaking, the first three of these projects concern effective teaching, ie drawing links from teacher classroom practice to student outcomes. The other two are concerned with student classroom engagement and the conditions for successful engagement created by a teacher's pedagogy. In this paper, I will report on one area that has been a central interest for systems in the last few years, viz. the issues of intellectual quality and intellectual challenge. In NSW government schools one of the three 'dimensions' of the Quality Teaching Model of pedagogy has been 'intellectual quality' (NSW DET, 2003). I have written elsewhere about this issue with relation to English teachers in low SES contexts (Sawyer, 2014), but will here range more broadly.

Given that the most recent of these studies was a study of successful engagement in schools in low SES communities, one should expect any relevant findings about intellectual quality to be positioned, then, as a key factor in engaging these students. In fact, the larger *Fair Go* research program at the University of Western Sydney, in which the *Teachers for a Fair Go* project sits, works with a model of classroom engagement (the MeE framework – see Munns & Sawyer, 2013) in which 'high cognitive' classroom work is a central feature. That research project worked with 28 teachers across NSW who had been identified by their peers as highly successful at engaging students from low SES communities with their education. Thus, among other aspects of engagement, we were investigating whether high cognitive work was a key part of the engagement in their classrooms. Put starkly, was intellectual challenge a key part of these teachers' success at engaging students? It was. In conceptualising engagement across the years pre-school to Year 12, high cognitive classroom work was manifested in two key ways:
• classroom experiences were intellectually challenging and
• teaching and learning were the focus of sustained and ongoing classroom conversations.

To deal with the latter issue first: there was an explicit focus in classrooms on the topic of teaching and learning itself and a valuing of the process of learning, as well as the content knowledge itself. Teachers would explicitly focus on questions such as
'How did you get there?' 'What was your process?' and the classrooms were marked by reflection on: what students 'now know/can do/have discovered'; what strategies were used to get there; what students found challenging, and what students needed more practice in, or help with etc. One could run a perfectly well functioning, even higher-order-thinking classroom, without this

conscious reflection on the processes of learning but this was not the case with these teachers and these classrooms, where teachers took time to have conversations about learning over and above lesson content, and which we believe contributed strongly to the cognitive work of the lesson.

However, it is specifically the notion of intellectual challenge on which I want to dwell here. The *Fair Go* classrooms valued higher order thinking, problem solving, problematising knowledge and analysis. Research and experimentation were common activities and students were encouraged to question their conclusions ('How did you work that out?' 'Did anyone have a different conclusion?' 'Would anyone do it differently?' 'Are there other ways of looking at this?'). This developed what we have termed a 'culture of inquiry', sometimes in terms of set tasks ('inquiry learning') but also, and importantly, in terms of the prevalence that teacher questioning had, and also the forms it took ('What do we know about …?' 'What can we tell about …?' 'What would happen if …?'). Judicious questioning was a key strategy creating this culture of inquiry. On occasions, we would refer to teachers' habits of 'relentless questioning'. Students were encouraged to question their own conclusions, to think critically and to appreciate a range of perspectives on a topic. This work in these classrooms created a particular disposition towards knowledge, viz that *some* knowledge is open to challenge, but that *all* knowledge is open to interrogation.

It was questioning which led students towards higher order thinking, as well as creating an intellectual space for student voice. Student-student discussion was a dominant feature of lessons, either in pairs or larger groups. Students were sometimes asked to create questions for others to answer/investigate, and the culture of inquiry was a shared culture, with students working together and teachers 'down there with them' and seen to be also seeking answers to problems.

Of course, explicit instruction also occurred. Modelling was an important strategy, used widely by both teachers and student-peers. Vocabulary was also a pre-thought-out focus in lessons, whether it was developing vocabulary, exploring word meanings or focusing on key terminology (including the spelling of such terms). 'Explicitness' in this context refers not only to instruction, but also to clear articulation of content, goals, key concepts and criteria for achievement. All of these were foregrounded by teachers. 'Transparency', 'visibility' and 'lucidity' are important synonyms for this foregrounding work. Such foregrounding and lucid task analysis creates the sense of security which assists students towards independence.

Teachers drew on, and made links to, student lived experience and funds of knowledge, often through this questioning. They were also careful to draw out, or make explicit, the links between existing student knowledge and experience and new knowledge. Teachers also made strategic and judicious use of resources, including ICT, which tended to be integrated into rich tasks and which were largely not used as an add-on or stand-alone. Student engagement was on occasions initiated and sustained through 'hands on' experiences with ICT.

The general thrust of this work strongly reflects findings from earlier work. But before I turn to this, it is salutary to remind ourselves why what I have been saying so far about this teaching in low SES classrooms is actually worth saying, ie why would we expect anything other than high cognitive work in schools?:

> in response to standardised testing of the sort now pervasive nationally in Australia, low SES schools are particularly susceptible to concentration on the 'basics'. Since public perception of schools based on league tables particularly

> disadvantages low SES schools, the consequence is a focus on 'performance', rather than 'achievement' (Teese & Lamb, 2009)
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> poor districts …offer stripped down drill-and-practice approaches to reading and math learning, rather than teaching for higher-order applications… …critical thinking and problem-solving; collaboration…effective oral and written communication; accessing and analyzing information; curiosity and imagination. The kind of curriculum that supports these qualities has typically been rationed to the most advantaged students in the United States (Darling-Hammond, 2010: 52-54).

This emphasis on intellectual challenge was manifested in other studies around effectiveness. In the project, *Successful teaching in the NSW HSC* (Ayres et al, 2000), we investigated the work of teachers who were consistently achieving outstanding HSC results with students in contexts where these results were atypical of those cohorts. Success based on external exams could easily be sought in skilling and drilling examination practice, but, again, this was not the case with these teachers. The key common factor in their pedagogy was an emphasis on having students think, solve problems and apply knowledge. Simply reporting back knowledge or practising formulae outside of the context of application was unusual. Teachers strongly saw their role in the classroom as challenging students, rather than 'spoon-feeding' information. Teachers made deliberate, clear decisions to deliver new information efficiently and to spend the bulk of class time using and applying knowledge. Part of this was another clear distinction in their planning about using class time in ways that exploited the community of the classroom – thinking about what things are best done while there was a group available, as opposed to what could be done individually at home. Class time was, as much as possible, for applying knowledge, reasoning, independent thinking, solving problems and groupwork. In one observed Maths lesson, after deriving a formula that was new to the students, the teacher first assured himself that students understood the new formula, then, rather than setting them practice exercises on the new formula, he instead set them a problem to solve in groups which involved using the new formula at some point. As he walked around speaking to the groups, his clear intention was to obtain as many possible ways to the solution of the problem as he could. In a class of 25 or so students working in groups, three different routes to the solution were found and these were demonstrated to the class by students chosen from the appropriate groups. Students were then set a series of exercises on the new formula for homework. This lesson epitomised well what we saw often – efficient delivery followed by application, higher order thinking, problem-solving and using the resources of the classroom as a community. These approaches were so common as to be seen by us as fundamental to the outstanding examination successes these teachers were achieving.

Maths teachers also epitomised a related set of pedagogies around problem-solving itself. Apart from encouraging students to seek a variety of solutions to a problem, they could be seen:

- complicating solutions by reversing the elements of a question ('What if it had said....instead of ….?' What if I changed this bit here?').
- spending time having students face, and talk through aloud, the particularly difficult aspects of a problem or even beginning with difficult problems rather than simple ones when working on a new concept
- encouraging inductive reasoning by using practical problems from which students derived concepts, or having students induce formulae from specific examples.

Similar approaches from two different Ancient History teachers included:
• supplying students with pictures of the Palace of Knossos and asking them to deduce the purpose of the palace before any information was supplied
• supplying students with a list of 'Sayings of Greek Women' and asking them to suggest the values inherent in the society that would produce such a list.

Nor is it the case that these practices were confined to students undertaking the most challenging courses in a subject. The example of the Palace of Knossos just quoted was in a class studying what was then the General Ancient History course. Similarly, in the AESOP project (eg Sawyer et al, 2007) which studied groups of highly effective teachers in Faculties, 'lower ability' students in English, for example, were not confronted by a sole diet of functional literacy, pen and paper activities, comprehension and vocabulary work, but engaged with IT, media, drama and poetry, just as higher streamed classes did.

In both the *Motivation and engagement of boys* project and the *Rural boys* project, the focus was explicitly on success with previously disengaged boys. Those who care to download the Case Studies Report from Munns et al (2006) will find in the schools which we termed *Amber, Azure, Cyan, Heliotrope, Indigo, Ochre, Olive, Russet, Sienna, Vermilion, Cerise* and *Teal* that challenging projects and problem-based learning provided opportunities for students to investigate big ideas and to engage in solving real-life puzzles. These types of experiences encouraged processes of exploration, discovery, investigation and problem-solving. Meaningful projects and investigations connected to their everyday worlds were effective ways of engaging these students in literacy and numeracy. They positioned boys as experts and enabled boys' real-world knowledge to be transferred to academic knowledge – and, at the cost of repetition, it needs to be remembered, these were sites where previously disengaged boys were now doing well

In the *Rural boys* project, one site implemented a forensic science investigation based on a MANSW publication, *The case of the mystery bone* (Clarke, 1996). Data were collected from the students through a survey about attitudes to mathematics. Students reported mathematics as irrelevant to their lives and of little interest; they wanted more practical, hands-on activities. The MANSW unit involved the students in hands-on activities, independent and pair tasks, problem-based learning and extensive use of ICT. Throughout, the students formally evaluated the unit using a Plus-Minus-Interesting (PMI) inventory, followed by discussions of how the unit and learning could be improved. Interestingly, there were no minuses recorded on the PMI inventories by the students throughout the unit, nor at the conclusion. The boys expressed appreciation of the more active learning experiences and opportunities to voice their evaluations and suggestions for learning.

Neither of these latter two examples should be taken as an argument that essentialises boys or their learning preferences. An elaborated discussion of that issue can be found in many sources, including a literature review in Sawyer et al (2009). My argument here is not about that issue, but about intellectual challenge, which, I am arguing, is both effective (HSC study, AESOP study) and engaging (*Motivation and engagement of boys, Rural boys*) not least for students in low SES communities, often seen as disengaged from schooling, and who historically receive very disengaging messages about their ability, not least from the media. Sometimes this challenge is contained in specifically problem/project-based work, sometimes it is contained in the culture of inquiry established by a teacher as the classroom norm. I want to leave the final message to Linda Darling-Hammond (2010:55):

> *Decades of research have shown that teachers who produce high levels of learning for initially low-and higher-achieving*

students alike provide active learning opportunities involving student collaboration and many uses of oral and written language, connect to students' prior knowledge and experiences, provide hands-on learning opportunities, and engage students' higher-order thought processes, including their capacities to approach tasks strategically, hypothesize, predict, evaluate, integrate and synthesize ideas.

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