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## Productive Pedagogies: Working with Disciplines and Teacher and Student Voices

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This paper identifies the ways in which the Productive Pedagogies framework has been refined to explore issues of school reform in Queensland. The resulting framework, while retaining the four dimensions of Productive Pedagogies as critical for the promotion of socially just classroom practices and outcomes, acknowledges the contributions that teacher and student knowledges can make to understanding what counts as high quality pedagogy. We illustrate the model via observational and interview data collected from different disciplines in upper primary and lower secondary classrooms.

This paper substantiates the methodology currently being constructed for a study of reform initiatives in Queensland schools commissioned by that state's Department of Education, Training and the Arts (DETA). The study is expected to revisit much of the work of the Queensland School Reform Longitudinal Study (QSRLS) that was conducted from 1998-2001 (Lingard et al., 2001). It was during the latter study that the Productive Pedagogies and Productive Assessment frameworks emerged as research tools for exploring classroom practices that have a positive impact upon the academic and social outcomes of *all* students, regardless of background. Senior DETA officers are supporting a concerted attempt to cultivate a research culture in Queensland government schools that entails self-reflections and critical analysis of existing practices with a view to improving students' school experiences. They consider the QSRLS to be a significant impetus for justifying such a culture. Our current study is expected to reinforce in the Queensland educational community the importance of research for informing education reforms in schools and classrooms. It also has an evaluative component in determining the impact of Education Queensland's investment in professional development around the Productive Pedagogies framework arising from the QSRLS.

Because of the background to the current study, we have drawn on the Productive Pedagogies framework to structure our observations of classrooms. In this paper we outline how we have addressed some methodological issues in using and refining the framework in response to critiques by other researchers and debates within our own research team.

### Rationale for the Study

The current study is the first phase of a longitudinal project intended to be undertaken over a six year period. The first phase, lasting 18 months, involves surveying approximately 2000 parents, 2000 students and 650 teachers from around 100 schools, as well as carrying out one week case studies of 18 schools, some of these are schools that were involved in the original QSRLS research. The focus is on middle years classrooms in Years 4, 6, 8 and 9 in English, mathematics, science and social sciences. In the case studies these classrooms are observed, assessment tasks and samples of student work are collected, and interviews are conducted with students, teachers, parents, and senior staff. Centrally held data on student performance on local, national and international standardised tests will also be accessed for analysis. The first phase of the project thus provides baseline data against which to measure change over the

In undertaking this study we acknowledge that many students are well served by schools; however, many do not benefit from the schooling process as much as could be the case (Teese & Polesel, 2003; see also Mills & Gale, 2007). We recognise the broad social conditions which work against the interests of students from particular communities (Comber & Kamler, 2004) and understand the difficulties that many in schools face in terms of improving the educational outcomes of students from disadvantaged backgrounds (Comber et al., 2001; Thomson, 2002). The social and economic conditions within which many students live make the task of providing equitable outcomes for all students extremely difficult, and schooling alone without serious attempts to alleviate poverty, racism, and other forms of injustice faces challenges of Herculean proportions. Nevertheless, we argue that education systems, schools and individual classrooms can change to better meet the educational needs of students of diverse socio-economic backgrounds, ethnicities, geographic locations and physical abilities. This is imperative in the light of international comparison studies that have highlighted the inequitable distribution of high quality outcomes delivered by Australian education systems (McGaw, 2006; ACER/OECD, 2004; Dusseldorp Skills Forum, 2005). In Queensland, there are clearly key equity issues to be discussed at the policy level (Singh & Taylor, 2007). For example, a report on social disadvantage amongst Australian children states in regard to the Child Social Exclusion Index, based on such measures as access to computers, levels of parental income and parental occupations (or lack thereof), that '25 per cent of children living in Queensland [fall] into the most disadvantaged decile' (Harding et al., 2006, p. 27).

Although the focus of this study is the classroom, realising high quality outcomes for students will require more than teachers simply changing their practices. They also need the support of school communities and the systems within which they are situated. Research in Finland, often cited as an example of an education system that combines high quality with high equity, indicates that these supportive measures include respect of and trust in teachers' professionalism, advanced qualifications for entry into the profession, an avoidance of high stakes testing and accompanying appraisal of teachers based on notions of accountability, high levels of student support in the early years of schooling, and a focus on learning that takes into account more than just academic achievement (Sahlberg, 2007; see also Routti & Ya-Antilla, 2006; Simola, 2005). Thus identifying a framework for classroom observation reminds us of the need to avoid making judgments about individual teachers and imposing standards upon them. In developing this study we want teachers to know that our classroom observations are as much about learning from them as determining the level of particular classroom practices. Any other approach is likely to alienate teachers and to be counter-productive to the longer term aims of a project such as this – to improve the educational outcomes of students.

## Observation Instruments

A key component of this commissioned research was to construct a model for observing teaching practices in Queensland schools. While there appeared to be an implicit assumption that the Productive Pedagogies framework would form the basis of the model, it was necessary to consider a range of other possible observation instruments in order to develop the most appropriate model to meet the aims of the research.

There is an extensive literature on observational studies of specific types of classrooms; for example, inquiry-based classrooms, communities of learners, or cooperative learning environments (Schoenfeld, 2006). This type of research provides detailed descriptions and theoretically informed interpretations of how student learning can be

transformed by the adoption of particular practices and norms. Such research can influence system-wide teaching and learning practices by indicating what is possible in particular classrooms, schools and communities. However, this approach is limited in scope and requires a long term investment in the design process and the evaluation of outcomes.

Another approach to classroom research is based on assessing learning environments. This approach has relied almost exclusively on the self-reported perceptions of students, teachers, and parents regarding the classroom climate or learning environment (Fraser & Walberg, 2005; Shavelson & Seidel, 2006). Using self-report questionnaires enables large scale studies to be carried out and can provide useful information on system-wide characteristics of classrooms. However, studies based only on self-reported data raise concerns regarding validity. For example, how do teacher and student perceptions map to actual classroom events and outcomes? How can self-interested perceptions of teachers and halo-influenced perceptions of students be avoided or at least monitored?

Our selection of an observation instrument for the current study was guided by the need for a valid form of measurement that could: (i) capture classroom processes and events that occur with some frequency and regularity across the system; (ii) provide an index of the variation in the quality of teaching and learning occurring in different classrooms; and (iii) allow different dimensions of quality to be identified and clearly described so that system-wide improvements in teaching quality can be designed on the empirical evidence gathered. As indicated earlier, we recognise the central role of the teacher in improving student outcomes and so our focus is on the activities, strategies and behaviours of teachers in enabling certain kinds of student engagement and practices in the classroom. In doing so we also acknowledge that learning is not limited to the classroom and may take place across a school (Mills, 1996, 1997).

Studies of whole systems that do not rely solely on self-report questionnaires or single case studies and narrative descriptions are rare. Two examples are the authentic pedagogy research of Newmann and Associates (1996) and the Productive Pedagogies research conducted as part of the QSRLS (Lingard et al., 2001). The former research was significant in the development of the latter model in that a number of items from the authentic instruction observation instrument were included directly in the Productive Pedagogies framework. The Queensland researchers then added other items to take into account particular expectations of Australian classrooms and the Australian context, drawing on diverse literatures on learning theories, critical literacy, sociology of education, learner identities and curriculum theory. This approach has been described as a jigsaw methodology that brings together 'pieces of the puzzle about influences on learner outcomes that are often spread over and embedded within a range of research studies' (Alton-Lee, 2004, p. 2). Factor analysis of the resulting 20 items led to determination of the four dimensions of the Productive Pedagogies framework: intellectual quality, connectedness, supportive classroom environment, and valuing and working with difference<sup>2</sup>.

The Productive Pedagogies framework has been written about extensively (e.g., Hayes et al., 2006; Lingard et al., 2003) and used in other research projects (e.g., Lingard et al., 2002; Allen, 2003; Martino & Berrill, 2003; Loudon et al., 2005; Keddle, 2006; Keddle & Mills, 2007; Marsh, 2007; Munns, 2007). It has been adapted as educational policy in New South Wales (NSW Department of Education and Training, 2007) as well as in Queensland. These developments are indicative of widespread acceptance of the framework amongst sections of the research community in Australia and internationally, and locally amongst policy makers and teachers. Nevertheless, there have been some critiques of the original

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<sup>2</sup> This dimension was originally referred to as Recognition of Difference, but in subsequent work has come to be

Productive Pedagogies framework (e.g., Sellar & Cormack, 2006; Narrative, discourse and pedagogy research group at UWS), including from some of its original developers (Ladwig, 2007). These and other considerations led us to modify and refine the framework for use in our current study. We proceed next to a justification of particular aspects of the original model and then to an explanation of the refinements we have made.

## Productive Pedagogies

One of the primary reasons for working with the Productive Pedagogies framework for this study is that it promotes the provision of a high quality education for *all* students, and especially students from disadvantaged background (Lingard et al., 2001). For students to demonstrate high level intellectual outcomes they must be provided with a learning environment that stimulates intellectual activity. This type of learning is encouraged when the material covered connects with the students' various worlds, especially for students who have disengaged or are in danger of disengaging from school. There is also ample evidence to suggest that the supportiveness of a classroom is critical for the achievement of high level outcomes for students, especially for those who have traditionally been failed by the education system. In a time and world that is characterised by diversity, complexity, rapid change and conflict, achieving positive social outcomes and values requires that students learn to work with and value difference. We would also claim that valuing difference delivers academic benefits to those students who often feel disconnected from schooling due to a failure to have their own 'differences' valued within the classroom. These arguments led us to retain the original four dimensions of the Productive Pedagogies framework – intellectual quality, connectedness, supportive classroom environment, and valuing and working with difference – in our reworked version. Table 1 shows the organisation of the 20 items into their respective dimensions and the questions to which researchers are expected to respond in recording their observations.

**Table 1. Productive Pedagogies dimensions and research questions<sup>3</sup>**

<b>Dimension</b>	<b>Items</b>	<b>Research question</b>
<b>Intellectual quality</b>	• Higher order thinking	• To what extent do students use higher order operations?
	• Deep knowledge	• To what extent is deep knowledge presented?
	• Deep understanding	• To what extent is deep understanding evident?
	• Substantive conversation	• To what extent is classroom discourse devoted to creating or negotiating understandings of subject matter?
	• Knowledge as problematic	• To what degree is knowledge presented as constructed?
	• Meta-language	• To what extent does the teacher (or the students) talk or discuss explicitly how language works, aspects and characteristics of languages, texts and discourses?
<b>Connectedness</b>	• Background knowledge	• To what degree are links with students' background knowledge made explicit?
	• Connectedness to the	• To what extent is the lesson, activity, or

	world	task connected to competencies or concerns beyond the classroom?
	<ul style="list-style-type: none"> <li>• Problem-based curriculum</li> <li>• Knowledge integration</li> </ul>	<ul style="list-style-type: none"> <li>• To what extent is the lesson based on the solution of a specific problem(s)?</li> <li>• To what degree is school knowledge integrated across subject boundaries?</li> </ul>
<b>Supportive classroom environment</b>	<ul style="list-style-type: none"> <li>• Student direction of activities</li> <li>• Explicit criteria</li> <li>• Social support</li> <li>• Academic engagement</li> <li>• Student self-regulation</li> </ul>	<ul style="list-style-type: none"> <li>• To what degree do students determine the classroom activities?</li> <li>• To what degree are criteria for what counts as high quality student performance made explicit?</li> <li>• To what extent is the classroom characterised by an atmosphere of mutual respect and support among teacher and students?</li> <li>• To what extent are students engaged in the lesson?</li> <li>• To what degree is classroom behaviour guided by implicit (self) control?</li> </ul>
<b>Valuing and working with difference</b>	<ul style="list-style-type: none"> <li>• Cultural knowledges</li> <li>• Group identities</li> <li>• Representation</li> <li>• Narrative</li> <li>• Active citizenship</li> </ul>	<ul style="list-style-type: none"> <li>• To what degree are non-dominant cultural knowledges valued?</li> <li>• To what degree is the class a supportive environment for the production and positive recognition of difference and group identities?</li> <li>• To what degree are non-dominant groups represented in classroom activities?</li> <li>• To what extent is narrative used for teaching and learning purposes in the lesson?</li> <li>• To what degree is the practice of active citizenship evident?</li> </ul>

Without elaborating in detail on the various items that constitute the model, we make some general points about the various dimensions of the framework.

### *Intellectual Quality*

The intellectual quality dimension of the Productive Pedagogies model stresses the importance of all students, regardless of background and perceived academic ability, being presented with intellectually challenging work (Darling-Hammond, 1997; Newmann & Associates, 1996; Sizer, 1996; Boaler, 2002; Sarra, 2006; Perry, Steele & Hilliard III, 2003). Challenging work is of particular importance for students from traditionally underachieving backgrounds, for example, Indigenous students and students from low socioeconomic backgrounds. We are concerned that, in some schools, streaming of classes has the potential to create underachievement by reducing the intellectual quality of the curriculum and the pedagogies experienced by lower streamed students (see for example, Boaler, 1997; Boaler, 2002; Perry, Steele & Hilliard III, 2003).

Hallam, 1999; Wiliam & Bartholomew, 2004). For example, in other research projects we have observed that these students are presented with low grade work based on the filling in of simplistic worksheets, while students in 'higher' classes are being stretched and challenged (Hayes et al., 2006; Lingard et al. 2003; Charlton, Mills, Martino & Beckett, 2007).

The current 'curriculum wars' that have been occurring in Australia and elsewhere represent another threat to intellectual quality. Contrary to some claims that have been made in the media that 'postmodern curricula' and the like are 'dumbing' schools down (see for instance Donnelly, 2004), we suggest that some of the back to basics calls are likely to do just this, and that it will be students in 'disadvantaged' schools who are most likely to be 'drilled and skilled' in ways that do not encourage high level thinking. These criticisms of contemporary curricula demonstrate a very limited, and limiting, view of education and its purposes, and of knowledge itself. As Hargreaves (2003) has argued, we now live in a *knowledge society*, and schools need to equip students for life in such a society. A knowledge society, Hargreaves argues, is both creative and destructive. It is creative in the sense that competitiveness between corporations and various national economies is driven by creativity and ingenuity. However, this drive, accompanied by a desire to maximise profits and one's self interests, inevitably leads to a breakdown in social cohesion and increasing gaps between the rich and poor. Thus, teaching students to live in this knowledge society will require teachers to encourage the development of students' creativity and ingenuity *and* 'to teach a set of values, dispositions and senses of global responsibility that extend beyond the bounds of the knowledge economy' (Hargreaves, 2003, xix). Working to promote students' creativity and ingenuity will involve intellectually challenging them through the promotion of 'deep cognitive learning' that involves higher order thinking work linked with particular understandings of knowledge as not fixed – but socially produced – and in the process learning how to create new knowledges. The productive pedagogies' concern with 'deep knowledge', 'deep understanding' and 'problematic knowledge' will serve to do just that, in that these items encourage teachers to take into account those social theories which challenge the 'fixicity' of knowledge and to ensure that students become immersed in the relevant disciplinary fields. Here students are encouraged to treat knowledge as a social and political construct. These ideas can be applied to mathematics and science (e.g., see Boaler, 2002; Gutstein, 2003; Hanrahan, 2005), as well as to the arts and humanities: learning of high intellectual quality has to be across the curriculum and for all students.

### *Connectedness*

Concerns have been expressed that new forms of curricula and pedagogy that appear to focus on making classes relevant for students often reflect a 'dumbing down' of lessons and also do not extend students' access to cultural capital by relying upon what they already know and on their own cultures. This is particularly likely to be the case when the curriculum is designed to accommodate the needs of low achieving students. However such an approach is problematic, for as Darling-Hammond (1997) has argued: 'Active learning aimed at genuine understanding begins with the disciplines, not with whimsical activities detached from core subject matter concepts as some critics of hands-on learning suggest, and it treats the disciplines as alive, not inert' (p. 107). As with the productive pedagogies work, she claims there has to be a focus on developing students' 'deep-understanding' in worthwhile and meaningful contexts and that this will require students to use higher order thinking that goes beyond simple recall, recognition, and reproduction to analysis, synthesis, evaluation, and production of ideas and performances.

### *Supportive Classroom Environment*

Providing all students with intellectually challenging classrooms is critical for improving academic outcomes. However, adoption of this approach has at times taken a conservative turn in overlooking the importance of relationships. In arguing for the creation of a supportive classroom, the productive pedagogies framework suggested that students be given a voice in the classroom in order to have some say over the direction that activities take within various units of work, that explicit criteria be provided to students so that expectations are clear, and that a classroom environment is created where students are prepared to take risks with their learning. While 'care' is central to good teachers' work (Lingard et al., 2001), Hargreaves (2003) has stated that, 'Care must become more than charity or control: it must become a relationship in which those who are cared for (pupils or parents) have agency, dignity and a voice' (p. 47). Many disengaged students feel angry at the system and the formal structures of the school: they often feel that they have no voice, that they are punished unfairly and that no one in the school cares about them (see for example, Mills, 2001; see also Mills, 1996; 1997). In developing positive and mutually supportive relationships, the importance of breaking down the power imbalances between teachers and students is particularly important, given many students' resistances to being overpowered and controlled (Keddie & Churchill 2004; Martino & Pallotta-Chiarolli 2003; Mills, 1996; 1997). This was evident in many of the student conversations we had with year 9 students at one school. For example:

G1: This maths teacher that I used to have, I've changed classes now, but she was horrible. Like you'd ask her a question and like and she'd be like, 'No I've just explained that to you.' But she didn't know how to explain it.

G2: And you didn't like walk away feeling like you knew it.

G1: Like this teacher I have now, she sits down and she explains it, doesn't matter how many times, but she does it because she knows it's stuck in your head, and I'm doing so much better now, like I'm actually understanding, and not just going, 'No, you're in trouble coz you don't understand it'. She was pathetic.

Much has been made about the need for explicit criteria in the classroom and the ways in which those familiar with the mores and nuances of what makes a 'good' student have an advantage over students who are not at ease with the schooling process (Bourdieu & Passeron, 1977; Cope & Kalantsiz, 1995). However, explicit expectations have to be both related to students' schoolwork *and* to their performances of being a good citizen – and here we broaden the notion of a 'good student' to include one who is concerned not just about academic achievement but also with being a positive member of a democratic community. This is taken up in the next dimension.

### *Valuing and Working with Difference*

The working with and valuing difference dimension of Productive Pedagogies is the one aspect of the model that has been the source of much debate. In the original QSRLS study very few of the items that make up this dimension were observed in classrooms to any great extent. The study noted that teachers were not *uncommitted* to valuing students' difference, but that at times they were afraid of getting it wrong – and this was especially the case in relation to Indigenous issues (Lingard et al., 2001). We acknowledge some of the problems with expressions such as 'valuing diversity' (see also Cooper, 2004). For example, questions relating to whose diversities are worthy of support, and whose are not, have to be confronted. Classroom practices that work with the difference dimension facilitate students' exposure to understandings of the ways in which power works to construct particular forms of domination

and subordination. Its presence in classrooms will also enable students to become aware of the ways in which various factors including gender, race/ethnicity, age and socioeconomic status affect their identities (Frankenstein, 1997, 2001; Gutstein, 2003). To a great extent the presence of this dimension in a classroom enables teachers to teach for democracy; that is to provide students with the skills and knowledges necessary for them to act as responsible members of a democratic community (Malloy, 2002; Skovsmose & Valero, 2002).

## Critiques and Limitations of the Productive Pedagogies Framework

In selecting the Productive Pedagogies framework for this research project, we are mindful of Debra Hayes et al.'s (2006) comment about educational research involving classroom observations that 'it is difficult to agree on what to look for and even more difficult to agree on what is seen' (p.1). This lack of agreement about what to observe in classrooms and the fraught consequences of including some things to be observed and some not is reflected in healthy debate amongst the academic community about aspects of the Productive Pedagogies framework. Critiques have focused on what is most important to look for (e.g., Luke et al., 2005; Luke et al., 2006; Sellar & Cormack, 2006) as well as the validity of what is seen (e.g., Ladwig, 2007).

Sellar and Cormack (2006), for instance, whilst generally supportive of the Productive Pedagogies research suggest that it is too focused on the outcome of pedagogy, for example, the production of deep knowledge, rather than 'describing the actual movement of pedagogy'. They suggest that such movement involves *researching, designing, communicating, transforming, performing* and *reflecting* (2006, p. 5). They contend in relation to their framework that 'these processes are... complementary to others such as the *productive pedagogies*, allowing teachers to consider what modes of interrelation in their classroom lead to outcomes such as *deep knowledge*' (p. 6).

Research undertaken in Singapore, which involved members of the original QSRLS research team, placed greater focus on the significance of knowledge in the classroom (Luke et al. 2005; see also Luke et al., 2006). The coding scheme used in this research is not readily available (see Shegar & Rahim, 2005, for research that uses this scheme), but it is described as looking '... at how knowledge is framed; that is, how the social interaction of teacher/student discourse and behaviour creates a mediating environment for working with ideas, knowledge and texts, using a range of semiotic tools and artefacts.' In so doing there is a focus on *depth of knowledge, knowledge criticism* and *knowledge manipulation*. The coding scheme also dropped the notion of 'higher order thinking' because of the suggestion that it 'proved too high inference as an observational construct' (Luke et al. 2005, p. 19).

The difference dimension of the Productive Pedagogies framework has been critiqued both for its inclusion in the model and for not going far enough. Researchers from the University of Western Sydney who have been working on the concept of 'enabling pedagogies' note that this research has developed in response to their 'scholarly critique of the Productive Pedagogies approach developed in Queensland and being taken up in NSW.' (NSW Department of Education and Training, 2007). They suggest that there is a need 'to move beyond the limitations of 'valuing' diversity, as outlined in Productive Pedagogies, to a critical understanding of the inadequacies of liberal tolerance discourse, recognition of micro and macro power relations, and the problematising of knowledge about 'community''.

Ladwig (2007), who was involved in the original QSRLS research team and was a key figure in the development of NSW's three dimensional Quality Teaching Model<sup>4</sup> that

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<sup>4</sup> These three dimensions are Intellectual quality. Quality learning environment and Significance.

incorporates most of the elements of Productive Pedagogies framework (NSW Department of Education and Training, 2007; Ladwig, 2005; see McConaghy, 2006 for a critique of this model), has argued that there is no empirical evidence to advocate for the inclusion of 'recognition of difference' into a model of quality pedagogy. He suggests that the lack of empirical evidence about this phenomenon in the observed classrooms may stem from one of two things: either very few teachers ever demonstrate particular elements of that dimension, or some of the items were poorly defined in the observation manual.

In addition to these published critiques we are aware from our experiences of some other limitations of the QSRLS research. These include lack of teacher contributions to understandings of the framework, lack of student voice in the research, inadequate focus on teachers' pedagogical content knowledge, and methodological issues relating to the depth of content knowledge of observers undertaking observations of lessons in disciplines with which they were not familiar. The next section outlines how we are addressing all of these issues.

## Refinement of the Productive Pedagogies Framework

### *Refining and Extending the Focus of Classroom Observations*

In relation to Sellar and Cormack's (2006) arguments about distinguishing between pedagogical outcomes and pedagogical processes, the case study reports that accompany our classroom observations will seek to identify the presence of such processes, without coding for them, in order to comment on their relationship to the more 'outcome' focussed elements in the Productive Pedagogies framework. Likewise, as with many of the features of the Singapore classroom observations we will be providing more detailed pictures of the classroom than was the case in the original QSRLS research without going down the path of quantifying the amounts of time that teachers, for example, spend on procedural talk. Whilst we recognise the importance of the distinctions made between depth, criticism, and manipulation of knowledge (Bernstein, 1996) and can see why in some studies there might be a specific focus on these, our view is that they are incorporated into a number of elements within the Productive Pedagogies model and that to code for them separately would hinder the broader analyses of classrooms that we are seeking to undertake.

### *Refining the 'Difference' Dimension*

In relation to Ladwig's (2007) criticisms of this dimension, we are committed to determining the presence, or lack, of pedagogies described by the 'difference' items. As with many others we recognise the importance of valuing and working with difference as a good in and of itself (see for example, Delpit, 2006; Lingard & Mills, 2007; Lingard 2007). However, we recognise that there is a need to refine some of the items to sharpen their focus. We refer especially to the items concerning Narrative, Group Identities, and Active Citizenship (see Table 1).

*Narrative.* In the original literature review for the Productive Pedagogies framework it is stated that 'some non-mainstream learners, particularly Indigenous children, may learn best through narrative structures, because of strong oral traditions and narrative practices extant in their communities'. Yet there is now a growing body of work that questions the assumptions made in this claim. First, significant research has been conducted into the structures and forms of Indigenous narratives, in Australia and elsewhere (for example, Sharifian et al, 2004; Olson & Torrance, 2001; Honan, 2003) that draws our attention to the differences in the styles of storytelling and oral traditions within particular societies and the structures of the Western-English narrative styles. Secondly, there is a body of work by Indigenous researchers that

English-language teaching' (Nakata, 2001, p. 72; Thaman, 2003). Nakata in particular is critical of pedagogical approaches that impede Indigenous students' acquisition of the Western knowledge systems they require in order to effectively participate in contemporary Australian society. And thirdly, the existing observational scale item relating to narrative contributes to a binary view of its relation to expository modes of expression. Lemke's (1990) foundational work in this area, disrupts this binary, recommending that students need to understand that the expository mode and the 'formal scientific style is not the whole of science'. In particular Lemke recommends:

Students should occasionally write fictional or fantasy narrative using scientific principles, construct scientific jokes or satires, read and write about historical events in science, write colloquial explanations of phenomena for younger students and parents, and so on. **They also need to know when to stick to formal scientific style (on tests, in problem-solving and complex reasoning, in lab reports, etc.), and why** (Lemke, 1990, p. 174, added emphasis)

The complexity of the relationship between informal narrative styles and formal scientific language is further explored in Roth's (2005) more recent work that again emphasises that students need to become familiar with the appropriate use of both forms. The observational scale item for 'narrative' has therefore been redeveloped for the current study to indicate the relationship between expository and narrative forms of language, and to take into account the need for pedagogies that explicitly provide students with exemplars and models of the particular purposes and contexts for using each form. The observation manual now contains the following descriptor for the highest score (5) in this item:

Narrative is used in the explanation and illustration of the content and/or processes of the lesson, the forms used are particularly appropriate for the social and cultural groups of students present, and the content of the usage is appropriate for the particular curriculum area.

For example, in our current study we observed a Year 6 mathematics lesson adapted from a well known resource, 'The Case of the Mystery Bone', in which students were presented with a series of simulated newspaper articles reporting on a murder mystery such that each successive article revealed new clues that had to be analysed. The lesson featured use of narrative that was appropriate to the group of students and helped to illustrate the mathematical content, which was concerned with collection of data on bone lengths and people's height and analysis of the relationship between these measurements. Refinement of this item has thus allowed us to acknowledge high quality pedagogies that appropriately blend informal narrative with discipline specific modes of expression.

*Group Identities.* The UWS critiques of the difference dimension of Productive Pedagogies remind us of the importance of moving beyond a weaker politics of tolerance which this dimension has in some cases come to represent. We recognise that classrooms are cultural spaces where teacher and student identities come together to form particular relationships about which it is often difficult to generalise. We also acknowledge that place is important (McConaghy, 2006). In terms of specific communities and particular equity groups (e.g., poor rural communities), explicit (if infrequent) attention to difference in cultures, to future life chances and to citizenship roles may be crucial for improving such students' academic and social outcomes of schooling. We would also suggest that such events are important for *all* in terms of recognising schooling's role in contributing to a cohesive, socially just and healthy democracy. In this sense we suggest that the classroom may not be the most appropriate unit of analysis for observing a supportive environment for the production and positive valuing of difference and group identities. For example, in one case study school with a culturally diverse student population our lesson observations yielded little evidence of group identities within the classroom, but interviews with focus groups of students from these classrooms

across the school. For instance, Indigenous students at this school had workshops and trips designed to expose them to various aspects of local Indigenous cultures. These students were encouraged to bring a non-Indigenous friend to such excursions.

*Active Citizenship.* The notion of active citizenship as teaching for democracy has led us to reconsider the meaning of this item in the Productive Pedagogies framework. Darling-Hammond (1997) noted: 'If schools are to be agents of democracy, they must provide access to knowledge that enables creative thought and access to a social dialogue that enables democratic communication and participation' (p. 141). This is illustrated within the mathematics curriculum by the notion of 'democratic access to powerful mathematical ideas'. Malloy (2002) identifies four distinguishing characteristics that provide a rationale for democratic access to the curriculum:

First, a *problem solving curriculum* should develop students' ability to draw on their mathematical knowledge to solve problems of personal and social relevance. Secondly, *inclusivity and rights* should be promoted by presenting mathematics from multiple perspectives that affirm the worth of individuals and groups from diverse backgrounds. Thirdly, there should be *equal participation in decisions that affect students' lives*, so that students use the classroom as a forum for public discussion of their own and others' ideas. Fourthly, students should experience *equal encouragement for success* through access to materials that develop critical habits of mind and engage them actively in learning mathematics. (Goos, Stillman & Vale, 2007, p. 106).

We have also seen democratic processes at work in one school that emphasises the importance of students 'having a say' in the running of the school. This includes students being responsible for taking assembly (including setting the agenda), co-constructing the curriculum with teachers and having a robust student council. These processes were also evident in many of the classrooms at this school.

#### *Including a Focus on Pedagogical Content Knowledge*

Observation alone cannot be used to determine the extent of a teacher's effect upon students' learning. It has been widely recognised, for instance, that teachers' pedagogical content knowledge (Schulman, 1986, 1987) has a significant impact upon their practice and there exists an extensive body of research in this area within mathematics and science education (e.g., Ball, 2000; Loughran, Mulhall & Berry, 2004; Ma, 1999). Hence, whilst the observation scales very closely reflect those used in the QSRLS, our classroom observations are accompanied by interviews with teachers enabling them to articulate the relationships between their knowledges of pedagogy and curriculum content (Baxter & Lederman, 1999). These interviews will also be used to help refine the model for future phases of the research project.

Methodological issues have also been addressed by our goal of assigning discipline specialists to observe lessons in their areas of expertise (English, mathematics, science, social science). This has strengthened the reliability and validity of coding of the 'deep knowledge' item within the Intellectual Quality dimension of the Productive Pedagogies framework. For example, a mathematics specialist observed a Year 9 mathematics lesson where the teacher was introducing students to indices as a way of representing square roots, cube roots, and reciprocals. The teacher explained that the symbol  $\sqrt{\quad}$  means 'square root', but that this can also be represented using index, or exponential, notation. So we can write either  $\sqrt{4} = 2$  or  $4^{\frac{1}{2}} = 2$ , where 'square root' is represented by the index  $\frac{1}{2}$ . Similarly, the cube root  $\sqrt[3]{\quad}$  can be represented by the index  $\frac{1}{3}$ . A reciprocal is represented by a negative index: thus  $\frac{1}{x}$  is written

as  $x^{-1}$  using index notation,  $\frac{1}{x^2}$  as  $x^{-2}$  and so on. The teacher gave no reasons why the indices were fractions and negative numbers in these instances, although it would have been easy to do so using number patterns that lead students to work out the index notations for themselves (e.g., see Goos, Stillman & Vale, 2007). Despite this procedural approach the students frequently asked questions if they did not understand the teacher's explanations. Part way through the lesson one student asked whether  $x^{\frac{1}{3}}$  was different from  $x \div 3$ . The teacher replied by saying that they were 'just different', and not to worry about this question because 'we will learn this later'. In dismissing the question the teacher lost an opportunity to address a key conceptual difficulty often experienced by students encountering exponential notation for the first time, especially when the indices are fractions or negative numbers. This is much more than a procedural matter, since operating with numbers and algebraic symbols expressed in exponential form underpins abstract reasoning in algebra, and errors in algebraic reasoning made by students later in their secondary schooling can often be traced to misconceptions when operating with expressions in exponential form (Goos, Stillman & Vale, 2007). Although a non-mathematics specialist may still have given this lesson a relatively low score on the 'deep knowledge' dimension, the significance of the exchange described above – and hence the consequences of the teacher's limited pedagogical content knowledge for student learning – would have been lost.

## Conclusion

In this paper we have provided a justification for the use of the Productive Pedagogies framework in our current study. At the same time we are aware of its limitations. Some of these have been taken up in a slight reworking of the items, others have been incorporated into the questions that will be asked as part of the interview process to accompany the observations. We suggest that the current observations will allow some useful comparisons with the QSRLS completed in 2001, but at the same time will enable a greater understanding of what matters in classrooms for improving the academic and social outcomes of *all* students. Combined with the surveys and interviews with stakeholders a picture will also emerge of how the development of such classrooms can be supported by all levels of the education system.

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