

Equity effects of Quality Teaching: Closing the gap¹

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Statement of the problem

With studies such as PISA and TIMSS making very public international differences in educational quality and equity, school systems around the world are under increasing pressure to improve student achievement – and to do so in a way that reduces the traditional achievement gap between cohorts of students who have historically achieved and not achieved intended outcomes of schooling. With the advent of *No Child Left Behind*, many school systems across the US have been driven to focus on the improvement of student achievement through increased school accountability mechanisms and increased stakes associated with performance. While concerns for the quality of school performance and student achievement are high on the agenda in countries around the world, the call to improve achievement has been answered with very different initiatives in vastly different policy contexts outside of the US. One such context is New South Wales, where, despite the support of federal government for teacher salary increases based on student performance, the use of high stakes accountability mechanisms has not been on the state educational policy horizon. Instead, pedagogical reform has been targeted as a major means of improving outcomes for all students.

In a rigorous attempt at system wide pedagogical reform, the NSW Department of Education and Training (DET), together with Jennifer Gore and James Ladwig from the University of Newcastle, developed Quality Teaching, a model of pedagogy framed within three dimensions of Intellectual Quality, Quality Learning Environment and Significance. While the NSW DET has not mandated for teachers to implement Quality Teaching, the support provided to teachers from both central and school levels has highlighted Quality Teaching as a key initiative through which the NSW DET plans to increase the quality of teaching throughout the system and improve students' learning outcomes. Alongside the implementation of Quality Teaching as a professional learning model in the system since early 2003, a collaborative study between the NSW DET and researchers from the University of Newcastle is examining, among other things, relationships between the quality of teaching and student achievement. This longitudinal research project (2004 – 2007) is entitled "Systemic Implications of Pedagogy and Achievement in New South Wales Public Schools" (SIPA).

One of the central research questions addressed throughout the SIPA research project is an examination of the equity implications of the Quality Teaching model. By analysing each of the three dimensions of Quality Teaching – Intellectual Quality, Quality Learning

¹ As part of a symposium, this paper should be read in conjunction with the other papers presented; the complete series is: GRI07282, LAD07283, AMO07284 and GOR07285.

Environment, and Significance, and the combined contributions of these three dimensions to students' learning outcomes, we examine the production of achievement differences between two key equity groups, namely, students from low socio-economic backgrounds and students of Aboriginal or Torres Strait Islander descent.

These analyses respond directly to what is standing equity debates on the relative importance of pedagogical strategies focusing on the different dimensions included in the NSW model for students of traditionally underachieving social groups (the achievement gap). On one hand, within this debate, some educational researchers have gone so far as to suggest that there are no sound theoretical reasons to expect pedagogy to have differential effects for students from differing social backgrounds (Rowan, Correnti & Miller 2002). On the other hand, there is a substantial body of mostly qualitative research, following the early socio-linguistic insights of Basil Bernstein that suggests differential effects of pedagogy should be expected (Karabel & Halsey, 1977; Halsey et al., 1997). This analysis is one of the first attempts to test pedagogical hypotheses of the Bernsteinian tradition using large-scale quantitative data.

Guided by these analyses, we challenge popular misconceptions about what matters most for students who are traditionally disadvantaged by schooling and suggest how school reform efforts to close achievement gaps need to be mindful of the differing effects of different dimensions of pedagogy.

Theoretical framework

Since the late 1990s, US-based research into Authentic Pedagogy (Newmann & Associates, 1996) has had a substantial impact on school reform initiatives in Australia. While each of the state systems in Australia has maintained a steady focus during this time period on structural approaches to school reform, such as moves to decentralise professional development budgets, the potential of pedagogical reform for improving student outcomes has recently been acknowledged and is currently being explored in a substantial way. Models of pedagogy focused on the core principles of Authentic Pedagogy, namely in-depth understanding, real-world connection and substantive communication, have been at the heart of these efforts to increase achievement for all students.

The NSW reform initiative, which is the focus of this paper, was based on the development of a model of pedagogy and associated teacher professional development materials and activities. Working with researchers from the University of Newcastle, the NSW DET released its three-dimensional model of pedagogy, known as "Quality Teaching" (QT) in 2003 (NSW DET, 2003b). The three dimensions of Intellectual Quality, Quality Learning Environment, and Significance, draw on the significant work of Newmann and Associates (1996) on Authentic Pedagogy, as well as other elements of classroom and assessment practice that have been linked through empirical research to improved learning outcomes for students across the spectrum of social backgrounds (see Ladwig and King, 2003 for an overview and the research background for the model). The dimensions of the model simultaneously draw teachers' attention to the depth and quality of ideas being addressed by their students, the extent to which learning environments genuinely support student learning, and the extent to which students see value in what they are learning.

Connection to the literature

The literature from which this work develops most directly includes studies on Authentic Pedagogy and its effects, Australian based literature developed in tandem with the importation of Authentic Pedagogy and broader international literature on the professional

development of teachers. The original studies in Authentic Pedagogy include descriptive studies of the prevalence of 'intellectual quality' that documented the relative scarcity of pedagogy focused on high levels of intellectual quality. These descriptive studies measured both in-class instructional practices, employing direct observation techniques and indirect survey instruments, and the quality of in-class assessment practices, from samples of assessment tasks employed by teachers, in the US (Lee and Smith, 1993; Lee and Smith, 1995; Newmann, Mark, Gamoran, 1996; Newmann and Associates, 1996; Newmann, Lopez and Bryk, 1998), in Australia (Gore, Ladwig, Lingard, Luke et al, 2001), and in the Netherlands (Reolofs and Terwal, 1999). Thus, using a variety of measurement techniques, these studies have collectively demonstrated that high levels of intellectual quality are not common in most classrooms.

Employing single point in time data analysed with multilevel, multivariate models, cross-sectional 'effect' studies have been able to document a strong association between Authentic Pedagogy and improved student outcomes after controlling for the independent effects of students' prior achievement, students' social backgrounds and several school level organisational, demographic and pedagogical variables. Strong positive effects have been found in studies that measure student outcomes by applying standard 'authentic' criteria to student performances on in-class assessment tasks (where tasks differ from class to class). This work, led by Newmann, measured pedagogy by coding both classroom observation and in-class assessment practices (Newmann, Marks, Gamoran, 1996; Newmann and Associates, 1996), and by coding in-class assessment practices alone (Newmann, Lopez and Bryk, 1998; Newmann, Bryk, and Nagaoka, 2001). Avery (1999) extended these studies by examining the effects of pedagogy (measured via classroom observation) on student performances on a common performance-based task, with similar results. Importantly, one of these cross-sectional studies found comparable positive effects of Authentic Pedagogy on student outcomes when measured on a conventional standardised test of basic skills (Newmann, Bryk and Nagaoka, 2001).

Further, using data available from the US National Education Longitudinal Survey (NELS), Lee and Smith (1995) and Lee, Smith and Croninger (1997) have been able to estimate the effects of 'authentic' pedagogy on student gains in national criterion-referenced tests in mathematics and science. Here it is also important to note that the Authentic Pedagogy construct was primarily focused on intellectual quality. Parallel studies of the effects of 'supportive classroom environments' (the US construct most closely related to the NSW 'quality learning environments') have shown independent efficacy of that construct on improved student learning outcomes (see, e.g. Newmann and Associates, 1996).

Subsequent studies in Australia have focused on the development of a broader model of pedagogy that incorporates Authentic Pedagogy's focus on intellectual quality as one dimension among others. This work includes placing the application of pedagogical models in larger school reform contexts (Ladwig, 1998, 2005), reports on the theoretical and technical development of the broader models (Ladwig, 2006), studies on the implications of this work for teacher education (Gore et al, 2003) and teacher professional development (Gore et al, 2005; Gore and Ladwig, 2005).

Mode of inquiry

As part of the overall reform strategy of the NSW DET, the SIPA research project was designed to follow students as they progress through schools in the NSW public system from 2004 to 2007. SIPA represents a major collaboration between a state department of education and university researchers, with the support of school leaders, parent and community groups, and the teachers' union. Using a multi-method approach, SIPA gathers data about: 1) students' pedagogical experiences in instruction and assessment; 2) student

performances, in performance based tasks and standardised testing regularly used by the system; 3) teaching practices; 4) teachers' professional development experiences; 5) teachers' perspectives and understandings of pedagogy, professional development, and system support; and 6) the practices and perspectives of school leaders.

SIPA also gathers a host of demographic data at school, class and individual teacher and student level, which is central to the analyses presented in this symposium. The equity concerns of the study are drawn from the most persistent findings of educational and social disadvantage found in NSW schools, namely concerns for Indigenous students whose achievement remains well below that of their non-Indigenous peers; and students from low socio-economic status backgrounds who continue to leave school earlier and achieve poorer results than their wealthier peers.

The analyses reported in this paper include students' pedagogical experiences in class-based assessment tasks and their performances in response to these class-based assessment tasks. The collection and coding of assessment tasks and student performances at six points throughout 2004 to 2007 is replicating the procedures used in Newmann, Marks and Gamoran (1996) and subsequent studies led by Newmann (Newmann, Bryk, & Nagaoka, 2001; Smith, Lee, & Newmann, 2001). For each data collection, teachers in the targeted classes submit sets of student work on regular in-class assessment tasks. For this analysis, assessment tasks were coded using a manual for measuring pedagogy as represented in the quality of learning tasks, developed by Ladwig, Gore and the NSW DET as the third phase of the Quality Teaching initiative (NSW DET, 2004). The 14-item, three-dimensional Quality Teaching scale was used to code the degree to which the tasks exhibit high levels of quality pedagogy, within each of the three dimensions: Intellectual Quality, Quality Learning Environment, and Significance (see NSW DET, 2003). Each of the 14 items (classified as elements) in the guide for coding assessment practice is coded on a one to five scale. To determine the relative contributions of the three dimensions of Quality Teaching to student achievement, tasks were ranked according to their overall Quality Teaching scores and the lowest quartile and highest quartile were deemed to be the lowest quality tasks and highest quality tasks respectively. The items comprising each dimension and the range of scores included in the lowest and highest quartile for each dimension are detailed in Table 1.

Table 1: Quality Teaching dimensions and quartile descriptives

Dimension	Intellectual Quality	Quality Learning Environment	Significance
Elements	Deep Knowledge Deep Understanding Problematic Knowledge Higher Order Thinking Metalinguage Substantive Communication	Explicit Quality Criteria High Expectations Student Direction	Background Knowledge Cultural Knowledge Knowledge Integration Connectedness Narrative
Dimension Mean	16.54	6.84	10.07
Lowest quartile	6 – 8.57	3 – 4.24	5 – 7.61
Highest quartile	18.24 – 23	7.92 – 12	14.76 – 19

The outcome variable in this modelling is Newmann and Associates' (1996) Authentic Achievement scale, which was adapted for the relevant disciplines under study and applied to student work samples gathered from observed classes. While student performance can be measured in a number of ways, and is most commonly measured in research projects of this scope in a conventional standardised tradition, the scales utilised for these analysis are

those used by the original research into the effects of Authentic Pedagogy, conducted by Newmann and colleagues at the Center on the Organisation and Restructuring of Schools (see Ladwig and King, 2003, for more details). The measures of students' Authentic Achievement included three items which were analysed on a four point scale. The items are: Construction of Knowledge (which examines the extent to which students manipulate information and ideas in which transform their meanings and implications); Deep Understanding (which examines the extent to which students demonstrate a deep understanding of important disciplinary concepts); and Elaborated Communication (which examines the extent to which student work demonstrates an elaborated account that is clear, coherent and provides richness in details, qualifications and argument). These scales are valuable for three key reasons. First, they are directly related to the dimensions named in the NSW model of pedagogy and are therefore a reasonable outcome measure to analyse with reference to the quality of assessment tasks as measured by the Quality Teaching resources. Second, they have been commonly used by teachers and schools across NSW and Australia more general since their first public report in the mid 1990s (so many teachers are already familiar with them). Third, these are the indicators that Authentic Achievement research has shown to be strong predictors of high levels of achievement as measured by other more conventional tests such as basic skills tests and syllabus-based criterion referenced tests.

The research reported in this paper is based on the analysis of 95 assessment tasks submitted by 121 teachers (with some teachers submitting the same collaboratively developed tasks) from 19 primary schools and 11 secondary schools from one data collection point in 2005. The student achievement outcomes are based on the scoring of 2913 pieces of student work that were completed by 1912 students. Just under 10 percent ($n=180$) of the students were of Aboriginal or Torres Strait Islander descent according to NSW DET student demographic data. The student sample was divided into quintiles based on a student level measure of economic disadvantage as recorded by the NSW DET. Analysis reporting the relative impacts of the dimensions of Quality Teaching for students in terms of socio-economic status (SES) were made by comparing the authentic achievement of the students in the lowest and highest economic disadvantage pentiles.

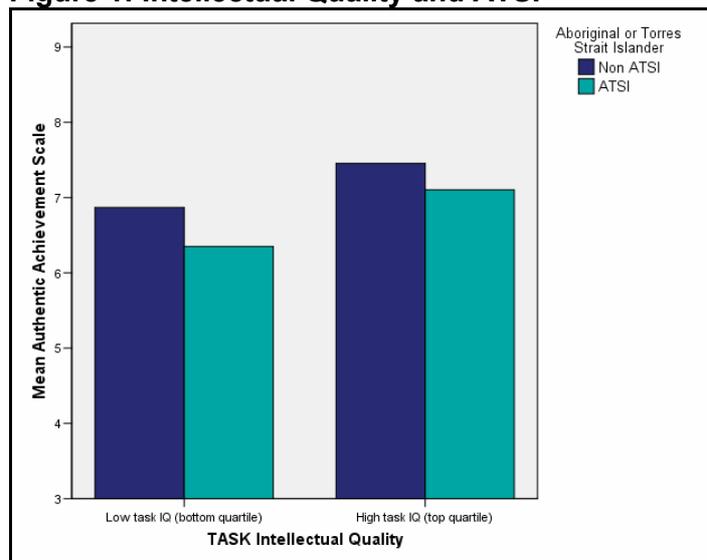
FINDINGS

Figures are presented to illustrate the differences for each Quality Teaching dimension, followed by the combined Quality Teaching model, in achievement between ATSI and non-ATSI students, and students from the lowest and highest SES quintiles.

Intellectual Quality (IQ)

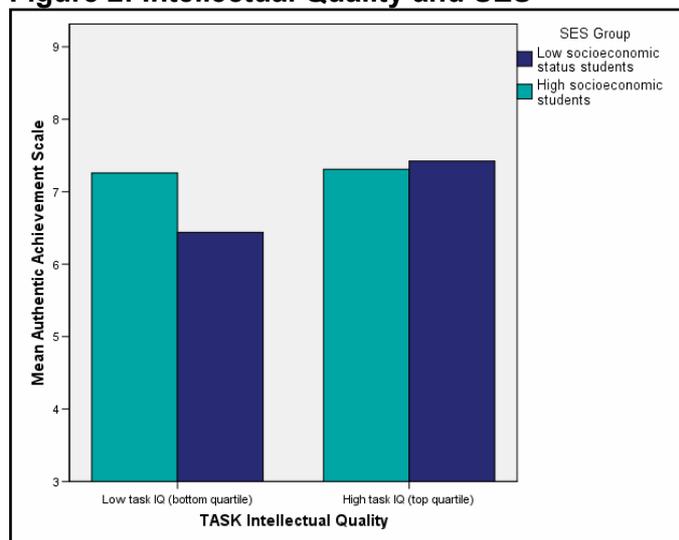
Figure 1 illustrates the differences in achievement for ATSI and non-ATSI students when assessment task Intellectual Quality was low and high.

Figure 1: Intellectual Quality and ATSI



While non-ATSI students outperformed ATSI students for both low IQ and high IQ tasks, authentic achievement was significantly higher for students responding to high IQ tasks compared to low IQ tasks ($\chi^2 = 12.66$; $df=1$ for $p < .001$), and the authentic achievement of the ATSI students when task IQ was high exceeded the achievement of non-ATSI students when task IQ was low. In other words, raising the intellectual rigour of assessment task requirements benefited the authentic achievement of students from Aboriginal and Torres Strait islander descent such that significant differences in authentic achievement were gained. Differences in achievement for the most economically advantaged and disadvantaged students in the sample relative to the Intellectual Quality of the tasks are illustrated in Figure 2.

Figure 2: Intellectual Quality and SES



While the achievement gap between the low and high SES students for tasks with low demands in terms of Intellectual Quality follows traditional achievement differences between such student samples, for the tasks with high IQ, the authentic achievement of all students was significantly higher than for low IQ tasks ($\chi^2 = 103.13$; $df=1$ for $p < .001$), and the authentic achievement of the low SES students is higher (if only just) than that achieved by their wealthier peers. In terms of closing achievement gaps, these findings demonstrate that

achievement gaps can not only be reduced, but be removed when students are required to demonstrate deep understanding through higher order thinking and substantive communication about important disciplinary concepts. In short, enhance the Intellectual Quality of tasks to eradicate traditional achievement gaps.

Quality Learning Environment (QLE)

Figure 3 illustrates the differences in achievement for ATSI and non-ATSI students relative to the quality of assessment task Quality Learning Environment.

Figure 3: Quality Learning Environment and ATSI

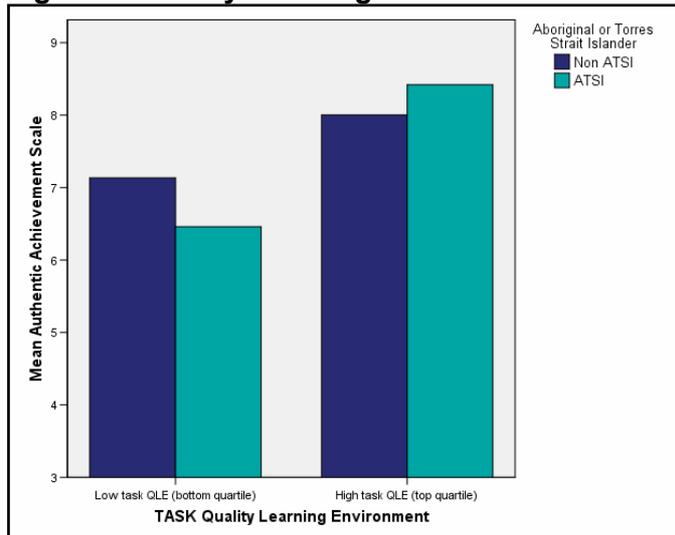
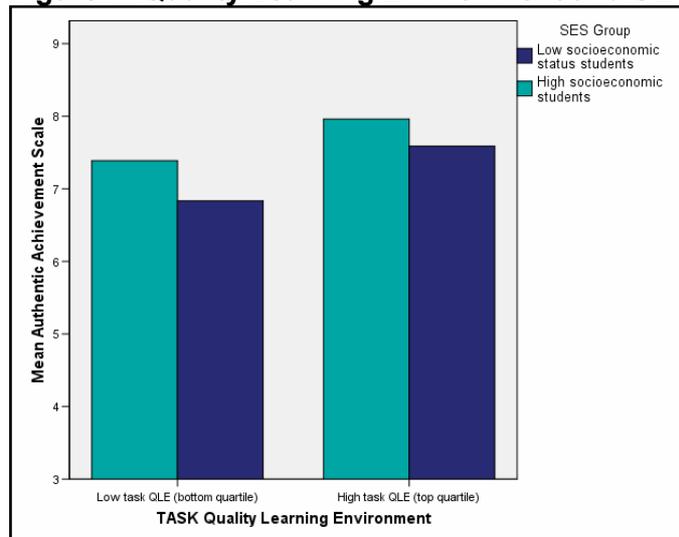


Figure 3 shows a significant improvement in authentic achievement for both ATSI and non-ATSI students when the tasks featured explicit details regarding the quality of work that was expected of students, when tasks made evident teachers' high expectations of students' achievement, and when tasks provided students some degree of choice in terms of the task requirements ($X^2 = 24.61$; $df=1$ for $p < .001$). As with the effect of high task IQ for low SES students, when task QLE was high, ATSI students outperformed non-ATSI students when measured in terms of authentic achievement, again demonstrating how high quality assessment tasks can help to close achievement gaps for students traditionally disadvantaged by schooling. The relationship between task QLE and student SES is illustrated in Figure 4.

Figure 4: Quality Learning Environment and SES

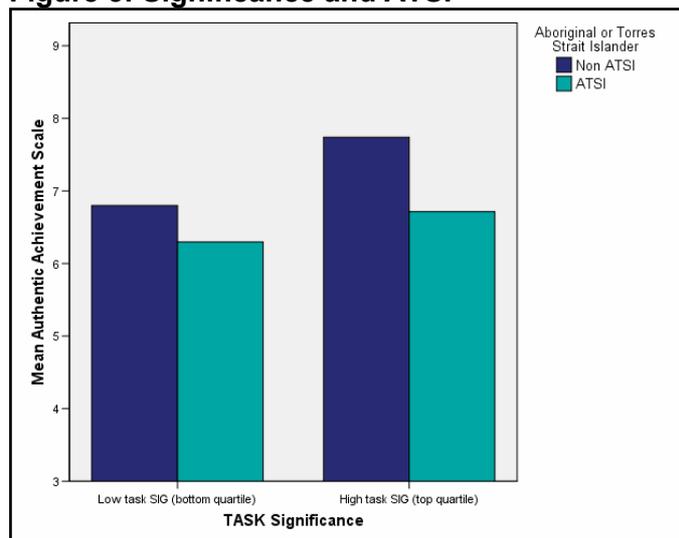


Similar to the findings presented in Figure 1, Figure 4 shows that while the authentic achievement of high SES students exceeds that of the low SES students for tasks scoring both low and high in terms of QLE, both groups of students perform significantly better when task QLE is high ($X^2 = 116.46$; $df=1$ for $p < .001$), and the achievement of the low SES students when task QLE is high exceeds that of high SES students when task QLE is low. Thus, in order to reduce the achievement gap between high and low SES students, it is imperative for students from low SES backgrounds to be assigned tasks that feature explicit quality criteria and set challenges in terms of teachers' expectations of student performance.

Significance

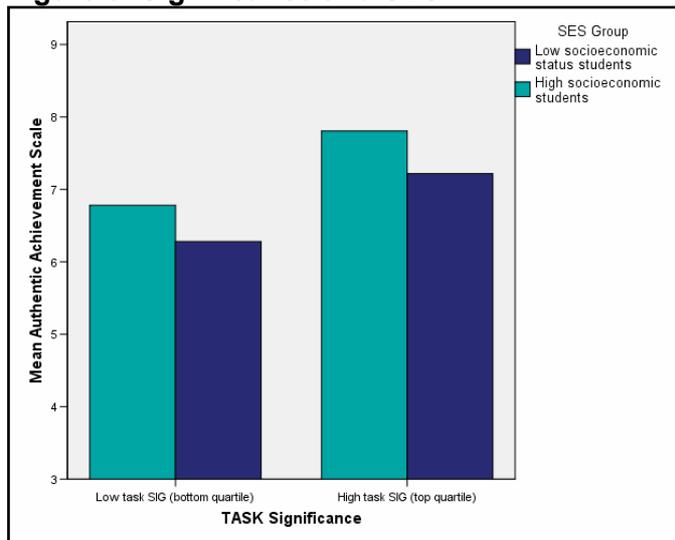
Figure 5 illustrates the differences in achievement for ATSI and non-ATSI students relative to the Significance of assessment tasks.

Figure 5: Significance and ATSI



Interestingly, and despite popular discourse in terms of the significance of Significance for ATSI students, tasks high in Significance led to little change in the authentic achievement for ATSI students. The findings demonstrated a stronger effect for non-ATSI students of task Significance than was identified for ATSI students. A similar trend was found for low and high SES students, as illustrated in Figure 6.

Figure 6: Significance and SES

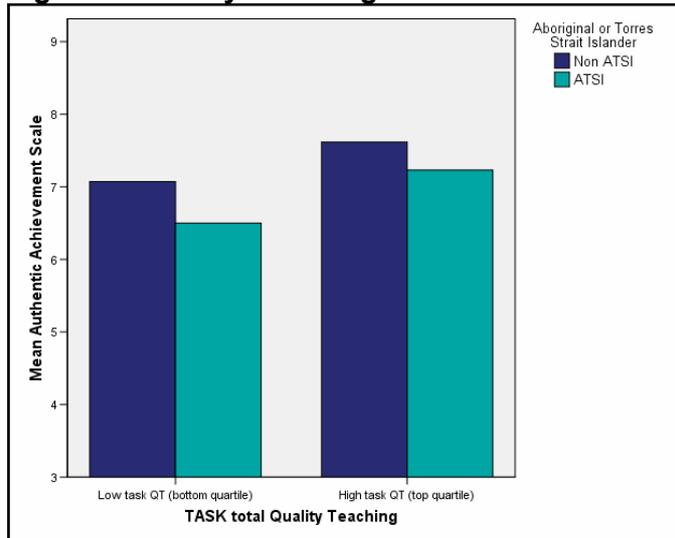


While these findings might surprise many advocates of creating significant learning experiences for students who have traditionally been disadvantaged by schooling, the task scores on particular elements of Significance may have contributed to the lack of anticipated relationships between this dimension of Quality Teaching and the authentic achievement of ATSI and low SES students. For example, the element of Significance that is most linked to students' cultural background is the element Cultural Knowledge, which examines the extent to which the task requires students to value the knowledge and perspectives of non-dominant cultural groups, such as consideration of Aboriginal perspectives. Cultural Knowledge is consistently the lowest scoring element of Quality Teaching, in this sample of tasks achieving a mean score of 1.26 on a five point scale. This mean score indicates that the clear majority of tasks analysed required students to only address the knowledge and perspectives of dominant social groups in Australia, which usually took the form of white middle-class knowledge. While task Significance was overall comparable to task Intellectual Quality, as detailed in Table 1, the poor quality of the tasks in terms of Cultural Knowledge does not allow us to examine the impact of this element on the authentic achievement of student performance.

Overall Quality Teaching (QT)

When we combine the scores of the three dimensions, the relationship between overall task quality and student authentic achievement for our two equity groups can be examined. Figure 7 illustrates the differences in authentic achievement for ATSI and non-ATSI students pending the overall quality of assessment tasks, as measured by the Quality Teaching framework.

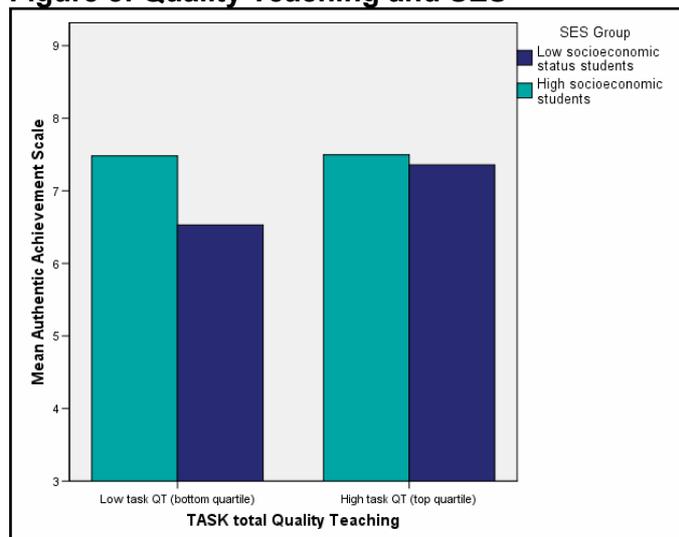
Figure 7: Quality Teaching and ATSI



While the achievement of non-ATSI students exceeded that of the ATSI students regardless of the overall quality of the task, not only was the authentic achievement of both ATSI and non-ATSI students significantly greater when responding to high quality tasks than when responding to low quality tasks, the achievement of ATSI students when the overall quality of the task was high exceeded that of non-ATSI students when task quality was low. The implications of this finding are best interpreted with reference to the work of Griffiths and colleagues (2007) who noted that the overall quality of pedagogy was significantly higher in schools with below average enrolments of ATSI students than it is in high ATSI schools. If non-ATSI students are, in general, being presented with assessment tasks that are of higher quality than those presented to their ATSI peers, the implications of these findings are that the gap in authentic achievement is likely to be greater than either of the sets of results presented in Figure 7. In other words, if non-ATSI students are receiving high quality tasks, and ATSI students are receiving low quality tasks, the achievement gap is most likely to represent the difference evident in the middle two columns of Figure 7. The results of this study have demonstrated that the achievement of ATSI students can be significantly better when students are presented with tasks that feature high demands of intellectual rigour and establish clear and high expectations for the quality of student work than when they are presented with poor quality tasks.

Figure 8 illustrates the differences in authentic achievement for low and high SES students pending the overall quality of assessment tasks, as measured by the Quality Teaching framework.

Figure 8: Quality Teaching and SES



When educational discourse speaks of closing the achievement gap, it is an image like that presented in Figure 8 that many educators have in mind. As evident in Figure 8, high SES students seem to perform well regardless of the quality of tasks. Many would propose that this is due to their cultural capital of schooling, which provides students of high socio-economic status with a form of inside knowledge on what it takes to not only survive, but thrive in the culture of schooling. Clearly illustrated in Figure 8, the overall quality of assessment tasks does much to make up for this potential lack of cultural capital held by low SES students. The intellectual rigour of the tasks, combined with the way in which the task supports quality learning and enhances the significance of the task to the students' lives, has such an effect on student achievement that the achievement gap is essentially nullified.

CONCLUSIONS

Before outlining some of the key implications of the research reported in this paper, it is important to acknowledge a couple of caveats. First, it is worth noting that the analyses reported in this paper measure pedagogy only by the quality of the assessment tasks, and do not include any measure of the quality of classroom teaching to which students were subjected before completing their work that was analysed as a measure of their authentic achievement. It is recognised that such assessment tasks are often introduced to students in class in a manner which provides greater clarity about task requirements and expectations of students. While the SIPA study has generated a wealth of data and will allow future analysis to include measures of most classroom and assessment practice, the analysis reported in this paper purely addresses the quality of the assessment tasks to which the students were responding.

In addition, it is important to note that the findings presented in this paper are best interpreted in light of the papers that accompany its publication. As one of four papers highlighting current equity findings from the SIPA study, each paper contributes insight to the rest, and each paper is informed by the rest.

The implications of this paper exist for the levels of individual dimensions as well as for the Quality Teaching framework overall. In terms of Intellectual Quality, the implications are clear. Increasing the rigour of intellectual demands of assignments significantly enhances student authentic performance and has the capacity to close the achievement gap between poor and wealthy students. Similarly, making more explicit high expectations about the

quality of student work has a positive and significant effect on student authentic achievement, and can reverse traditional achievement patterns for students of Aboriginal and Torres Strait Islander descent. Significance, as a dimension of Quality Teaching, was identified to not contribute to reductions in achievement gaps between ATSI and non ATSI students, or between wealthy and poor students. While popular thought suggests that Significance would be the most important dimension for ATSI students, this data suggests that task Intellectual Quality and Quality Learning Environment have more impact on closing the achievement gap.

In light of findings presented in Griffiths et al (2007), there are vital implications of this research that need to be emphasised. If the achievement gaps demonstrated in these analyses are to be achieved in a sustained and rigorous manner such that goals of equity in schooling are reached, it is imperative that all students, and especially those who have been traditionally disadvantaged by schooling, are exposed to quality assessment tasks that serve to encourage high levels of authentic achievement in student work. If students who are already advantaged by schooling are the only ones who are able to access quality assessment tasks, this data suggests that achievement gaps could actually widen, thus silencing the equity imperatives of Quality Teaching as a system wide pedagogical reform.

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