

Exploring 'productive pedagogy' as a framework for teacher learning

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Regardless of how schools are formed or reformed, structured or restructured, the renewal of staff members' professional skills is fundamental to improvement. (Guskey and Huberman, 1995, p.vii)

Much is made of teacher learning as a corrective to the ills of our education systems. Recruitment and accreditation schemes, codification of standards for accomplished practice, teacher education reform, and professional development initiatives are just some of the ways in which teacher learning is being addressed. TTeacher learning is of his general problem is particularly importance true when the concern is one of promoting a form of teaching thatis consistent with emphasises high ststandards of intellectual qualityassociated with models of pedagogy as explicated in models found in concepts such as like 'Authentic Pedagogy.' In this paper, we report outcomes from a study designed to address the fundamental question of

whether it is possible to change teaching to more closely match such standards. Some of the teacher socialisation literature suggests that teachers' classroom practices are fairly intransigent, and informed as much by their own schooling experiences as by anything like their preservice teacher education or inservice professional development. We wanted to see whether it was possible to substantially improve the teaching of an "ordinary" group of teachers. That is, the teachers we worked with were not selected because of any special expertise, or status, or motivation.

'Productive Pedagogy' (PP), employed in this study, is a four-dimensional normative framework for classroom practice that was developed out of earlier research investigating school restructuring. The four dimensions of PP are (1) intellectual quality, (2) relevance, (3) supportive classroom environment, and (4) recognition of difference (see Table 1 for an overview what is included within each of these dimensions). In the study reported here, PP was used to assist inservice teachers to improve their teaching. Drawing on data from coded observations of the participants' teaching before and after professional development activities, as well as interviews about their experience of learning and applying PP, some principles for enhancing both professional development programs and preservice teacher education will be elaborated.

We begin this paper with an overview of (1) the concept of Productive Pedagogy, (2) and recent research findings about its prevalence among practising teachers, and (3) arguments for in favour of PP as a framework for teacher learning. Next, we provide an analysis of the data, compare results with those gained in other studies, and elaborate arguments to refine the potential use of PP in teacher learning.

Rationale

The literature on school reform argues persuasively that the quality of teaching is perhaps the key factor over which schools have any influence in determining the achievement of students in schools (see Darling-Hammond, 2000; Wenglinsky, 2000). In this light, it makes sense to focus professional development activities on teaching practice. Ball and Cohen (1999) put it more strongly: "Professional education must be education for professional practice if it is to be either professionally responsible or usable. Thus a conception of the practice itself, and what it takes to practice well, should lie at the heart of professional education" (in McRae, Ainsworth, Groves, Rowland & Zbar, 2001, p.20)

While there has been (and remains) considerable debate over what constitutes quality teaching, as manifested in attempts to develop agreed standards for teachers, a consensus does seem to be emerging about characteristics of the type of classroom teaching that is needed. A major part of this consensus relates to the intellectual quality of what teachers deliver to and expect from their students. This emphasis on intellectual quality has been expressed in several recent models of effective teaching, including Productive Pedagogy and its predecessor Authentic Pedagogy (Newmann & Associates, 1996; see also Avery, 1999). In an unrelated study, Wenglinsky (2000) concluded that he "found strong support for the notion that conveying higher-order thinking skills leads to improved student performance" (p. 29).

Productive Pedagogy, developed by the Queensland School Reform Longitudinal Study (QSRLS) research team, built upon a very large body of extant research into the production of socially equitable student learning outcomes (QSRLS, 1999; Ladwig, Luke and Lingard, forthcoming). In particular, the QSRLS extended the ground-breaking work of Newmann and Associates (1996) and their less comprehensive construct, known as 'Authentic Pedagogy (AP)'. This concept was found to promote both overall increases in student learning outcomes and significant improvements in terms of social justice, through a lessening of traditional equity-based gaps in student achievement.

While research into 'Authentic Pedagogy' has offered significant general insights into how teaching practice might be improved, the generic quality of 'authentic pedagogy' does not readily translate into practical models of pedagogy (Ladwig, 1998). The more comprehensive and multi-dimensional construct of 'Productive Pedagogy' provides an analytical framework for more descriptive models of teaching practice that can be developed theoretically and applied in the professional development of teachers. The four dimensions of PP capture the critical elements of quality teaching, in terms of intellectual quality and social justice outcomes for all students, while the twenty items provide a comprehensive account of teaching practice to achieve these outcomes (see Table 1). For each of the twenty elements, a five-point coding system was developed to enable QSRLS team members to observe and describe classroom practice.

Research studies demonstrate that this kind of teaching is quite scarce. The US studies on Authentic Pedagogy as well as recent Australian studies on Productive Pedagogy demonstrate that the typical pedagogy provided in schools is far from meeting the criteria of these models. For instance, the Queensland School Reform Longitudinal Study (QSRLS, 2001) found "overall levels of productive classroom practices were [. . .] low. While mean ratings on the socially supportive classroom environment dimension of productive

pedagogy were consistently higher than all other dimensions of classroom practice, the overall distributions of classroom practice measures were well below theoretical means" (p.iv).

Explanations for the relatively low levels of AP and PP are partially found in the structural and cultural obstacles to high quality teaching. Such obstacles include: I don't know what to put in herestructural and cultural dimensions of conventional school practices that mitigate against high quality instruction, conventional curricula that fail to focus on the development of student learning that is interactive and committed to demanding intellectual work, and a history of schooling in which neither students nor teachers have been socialized into modes of practice consistent with AP.

But we hasten to point out that these obstacles do not always impede the quality of teaching and learning produced. There are some exciting classrooms and some outstanding teaching practices. Some teachers are able to produce high quality teaching, despite the obstacles. An analysis of what differentiated the highest rating teachers from those teachers with low ratings in the QSRLS (2001), using PP, showed a much stronger sense of responsibility for, and efficacy in relation to, student learning. Teachers with low ratings were much more inclined to express the belief "that factors totally outside of their control 'determine' student outcomes" (p. iv). Our question, here, is whether other teachers, including those who don't share the dispositions of the highly rated teachers, can be assisted to produce higher levels of PP.

While PP appears to be a useful model for improving teaching practices, given its strong relationship to both academic and social outcomes for students in schools (QSRLS, 2001), and while it would seem to have potential in reforming schools, there is also abundant evidence that school reforms frequently fail, or have only short term consequences (Hargreaves, Lieberman, Fullan, and Hopkins, 1998; Fullan, 1999). One of the most unresolved issues in school reform remains how to improve the pedagogical practices of teachers in a sustainable fashion (Hargreaves, 1995). Current systemic mechanisms designed to address this issue include: staffing policies designed to increase school level engagement in 'flexible' hiring practices; induction policies that seek to improve the capacity of beginning teachers; and, teacher improvement practices based largely on uncoordinated and organisationally incoherent professional development programs (Darling-Hammond and McLaughlin, 1996; Fullan, 2000; Gamoran, Porter, and Gahng, 1995; King and Newmann, 2000).

Unfortunately, none of these general approaches is likely to assist school systems to improve the overall quality of their offerings in the long term. Flexible hiring policies do nothing except redistribute teachers differentially within systems. Innovative novice teachers, for a v ariety of reasons, have been known to have only a moderate shelf life (Zeichner and Gore, 1990), and do not change overall school performance. And, with only a few notable exceptions, extant professional development programs have shown a remarkable inability to demonstrate lasting benefits at the school level (Wilson and Berne, 1999). Since the teaching population of Australia, where this research is situated, is relatively stable, and finite, it is crucial that professional development programs be developed that can improve the overall performance of practising teachers.

There is, therefore, no reason to believe that reforms promoting PP are going to "stick" any more that previous reforms unless we have greater insight into how to make them stick. There is a growing body of literature which seeks to find the organisational supports associated with PP and AP (and the like), but this literature does not directly address the central question of whether teachers *can* substantially change their teaching practices. Hence this study was designed to gather direct data on the question of teacher change, using the PP framework. The question of long-term effects is secondary (and not possible to answer within the time-frame of this study) to finding out whether it is even possible to work with teachers who have no particular strength in PP terms and get them to teach in ways that are more consistent with the PP framework.

Outline of the study

To address this question, two groups of teachers participated in the study reported here: the entire staff of a small rural primary school (n=12), and a group of teachers from a large urban secondary school (n=14). All participants volunteered to participate in the study conducted during 2001. Participants' own teaching was observed and coded by the research team, according to the manual, both prior to and following a series of professional development activities focussed on PP. Two to three classes were observed during each data collection phase. The lessons to be observed were nominated by the participants. Simple descriptive statistics were used to compare the scores on PP before and after the intervention, including mean comparisons, analyses of variance and multiple analyses of variance controlling for between-school differences. In order to place these results into a broader picture of pedagogical reform in AustraliaJim, can you fill this blank?. . . these scores were also compared with the larger sample of teachers from the

QSRLS, with whom the original work on PP was developed (n= 305), as well as a group of student teachers who undertook a final year introduction to the model (n=10).

The professional development intervention took the form of a series of workshops (amounting to around 18 hours total). In these sessions, participants developed an understanding of the model and of the observation scoring manual that was developed to code classroom practice in the QSRLS and used to code their own practice. They had opportunities to code the teaching episodes of others, to strengthen their understanding of the PP construct through its four dimensions and twenty items. In subsequent workshops participants planned lessons, units, and assessment tasks designed to maximise intellectual quality, relevance, supportive learning environment and recognition of difference. The content of this planning was initiated by participants, and developed through the workshops, based on topics they were teaching.

During the observation phase, participants had the opportunity to discuss their observed class with the researcher, in terms of their performance against the four dimensions and, where appropriate, specific items. Following each observation period, participants were provided with summaries of their own scores and, as a point of comparison, the mean scores (by item and dimension) for all of the observed classes in their school. Descriptive statistics showing changes between visits by dimension and item were subsequently provided.

Semi-structured interviews were also conducted with all participants to investigate: their understanding of PP, their perceptions of its impact on their pedagogical practice and on their students, as well as its impact on the structure of their work and school culture. Interviews were transcribed and the data analysed, through the categorizing and contextualizing processes of qualitative research, to check the relationship between comprehension, translation into practice, and observed success.

An overview of the observational data

Before the professional development

The first set of observations demonstrated that these teachers were not particularly strong practitioners of PP. Mean scores for the whole sample show that, for three of the dimensions, teachers were close to a mean score of 2 on the five point scale. These dimensions were Intellectual Quality (2.13), Relevance (2.14) and Recognition of Difference (2.04). The only dimension of PP in which teachers scored significantly higher was Supportive Classroom Environment, for which the mean score was 2.95. We should note that, prior to any intervention, significant differences did obtain between the two schools in this study, in a pattern that was consistent with other Australian analyses of pedagogy (QSRLS 2001) in which the differences were associated with different levels of schooling (primary v. secondary).

[Differences between sites before the PD?]

After the professional development

Whole sample: Results from the second set of observations indicate substantial improvement in the level of PP produced by the teachers with whom we worked (See Table 2 and Figures 1 and 2 below). Of particular note is the statistically significant improvement in the Intellectual Quality scores. Blah, blah The level of improvement for the whole sample on this dimension was statistically significant ($p < 0.01$), lifting 0.39 of a point on the 5 point rating scale, from 2.13 to 2.52. The mean gain for this dimension was more than half a standard deviation.

The contrast between this dimension and the Supportive Environment scores is also note-worthy, where the gains were less substantial and not statistically significant. The mean scores for this dimension increased only slightly after the PD intervention by 0.08 to 3.03. This small change needs to be understood in terms of the dimension having a relatively high initial score, compared to the other three dimensions, as well as some major differences between the two sites. The rural primary site had a mean of 3.22 prior to the intervention, compared with 2.73 for the urban secondary site, due to a range of contextual features. After the intervention, however, the primary teachers' mean scores remained steady at 3.19, whilst the urban secondary teachers closed the gap with a mean score of 2.91.

While not statistically significant, the mean score for the Relevance dimension increased after the professional development by around a quarter of a standard deviation. The net gain here was 0.16 of a point, lifting from a mean of 2.14 to 2.30. The mean gain for the Recognition of Difference dimension was even smaller, increasing by just 0.04 of a point from 2.04 to 2.08. As supported by the interview data, teachers in

both sites had difficulty understanding aspects of this dimension.

Data from the interviews with teachers suggest that they tended to view the Supportive Environment dimension as a strong part of their current practice, and that they put more conscious emphasis onto other dimensions of the PP model. **[insert quotes? - jen/tom - sure, can add some, but I don't think they are needed]**. For example, Veronica (Secondary) observed: "Well I think your Social Support, we all do well on that one". Similarly, Margaret (Secondary) noted:

"I felt that I was already trying my hardest to be socially supportive and recognise differences ... I don't have to consciously think 'Ooh, I've got to start doing some Supportive Classroom Environment stuff here!' It just happens".

As we have argued elsewhere (Gore, Griffiths, and Ladwig, 2001), in teacher education and in school and public cultures, considerable discursive emphasis is placed on aspects of the learning environment, such as management of behaviour (self-regulation) and on-task engagement (related to academic engagement). Are the gains in learning environment in this study directly related to the gains in intellectual quality? Are they a result of changes teachers made to the intellectual demands they placed on students? Furthermore, were teachers able to make such significant gains in intellectual quality because they have given it so little attention, or had so little understanding of it, previously? In the interviews, teachers certainly indicated that the Intellectual Quality dimension was the most challenging:

"As I said, for me Intellectual Quality is difficult. I don't really have a problem with the others, I felt I do the others okay (the other three areas), obviously I can "up" them a bit if I really thought about it, but for me the Intellectual Quality bit is the hardest." (Jo, Secondary).

"I felt that I was already trying my hardest to be socially supportive and recognise differences and, as I said, the nature of the children requires it to be relevant, so my big one, the big thing I was trying to tap into was the Intellectual Quality - how do I get from here to here?" (Margaret, Secondary).

"This is a real challenge, the Higher Order Thinking ... So we had to actually think 'we want them to do this, it's an orientation activity, but what do we *really* want them to learn? What Deep Knowledge, what Deep Understanding is behind this?' That's as far as we got, we've got to find a couple of days before the end of the year to work on that unit so that we can hand it over to all the Year 7 teachers." (Veronica, Secondary).

"I want to know how to improve the intellectual quality of lessons and what strategies I can use for instance, as well as all those other areas." (Sylvia, Primary).

Individual teachers:

In addition to gains for the whole sample, most teachers involved in the study improved their individual scores following the professional development activity (see Table 3). This result, showing improvement in at least some dimensions for nearly every teacher, indicates that teachers can produce more "productive" pedagogy when they understand what is asked of them, and make some effort to do so. As a measure of their level of understanding, the following comments from interviews are indicative:

[None of these quotes really do it, and a quick search of the interviews doesn't provide any neat, brief statements showing a solid understanding of the whole model?...]

"I think it gives more of a total picture. Those others [Bloom's taxonomy, thinking hats, multiple intelligences] are just concentrating on one area, but PP is a total picture of your total kid, of your total teachers, and your total processing ... this is giving me a structure that ... it gives me the backbone! I now know where I can hang all those things" (Kristi, Secondary).

"I've grasped the concept and I think all the parts are important and it's just perhaps putting names to areas which teachers have always done, but it's given names, it's categorised bits of it, and I think they're all important" (Jo, Secondary).

"[Productive Pedagogy describes] describe classroom practices, sort of across a framework which consists of four aspects of teaching and learning and that's Intellectual Quality, Socially Supportive Environment, Relevance and Recognition of Differences. And basically each of those have particular aspects to them which, singularly and collectively, have a purpose of improving both teaching and learning on the part of students and also improving delivery on the part of teachers" (Luke, Primary).

"I think it gives you an outline to work with with your lesson planning that incorporates different areas that might engage students more" (Liz, Secondary).

"I would explain it in terms of more student-centred, I think, and also more student relevance. More relevance and connectedness so that you're not just teaching content, you're teaching it with links into what they're doing" (Margaret, Secondary).

"I think it's more concrete than, say policies. Or things...packages that we get or that sort of thing. I really think it gives you some clear guidelines to things that you can address. And it's made me do that, I mean I've got a long way to go, but I've become aware of where I need to be heading to be a better teacher and to get more out of the kids here who aren't engaged" (Veronica, Secondary)

Of the 17 teachers who were observed both times, 14 made gains in the Intellectual Quality score (range = 0.08 - 1.25 points on the 5 point scale), 12 made gains in Relevance (range = 0.12 - 1.13), 10 made gains in Supportive Environment (range = 0.1-0.6), and 13 made gains in Recognition of Difference (range = 0.1 - 0.8). INTELLECTUAL QUALITY MEAN GAIN=0.45, which is about two-thirds a SD.

RELEVANCE MEAN GAIN=0.26, which is about half of a SD

SUPPORTIVE MEAN GAIN=0.15, which is about a quarter of a SD, and

RECOGNITION MEAN GAIN=0.11, which is about a third of a SD.

As for the entire sample, the individual improvements in Intellectual Quality scores are most most impressive given the relatively minor intervention, particularly when represented graphically (see Figure 4).

Benefits named by participants: More generally, teachers across both sites highlighted the benefit of the PP model, and their introduction to it through the professional development intervention, in terms of a heightened awareness and understanding of their own teaching practice and its impact on their students' learning. This process of a heightened self-awareness led teachers, for example, to identify Intellectual Quality as a dimension requiring their attention.

Further, they cited the direct consequence of this process in terms of a perceived need to consciously plan content and pedagogy to improve their performance as teachers across the four dimensions of PP. Given the relatively low levels of PP being practised by teachers prior to the intervention, this type of response is not surprising, but reinforces the value of the model as perceived by teachers, and the potential for it to be taken up by them as a part of their regular practice.

"I just think that the success is me being aware of it [PP] and trying to incorporate it. Surely that has to be of benefit, rather than me not being aware of it?" (Jo, Secondary).

"I guess that what I'm trying to do is take this constant questioning, 'what am I doing or not doing?', and trying to channel into those areas ... You've raised our awareness ... the positives are that they've [the PP items and dimensions] made us think about what we're doing, which will obviously have an effect on kids in the classroom." (William, Primary).

"it just makes you more aware of what you are actually doing out in front of the kids and makes you think about things . I think that we all get a bit lazy at times and a bit slack at times, and I think it sparks you up again" (Marie, Primary).

Following the intervention, and teachers' reflection on their observation scores and attempts to incorporate PP, they strongly differentiated the PP model from other professional development experiences and models. What made PP different was its integral character, providing a substantive framework to inform many aspects of their work as teachers. Many teachers articulated this type of response to the model, including:

"I see it as a set of principles for lesson construction and delivery." (Monty, Secondary)

"I think it gives more of a total picture. Those others [Bloom's taxonomy, thinking hats, multiple intelligences] are just concentrating on one area, but PP is a total picture of your total kid, of your total teachers, and your total processing ... this is giving me a structure that ... it gives me the backbone! I now know where I can hang all those things" (Kristi, Secondary).

"No I think it's a bit deeper than that [other PD moments] because it's not so prescriptive as like Teaching with Multiple Intelligences or Blooms or whatever. It's more to do with a mindset than a practical application, I would say, a philosophy. Yeah." (Veronica, Secondary).

"This has helped me a lot because it just gave me a framework and it was quite an easy thing to look at" (Jane, Secondary)

"I see it as a series of guidelines or principles that we can use to construct lessons with" (Monty, Secondary).

"I think it's more concrete than, say policies. Or things...packages that we get or that sort of thing. I really think it gives you some clear guidelines to things that you can address. And it's made me do that" (Veronica, Secondary).

"... it's ways that people can look at their teaching and how to improve it" (William, Primary)

"I'd say it's a model for looking at how you teach, what you're teaching, and I think it's useful for getting you to think about what you're actually doing with kids in the classroom." (Antonio, Secondary).

The findings in broader context

These data indicate that, in addressing the specific question of this study as to whether teachers can change their practices at all, the answer is a simpler-sounding yes. Under the conditions of this study, namely relatively little intervention producing some (but by no means universally deep) understanding by teachers of what was being measured, the teachers were able to produce higher levels of PP.

How does this result fit into the larger picture of school reform and teacher change? Figure 3 shows the scores of these practising teachers in relation to two other cohorts:

Practising teachers from the QSRLS (n=305), average teaching experience 13 years, selected from schools identified as engaged in substantial reform (including attempts to improve classroom practice), no specific training in PP (See QSRLS 2001).

Final year student teachers (n=10), approx 18 hours 'training' in PP, claimed not to be trying hard to produce PP when observed (See Gore, Griffiths, and Ladwig, under review).

When examining the achievements of each cohort of teachers in terms of mean PP scores for each dimension, the following observations can be made:

The Intellectual Quality scores of the preservice teachers are dramatically low, and probably indicative of their poor understanding of what was required as well as the low emphasis on this dimension in their total teacher education program (see Gore, Griffiths, and Ladwig, under review).

The Intellectual Quality scores of the practising teachers from our study, post-intervention, indicate that the professional development activity had some benefit. When compared with the scores of the Queensland teachers in the original study, who did not have any systematic professional development, and compared with their own scores in the first visit, significant gains were made. Given the selective sample in Queensland, we consider this result to be remarkably good.

The Relevance scores of the preservice sample are surprisingly good. These results may have in part resulted from the fact that many of the lessons observed focussed on the Olympics (Sydney 2000) where there was more knowledge integration and connection to the world beyond the classroom that we might

normally have seen.

The Relevance scores of the practising teacher show improvement relative to the Queensland sample.

The Supportive Environment scores are mixed, and probably relate in part of the specific contexts in which the observations were conducted. The influence of context is highlighted by the differences between urban and rural sites.

The Recognition of Difference scores indicate some minor gains for each professional development sample relative to the Queensland sample, but little variation. These results highlight some of the measurement difficulties with this dimension.

Conclusions

When combined with the results we have obtained in other studies of Productive Pedagogy in Australia (QSRLS, 2001; Gore, Griffiths, and Ladwig, under review), there are a number of points that can be drawn from this work. First, it is interesting that the in-service teachers were much more successful in tackling the difficult task of increasing the intellectual quality of their pedagogy, as compared to pre-service teachers. In addition to explanations of why pre-service teachers might have difficulty with this central dimension, it is likely that the in-service teachers were a) better situated to focus on this dimensions because their experience has made them more comfortable and more able to maintain a supportive environment, and b) able to draw on a much broader knowledge of the subject matter they intended to teach.

Second, it is interesting that the pre-service teachers made substantial gains on relevance. While this is partially attributable to the historic moment (Jen - let's we should note that the primary school in this study was celebrating its not forget that Kootinag also had the centenary moment, , which is somewhat parallel), there is probably something more going on here. That is, these study findings may be explained by the idea that teachers are likely to address the four dimensions of PP by focusing on aspects with which they feel most comfortable. Young pre-service teachers may well be better equipped to deal with the demands of making school learning more connected to real world contexts than teachers who have years of experience doing otherwise.

Lastly, we should note that these two dimensions, intellectual quality and relevance, in some ways call for very different forms of knowledge and the differing successes of our different populations may well indicate a more fundamental underlying tension between these two different forms of knowledge. Intellectual quality is about helping students to develop deep, structured knowledge and understanding, while relevance is about helping students to see applications of knowledge in multiple and meaningful contexts. There is a fundamental difference here between what might be called vertical and horizontal forms of knowledge (Bernstein, 2000; Muller, 2001). Preservice teachers tend to be very conscious of horizontal forms of knowledge as they seek to make sense of the diverse pieces of their teacher education programs and future applications to their work as teachers. Inservice teachers, immersed in applications of knowledge, may be more open to tackling vertical structures of knowledge and more aware of the potential gains. This is not to suggest that preservice teachers could not tackle deep knowledge. Rather, a precondition of achieving such a focus for their teaching may be programs that have greater coherence and that address their need for applications.

In terms of implications of these findings for preservice teacher education, as we have argued elsewhere, PP needs to be introduced early in the teacher education program and integrated throughout if it is to become fundamental to the way in which graduates think about their own teaching. More importantly, though, the purposes and priorities of the teacher education program need to be reconsidered. In particular, the difficulty experienced by these students in producing high levels of intellectual quality, points to an overemphasis on developing classroom processes and techniques relative to addressing, in any depth, what is to be taught. When talking about

Here I guess we have to talk about implications for PD and TE (inservice and preservice) [yes - take it away love, it is looking good - very good for an AERA paper, and gives us a great base for developing it after AERA]. what they were planning to teach, the student teachers primarily named topics or mandated syllabus outcome statements, rather than key concepts or relationships or ideas. To the extent that this reflects how they have been asked to think about teaching through the teacher education program, it identifies how the program might be changed. As Gore (2001) has argued, PP has potential to overcome some of the fragmentation of teacher education programs borne partially of the various traditions of teacher education

represented in most programs.

At the professional development level, these findings provide substantial optimism about the potential of PP as a framework for teacher learning. The teachers' understanding of the various aspects of the PP model and its applicability to their work were fundamental to the improvements seen here. Other factors such as supportive leadership and opportunities for professional collaboration were also influential.

More generally, in terms of teacher learning, these studies reaffirm our confidence in teachers' capacities to teach well, provided they are clear about what it means to teach well and supported by educational systems to adopt such a focus in their work. PP is a model of teaching that makes high intellectual demands on students, based on high expectations. It is also a model that makes high demands on teachers, demands that teachers can meet. At the same time, PP supports and assists teachers in doing valuable work.

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Table 1. Productive pedagogy dimensions, items and key questions addressed

<i>INTELLECTUAL QUALITY</i>	
Higher order thinking	Are higher order thinking and critical analysis occurring?
Depth of knowledge	Does the lesson cover central concepts and their complex relations in any depth, detail or level of specificity?
Depth of students' understanding	Do the work and response of the students provide evidence of understanding of concepts or ideas?
Substantive conversation	Does classroom talk break out of the initiation/ response/ evaluation pattern and lead to sustained dialogue between students, and between teachers and students?
Knowledge problematic as	Are students critiquing and second-guessing texts, ideas and knowledge?
Meta-language	Are aspects of language, grammar, and technical vocabulary being foregrounded?
<i>RELEVANCE</i>	

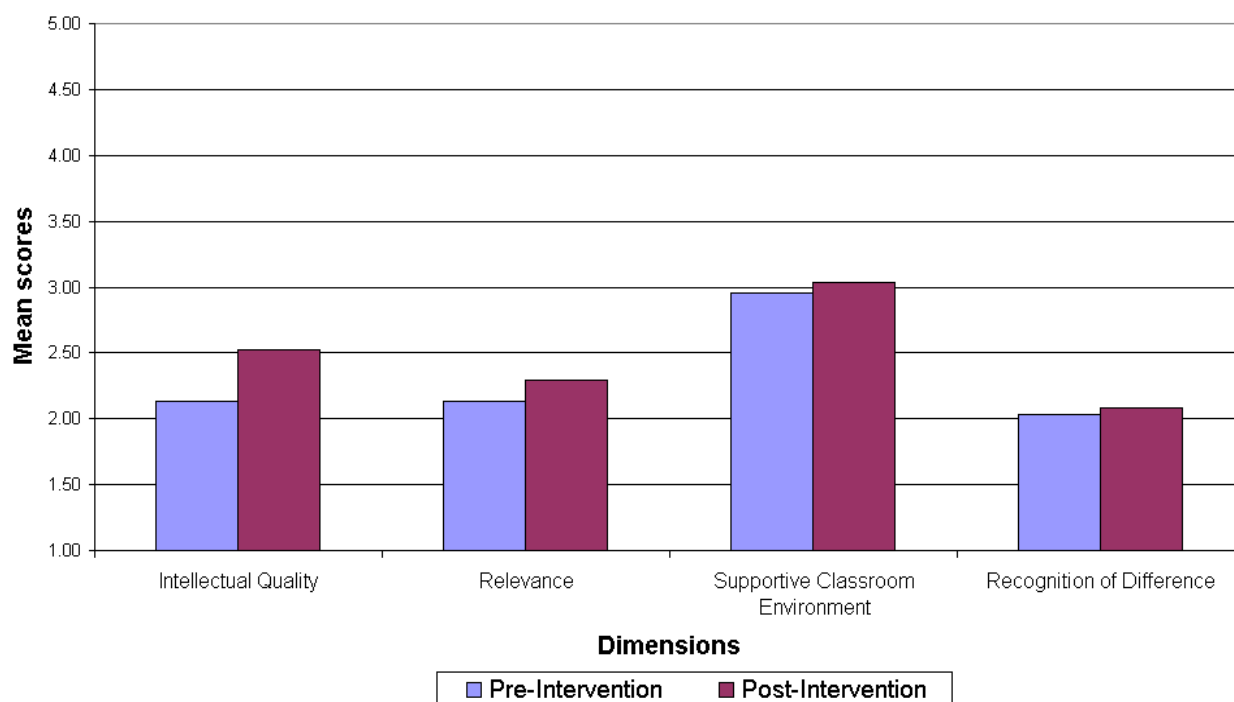
Knowledge integration	Does the lesson range across diverse fields, disciplines and paradigms?
Link to background knowledge	Is there an attempt to connect with students' background knowledge?
Connection to the world beyond the classroom	Do lessons and the assigned work have any resemblance or connection to real life contexts?
Problem-based curriculum	Is there a focus on identifying and solving intellectual and/or real-world problems?
<i>SUPPORTIVE CLASSROOM ENVIRONMENT</i>	
Students' direction of activities	Do students have any say in the pace, direction or outcome of the lesson?
Social support for student achievement	Is the classroom a socially supportive, positive environment?
Academic Engagement	Are students engaged and on-task?
Explicit quality performance criteria	Are criteria for student performance made explicit?
Student self-regulation	Is the direction of student behaviour implicit and self-regulatory or explicit?
<i>RECOGNITION OF DIFFERENCE</i>	
Cultural knowledge values cultures	Are diverse cultural knowledges brought into play?
Public representation of Inclusive participation	Are deliberate attempts made to increase the participation of all students of different backgrounds?
Narrative	Is the teaching principally narrative, or is it expository?
Group identities in learning community	Does teaching build a sense of community and identity?
Active Citizenship	Are attempts made to foster active citizenship?

Table 2: Change in mean scores for each dimension - whole sample

	Pre-Intervention	Post-Intervention	Mean Gain	Sig	SD	Gain as % of Standard Deviation
Intellectual Quality	2.13	2.52	0.39	0.005*	.6146	63.8%
Relevance	2.14	2.30	0.16	0.249	.5954	27.0%
Supportive Classroom Environment	2.95	3.03	0.08	0.326	.5753	13.3%
Recognition of Difference	2.04	2.08	0.04	0.673	.4543	9.9%

Table 3: Change in mean scores for each dimension, as % of standard deviation - individual teachers

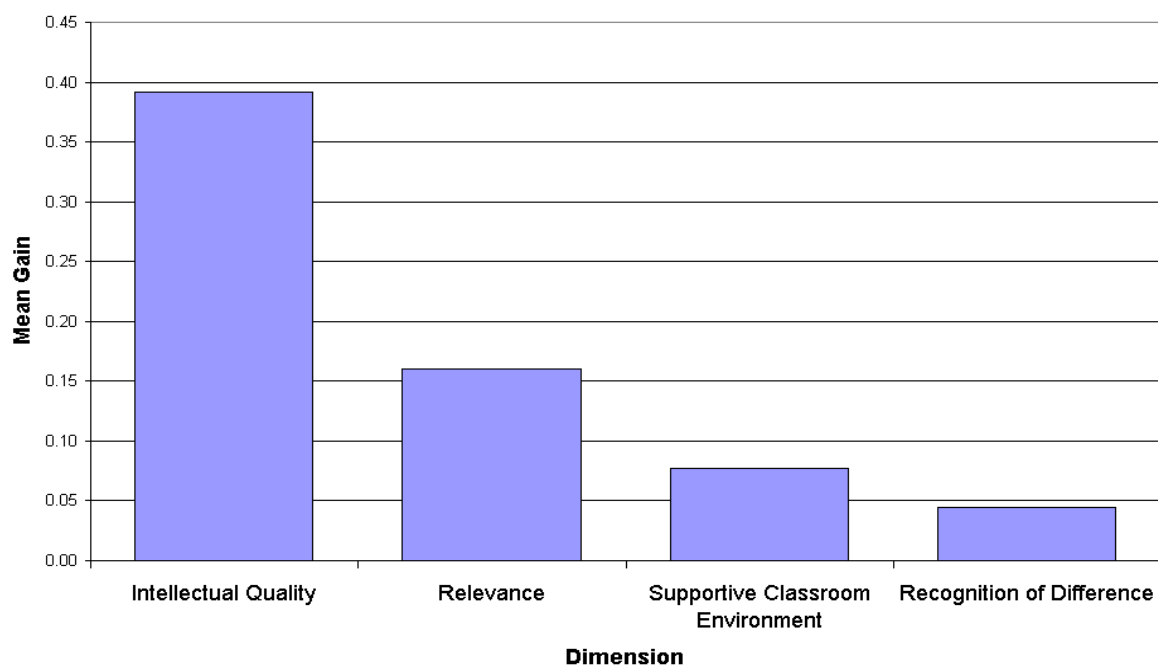
		Intellectual Quality (SD: 0.6146)	Relevance (SD: 0.5954)	Supportive Classroom Env. (SD: 0.5753)	Recognition of Difference (SD: 0.4533)
Primary	Lyndal	-27.66	125.97	0.00	-110.30
	William	122.03	20.15	0.00	22.06
	Sylvia	40.68	83.98	17.26	44.12
	Celia	162.71	41.99	51.79	44.12
	Melba	40.68	62.14	69.05	176.48
	Marie	27.66	20.15	34.52	22.06
	Antonio	-27.66	-125.97	-69.05	-110.30
	Luke	94.37	189.79	-51.79	44.12
Secondary	Jane	122.03	83.98	103.57	0.00
	Liz	13.02	0.00	0.00	44.12
	Barry	203.38	21.83	17.26	110.30
	Jo	68.34	-6.72	56.97	22.06
	Monty	-40.68	-63.82	17.26	22.06
	Margaret	96.00	167.95	-103.57	88.24
	Veronica	122.03	41.99	155.36	-88.24
	Rosa	177.35	105.81	172.62	66.18
	Kerry	40.68	-20.15	-17.26	22.06



Figure

1: Mean scores for dimensions, pre and post-intervention - whole sample

Figure 2: Mean gains for each dimension - whole sample



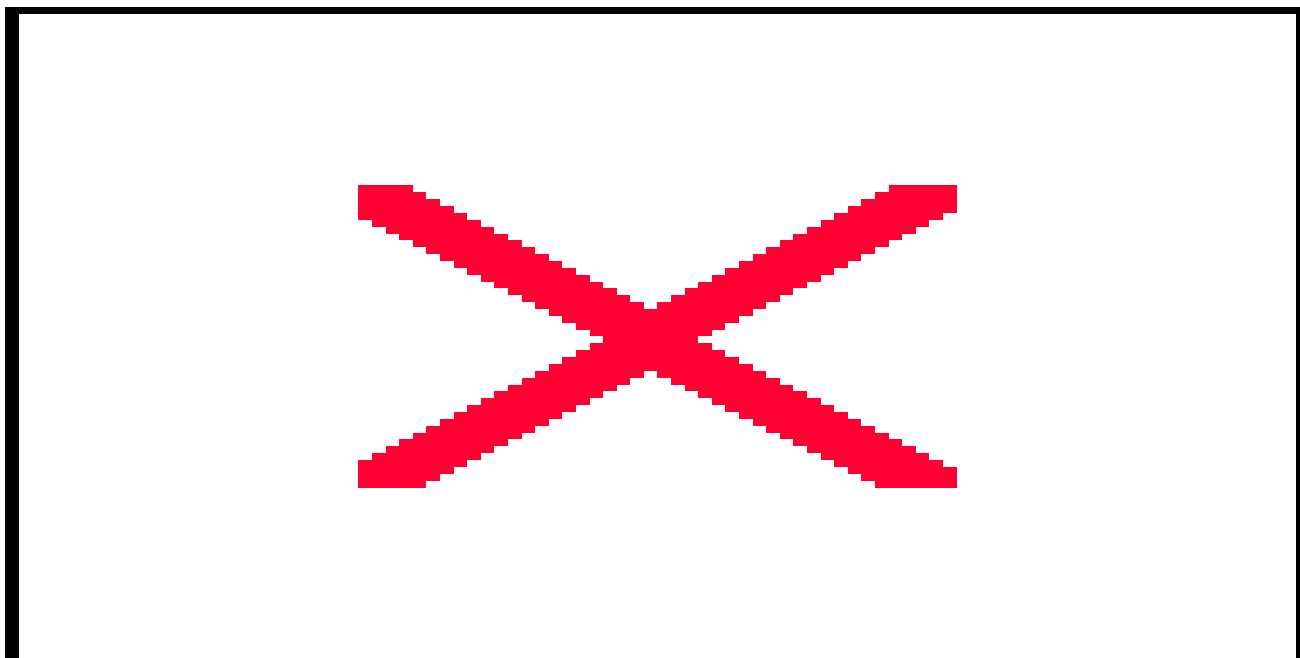


Figure 3: Mean scores for each dimension - all sites

Figure 4: Change in mean score for Intellectual Quality as % of standard deviation - all teachers

