

## **Investigating Teachers Pedagogical Beliefs in Indonesia and Australia**

**Bill Atweh – Curtin University of Technology, Australia**

[b.atweh@curtin.edu.au](mailto:b.atweh@curtin.edu.au)

**Abadi – Surabaya State University, Indonesia**

[abadi4@yahoo.com](mailto:abadi4@yahoo.com)

In this project, we were interested in investigating factors that mathematics and science teachers deem to be important in their preparation and delivery of classroom teaching. During the last twenty years, the international literature in mathematics and science education demonstrated an overall shift of focus from studying the student and issues related to learning to a study of the teacher and issues related to teaching. This shift reflects an affirmation of the importance of the role of the teacher in implanting policies and applying research learning into practice that directly impacts on student learning. In particular, our aim was not to study the actual practice of teachers in the classroom but rather their beliefs about what they consider to be important in both preparation and implementation of their teaching. Teachers' beliefs, particularly as they relate to their classroom practice, are an important and ever expanding area of research in mathematics and science education (Raths & McAninch, 2003).

A review of the literature on teachers' beliefs reveals a variety of focuses. For example, one can argue that teachers' beliefs about the nature and aims of their discipline would affect decisions about what they focus on in the classroom and the type of activities that they involve their students in (Atweh & Brady, 2009). Arguably, this aspect of teachers' beliefs is not often subjected to research studies; an absence parallel to a general lack of discussion of these issues in current discourse on curriculum reform and development that is dominated by rationality of testing and measurement of outcomes (Neyland, 2010). In contrast, teachers' beliefs about the nature of learning and its effect on their teaching practices has been subjected to considerable research (Kagan, 1992). Applefield, Huber and Moallem's (2000, p. 35) state, "teachers' personal theories of learning have long been viewed as having considerable influence on virtually all aspects of teachers' decisions about instruction".

In this study we were interested in investigating teachers' pedagogical beliefs; that is, what teachers deem to be important in planning and implementing teaching for effective learning experiences in the classroom. Here, we argue that these pedagogical beliefs are affected by the teachers' beliefs about the nature of their discipline and their beliefs about the learning. However, these beliefs are directly related to their decision-making in planning and implementing their teaching. Thus, they may be more directly relevant to attempts to understand and reform practice.

This study is a comparison study between teachers pedagogical believes in two countries, Indonesia and Australia. Several authors have discussed the uses and limitations of comparative type of research (e.g. Clark, 2003; Kaiser, 1999). The intention here is not to undertake benchmarking between the two countries, but to establish an initial understanding of teachers' beliefs in order to build further collaborative work between researchers in the

two contexts. We will return to this point in the concluding remarks of the paper. Of particular interest here are the following research questions:

1. What pedagogical beliefs do Indonesian and Australian mathematics and science teachers have which are reflected by the factors that they take into consideration in planning for and conducting their classroom teaching?
2. How do these beliefs differ between the two countries and how are they affected by subject matter taught, gender of teacher, teaching level and their country?
3. What is the relationship between these beliefs and focus of the curriculum in each country?

We will commence with a short discussion of the general curricular context in under which the teachers investigated in the study work.

### *The Indonesian Context*

As in many countries around the world, the Indonesian education system has undergone several changes during the recent past towards modernising and reforming the school system and the curriculum. In the period starting with the country's independence in 1945 and 1975 there has been several curriculum developments and restructuring of schooling. It is safe to generalise that subject matter content of the curriculum has dominated those early reforms that paid little attention to questions of pedagogy and assessment. Due to the political instability that the country has experienced during that period, curriculum decision making was politicised paying more attention to nationalistic agendas than concerns about teaching and learning. During the mid-eighties the *Kurikulum Cara Belajar Siswa Aktif* (CBSA: Student Active Learning Curriculum) was produced based on educational considerations with a heavy focus on student centred learning (Depdiknas, 1984). However, with limited provisions for professional development and teacher guides, this movement resulted in a variety of teacher understandings of the intended reform. While teaching materials in terms of activities and posters crowded the classrooms, teachers' lack of clarity about their expected roles lead to the overuse of homework and activities leading to concerns by parents and educators about the decline of actual teaching and learning in schools.

Further, additional demands on the school curriculum by various professional and business special interest groups have resulted in an over-crowded curriculum. This crowdedness of the curriculum was fuelled by the 1994 reforms (Depdiknas, 1994) which demanded that the national content, expected to be taught by all schools in the country, be supplemented by local provincial content. For example, rural schools were expected to add to the national curriculum subjects on farming and agriculture. Often, local authorities had their own priorities and values that lead to further demands on teachers' school time. Although teachers were given more freedom to develop their own lesson plans and work programs, they struggled to perform their expected tasks due to time limitations and lack of experience. Further, they faced difficulties in attempting to relate the often high academic content to the real life experiences of the students.

In 2004, joining the international trends for outcome-based education, the *Kurikulum Berbasis Kompetensi* (KBK: Competency-based Curriculum) was developed (Depdiknas, 2004). Once again, with limited professional development on the principles of competency-based education, teachers reached alternative understandings of the curriculum intentions and its implications for planning, teaching and assessment. Ironically, students still had to face national multiple choice exams at the end of the year as a measure of their competencies. The 2006 curriculum called *Kurikulum Tingkat Satuan Pendidikan* (KTSP: School-based Curriculum) (Depdiknas, 2006) was developed to give space for teachers to create their own lesson plans and assessment tools based on nationally outlined content and competency standards.

Arguably, the most significant and far reaching educational reform in Indonesian is the so called *Rintisan Sekolah Bertaraf Internasional* (RSBI: Piloting of International Standard Schools) which occurred with collaboration between the Department of National Education through the Directorate of High School Development, who launched the program. The program is based on decree number 20, year 2003, Article 50, Verse 3 (Depdiknas, 2003), saying that “The national and/or regional government should conduct at least one education unit [school] at each level to be developed as internationally standardized education unit” (p, XX). The RSBI aimed to develop the abilities of the selected schools across the country to improve their teaching and learning processes to equip their student abilities to live and compete globally. In those schools, English, mathematics and science were chosen as the first topics to be developed. Further, instruction in them was to be delivered in English.

Perhaps unlike previous reforms, this program was accompanied by heavy investment in school and professional development of the whole school. The implementation of the program is based on the nine pillars of reform, i.e. curriculum, teachers’ content knowledge, school-leaver competencies, instructional process, assessment practices, human resources, infrastructure, management, and funding (Depdiknas, 2005). Schools were provided with special activities to improve their managerial capacity and human resources, as well as teaching and learning, and to develop their infrastructure and resource maintenance. This is a whole school approach to reform that targeted the development of school principals and administration staff, as well as teachers. The reform provided for the employment by the school of university facilitators to assist the school in the planning and implementation of the reform. In-house training was developed to assist teachers in the preparation for their teaching by modelling effective practices and the use of peer observations and critical feedback. The program identified some standards for instruction that aspired to teaching and learning processes that are interactive, inspiring, joyful, challenging, motivating for students to participate actively and provide students with spaces to be self-regulatory, collaborative, problem solvers, systematic inquiring, self-evaluating and active citizens.

It is within the context of these schools that the current research project was conducted. To achieve the desired level of international standards, there is an interest in the country to undertake benchmarking and to compare students with international counterparts. This focus is in addition to an emphasis in many universities in Indonesia to encourage international standard research and publication. Many universities and the Federal government have instigated programs that allow academics from the universities to undergo short study and research programs at international destinations. This program allowed the second author to visit Australia to conduct part of this research.

### **The Australian Context**

A discussion of educational curricular reform in the Australian context has to take into account the political setting that lies behind the changes that have occurred during the last four decades. Up to the 1970s, each State in Australia had full jurisdiction on curriculum development, school policies and structures and adopted assessment regimes. This is not to say that there were major differences between the States in terms of curriculum or teaching. However there were some significant differences in the area of the starting age of students in the primary and secondary schools, and in the area of the type of assessment at year 12. In 1970s, the Federal Government started to play an active role in school education by funding national collaborative priority projects and teaching materials intended mainly to reduce the hindrances to students moving from one state to another without impinging on States’ constitutional responsibilities for school education. In the late 1980s, direct attempts commenced by the then Labor government for standardising the curriculum towards developing a national curriculum. Initial cautious support was obtained from the State Labor

governments who reached an agreement on a set of common goals of school education (Hobart declaration). This national collaboration resulted in the publication of National Statements on the teaching of many school subjects including mathematics and science. However, the attempt to develop a national curriculum has failed mainly due to the gradual demise of the Labor governments in different states. However, it is fair to say that the Statements produced reflected the then current thinking about values and practices in education but also have helped to shape such values and practices for the following decades. In order to highlight some of characteristics of mathematics and science teaching in Australia, we will discuss the National Statement on Mathematics (Australian Education Council, 1990) in some detail.

One significant contribution of the National Statement on Mathematics is its articulation about the usefulness of mathematics for work opportunities and for the development of science and technology, but also it is useful for civic participation. Arguably this is the first articulation relating mathematics to civic participation in Australia. Similarly, while mathematics education should aim to develop quality mathematics knowledge and skills for more able students, the Statement also identified the needs of student groups that are often excluded in their study. In particular, social background factors that affect students' participation and achievement in mathematics study include gender, social class, ethnicity, and students with special needs. A curriculum in mathematics should accommodate the needs of these students as well. In terms of the aims of mathematics education, the Statement asserts that not only the curriculum should aim to develop competent and confident users of mathematics, but also develop the students' positive attitudes, ability to use mathematics for problem solving individually and collectively, communicate mathematics, and use the most modern techniques and tools to teach the subject. Also of interest, the Statement describes the content areas using non standard mathematical terms such as space rather than geometry, chance and data rather than probability and statistics, as well as introducing non-content topics such as attitudes, mathematical inquiry, and choosing and using mathematics as strands to be developed in mathematics education across the different year levels. In terms of the elaborations within each strand and level, the Statement lists examples of activities that may be used by teachers rather than outcomes or content to be covered.

In Western Australia, the state where the Australian component of this study has taken place, the main reforms that may be useful to illustrate the general characteristics of education systems in Australia are, firstly, the 1984 Beazley report (Committee of Inquiry into Education in Western Australia, 1984) which recommended that the curriculum was to be conceived as seven groupings of subjects including mathematics and science and technology. Each grouping consists of a number of units of successive difficulty offered to students. This model allowed students to choose any level they want to study depending on their ability, need or interest. Some serious problems were identified from the implementation of this curriculum model relating to the lack of grounding that students had developed in the different areas and their level of maturity to make informed decisions. Even though this reform failed and was abandoned, the choice of subjects at different levels remains a characteristic of several Australian jurisdictions.

The second notable curriculum reform occurred in the late 1990s. The establishment of the Curriculum Council in Western Australia has allowed for the development of a common Curriculum Framework (Western Australia Curriculum Council, 1998) for all schools: public, private and religious, and formed a seamless curriculum at all levels. The significant feature of this Framework is that it was based on the Outcome Base Education (OBE) model. The Framework identified a set of core values and 12 overarching learning outcomes to be reflected in all areas. Of noted absence in the framework is the lack of content topics familiar in traditional curricula – an absence that, arguably, has caused the greatest concern among

teachers. Teacher and public concerns gave rise to what can be called a general revolt against OBE that led to its eventual abandonment.

In more recent times, Australia embarked on another attempt to nationalise the curriculum, the outcome of which is yet to be determined and lies beyond the scope of this paper. We turn our attention now to the establishment of a theoretical model to study teachers' pedagogical beliefs.

### Theoretical Considerations

The international educational literature contains discussions on several teaching methods and instructional techniques appropriate for developing deep and effective learning. There is, however, ample evidence that there are no universally appropriate teaching styles or methods that produce the required results in all classrooms, with all teachers and with all groups of students. Effective teachers are those who, not only are confident about their content knowledge and have a repertoire of teaching skills, but also know their students and their contexts and are able to make informed decisions about what is appropriate for them. In other words, effective teaching and learning is always contextualised. What is of greater value for informed pedagogical decisions are frameworks that allow teachers to reflect on their practices and to enter into dialogue with the community of teachers, policy makers and the general public about issues related to teaching and learning. This is in line with the professionalisation of teachers (Atweh, 2007).

Perhaps most widely known such frameworks are those of Bloom's Taxonomy, Gardner's Multiple Intelligences, Debono's Thinking Hats and Myer-Briggs Personality Types. Without dismissing their value for classroom teaching, we note that the educational research base upon which they are based is perhaps limited in that they focus more on higher order thinking and intelligence constructed under the individualistic models of learning. In other words, they don't take into account the social dimension of learning. While some of them might acknowledge individual differences in thinking style and preference for learning, they do not account for the effects of student background and their social context.

One framework developed recently in the state of Queensland in Australia, called Productive Pedagogy<sup>1</sup> (PP) (see also, Hayes, Mills, Christie, & Lingard 2006) is an example of an attempt to integrate research findings on effective teaching from a variety of areas of research within education itself. The framework was based on the previous work of Newmann and his colleagues (Newmann & Associates, 1996) at the University of Wisconsin, on Authentic Pedagogy and based on a longitudinal study conducted in that state (Queensland School Reform Longitudinal Study, 1999). Similar to the previous frameworks, the Productive Pedagogy model does not provide readymade techniques for teaching. Rather, it *is an approach to creating a place, space and vocabulary for us to get talking about classroom instruction again. It isn't a magic formula (e.g., just teach this way and it will solve all the kids problems), but rather it's a framework and vocabulary for staffroom, inservice, preservice training, for us to describe the various things we can do in classrooms – the various options in our teaching 'repertoire that we have – and how we can adjust these ... to get different outcomes.* (Luke, 1999, pp.5-6).

The Productive Pedagogy framework consists of four main dimensions, each of which consists of several characteristics:

---

<sup>1</sup> Further information about the Productive Pedagogy can be available from the Website of the Queensland Department of Education and the Arts at <http://education.qld.gov.au/corporate/newbasics/>

- Intellectual Quality
- Connected knowledge
- Supportive Classroom Environment, and
- Recognition of Difference (Hayes et al, 2006).

Atweh (2007) identified several possible uses of this framework. First, such a framework can be used by an individual teacher, or a group of teachers to reflect on their own lessons or those of others, either at the planning stage or after a lesson has been conducted in order to improve their teaching in their classrooms. Secondly, it provides a useful means for a teacher or a group of teachers to plan curriculum and lessons at one school level in one subject, or across levels and subjects. Thirdly, this framework can be used as professional development of teachers and as a means of induction for new teachers in schools.

In this pilot study, we utilised the Productive Pedagogy framework to investigate the dimensions that teachers consciously value in their curriculum decision making. This knowledge of teachers' pedagogical beliefs is deemed important for subsequent research on teachers in both settings as well as for developing appropriate and relevant professional development work with those teachers

### The Research Project

#### *The sample*

The sample used in this study consisted of two cohorts from both countries. Being a pilot study, sampling by convenience was deemed appropriate (Creswell, 2005). The first cohort consisted of 76 teachers selected from Indonesian secondary schools. The teachers are chosen from mathematics and science teachers in Piloting International Standard Schools in East Java. The cohort consisted of teachers who were enrolled in a master of education program at the Surabaya State University as part of professional development programs available for these schools. It consisted of 37 teachers of mathematics and 39 teachers of science; of these 41 taught at senior level and 35 at junior high school. The cohort included 39 male and 37 female teachers.

The Australian cohort consisted of 35 teachers. The teachers came from public and private schools in the Perth metropolitan area. The schools were selected because at least one teacher from each school was undertaking a master of education program at Curtin University. The cohort included 18 teachers of mathematics and 15 teachers of science with two teachers teaching both. Twenty-five teachers identified as mainly teaching in the senior high school and 6 in junior high school with 4 teachers teaching at both levels. There were 22 male and 13 female teachers in this cohort. Table 1 presents the overall sample.

**Table 1: Sample composition**

	Maths	Science	Both Math & Science	Senior	Junior	Both Senior & Junior	Male	Female
Indonesia	37	39	0	41	35	0	39	37
Australia	18	15	2	25	6	4	22	13

### ***The Instrument***

The instrument used in this study is a closed ended questionnaire on teachers' preferred and actual practices in curriculum preparation and implementation of their teaching in their subject areas. The instrument was adapted from a longer instrument, *A Study of Reform Initiatives in Queensland Schools: Teachers' Survey* developed Mills and Goos at the University of Queensland in a context of a project on Productive Pedagogy (Mills, et al, 2009). Four scales of the original instrument were used.

1. Aspects that teachers emphasised in planning the curriculum (Planning Actual)
2. Aspects that teachers would have liked to emphasised in planning the curriculum (Planning Preferred)
3. Aspects that teachers emphasised in classroom teaching (Teaching Actual)
4. Aspects that they would have liked to emphasised in classroom teaching (Teaching Preferred).

Each selected item in these scales was categorised by us into one of the Productive Pedagogies dimensions as discussed above resulting in four subscales. The Appendix contains selected items from the instrument.

**Table 2: Structure of the Adapted Questionnaire**

PP Dimensions Scales	Intellectual Quality	Connected Knowledge	Social Support	Recognition of Difference
Planning Actual	7 items	1 item	1 item	2 items
Planning Preferred	7 items	1 item	1 items	2 items
Teaching Actual	8 items	3 items	4 items	4 items
Teaching Preferred	8 items	3 items	4 items	4 items

The original instrument was developed in English. Although the Indonesian teachers were capable of reading and writing in English, it was deemed appropriate to translate it into Indonesian to avoid language difficulty. The Second author has developed the first draft of the translation which was checked by an Indonesian doctoral student in Australia with a good command of both languages. Differences of opinion were negotiated between the two authors and the translator until a decision on wording was unanimously agreed upon.

### ***Procedures***

Two groups of teachers undergoing masters of mathematics and science education courses in an Indonesian university were selected to complete the questionnaire. A similar sample of Australian teachers was not possible due to the numbers of teachers undergoing postgraduate study in Australia being much lower. Hence, an invitation was sent to 5 schools in the Perth metropolitan area and all mathematics and science teachers were invited to participate by completing the questionnaire. This nonparallel sampling would have been a problem if the aim was to generalise to all teachers in the two countries. However, as a pilot study, it was deemed to be acceptable.

### ***Results and discussion***

Since this is an exploratory study, it does not seek to "measure" teachers' attitudes or practices. Similarly, it does not aim to generalise about differences between countries and the subject matter being taught. Rather, it aims to explore and identify possible patterns in the data for further investigation and research. Hence, statistical comparisons between the different cohorts and factors will be made based on means of the data of the various segments

of the sample. In other words, no statistical hypothesis testing will be used. Operationally differences of more than 0.5 (i.e. 10% of the total possible score of 5) on the means will be regarded as sufficiently significant to note. More importantly, patterns of differences are more important than a one-off result. In this section we will discuss the performance of the whole sample and consider the impact of factors such as country, gender of the teacher, level of teaching and the subject matter taught.

*Overall sample*

First we were interested in seeing if there are overall patterns in the way teachers value the different dimensions of the Productive Pedagogy framework. Table 3 indicates that teachers, overall, seem to put more emphasis on the Intellectual Quality in planning their teaching experiences (mean 4). This is followed by attempts to achieve Connected Knowledge for their students (mean 3.5) and Recognition of Difference (mean 3.6). Mathematics and science teachers in both countries, however, tend to put less emphasis on Social Support (mean 2.7). Perhaps this is consistent with the view that schools main function is to develop knowledge and skills and that measures of students’ outcomes should be more content related with a less focus on social outcomes in education.

**Table 3: Total Actual scores valuing the PP Dimension**

PP Dimensions Scale	Intellectual Quality	Connected Knowledge	Social Support	Recognition of Difference
<b>Planning</b>	<b>4.0</b>	<b>3.5</b>	<b>2.7</b>	<b>3.6</b>
<b>Teaching</b>	<b>3.7</b>	<b>3.6</b>	<b>3.6</b>	<b>3.7</b>

However, it is interesting to note from Table 3 that the patterns of relative importance of these dimensions on the Actual Teaching scales show that all the four PP dimensions were equally emphasised with means of 3.6 or 3.7. This indicates that while in preparation for teaching, the teachers may focus on Intellectual Quality more, in the actual teaching practices in the classroom, they cannot omit social support and the individual differences.

In particular Social Support is seen more as a classroom teaching concern rather than a planning issue. In other words, teachers tend to put less attention for supporting students in their preparation for teaching than they actually do it in the classroom. Perhaps, this is the result of teacher preparation programs that might focus on the teaching of the content more than providing support for students. Perhaps we often assume that teachers are naturally supportive of students and do not require training to do so. However, when faced with the reality of the classroom, teachers seem to put some focus on student support. This is consistent with expectation that teachers are naturally caring about students and their welfare.

Next we investigated if the teachers’ aspirations and what they prefer to do match their actual practices in planning and implementing teaching. Table 4 reveals similar patters to their actual practices when it comes to relative importance of the different PP dimensions. However, it is interesting to note that in all cases, teachers would have preferred to put more emphasis on each PP dimension than they actually do. It is also worthwhile to note that the differences among the four PP dimensions are much lower than for the actual scales. For example, in their preferred teaching scales, the means ranged from 4.2 to 4.1. While in the actual subscales, they ranged from 4.3 to 3.3. However, the Social Support dimension remains low indicating that future work with teachers should target an increased awareness on how to incorporate it in the planning stage of teaching.



**Table 4: Total Preferred scores valuing the PP Dimension**

PP Dimensions Scale	Intellectual Quality	Connected Knowledge	Social Support	Recognition of Difference
<b>Curriculum</b>	<b>4.3</b>	<b>3.9</b>	<b>3.3</b>	<b>4.0</b>
<b>Teaching</b>	<b>4.2</b>	<b>4.2</b>	<b>4.1</b>	<b>4.2</b>

Arguably, this similarity in patterns among the different PP dimensions may indicate a greater confidence in the validity of interpretation by the participants of the items on the questionnaire. However, the differences between the actual and preferred results raises important questions for further research and action. Several reasons can stand between the actual and preferred practices of teachers. Some factors may be contextual or external factors. Worldwide, the demands on teachers' time and resources are escalating. Often, teachers find themselves swamped with responsibilities that prevent them from sufficient planning time for the implementation of programs according to what they think is necessary. To address this issue, teachers need scaffolding in managing their workloads to allow them to concentrate on pedagogy. However, there might also be factors that are internal to the teachers as well. It might be that even though teachers might think these characteristics of pedagogy are important, they may not be sufficiently confident in knowing how to plan and implement them in the classroom. In this case, the teachers' needs might be to consider more effective pedagogies. In other words, they need scaffolding to understand the dimensions of PP and how to plan and implement them.

#### *Differences between countries*

The following two tables report on the means of the different subscales on Planning Actual and Teaching Actual for each country separately.

**Table 5: Means by country on the Planning Actual scale (\*)**

PP Dimensions Country	Intellectual Quality	Connected Knowledge	Social Support	Recognition of Difference
Indonesia	4.1	3.8	3.0	3.8
Australia	3.9	2.8	1.9	3.1
<b>Total</b>	<b>4.0</b>	<b>3.3</b>	<b>2.7</b>	<b>3.6</b>

(\*) shaded area denotes significant differences

**Table 6: Means by country on the Teaching Actual scale (\*)**

PP Dimensions Country	Intellectual Quality	Connected Knowledge	Social Support	Recognition of Difference
Indonesia	3.8	3.7	3.7	3.9
Australia	3.6	3.5	3.3	3.2
<b>Total</b>	<b>3.7</b>	<b>3.6</b>	<b>3.6</b>	<b>3.7</b>

(\*) shaded area denotes significant differences

The first pattern that emerges in both Tables 5 and 6 is that the Indonesian teachers have higher means than their Australian counterparts. Nevertheless, differences on three particular PP dimensions are worthwhile pointing out. Australian teachers seem to put lower focus on Connected Knowledge, Social Support and Recognition of Difference in their curriculum planning but not as much on their teaching. In other words, even though Australian teachers seem not to cater for connecting their subject to real world and to support students at the curriculum planning stage, they attempt to cater for them in their actual teaching.

Of course there are two possibilities that might account for these results. First, while there might be differences in the interpretations of these dimensions in the two countries (Watkins & Cheung 1995), it is unlikely that either group is more familiar with the dimensions of Productive Pedagogies. Secondly, the differences in results may indicate that Indonesian teachers do actually put more effort in planning and implementing the characteristics of Productive Pedagogies. Further research might be needed in this area.

Similar patterns of differences were observed between the two countries on the preferred scales on Planning and Teaching. What is clear from these results is that teachers in the two countries do not have the same pedagogical beliefs and practices in planning for their teaching. Hence, professional development that arises in one country cannot be simply transplanted into another context if it aims to achieve effective productive change in practices.

#### *Difference due to Contextual factors*

The next social factor that was of interest in this study was gender. One cannot assume that gender issues are understood or dealt with the same in both countries. Hence, gender differences were reported within each country and also on the combined sample in Table 7. The results, however, show that teachers' gender differences were not significant in any scale or subscale. The similarity of results between male and female teachers was consistent within each country and between the two countries. Also, the same results were observed between actual teaching, and preferred teaching and curriculum.

**Table 7: Means by gender on the Planning Actual scale**

Country	Gender	Intellectual Quality	Connected Knowledge	Social Support	Recognition of Difference
Indonesia	Female	4.0	3.6	3.1	3.7
	Male	4.0	3.9	3.1	3.9
Australia	Female	4.0	2.8	1.8	3.0
	Male	4.0	2.8	2.1	3.1
Combined	Female	4.0	3.4	2.7	3.5
	Male	4.0	3.5	2.7	3.6
	<b>Total</b>	<b>4.0</b>	<b>3.5</b>	<b>2.7</b>	<b>3.6</b>

Table 8 represents the analysis of data by level of teaching for each country and the total sample on the scale Planning Actual. With the Indonesian cohort, there are no significant differences between teachers who identified as junior or senior teachers on the scale of Planning Actual on any of the PP dimensions. This was consistent on the scales of Planning Preferred, Teaching Actual and Teaching Preferred. However, some differences

appeared with the Australian cohort. Senior school teachers put more focus on Connected Knowledge and on providing Social Support than junior school teachers. These are somewhat surprising results. Middle school mathematics and science are often seen as more applicable to the real world outside the classroom. However, in the sample we did not differentiate between academic mathematics and science subjects at the senior level and other less academic subjects. Similar patterns were observed in the scales Curriculum Preferred, Teaching Actual and Preferred scales.

**Table 8 Means by level of teaching on the Planning Actual Scale (\*)**

Country	Level	Intellectual Quality	Connected Knowledge	Social Support	Recognition of Difference
Indonesia	Junior	4.0	3.8	3.9	3.4
	Senior	4.1	3.7	3.7	2.8
Australia	Junior	3.9	2.3	2.6	1.7
	Senior	3.9	3.0	3.2	2.0
Combined	Junior	4.0	3.6	3.7	3.1
	Senior	4.0	3.4	3.5	2.5
	<b>Total</b>	<b>4.0</b>	<b>3.5</b>	<b>3.6</b>	<b>2.7</b>

(\*) shaded area denotes significant differences

**Table 9: Means by subject taught on the Planning Actual Scale (\*)**

Country	Subject	Intellectual Quality	Connected Knowledge	Social Support	Recognition of Difference
Indonesia	Maths	4.0	3.8	2.8	3.8
	Science	4.1	3.7	3.3	3.8
Australia	Maths	3.8	2.6	1.8	3.0
	Science	3.9	3.1	2.2	3.3
Combined	Maths	4.0	3.4	2.5	3.6
	Science	4.0	3.6	3.0	3.6
	<b>Total</b>	<b>4.0</b>	<b>3.5</b>	<b>2.7</b>	<b>3.6</b>

(\*) shaded area denotes significant differences

Table 9 reports on the means of the different groups of teachers by the subject taught for each country and total sample on the scale Curriculum Actual. There are no differences on many of the subscales in both countries. However, in the Australian cohort, science teachers tend to put more emphasis on connection of subject matter to previous learning and the outside world than mathematics teachers. Similarly, they plan for more Social Support than their mathematics counterparts. In Indonesia, science teachers tend to put more focus on Social Support than mathematics teachers. Similar patterns were observed on the other scales of Curriculum Preferred, Teaching Actual and Teaching Preferred. It is interesting to note

that, in general, subject matter differences were greater than the level of schooling or gender of the teacher in this study. From these results, it would seem that there may be a variation in the needs of teachers of the different subjects with respect to improving their practice.

### *Pedagogical beliefs and focus of curriculum*

While, the use of a questionnaire in this study does not allow us to make informed judgements on the role of the curriculum that the teachers are supposed to implement and their pedagogical beliefs, the above results point out some very interesting – and arguably surprising – observations that both indicate the need for further research and possibly imply different types of action to assist classroom reform.

From the discussion above with regard to the different changes in the curriculum in both countries during the recent past, it would appear that the consideration of equity and diversity are more directly highlighted in the Australian curricula. One would have expected that Australian teachers would value dimensions such as Social Support and Recognition of Difference to be more valued by Australian teachers in both planning and implementing their teaching. Perhaps one of the most surprising findings in this study is that the opposite is the case. Naturally, this raises the need for further investigations using different methodologies. First, future research should explore the teachers' understanding of these dimensions. Such an understanding can be obtained by research that uses interviews and focus groups. Secondly, there is a need to investigate how these dimensions are manifested in the actual classroom practices. Research that uses classroom observations may shed some light on this.

Lastly, based on further investigation, professional development activities that aim at improving the teaching and learning in both contexts should be contextualised to take into consideration teachers' understandings, beliefs and actual practices in order to achieve the maximum benefit of efforts to reform teaching in both countries.

### **Concluding Remarks**

In spite of the limitations in the sampling and design of the pilot study, it is interesting to point out some patterns in the data. As a whole, this group of teachers in the study do not seem to equally value all four dimensions of the Productive Pedagogy framework. In particular the teachers tend to value more the development of the Intellectual Quality of their students over the need to present a curriculum that is connected to students' background knowledge and life outside the classroom. Even less emphasis is devoted to providing Social Support for their students. Interestingly, the gender of the teacher does not seem to be related to these patterns. However, science teachers over all did report a higher focus on social support than mathematics teachers. Lastly the difference between junior and senior school teachers on their valuing of social support was noted only in Australia – however, this difference may have resulted from the small sample of Australian teachers at the junior level.

An important observation to make is that, in general, teachers responses tend to reflect different scores on their preferred and actual dimensions of the questionnaire. This points out to the need for further in-depth research in both contexts into the contextual pressures that teachers find themselves in that prevent them from actualising what they consider to be important to do. Similarly, these possible contextual factors should be taken into account in any intervention programs that aim to reform teaching and learning in both subjects and in both countries.

As stated in the introductory comments of this paper, the purpose here is not to present simple benchmarking of teachers in the different contexts. On the contrary, it points to deep problems with any attempt to simply provide measures that point to differences unless the context of the curriculum is taken into consideration. We planned this study as a

pilot study to indicate some differences that may lead to further investigation and understanding of teachers' beliefs, their relationship to classroom practices and eventually for collaborations towards reforming practice. Arguably the main benefit of this type of research is not the measurement of teachers' beliefs but the potential of leading to action to improve teaching. It is hoped that further research might not only look at measuring beliefs but understanding of the contextual factors that give rise to it and to conduct interventions to change it towards improving practice. In the least, this study points to the observation that a universal program that is designed to reform teachers' beliefs and actions in teaching cannot be one-size-fits-all. It has to take local conditions into account.

#### Acknowledgement

This article is partly sponsored by the Ministry of National Education of the Republic of Indonesia 2009

#### References

- Applefield, M., Huber, R. & Moallem, M. (2000). Constructivism in Theory and Practice: Toward a Better Understanding. *The High School Journal*, 84(2) 35-53.
- Atweh, B. (2007). Professional development, capacity building and action research. In B. Atweh, et al. (Eds.), *Ripples of change: A journey in preservice teacher education reform in the Philippines*. Manila Philippines: Commission of Higher Education.
- Atweh, B. & Brady, K. (2009). Socially Response-able Mathematics Education: Implications of an Ethical Approach. *Eurasia Journal of Mathematics, Science and Technology Education*, 5(3) 135-143.
- Australian Education Council. (1990). *A National statement on mathematics in Australian schools*. Victoria: The Curriculum Corporation.
- Clark, D. (2003). International comparative research in mathematics education. In A. Bishop, M. A. Clements, C. Keitel, J. Kilpartick, & F. Leung (Eds.), *The second international handbook of mathematics education*. Dordrecht: Kluwer Academic Publishers.
- Committee of Inquiry into Education in Western Australia. (1984). *Education in Western Australia: A report of the committee of inquiry into education in Western Australia*. Perth: Government Printer Depdiknas. Kurikulum Nasional (Kebijakan Umum Pendidikan Dasar dan Menengah). Jakarta: Depdiknas.
- Creswell. J. (2005). *Educational Research: Planning, conducting and evaluating quantitative and qualitative research*. Merrill Prentice Hall: New Jersey.
- Depdiknas. (1994). Kurikulum Nasional (Kebijakan Umum Pendidikan Dasar dan Menengah). Jakarta: Depdiknas.
- Depdiknas, (2003), Undang-Undang Nomor 20 Tahun ps 50, Jakarta: Depdiknas
- Depdiknas. (2004). Kurikulum berbasis kompetensi (Kebijakan Umum Pendidikan Dasar dan Menengah). Jakarta: Depdiknas.
- Depdiknas. (2005). Peraturan Pemerintah (PP) Nomor 19 Tahun Standar Nasional Pendidikan (SNP) ps 6. Jakarta: Depdiknas.
- Depdiknas. (2006). Kurikulum Tingkat Satuan Pendidikan (Kebijakan Umum Pendidikan Dasar dan Menengah). Jakarta: Depdiknas.
- Hayes, D., Mills, M., Christie, H. & Lingard, B. (2006). *Teachers and Schooling making a difference: Productive Pedagogies, Assessment and Performance*. NSW: Allen & Unwin.
- Kagan, D. M. (1992). Implications of research on teacher belief. *Educational Psychologist*, 27(1), 65-90

- Kaiser, G. (1999). International comparisons in mathematics education under the perspective of comparative education. In G. Kaiser, E. Luna, & I. Huntley (Eds.), *International comparisons in mathematics education* (pp. 3-18). London: Falmer Press.
- Luke, A. (1999). *Education 2010 and new times: Why equity and social justice still matter, but differently*. Education Queensland online conference.  
<http://education.qld.gov.au/corporate/newbasics/docs/onlineal.doc> (accessed July 1, 2010).
- Mills, M., Goos, M., Keddie, A., Honan, E., Pendergast, D., Gilbert, R., Nichols, K., Renshaw, P., & Wright, A. (2009). Productive pedagogies: A redefined methodology for analysing quality teacher practice. *Australian Educational Researcher*, 36(3), 67–87.
- Newmann, F. & Associates (1996). *Authentic achievement: Restructuring schools for intellectual quality*. San Francisco: Jossey Bass.
- Neyland, J. (2010). *Rediscovering the spirit of education after scientific management*. The Netherland: Sense Publishers.
- Queensland School Reform Longitudinal Study. (1999). *Final report*. Volume 1 & 2. Brisbane: The University of Queensland.
- Raths, J. & McAninch, A. (2003). *Teacher beliefs and classroom performance: The impact of teacher education*. Information Age Publishing.
- Western Australia Curriculum Council (1998). *Curriculum framework for kindergarten to year 12 education in Western Australia*. Perth: The Western Australian Curriculum Council.

#### Acknowledgement

This article is based on the joint research project sponsored jointly between the Ministry of National Education of the Republic of Indonesia and the Science and Mathematics Education Centre at Curtin University

## Appendix

### Sample Questions from Questionnaire

The list below outlines a number of aspects that can be emphasised in delivering curriculum to students. Indicate how much emphasis you place on these aspects of teaching (Actual emphasis).

	Great emphasis	considerable emphasis	Some emphasis	Little emphasis	No emphasis
Content specific knowledge	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
Higher order thinking	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
Social and personal competence	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>

The table below outlines a number of approaches that can be emphasised in teaching. Indicate how much emphasis you give to these approaches when you teach your students (Actual emphasis).

	Great emphasis	considerable emphasis	Some emphasis	Little emphasis	No emphasis
Investigating a significant problem	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
Connecting ideas & knowledge across subject areas	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
Appreciating and valuing cultural differences	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
Using other technologies for a range of learning activities	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
Conducting practical activities	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>