

# Australian Pre-Service Teachers Overseas Tour: Implications for Mathematics Teaching and Learning

Allan Leslie White  
*University of Western Sydney*  
<al.white@uws.edu.au>

Australian pre-service teachers have to acquire layers of knowledge as school classrooms are multicultural in composition. To what extent does the experience of an overseas professional experience tour contribute to the development of pre-service teachers in meeting recognised professional teaching standards? This paper describes the perceptions of Australian pre-service mathematics teachers who participated in educational and cultural activities during planned tours to Malaysia. The data set was collected through the use of questionnaires, interviews and focus group discussions.

The University of Western Sydney (UWS) is unique in the extent of cultural diversity among the students and staff, with students originating from around 170 different international backgrounds (Ingleson, 2009). Nearly half of the Australian students are from non-English speaking backgrounds. Teaching is becoming increasingly globalised in terms of teachers and their careers (Ministerial Council on Employment, Education, Training & Youth Affairs (MCEETYA), 2002), and teacher education cohorts in Australia are more diverse with increasing numbers of international students (Lee, 2011). UWS reflects the composition of Australian school classrooms which are multicultural and thus broad cultural understanding and knowledge are important to pre-service teachers' knowledge base (Clarke, Shimizu, Ulep, Gallos, Adler, & Vithal, 2006). One of the goals of UWS policy is to "maximize the number of UWS pre-service teachers who have an international experience during their program of study" (Ingleson, 2009, p. 3). In response to the goals of UWS, the School of Education has a history of conducting Overseas Professional Experience Program (OPEP) for pre-service teachers in such countries as Malaysia, Fiji, Cook Islands and China. Currently OPEP is a fundamental platform of the UWS School of Education's strategy to 'internationalise' its teacher education programs, but there is considerable outside pressure to discontinue this program.

The pressure on overseas professional experience comes from a variety of sources such as the formation of national and state institutes of teachers which have influenced pre-service education programs to focus more strongly upon preparing teachers for local schools. Thus universities offering overseas professional experience programs have dropped significantly because they are seen as a tourist activity rather than a preparation for pre-service teachers who will need to meet local accreditation requirements. This study challenges this view by analysing the learning of pre-service teachers who have completed an OPEP tour in terms of Australian teaching standards and draws on data from two evaluation studies (Ng & White, 2011; White & Ng, in press). The question addressed in this paper is: To what extent does the experience of the OPEP tour contribute to the professional development of pre-service teachers in meeting the Australian Association of Mathematics Teachers (AAMT) professional teaching standards?

## Review of Literature

Pre-service teachers require particular types of knowledge (Shulman, 1986, 1987; Hill, Ball & Schilling, 2008). Ponte and Chapman (2008) in their review of pre-service mathematics teachers' knowledge and development, gave special attention to: "(1) the

development of the mathematical knowledge of prospective teachers; (2) the development of their knowledge of mathematics teaching; and (3) the development of their professional identity" (p. 254). The acquisition of this knowledge occurs in a socio-cultural environment and involves other teachers as mentors and university teacher educators. There have been a number of other proposed lists or frameworks. One arising out of the USA context by Villegas and Lucas (2002) recommended that pre-service teacher programs systematically interweave the following six salient characteristics throughout the coursework, learning experiences, and fieldwork of pre-service teachers to better prepare them to work successfully in culturally and linguistically diverse classrooms. These include: (i) socio-cultural consciousness, that requires pre-service teachers to critically examine their own socio-cultural identities and the inequalities between schools and society that support institutionalized discrimination; (ii) an affirming attitude toward students from culturally diverse backgrounds through respecting cultural differences and by adding activities related to the culture of the students; (iii) commitment and skills to act as agents of change to confront barriers to change, and skills for collaboration and to assist schools in becoming more equitable over time; (iv) constructivist views of learning that assumes all students are capable of learning, and that teaching promotes critical thinking, problem solving, collaboration, and the recognition of multiple perspectives; (v) learning about students' past experiences, home and community culture, and world both in and outside of school to build relationships and use of these experiences in the context of teaching and learning, and; (vi) culturally responsive teaching strategies to assist students construct knowledge, build on their personal and cultural strengths, and experience the curriculum from multiple perspectives.

Pre-service teachers sometimes report experiencing resistance by students to attempts to introduce newer pedagogies while on professional teaching experience placements in schools. The research by Brousseau (1984) on 'didactical contracts' helps to explain the pre-service teacher's frustration. The didactical contract encompasses the conscious and subconscious beliefs, behaviours and relationships that guide and control what teachers and students do within mathematics lessons. His research shows that once teachers and students become accustomed to an approach then they resist any change. Teachers and students develop sets of ingrained actions that arise from, yet simultaneously determine, didactical contracts. The teachers and their students have reciprocal expectancies, and their actions tend to become economical in the sense that they are guided by expectations of what can and cannot be done in lessons. Although these expectations generate common classroom practices, it is usually the case that neither the teacher nor the students subject the expectations to reflection or scrutiny. A teacher attempting a different pedagogy may be subjected to cries of 'is this in the test?' Similar findings have been reported in Brunei (Lim, 2000), and New Zealand (NZ) schools. Barton (2003) maintained that in NZ classroom settings, didactical contracts influence teachers' aims, methods, behaviours, content covered, and choice of procedures for assessing learning.

The AAMT (2002) published the *Standards for Excellence in Teaching Mathematics in Australian Schools* document as representing a consensus view, by the profession for the profession, describing the knowledge, skills and attributes required for good teaching of mathematics. These *Standards* are structured using the three domains of professional knowledge, professional attributes and professional practice.

Professional knowledge comprises: knowledge of students including their social and cultural contexts, the mathematics they know and use, their preferred ways of learning, and how confident they feel learning mathematics; knowledge of mathematics; and, knowledge of students' learning of mathematics. Professional attributes comprises: personal attributes;

personal professional development; and, community responsibilities. Professional practice comprises: the learning environment; planning for learning; teaching in action; and, assessment. These three domains will be elaborated in more detail as needed during the discussion section.

Studies involving international professional experience programs make claims of greater professional autonomy and resourcefulness (Hill, Thomas & Cote, 1997), empowerment (Yarrow & Miller, 2006), and greater resilience, personal growth and confidence to innovate (Fitzsimmons & McKenzie, 2006).

It can be argued that the OPEP tours fall into the area known as service learning, that is pre-service teachers learn while serving the students in culturally and educationally different schools. The basic components of service learning are experience, reflection, and knowledge which are regarded as mutually interdependent and reciprocal. The structure of the tours creates opportunities for all the participants to interact with these basic components. The long term benefits, as the literature suggests, are that the pre-service teachers participating in service learning are highly likely to: improve academically (Sax & Astin 1997; Fredericksen 2000); use a more engaged form of learning in their classrooms (Eyler & Giles 1999); and use the skills of critical thinking and analysis in other arenas (Roschelle, Turpin & Elias, 2000; O'Hara 2001).

The AAMT framework was chosen because it is applicable to the participants in this study. This study seeks to test these claims by examining if the experience of the tours contributes to the professional development of pre-service teachers in meeting the AAMT professional teaching standards.

## Methodology

This paper reports a selection of data from two larger evaluation studies of the 2010 and 2011 OPEP tours (Ng & White, 2011; White & Ng, in press). The studies used a mixed model research design with a combination of quantitative and qualitative aspects while the theoretical basis for the evaluation was guided by the principles articulated by Guskey (2000).

### *Sample*

The tour groups include pre-service teachers from secondary (across a range of subjects), primary and early childhood learning contexts. Australian pre-service teachers teach mathematics as either a specialist in the discipline (such as in secondary schools) or along with other subjects (such as in primary schools). In Malaysia, primary and secondary teachers are specialists in the discipline.

In 2010 the pre-service mathematics teaching sample of the tour participants included one primary teacher and three secondary mathematics teachers, and in 2011 there were four primary teachers and one secondary mathematics teacher.

The pre-service teachers spend two weeks teaching in Penang Island schools. In 2010 six Malaysian schools were involved (1 primary, 5 secondary schools) and in 2011 there were four schools (2 primary and 2 secondary). The schools are allocated by the Penang State Education Department.

### *Instruments*

Data were collected at different times using a variety of instruments and groups of participants for the purposes of triangulation. The data came from UWS pre-service teachers and staff, Malaysian students, school administrators and teachers. Data collection was

mainly done via questionnaires administered to school Malaysian administrators or teachers and Australian pre-service teachers, interviews with pre-service teachers, and focus group interviews conducted with groups of Malaysian primary and secondary students.

The pre-service teachers' questionnaire was a combination of a short answer demographic information section, a Likert scale section based on the first four levels of Guskey's (2000) scale, and three open-ended questions probing responses to the Likert scale. The questionnaire was adapted from the instruments administered during similar programs in the Malaysian context from previous years. The pre-service interviews consisted of a number of open-ended questions and were analysed according to emerging themes. The focus group interviews of Malaysian students in both primary and secondary schools consisted of a number of open-ended questions and students were encouraged to volunteer their opinions. Focus group discussions were recorded, transcribed and key themes identified.

Data were extracted for the mathematics teaching pre-service teachers from the larger evaluation data set.

## Results and Discussion

The limitations of the data arising from the small sample size and because it was collected for other purposes demand caution when discussing the significance and implications of the findings. However, within these limitations, the data reveals some interesting observations that could provide direction for future studies. The tour provided a unique context for pre-service teacher learning. During the school weeks the teachers worked together every night with the two UWS staff in an intensive process of preparing, discussing and reflecting upon their teaching. This section is divided according to the dimensions listed in the AAMT Standards (2002) and will be supported by the use of the participants' voice through direct quotes. However, the content of the quotes often ranges across more than one dimension.

### *Professional Knowledge*

This section in the Standards is divided into knowledge of students, of mathematics, and of students' learning of mathematics.

An issue reported by all pre-service teachers was that of dealing with differences in context and culture from a position of being an outsider. Although most of the pre-service teachers had taught in Australian classrooms with mixed abilities, a range of learning styles and communication issues, they found that in the Malaysian classes their awareness of these issues was enhanced. "By being in the minority instead of the majority, I believe I have developed a greater empathy with students in the same position" (pre-service teacher Epsilon).

The pre-service teachers' responses to the open questions reflected a greater awareness of the needs of students which motivated the pre-service teachers to reassess their teaching. The following responses are typical of the sentiments expressed by the pre-service teachers: "I will be more tolerant and patient with [students of] different cultural background or [who] are struggling with English" (pre-service teacher Alpha). And,

I have developed a better understanding of the Muslim religion, Malay, Chinese and Indian cultures, and that students no matter what [the] cultural background have different learning styles and [it] confirmed my beliefs that a mixture of strategies need to be used to facilitate their learning. (student Delta).

From the analysis on participants' reactions towards the tour, all reported they had benefited from the program in terms of the involvement with the teaching and learning process, the positive interaction with the school students, resulting in the pre-service teachers developing an affirming attitude toward culturally diverse backgrounds and in respecting cultural differences. The tour contributed to participants' socio-cultural consciousness, and allowed the pre-service teachers to critically examine their own socio-cultural identities and the inequalities between schools and societies (Villegas & Lucas, 2002).

Knowing what I know now about their culture will completely change the way I run my classroom. You may think that a student with poor English is a little bit different, but it is more than that. You really have distinct differences. I need to listen more and allow the kids to teach me before I start to teach them. This tour has opened my eyes (pre-service teacher Gamma).

When asked about the mathematics that they had to teach, the pre-service teachers reported that it was generally similar to what they were expected to teach in Australia. However the primary pre-service teachers commented upon the Malaysian primary schools being examination focused, having specialist subject teachers and the teaching of subjects rather than integrated learning units. Both primary and secondary pre-service teachers observed that students were reticent in answering questions unless they were certain they were correct. The students were also more focused on the answer and not on the process for obtaining the answer.

The Malaysian people are perfectionists in education. Students are taught to stand and greet the teacher on entering the room. Some students will thank the teacher at the end of the lesson. Students are unwilling to volunteer information unless they are 100% sure they are correct. They don't care how the answer was worked out, as long as it is correct (pre-service teacher Zeta).

The students were contributors to the pre-service teachers' new knowledge of students' learning of mathematics. There was common agreement across all student focus groups that they enjoyed and were excited at having a pre-service teacher as their teacher. When asked why, they used words such as: 'newness', 'different', 'younger', 'interesting', 'explain clearer' and 'funnier'. They all mentioned enjoying talking to the pre-service teachers as an opportunity to use and improve their English language. They also liked telling the pre-service teachers about their lives and culture. The Malaysian teachers commented positively on the more relaxed relationship between the students and the Australian pre-service teachers.

While it is unrealistic to think that a two week interaction will greatly change the students' proficiency with English, what came through strongly from all groups, was that they were motivated to communicate in English. The students felt comfortable with making errors in their engagement with the pre-service teachers. Whether the excitement and motivation will remain after the teachers leave was beyond the scope of this study.

### *Professional Attributes*

This dimension includes personal attributes, personal professional development, and community responsibilities. The OPEP tour is voluntary and fully funded by the pre-service teachers. UWS only covers staff costs. The demographic information was very diverse. The pre-service teachers listed enthusiasm for mathematics as an essential attribute for engaging the class.

When I got passionate about what I was teaching the children became excited. They also responded to any jokes I told no matter how lame they were. Four of the girls told me that my lessons were the

first mathematics ones they had enjoyed. I felt so good and I was inspired to do better (pre-service teacher Kappa).

The majority of pre-service teachers responded positively regarding the impact of the collaboration and cohesive group relationships that developed because of the nightly lesson planning process. They felt the process accelerated their personal professional development as teachers and used words such as enhanced self-efficacy, fostered critical reflection, reassessed ways of thinking, new ideas and problem-solving.

I learnt so much from the others and made such good friends that I will find it difficult when I am on my own. I will probably keep in touch using Facebook so I won't be fully on my own. For the first time I really feel that I can be a teacher (pre-service teacher Iota).

### *Professional Practice*

This dimension includes the learning environment, planning for learning, teacher in action, and assessment.

The schools altered their organization to cater for the pre-service teachers through flexible schedules for teaching, observation and an alterable timetable to enable involvement in other co-curricular activities and enrichment exposure, e.g. sports, trips, staff development, in-service training or meeting.

All pre-service teachers commented on the development of a sense of confidence and of autonomy. They compared overseas with local professional teaching experiences and reported having made greater advances as a consequence of their teaching overseas. A typical response was:

Thank-you for giving me the opportunity to be part of this amazing experience. I have been stretched 'out of my comfort zone' and this has helped me to hone my skills and give me confidence in my ability to facilitate students learning (pre-service teacher Beta).

A key area was in the understanding of cultural and language issues and how to support second language learners and how to organise for inclusive education in a mathematics classroom. The pre-service teachers discussed the strategies that they developed such as constantly assessing comprehension, allowing more think time, speaking slower and repeating key phrases and breaking down tasks in their planning. Most reported modeling, and explaining mathematics in spoken, written, non-verbal and visual forms. They taught students how and why to do group work in mathematics, to speak to peers and in front of the class and how to listen to English instructions. They reported a greater awareness of the literacy issues around the teaching of mathematics.

I developed pedagogical skills for teaching English to second language learners. Children are becoming more globalised, so similar interests between students can be used to engage students. [I learnt] not to underestimate some abilities and how to modify lessons not only for ability but cultural understanding (pre-service teacher Epsilon).

The primary pre-service teachers made some observation regarding the workings of the primary classrooms. The teaching of mathematics, while taught by a mathematics specialist, was largely focused on the external examination and the pedagogy concentrated upon the procedures for getting a correct answer. When the pre-service teachers tried getting students to develop an understanding of the underlying concepts before mastering the procedure they met resistance from the students. They found that they adjusted their pedagogy to follow the Malaysian teacher and to look for and use teachable moments to strengthen students' understanding of the concepts.

When they couldn't do the algorithm, then they would listen to me explain why and how the algorithm worked. I was just waiting for them to fail so that I could help them understand what they were trying to do (pre-service teacher Iota)

The research by Brousseau (1984) helps explain this observation. He highlighted the important role of mutual expectations between teachers and pupils in the construction of mathematics learning environments. Thus an established didactical contract in a classroom may need to be renegotiated. The Malaysian students were working with a one constructed with their regular classroom teacher. This contract appears to value the end product over the process. The students resisted the pre-service teacher's attempts to make a change.

## Conclusion

The paper has briefly argued that teaching is becoming increasingly globalised in terms of teachers and their careers (MCEETYA, 2002). Teacher education cohorts in Australia are more diverse with increasing numbers of international pre-service teachers (Ingleton, 2009; Lee 2011) and there is a need for pre-service teachers developing skills to work in a range of Australian teaching contexts that are multicultural.

This paper examined the OPEP program's contribution to the professional development of pre-service teachers in meeting the AAMT (2002) professional teaching standards. The data presented in this paper, while limited, suggest that for this small sample there is evidence that the experiences of the tour made a positive contribution to the pre-service teachers professional knowledge, professional attributes and professional practice. The tour contributed to the development of pre-service teachers' cross-cultural understandings, empathy and skills as a result of experiencing different traditions. Whether this can be generalized for all tours and for larger cohorts must be left to further research.

Thus an overseas professional experience program is much more than a mere tourist activity and exhibits the potential for making a positive contribution to the preparation of pre-service teachers.

## References

- Australian Association of Mathematics Teachers (AAMT)(2002). *Standards for excellence in teaching mathematics in Australian Schools*. Adelaide: Author.
- Barton, B. (2003). The Mathematics Enhancement Project: Using the concepts of cultural conflict, critical mathematics education, and didactic contract. In L. Bragg, C. Campbell, G. Herbert & J. Mousley (Eds.), *Mathematics education research: Innovation, networking, opportunity* (Proceedings of the 26th Annual Conference of the Mathematics Education Research Group of Australasia, Vol. 1, pp. 137–143). Geelong, Australia: Mathematics Education Research Group of Australasia.
- Brousseau, G. (1984). The crucial role of the didactical contract in the analysis and construction of situations in teaching and learning mathematics. In H. G. Steiner (Ed.), *Theory of mathematics education* (pp. 110–119). Bielefeld, Germany: Universität Bielefeld.
- Clarke, D. J., Shimizu, Y., Ulep, S. A., Gallos, G., Adler, J., & Vithal, R. (2006). Cultural diversity and the learner's perspective: Attending to voice and context. In F. K. S. Leung, K-D Graf, F. J. Lopez-Real (Eds.), *Mathematics education in different traditions – A comparative study of East Asia and the West* (pp. 353-380). New York, NY: Springer.
- Eyler, J., & Giles, D. E. (1999). *Where's the learning in service-learning?* San Francisco: Jossey-Bass.
- Fitzsimmons, P., & Mackenzie, B. (2006). Super or superfluous in the South Pacific? Unearthing the benefits of an overseas teaching practicum. *Journal of Research in International Education*, 5, 177- 89.
- Fredericksen, P. (2000). Does service learning make a difference in student performance? *The Journal of Experiential Education*, 23, 64-74.
- Guskey, T. R. (2000). *Evaluating professional development*. Thousand Oaks, California: Corwin Press.
- Hill, H. C., Ball, D. L., & Schilling, S. G. (2008). Unpacking pedagogical content knowledge: Conceptualizing and measuring teachers' topic-specific knowledge of students. *Journal for Research in Mathematics Education*, 39, 372–400.

- Hill, B., Thomas, N. & J. Cote (Eds.) *Into Asia: Australian Teaching Practicums in Asia*. Carlton, Victoria. National Project of the Partnerships and Professional Development Program, Asia Education Foundation.
- Ingleson, J. (2009). *International framework 2009 - 2013*. Penrith, Sydney: University of Western Sydney.
- Lee, J. K. F. (2011). International Field Experience – What do student teachers learn? *Australian Journal of Teacher Education*, 36, 10, 1-22.
- Lim, T. H. (2000). *The teaching and learning of algebraic equations and factorisation in O-level Mathematics: A case study*. Unpublished M.Ed dissertation, Universiti Brunei Darussalam.
- Ministerial Council on Employment, Education, Training & Youth Affairs, (MCEETYA) (2002). *Demand and supply of primary and secondary school teachers in Australia*. Retrieved October, 10, 2011 <http://www.mceetya.edu.au/public/demand.htm#intro>
- Ng, K. T., & White, A. L. (2011). *Programme Evaluation Report: Australian Pre-Service Teachers Overseas Educational and Cultural Tour 2010*. Penang, Malaysia: RECSAM
- O'Hara, L. S. (2001). Service-Learning: Students' transformative journey from communication student to civic-minded professional. *The Southern Communication Journal*. 66, 251-266
- Ponte, J. P., & Chapman, O. (2008). Preservice mathematics teachers' knowledge and development. In L. D. English (Ed.), *Handbook of international research in mathematics education* (2nd ed., pp. 223-261). New York: Routledge.
- Roschelle, A. R., Turpin, J., & Elias R. (2000). Who learns from service learning? *The American Behavioral Scientist*. 43, 839-847.
- Sax, L. J., & Astin, A. W. (1997). The benefits of service: Evidence from undergraduates. *Educational Record*, 78, 25-32.
- Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 15(2), 4-14.
- Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, 57, 1-22.
- Villegas, A. M., & Lucas, T. (2002). *Educating culturally responsive teachers*. Albany, NY: State University of New York Press.
- White, A. L., & Ng, K.T. (in press). *Similarities and differences: A Malaysian and Australian research study*. Penang Malaysia: SEAMEO RECSAM.
- Yarrow, A., & Millwater, J. (1992). *The mathematical practicum in teacher education: A research report of the work of one institution*. Brisbane, Queensland Institute of Technology.