

## **An Australian mathematics educator in south-east Asia: globalisation has virtually changed everything**

**Allan Leslie White**  
University of Western Sydney

### **The universal and the particular**

Globalisation is a familiar and inexact term that has been associated with current multiple and significant changes happening in all areas of social life, particularly economics and culture (Stromquist & Monkman, 2000). The word itself portrays a process of universal influence that is apparent in some attempts at defining this catch-all term such as:

the processes through which sovereign national states are criss-crossed and undermined by transnational actors with varying prospects of power, orientations, identities and networks (Beck, 2000, p. 11).

Levin (2001) studied the effects of globalisation upon seven educational institutions and while they differed in history, geography, community composition and regulatory frameworks similar forces directed their organizational responses. He described how university educators are compelled to respond to social contexts constituted and regulated by regional, national and multinational flows of ideas and information, capital, material and artefacts. Levin discussed how many of the patterns and practices of everyday life are shifting and changing at different rates in response to the powerful global processes that often appear beyond immediate local control, belief or even comprehension. Thus Levin is emphasizing the homogenizing aspects of the globalisation processes. Clarke (2003) argued that the globalisation of mathematics education, if it were to exist, would be evident in the extent a specific mathematics curriculum (policy and practice) was present in all school systems.

But how homogeneous and universal is the influence and impact of globalisation? Globalisation processes are transnational and have resulted in the increasing standardization of some areas yet they are only partly constitutive of local realities. Globalisation is not a predetermined force that moulds local contexts into uniform shapes (Singh, 2004). Yet local contexts cannot be completely understood in strictly local terms (Lee, 2000). Stromquist and Monkman (2000) point to the efforts of groups to recapture traditional values and identities as unintended effects of globalisation and the reaction of local contexts (for example the Indians in Latin America). Green (1999) presents evidence of the mutual influence of global and local in terms of convergence and divergence:

There is clear evidence of policy convergence within Europe and East Asia around a range of broad policy themes: including lifelong learning; internationalization in higher education; decentralization in regulation and governance; increasing use of evaluation and quality control measures; and the need to bring education and work closer together. However, this does not appear to have lead to any marked convergence in structures and processes... What is apparent is that each country has responded in practice to common



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problems in different ways in line with its particular traditions and ET (Education and training) model characteristics (p. 69).

In an attempt to name this process of mutual influence, Robertson (1995) uses the term 'glocalization' whereby the global and the local interpenetrated each other, creating a hybrid. This hybrid contains sources of global trends adapted and blended with local conditions and options. Lee (2000) provides an example of the Malaysian education hybrid that has on the one hand standard subjects such as mathematics, social studies and the almost identical classroom hours devoted to each which are observable across nation states. And on the other hand, the local influence of the Islamic movement has resulted in an emphasis on the teaching of moral values across the curriculum. Thus global trends are recontextualised by the specific local settings.

This paper involves a local context of an Australian university operating in an environment exposed to the processes of globalisation. The paper will attempt to explore issues that arise as the universal and the particular interpenetrate. Globalisation or transnational effects will have an influence upon local Australian university education and curricula, but what are the issues and challenges that arise for an educator working in pre-service mathematics education as a result of the tensions between global and local contexts? For example, are teaching and learning strategies transportable across countries or are they specific to the local context? To explore these issues, the paper will consider briefly the processes of globalisation that are influencing the Australian Higher Education (AHE) system. Then the paper will concentrate upon the local context of an Australian tertiary mathematics educator (ATME) and the educator's responses to the challenges and issues that have arisen. And finally, an attempt will be made to determine if some responses have possible consequences for higher education beyond the local context.

## Global context

Globalisation theories often emphasise different processes involving economic, cultural, technological and political aspects (Stromquist & Monkman, 2000; Singh, 2004). Thus globalisation has many important implications for the policies, pedagogies and politics involving mathematics education in universities. Globalisation manifests itself through the dimensions of ecology, economics, culture, civil society, work organisation including the destabilisation of the patterns of university professional work, and information communication technologies (ICT), where the speed brought about by the current technologies vastly surpasses earlier times (Kirkbride, Pinnington, & Ward, 2001).

In the area of global economic and political decision making the market and the transnational corporations are seen as very important (Stromquist & Monkman, 2000). The power exercised by these two players may not benefit all, thus in the market education and knowledge may be seen as components in the attainment of competitiveness and thus accessibility may be limited and controlled. Transnational organizations can provide knowledge management systems as a means around this access issue, but others are highly critical of their impact (Stromquist, 2002). The power of the market is also evident in the influence of business upon education.

At local levels, there is an increased presence of business in cooperation with the schools, determining what constitutes quality and what is needed (Stromquist & Monkman, 2000, p. 6).



The forces of the market have impacted upon AHE resulting in education becoming increasingly commodified, with transnational education in Australia now exceeding wheat as an export earner (Lee, 2000, p. 327).

Australian academics work in a context where educational export in 2004 has exceeded \$5 billion to become the third largest export after tourism and individual transport and seventh largest national export of all goods and services (Atweh & Clarkson, 2005, p. 110).

Australia has mirrored the global trend of neo-liberal economic ideologies whereby the state limited its role to basic education and extracted user fees from higher levels of public education as any other service in the market place (Stromquist, 2002). Thus universities are expected to become self-supporting and students are expected to pay for the service they receive. In the late 1980s the Hawke Government Minister John Dawkins administered significant structural changes to AHE.

Dawkins' restructuring had the purpose, since realized, of greatly expanding AHE participation rates. To fund this expansion Dawkins altered the funding arrangements for AHE, primarily through the introduction of a local graduate tax system, the Higher Education Contribution Scheme (HECS) and fees for overseas students. Prior to the Dawkins funding changes 90% of AHE was government funded. The level of government funding was declining gradually under the Labor administration of Keating with the balance being taken up by the new HECS and fee based funding arrangements. However the Howard Government funding arrangements have led to a dramatic decline of over 6.9% per student between 1995 and 1999 (Cripps, McMahon & Seng, 2002, p. 4).

There has been a steady increase in the Higher Education Contribution Scheme (HECS) payments by students. With the federal government's tighter controls on over-enrolments the result has been increasing competition amongst universities for a declining number of students.

Stromquist (2002, p. 128) included the performance of schools of education in training teachers as a global challenge. Green (1999) provides the background for such a trend, situating it in global demographic trends involving ageing of populations and workforces in the advanced nation states. The declining size of the youth cohort and the ageing of the teaching population created challenges with teacher recruitment and retention. A recent submission to the Senate Inquiry into Higher Education in Australia by the Australian Mathematical Association reported that the Australian context would experience a shortage of mathematics teachers as a consequence of an ageing teaching force and an inadequate supply of pre-service mathematics teachers. The submission highlighted:

A dramatic fall over the last decade in the number of secondary students studying the more advanced mathematics subjects and a lack of appropriately qualified staff (Carey, Guttman, & Thomas, 2001, p. 55).

And the submission proposed that in the near future:

... there will be an emerging realization by parents and the students themselves for the necessity of mathematical competence, and that this is related to quality teaching. They



will demand the right to learn mathematics and will demand properly qualified teachers (Carey, Guttman, & Thomas, 2001, p. 58).

In a review of teaching and teacher education, the Department of Education Science and Training (DEST) (2002) reported data indicating “a recent trend towards shortages of teachers in some subject area specialisations” (p. 7). In particular the number of tertiary students in secondary mathematics education courses declined by 46% between the years 1992 and 2000, and students in combined mathematics – computing secondary education courses declined by 37% (DEST, 2002, p. 8). The Australian overall figures also showed 45.7% of current secondary teachers were aged 45 years and above in 2000 (DEST, 2002, p. 8). This current and looming shortage of mathematics teachers has created pressure on pre-service teacher programs to deliver more quickly and efficiently and this issue will be elaborated upon at a later stage in this paper.

There has been a number of responses to these global trends upon the AHE system, so that:

Today, Australia evinces a large diversity of institutions of higher education that spend a great deal of time recruiting students from within and from abroad (Stromquist, 2002, p. 107).

The recruitment of overseas students has become an important source of funds for some universities:

At present there are about 303,000 overseas students enrolled in all sectors of Australian’s education system, of which \$6 billion (Andrews, 2005) is earned from about 186,400 students enrolled in the tertiary sector (Department of Education and Training, 2005). This sector has continued to increase over the last 5 years or more by approximately 10 per cent or more. (Atweh & Clarkson, 2005, p. 110)

Many universities have enthusiastically embraced online teaching and learning in order to give them an edge in the market place. In three years from 2000 to 2002, online courses throughout the world had grown from 700,000 to 2.2 million (Stromquist, 2002, p. 124). In many cases these directions have been forced upon staff as a result of non-consultative senior management decisions. Thus policy has moved from strategic planning to continued responsiveness in order to cater for market sensitivity (Stromquist & Monkman, 2000, p. 19).

So market forces and transnational processes have resulted in the AHE system reacting in ways that resonate with responses of other nation states. Is this the case for the reader? It is appropriate now to consider how the local context has modified these responses to accommodate local concerns. How does an Australian tertiary mathematics educator engaging with, and responding to the local experiences of globalisation, cope with and adapt to the changing local and global order?

### **Australian Tertiary Mathematics Educator’s (ATME) local background context**

People experience globalisation in complex, uneven, and varied ways across different places and locales (Singh, 2004). These complex uneven and varied ways of responding by the ATME are grounded to a large part in the educator’s personal and professional background, the background and expectations of the educator’s students, and the specific local university’s responses to the global trends.



The ATME works with undergraduate and postgraduate pre-service primary and secondary mathematics teachers. He has been at his current university for the past eight years after returning from two years of living and working in Malaysia. The ATME has an extensive primary and secondary school mathematics teaching background as well as a strong network of educators and institutions in countries within South East Asia. He gained his doctorate in mathematics education in 2000.

The ATME is involved in coordinating and presenting what are regarded as 'method' units where the focus is upon mathematics pedagogical knowledge rather than content knowledge. The units attempt to prepare the pre-service students in how to teach the content of secondary school mathematics. As a result of research reporting student dissatisfaction with units that are too theoretical and academic and not paying attention to the realities of schools (Lampert & Ball, 1998), the method units have the added expectation that lecturers will model 'best practice' teaching and learning strategies. Thus there is a greater emphasis on the process of delivery and assessment. What constitutes 'best practice' is an amalgam of local and international research and practice. The students expect that these units will play a large part in preparing them for the classroom. While the foundation units (for example psychology) also do this, the method units provide the context for the foundation subjects to operate. It is usual for students to report that method units have the greatest direct relevance to their professional experience placements in schools.

Method units aim to provide pre-service teachers with a range of teaching and learning strategies to be used in their particular context. Global trends mentioned earlier involving increasing financial pressure resulted in the university seeking to maximize quality education while using fewer resources and using them more efficiently. The impact of this trend upon the local context has meant that over the past eight years at the educator's university, the ATME has witnessed a decrease in the time allocated to the units taught (15 weeks of 3 hours to 9 weeks of 4 hours), an increase in the class sizes (from average of 17 in 1998 to 28 per class in 2005), as well as a general reduction in the time allocated to complete an undergraduate or postgraduate course (a 2 year add-on Bachelor of Teaching that could be accelerated to 1 year. The majority of students choose the accelerated option). This trend contradicts Beck (2000) who wrote in response to ten errors of thinking about globalisation and education stated:

One of the main political responses to globalisation is therefore to build and develop the education and knowledge society; to make training longer rather than shorter; to loosen or do away with its link to particular jobs or occupation, gearing it instead to key qualifications that can be widely used in practice. This should not only be understood in terms of 'flexibility' of 'lifelong learning', but should also cover such things as social competence, the ability to work in a team, conflict resolution, understanding of other cultures, integrating thinking, and a capacity to handle uncertainties and paradoxes ... (pp. 137-8).

Thus the challenge of this global trend for the ATME involves the ability of the method units to deliver key knowledge and strategies that are able to be widely used in school practice and to produce reflective lifelong learners.

This section has very briefly outlined some of the challenges and constraints faced by the ATME as a result of the university's response to globalisation. What would the reader do when faced by the same challenges? The next section continues the themes of globalisation and examines some of the attempts at meeting the challenges and constraints faced by the ATME as a result of the university's response to globalisation.



## Virtual solutions to global challenges

The ATME has used research and ICT to support the development of mathematical thinking and effective pedagogy within his pre-service mathematics teachers (White, 2003). The globalisation processes of ‘time-space compression’ are evident in this work. Singh (2004) lists ‘time-space compression’ as:

First, it signals the shrinking of space in terms of the time taken to travel physically and electronically between places and locales. Second, time-space compression points to the increasing connectivity across places, or the extension of social relations across distance. Third, it suggests the specific presence and absence of people in specific locales (p. 103).

Thus ICT is used to provide a local context inhabited by images, ideas, expertise and people who are not physically present.

In all mathematics method units it is intended that students are immersed in the efficient and effective use of ICTs in order to give them the confidence and the knowledge to incorporate ICTs in their own teaching. However it is the underlying pedagogical practices that are employed in using ICT which are crucial. Students are given the opportunity to consider carefully the social and individual effects due to ICTs as their unit progresses. So while discussing the strategies used in the development of mathematical thinking their units will also address the questions, is it possible: to differentiate between what ICT can do with what it is doing and what it should be doing? for ICT to support learning and the building of knowledge? for ICT to contribute to the development of mathematical thinking? and for ICT to be more efficient and effective in producing independent thinkers, skilled in life-long learning, with sound social values and capable of intelligently handling complex problems?

All units are presented using a combination of lectures and tutorials and students have access to a web site for each unit, which are located on the WebCT platform of the University's server. With the decrease in unit time and the increasing numbers in class, the unit web sites are used to maximize the engagement of students in each class. One way this is achieved is through the provision of all lecture notes, tutorial material and copies of overheads used in the classes, for students to download and read *before* their class. This allows the ATME to abolish the traditional style of transmission lecture class. Instead, the class becomes an opportunity for a collaborative dialogue with the material, where students are encouraged to explore the ideas and the information supplied while the lecturer models pedagogical practices based upon constructivist learning principles. Thus the drudgery for students in copying is removed and more time is provided in class for them to think and respond to what is presented. The ATME assists the students to deepen their understanding by facilitating the making of connections with previous learning, and students who are unable to attend are able to minimise their loss by having access to the notes. Some issues that arise in class may become on-line discussions that continue outside of the classroom and where the material expands and progresses until the end of semester. During the lectures and tutorials, other ICTs are introduced, demonstrated and used by the pre-service teachers, such as spreadsheets, internet activities, CD-roms, and databases. The secondary pre-service teachers are loaned a graphical calculator that they return at the end of the year. There is an expectation that pre-service teachers will BOOST (By Out Of School Time) their skills on certain technologies. Take home activities are planned and assigned to develop this expectation such as becoming familiar with the keyboard of a graphics calculator. Web-based simulations and applets are also very useful as take home activities.

At the very beginning of each unit, students must register on the discussion board by leaving a short message of introduction. This is a check that all students have access and the



necessary computer knowledge and skills. Students are divided into communities of learners and each community is given a private chat area on the discussion site. Thus discussions can be continued and students can gradually build and refine their ideas as the unit progresses. There has been considerable research completed on the effect of Internet use upon the patterns of social interaction of the users. Castells (2001, p. 124) in summarising this research stated:

Thus, overall, the body of evidence does not support the thesis that Internet use leads to lower social interaction and greater social isolation. But there are some indications that, under certain circumstances, Internet use may act as a substitute for other social activities.

He further claimed that the new pattern of sociability in our societies was characterised by networked individualism.

To further encourage the process of student networking, one or two questions are displayed on the unit web site as a focus for the key ideas for that week, so that by the end of the unit there is a collection of about twenty. The communities of learners are asked to consider and discuss how to respond to these questions. The aim was to assist them to focus their thinking. One component of the unit assessment is a 2-hour end of semester extended reflection activity paper (taken under examination conditions) that consists of 5 questions taken from the collection, although precisely which ones are not known. Research involving the extended reflections paper has revealed gains from this assessment strategy. Students reported that the stress from fear of the unknown in examinations was removed or greatly reduced. Assessment markers reported that the quality of the answers exhibited a deeper understanding of the issues as a result of the prolonged thinking and reflection. The pre-service teachers revealed that they used to a lesser extent pre-prepared and memorised answers which they reported using in other examinations (White, 2003).

Another strategy for coping with larger student numbers involves the ATME's use of the discussion facility. It is a rule that questions concerning assignments, examinations or unit material will only be answered via this space. This not only ensures that every student has equal access to the information, but it also saves the ATME a great deal of time and effort as questions need only be answered once. Also, the ATME advertises the times when he will be on-line and this reduces the expectation by students that they will receive an immediate reply. It also discourages them from asking trivial questions, and quite often another student will answer a question, and the ATME needs only to add a brief supporting statement. An unintended benefit is that the better students through their questions and enthusiasm greatly influence the pace and quality of the unit. The more relaxed students are encouraged into greater effort by the thoughtful questions and responses from the keener students.

Other research indicated that students in both primary and secondary areas experienced difficulty in obtaining expert and quick mathematical pedagogical advice while completing in-school professional experience programs (White, 2002). Due to the increased numbers, the ATME was unable to supervise all the secondary and primary pre-service students. In response, a webCT site was constructed as a means of providing access to speedy expert advice on the teaching of mathematics. This site contained a number of features such as collections of classroom teaching ideas and lesson plans, links to other helpful websites, a threaded discussion site, frequently asked questions, and an entry port for submitting material. Although the provision of pedagogical and content information was seen as important, it was access to fast feedback and assistance that the students valued highest.

For example one student from the secondary program wrote:



I had my first lessons and they were so terrible! It was 2 x 50 min lessons for yr9 adv math class. Kids were OK when they were with my supervising teacher, but in my lesson they just didn't listen and I had serious problems in attracting students concentration on the tasks and controlling the whole class. So my supervising teacher gave me 1/14 - total failure!

After discussion with my supervising teacher, I found I had problem(s) with

- \* Long teacher talk.
- \* Disorganised lesson (My lesson went astray very quickly!)
- \* Need to be more assertive.
- \* Lack of teacher-students interaction and the list goes on...

I agree with everything my supervisor commented, but I felt so down after my first shot. I feel so bad. Can you give me some tips that can improve my lessons? Also I would like to know how long teacher's talk should be. (i.e. what's the kid's concentration span?) (White, 2002, p. 588).

In this case a telephone call was made to the student (overseas student from Korea) and time was spent allowing the student to ventilate his feelings before gently moving him to consider his part in the situation. The important issue arising from this example is the speed in providing feedback which resulted in the student being able to return the next day with confidence and with a plan of action. The student managed to pass his professional experience after a very poor start.

This section has very briefly outlined some of the attempts at meeting the challenges and constraints faced by the ATME as a result of the university's response to globalisation. What would the reader have done differently? The next section continues the themes of globalisation and ICT but examines the challenges that have arisen through the increasing overseas contacts with academics.

### **Beyond the local context: a global lifestyle or a lonely traveller?**

Luke (2001) examined the imagining of professional identities for a number of senior academic women employed in higher education institutions in Southeast Asia. She elaborated on the homogenising aspects of educational globalisation (for example through the greater standardisation of degree programs and accreditation) and identified an elite cosmopolitan transnational female educational community. These women attended international conferences, were advisors on international and national education committees, and yet worked within specific local institutions. This facility to move between the transnational and the local was not without complications.

Around the world young graduates fresh out of university look for jobs with international opportunities. At the same time, however, many older executives tell how tedious it is to live out of a suitcase, moving from one anonymous international hotel to another. They speak freely of how little they spend at home, how rarely they see their partner or spouse, of the monotony of airline food and lounges, of missed birthdays and forgotten anniversaries (Burns, Dell'Anno, Khan & Poppleton, 2001, p. 300).

Stromquist (2002) observes that transnational corporations use transient professional migrants as a means of supplying human capital and advanced technical knowledge to their many operations. She claims that it remains an invisible fact of globalisation processes.



Globalisation has meant greater travel opportunities for the ATME and the building of a wide and rich source of colleagues and contacts within the nearby Asian countries. ICT has enabled this network to be constantly used and renewed, and collaboration is encouraged through the simplicity and immediacy of the technology. It has allowed the ATME to become a regular presenter at Asian conferences and to work in overseas universities and centres such as SEAMEO RECSAM which is the Southeast Asian Ministers of Education Organization's Regional Centre for Education in Science and Mathematics.

It could be argued that being rootless is desirable for a global lifestyle, where skills, knowledge and ideas are easily transportable allowing the person to belong anywhere and everywhere. Yet there is evidence that people become increasingly uncertain, anxious and feel they belong nowhere. A global lifestyle necessitates immersion in many cultures. Yet this can be in opposition to the developing of a deep appreciation and knowledge of one culture and using it as a grounded basis for valuing new experiences.

This dilemma is particularly illustrated by the educator's research involving a process of teacher professional learning called Lesson Study. While the Lesson Study program originated in Japan (Stigler, & Hiebert, 1999) it has manifested itself in various forms according to cultural contextual differences in countries such as USA (Fernandez, 2000), and Australia (White & Southwell, 2003 a, b). The educator was invited to participate as 'expert' when the School of Educational Studies of University Science Malaysia initiated a Lesson Study Research Project in June 2004 at two secondary schools in a district of Northern Malaysia, which was the result of earlier professional discussions and research (Chiew & Lim, 2003). This collaboration is largely conducted through the use of ICT.

Lee (2000) describes the Malaysian system as a product of the interaction of global and national influences. Thus it is possible to identify the global thrust of technology and the local influence of Islam upon the education system. So while the ATME continues to be collaboratively engaged with the Malaysian researchers and has three jointly authored research papers, the fact of knowing how the Lesson Study process works in Australia was no guarantee of success in the Malaysian context. In fact each country that has implemented the process, while identifiable with the Japanese original model, has made adjustments to accommodate the local circumstances, resulting in a number of versions of the Lesson Study process. For example, in the New South Wales (NSW) statewide implementation teachers were recruited through a voluntary process, whereas the Malaysian teachers were directed to participate by their school executive. The educator's research illustrated again that it was not surprising to observe:

How ideas get translated into policies and practices depends greatly on the local settings, and, very often, what may at first appear to be similar policies may end up being quite different practices (Lee, 2000, p. 329).

This section has very briefly outlined some of the issues that have arisen through the increasing overseas contacts with academics by the ATME as a result of globalisation. It is appropriate to conclude this discussion of the interplay of global and local influences and the ATME's attempts at seeking a balance.

## Conclusion

The paper has discussed an ATME's attempt to engage with and respond to the constraints and challenges that have arisen as a result of globalisation within a local university context. The paper has explored the interaction of the global homogenisation processes upon the presentation of mathematics education within a local university context in order to identify



specific local responses. For example, particular examples were given where pedagogical practices are being increasingly positioned within a virtual space. Other examples were briefly provided where ideas were transportable across country boundaries, nevertheless still required knowledge of the local context for the ideas to succeed. There is an importance of knowing other groups and cultures and the development of comparative insights across situations and countries in order to improve understanding of current and evolving trends (Stromquist, 2002). Only a brief effort in this paper was made to consider if the experiences of the ATME were transferable beyond the educator's local context. In a paper of this type, general principles of response are not possible for it remains for the reader to determine if these reflections resonate with their own experiences and reflect the universal or instead constitute particular and unique local responses.

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## Author

Allan White has taught in primary and secondary schools in three Australian states. He has lectured at a number of Australian and overseas universities and has worked on international projects in Malaysia, Thailand, Brunei Darussalam, Indonesia and the Cook Islands. His research interests are teacher beliefs and attitudes; teacher professional learning; and mathematics curriculum incorporating ICT. He is currently a senior lecturer at the University of Western Sydney. Email: [a.white@uws.edu.au](mailto:a.white@uws.edu.au)