

Papua New Guinea Journal of Education

Volume 41

Number 1

2014



PAPUA NEW GUINEA JOURNAL OF EDUCATION

Volume 41, Number 1, 2014

Editor: Dr. Arnold Kukari, *National Research Institute*

Editorial Board: Dr. Michael Mel, *University of Goroka*, Dr. Uke Kombra, *Department of Education*, and Dr. Arnold Kukari, *National Research Institute*

Editors-at-Large: Dr. Kapa Kelep-Malpo, *University of Goroka*, Dr. Dinah Ope, *University of Goroka*, Dr. Lynus Yamuna, *Divine Word University*, Dr. Catherine Nongkas, *Divine Word University*, Dr. Jerry Semos, *Divine Word University*, Dr. Steven Winduo, *University of Papua New Guinea*, Associate Professor Paul Pagliano, *Queensland University of Technology*, Professor Gerard Guthrie, *New Zealand*, Professor Mark Solon, *University of Goroka*, and Dr. Rachel Aisoli-Orake, *University of Technology*.

The *Papua New Guinea Journal of Education* is published twice yearly. It is intended to serve a professional and academic audience of policy makers, planners, teacher educators, practitioners, and researchers. The main criterion for publication is relevance to Papua New Guinea, and papers should bring out the potential applications of their findings. Material on other countries will be published provided the direct relevance to Papua New Guinea is established in the text. Book reviews will also be considered for publication.

Editorial Correspondence: Correspondence, including manuscripts and book reviews, should be addressed to the Editor, Dr. Arnold Kukari, Associate Professorial Research Fellow, National Research Institute, P.O. Box 5854, Boroko, National Capital District, Papua New Guinea. Details regarding the preparation and submission of manuscripts can be found on the inside back cover of each issue.

Review of Manuscripts: All manuscripts will be reviewed by the Editor and, if judged to be suitable for publication, will be submitted for peer review by at least 3 peer reviewers. The journal is published at least twice a year.

PAPUA NEW GUINEA JOURNAL OF EDUCATION

Volume 41 Number 1 July, 2014

Contents

Editorial	1
Arnold Kukari	
The failure of progressive paradigm shift in Papua New Guinea	3
<i>Gerard Guthrie</i>	
Prior beliefs die-hard: Impact of teacher education on student teachers' prior beliefs of teaching and learning	18
<i>Arnold Kukari</i>	
Linking indigenous environmental knowledge and conservation education: Lessons from the field	31
<i>Sangion Tiu and Sheebah Mirisa</i>	

Journal Subscription

Papua New Guinea K50 per annum.

Outside Papua New Guinea K120.00 or US\$40.00.

Cheques should be payable to Papua New Guinea Journal of Education and addressed to:

The Editor
Papua New Guinea Journal of Education
The National Research Institute
P.O. Box 5854
BOROKO
National Capital District
Papua New Guinea

EDITORIAL

Arnold Kukari

The *Papua New Guinea Journal of Education* has been in hibernation for the last 10 years owing to a variety of factors. These will not be elaborated here except to announce its revival. The journal has been an important medium for the dissemination of knowledge, cultivation of ideas, fostering of education dialogue, and a basis for influencing education policy and practice. I am pleased to have helped in reviving it and to be its Editor going forward. An Editorial Board comprising Associate Professor, Michael Mel, University of Goroka, Dr. Uke Kombra, Acting Deputy Secretary, Department of Education, and me has been established and mandated to manage the journal. In addition, a core group of Editors-at-Large have been appointed to assist with the review of manuscripts submitted to the Editor to consider for publication in the journal. Members of this group comprise both national and international scholars and practitioners with a wide range of experience in education and academic credentials and reputations.

This issue of the journal is quite different in its layout as well as in its content. Some sections have been rearranged while others have been added on to give it a more professional outlook and keep it in tune with the changes not only in the communication and the sharing of knowledge but also in the application of this knowledge to improve both theory and practice. An Editorial has been included and will be a common feature of the journal from this volume onwards.

Let me now turn your attention to the papers published in this volume of the journal. The papers focus mainly on epistemology - how knowledge is produced, validated, and transmitted. Gerard Guthrie provides an interesting critique of the failure of shift from formalism to progressivism or what is sometimes referred to as the post-formalist paradigm and its influences on education theory and practice in Papua New Guinea (PNG). His central thesis is that efforts to impose progressive thought on a society embedded in formalism for centuries has failed because formalism is often viewed and approached from a pathological stand point. He gives several examples to demonstrate how this has transpired in different curriculum and pedagogical contexts in PNG. He argues that efforts to transform formalism through the imposition of progressivism had failed because these two patterns of thought were not compatible and were contradictory culturally. He further argues that formalism should be used rather than progressivism to inform education discourse and practice in PNG.

My paper is linked to the progressive paradigm critique of Gerard Guthrie in that it focuses on the impact of teacher education on the prior beliefs of student teachers about knowledge, teaching, learning, students as learners, and a teachers' role. Student teachers enter their teacher education programs with prior beliefs of teaching and learning. These beliefs were often considered as pathological by teacher educators. Teacher educators design specific courses and experiences to challenge these beliefs with the intent of transforming them by exposing students to more progressive notions of teaching and learning. This, they hoped, would lead to students abandoning their prior beliefs and embracing the teacher privileged perspectives of teaching and learning before graduating from their teacher education programs. This approach to changing student teachers' beliefs, as my research and similar research show, has achieved mixed results. While some prior beliefs were altered, others were elaborated and retained by the student teachers. Generally, regardless of efforts to

change student teachers' prior beliefs using constructivist pedagogy, these beliefs continue to persist.

Sangion Tiu and Sheebah Mirisa in their paper discussed the leveraging of indigenous knowledge to teach and disseminate environmental knowledge and boost environmental conservation in local communities. Papua New Guinean communities have their own conservation knowledge and practices that they have used for generations to conserve their natural resources and protect their environments. Rather than imposing external knowledge and practices of environmental conservation, indigenous knowledge, practices, and worldviews should be used to educate the people about the environment and the importance of living in harmony with nature. This knowledge should be used as the platform for teaching children and adults about different aspects of the environment. Tiu and Mirisa's research shows that children enjoyed learning using their local vernacular and were able to learn what was taught. Integration of indigenous and modern forms of knowledge can enhance children's learning.

The failure of progressive paradigm shift in Papua New Guinea

Gerard Guthrie

Abstract

Some 38 years since Independence in Papua New Guinea (PNG), eight major progressive primary and secondary classroom reforms have failed to change teaching styles. Several were based on the Matane Report, including Outcome-Based Education (OBE). This article reviews research on these progressive curriculum reforms. It finds that they have had no apparent sustained professional success in changing formalistic teaching towards progressive practice despite large professional, administrative, and financial inputs. In considerable part they were incompatible with the traditional formalistic paradigm, did not recognise the depths of the issue, and were blind to previous failures. A deep explanation for the lack of success in creating a paradigm shift in the classroom is that the progressive paradigm is culturally inappropriate. The continuing relevance of formalism in PNG and the considerable failures of introducing alternatives imply that formalism is not just an outdated colonial impost, nor one that can be rectified through more aid. The clear implication is that 'progressive' curriculum reform should be abandoned in favour of upgrading formalistic teaching.

Introduction

Prior to the Pacific War, colonial administrations took little part in schooling in Papua and New Guinea. From 1946, education was slowly taken more seriously, with an initial emphasis on schooling for rural life. Mass literacy and a gradualist approach to universal primary education became an objective in 1955 but gradualism became increasingly out of step with the international agenda on decolonisation. The late 1950's and early 1960's saw a wave of expansion of primary schooling, establishment of more secondary schools, and increased teacher training. From 1960-73, consolidation and expansion of the disparate school system saw first attempts to provide progressive curriculum that would allow Papua New Guineans to localise expatriates (Weeks & Guthrie, 1984). The progressive paradigm on which curriculum reforms were based around the time of Independence has continued to push reform since.

Internationally since the middle of the last century, the progressive paradigm has dominated three bodies of literature about classroom schooling in 'developing' countries. Its dominance in the academic literature of comparative education has been strong, although a growing body of writers questions its relevance (see Guthrie, 1990 & 2011; Tabulawa, 1997 & 2013). The paradigm also influences the policy documents of international and multilateral aid organisations (Barrett et al, 2006; Hawkins, 2007; Tabulawa, 2013). A third area of influence is the educational projects of bilateral aid agencies, including AusAID (Australian Agency for International Development) projects in Papua New Guinea (PNG), (Guthrie, 2012). However, the dominance of the progressive paradigm in the academic and official literature of the second half of the 20th century has not led to its permanent adoption by teachers inside 'developing' country classrooms, including in PNG. This article draws from and updates Guthrie's (2003, 2011 & 2012) reviews of empirical research and professional commentaries on the eight best-documented progressive curriculum innovations in PNG over the last 50

years. All failed in the sense that none have had apparent sustained professional success at replacing formalistic teaching.

As we will see, the evidence is that failure followed several paths. Three earlier top-down change efforts did not survive initial attempts at implementation and were allowed to fade away (Primary Mathematics, the Community School and Generalist Teaching, all in the 1970's). A fourth was so heavily revised that it eventually bore little resemblance to the initial progressive precepts (the Secondary Social Science Syllabus from the 1960's to the 1990's). The fifth case, the Education Reform derived from the Matane Report and on-going since the early 1990's, left system-wide structural changes, but curriculum innovations were ineffective. Despite some initial successes, three project-based change efforts did not outlast aid-funded trials. SCCEP (the Secondary School Community Extension Project) received World Bank funding and considerable international attention in the 1980's, but had sustainability problems and soon faded away. The AusAID Community Teachers' College Lecturers Professional Development Project in the 1990's was strong on rhetoric but appeared to have few long-lasting outcomes. An eighth innovation, Outcome-Based Education (OBE), was supported on a large scale by another AusAID project, the Curriculum Reform Implementation Project (CRIP). OBE was roundly criticised in *Papua New Guinea Vision 2050* as generating overwhelming dissatisfaction among parents and teachers such that it is imperative that it be replaced immediately (NSPT, 2010). Many of the curriculum 'reforms' successfully delivered technical inputs, for example supplying materials to schools, but an absence of sound evidence of sustained classroom success contrasts with solid evidence of failure to generate paradigm shift.

These reforms are presented in overlapping chronological order. The list is comprehensive in that it includes those where classroom outcomes have been thoroughly reviewed and published. Professional documentation of other efforts tends to be free of data on outcomes in classrooms, and is often hidden in official and aid project files. In contrast, in a long, deep and wide search of the literature on education in PNG, I have found no evidence of sustained progressive success.

Earlier Progressive Curriculum Failures

1. Primary Mathematics. For a decade from mid-1960, TEMPLAB (Territory Mathematics Laboratory) was an early attempt to reform primary mathematics teaching. TEMPLAB introduced 'the new maths' and progressive teaching skills through similar individual instruction methods to those entering Australia. The progressive games approach, using local materials that could embody mathematical relationships, ran into serious difficulties with teacher capabilities and supply of materials despite strong departmental support (Roberts, 1978; McNamara, 1979). TEMPLAB failed, but was followed up with an even more ambitious attempt at a new maths curriculum, Mathematics for Community Schools (MaCS), introduced in 1978 and considered sophisticated compared with Australian schools. Many problems resulted for teachers, including creating new exercises, programming and timing, printing and distribution of curriculum materials, lack of teacher training and in-service, and language difficulties. An initial evaluation showed poor levels of student mastery (Roberts, 1978). A follow-up survey a year later asked whether the syllabus was being taught in the 'recommended spirit', finding generally that it was not (Roberts & Kada, 1979). The authors placed much of the blame on the teachers rather than an inappropriate curriculum.

2. *Secondary Social Science Syllabus*. SSSS was a progressive concept-based spiral development attempt to promote a student-centred, subject-integrated syllabus following Bruner and Taba. Design and writing occurred in the 1960's and 1970's with an academic perspective to provide knowledge and intellectual skills to prepare future members of the governing elite for tertiary education. The intent was concept - rather than fact-based; had a spiral development of concepts from year to year; intended pupils' community experiences to be the basis of concept development involving material from outside the classroom; and enquiry, experimentation, and simulation were to be key learning methods to develop concepts from pupils' experiences rather than teachers' presentations (Trevaskis, 1969; Ritchie, 1977).

Following trialling, the full course was implemented from 1977 (Lornie, 1980). Classroom and student teachers had many difficulties. False design assumptions included an expectation that pupils working in a foreign language could derive abstract relationships and theoretical principles from social science concepts, the spiral development of concepts was therefore sound, and teachers would have a solid grounding in academic subjects (Guthrie, 1980). The progressive emphasis on the teacher's role as a facilitator of learning was another problematic assumption. The Department of Education began to revise SSSS almost as soon as it was implemented. Revisions to grades 7 and 8 were issued in 1979 and 1980, while the approach for grade 9 was rewritten independently as student textbooks that downplayed the spiral concept approach (Lornie, 1979, 1980 & 1982). Subsequently, the textbook approach was adopted for the whole course. With further rewriting in the 1980's, the syllabus developed into a series of standalone student booklets with content becoming a mixture of geography, history, and politics, far removed from the original progressive intentions.

Eventually the revised syllabus was replaced in 2006 with support from CRIP as part of the Education Reform (see below). Despite the lessons involved in turning the original progressive syllabus into a more formalistic one, the new syllabus for grades 9 and 10 dubiously reverted to the progressive enquiry mantras at the centre of the original design 40 years previously, albeit with the addition of integral human development themes. Official documentation stated that the syllabus again used a student-centred approach,

with the opportunity to practice and develop critical and creative thinking, problem-solving and decision-making skills as well as a range of practical skills and knowledge [students can] think critically about what they are learning and ... take responsibility for their learning. They learn to teach each other and to learn from each other, to work cooperatively and to work individually (Department of Education, 2006, p. 8).

Presumably, if the new writers were even aware of the history of failure behind this approach, they assumed that the situation had 'progressed' since the early days of SSSS 40 years before. The only plausible reasons for this assumption could be that there was classroom change in the meantime, teachers had become less formalistic, or that academic standards had risen: none of which has any supporting evidence.

3. *Community Schooling*. When oversupply of primary school leavers became apparent in the late 1960's, the focus turned again to attempts to make schooling more relevant to village life (McNamara, 1979; Weeks & Guthrie, 1984). With Independence in 1975, the education system was subject to major change to transform primary schools into community schools in keeping with government policies encouraging community self-reliance. School reforms

adopted many elements of progressive education, including a curriculum intended to be flexible and school-based, with only a framework for teaching so that “the actual stuff of instruction should be devised by the teacher to ensure that it is adapted to the community” (Lancy, 1979, p. 4). Teachers were unable to do this. They lacked subject knowledge on which to develop local curriculum and could lack general knowledge as well as local knowledge about the community itself (Cheetham, 1979). A Community Life Syllabus introduced to grade 1 in 1978 aimed to prepare pupils for returning to rural community life (Watson, 1979). Its progressive approach required teachers to be flexible and self-reliant, use improvised materials, and integrate the syllabus with other subjects, as well as relate them to community activities. Teachers in a sample from 16 schools across five provinces voiced difficulties in obtaining materials, understanding content and vocabulary, programming topics, and programme lessons without a teachers’ guide. Teachers considered excursions created dangers for children, found problems with lack of community support, and preferred to use pre-packaged community life materials if available. Many preferred the previous more formalistic social studies programme. The progressive syllabus was often unread and ignored.

Within a few years, community schooling was developing into a failure, as shown in a 1979 Special Issue of the *Papua New Guinea Journal of Education*. From an educational perspective, the concept had not been tested fully. However, the government had not provided rural development funds, which indicated broader systemic problems in addition to the problematic integrated curriculum. Lancy’s (1979, p. 5) conclusion was that, “on the whole, the news is bad and the community school now has few firm supporters”.

4. *Generalist Teaching*. GT was another progressive approach used in grades 7 and 8 of provincial high schools from 1975-79. In many ways a high school version of the community school curriculum, GT attempted to initiate change from subject specialisation to subject integration using a primary teaching approach to class and subject organisation. Again, school-based curriculum development and changes to teaching styles were demanded.

Field’s (1981) comprehensive evaluation of policy and practice, included a questionnaire survey of 96 generalist teachers in a random sample of 33 of the 81 high schools and qualitative case studies of five schools. Field found that many contradictions existed between policy and practice because GT was poorly planned and badly managed. Schools usually fulfilled the Department’s organisational requirement for one teacher to take a class for three subjects during at least half of the available periods, but there were no curricular guidelines. Field (1981) noted that “teachers were formalistic, yet GT required teachers willing and able to undertake curriculum development and teach progressively” (p. 99). This was very different in concept, structure and practice to previous methods of teaching and learning, which worked against successful adoption:

Teachers were given the freedom to experiment, to devise their own aims, objectives, teaching methods and content. Such responsibility caused problems because it only showed young, generally inexperienced teachers more things they could not do, thus magnifying their feelings of insecurity, confusion and bewilderment (Field, 1981, p. 106).

Only 48% of teachers were willing to continue with GT, including significantly fewer national than expatriate teachers.

A Departmental enquiry found GT was adversely affecting school standards (Roakeina, 1977), and it was allowed to fade away from the high schools. But, despite Field's (1981) warning that "as a style of teaching and learning, generalist teaching had little future in PNG" (p. 110), it was only to reappear in the 1990's as part of the Education Reform, when grades 7 and 8 were moved from high schools to primary schools.

5. *Secondary School Community Extension Project.* For some 10 years from 1978 SSCEP was a major pilot project that included taking progressive elements from community schooling and generalist teaching a level higher to secondary grades 9 and 10. SSCEP was heavily researched, hailed internationally as a promising pilot project, and gained World Bank funding. With oversupply of high school leavers now apparent, the project piloted a more 'relevant' curriculum intended to lead students to value education for its contribution to improvement in village life. Relevance was to come from integrating classroom and practical work through application of existing high school syllabuses to community-oriented tasks (McNamara, 1980 & 1982). Specialist staff would "provide the practical project management skills to enable the general subject teachers to teach their subjects ... applying the concepts and skills of each discipline to practical on-going school projects that are relevant to the surrounding community" (McNamara, 1980, p. 20). Syllabus interpretation, assessment procedures, programming, and teaching methods would change. The pupils would have to make practical applications of their subjects to meet the extrinsic motivation of modern sector employment through the grade 10 examination pathway. Hopefully, those without formal sector employment would internalise the value of practical work so that it became an intrinsic motivation adapted to problem-solving in the community.

Crossley's (1984) case study of the school-based curriculum development strategy included six months as a participant observer in one of the pilot schools. Many positives included participating teachers developing increased competence in curriculum development and teaching. However, Crossley wrote, the research was primarily a cautionary tale. The pilot project provided especially favourable conditions, but problems were encountered with the curriculum change strategy in all five pilot schools and two experienced major difficulties. Despite a positive impact on staff development, many teachers continued to find excessively taxing the development of integrated teaching-learning and assessment programmes focussed on higher cognitive and affective objectives. Little evidence suggested that SSCEP in-service adequately prepared formalistic staff for such demands. Similar findings came from Vulliamy's (1985) case studies of three trial schools that had developed outstations to teach practical applications of core subjects. Greater informality in staff-student relations at outstations made possible a more student-centred teaching style, greater student responsiveness in classrooms, and more group and discussion work. However, students tended to perceive the integration of practical and academic work as relevant only to the outstation itself. Within schools, curriculum was hampered by the unwillingness of staff and students to move away from core subject study, unreasonable demands on teachers' time and skills, logistical problems, and divisions between SSCEP and non-SSCEP staff. These difficulties created serious student assessment problems.

While considerable successes did occur under pilot conditions, SSCEP (like GT) required intensive school-based curriculum development and in-service to generate progressive teaching stressing integrated curricula and activity methods. Difficulties arose with all these aspects, including a classic conflict between formalistic and progressive teaching styles (Vulliamy, 1983; Lipscomb, 1985; Crossley & Vulliamy, 1986). With the end of World Bank

funding from 1986, Government funds could not be found to extend SSCEP in a difficult economic period, and it soon faded out. The curriculum changes did not survive the 1980's.

Later Reform Failures

6. *The Education Reform.* The Education Reform is a label for major policies deriving from the 1986 Ministerial Committee into Education (Matane, 1986). The well-known Matane Report was, according to Guy (2009), “an important prologue for much of the policy documentation and literature on education in Papua New Guinea today” (pp. 134-135). The Report was influenced by the notion of integral human development found in the PNG *Constitution and Vision 2050*. Thus, “the philosophy is for every person to be dynamically involved in the process of freeing himself or herself from every form of domination and oppression ... education must aim for integrating and maximising: socialisation, participation, liberation, equality” (Matane, 1986, p. 6). The Report rejected a formalistic approach to schooling, recommending instead comprehensive changes to classroom teaching and greater equity and social justice based on traditional cultural values. The authors considered that this would be promoted by a radical restructuring of the school system (Avalos, 1992a).

All this ignored the earlier findings about failed progressive reforms. The thinking behind the Report, on Avalos' (1992a & 1992b) evidence as an active leader in the process, apparently came about in a fit of enthusiasm arising from a single brainstorming session, spiced with elements of liberation theology and a dose of Chilean-influenced Marxism. Avalos linked the reforms to radical South American writings and to socialist tradition. While notionally emphasising ‘participation’, essentially the major school reorganisation recommended by the Report was based in the Marxist-influenced view that structural upheaval is necessary in society to remove tradition as an obstacle to modernisation. The relevance of Latin American radicalism to an entirely different context on the far side of the Pacific was assumed rather than established.

The Report was met with professional skepticism. Its introduction was delayed until a 1991 Education Sector Review, which sensibly focussed on the practical implications for schooling and disputed a need to use progressive-influenced student ‘outcomes’ rather than the prevailing and more formalistic teacher ‘objectives’ (Department of Education, 1991). Reasoned criticism also came from O’Donoghue (1994 & 1995) and McLaughlin and O’Donoghue (1996), who recommended pragmatically a major overhaul of the system in order to facilitate greater pupil access to primary school by taking the much less radical step of increasing the average primary school class size. He also commented that the education reform proposals facilitated introduction of a primary school programme based on a child-centred notion of curriculum, but that it should have recommended existing primary school educational structures be maintained, the existing subject-based curriculum be implemented properly, and steps be taken to improve the quality of the formal style of teaching with which the majority of teachers felt most comfortable.

Nonetheless, depending on resources in the provinces, somewhat ad hoc implementation of the restructuring occurred from 1993 until completion in 2001 depending on locally available resources and, in considerable part, driven politically in the belief that restructuring would increase enrolments. Elementary schooling was provided for grades EP-E2 (with a need to establish new schools and recruit and train vernacular teachers); primary schools now covered grades 3-8, with grades 7 and 8 transferred from high schools (with generalist

teaching and a need to retrain primary teachers for these grades), while grades 9 and 10 were topped up with grades 11 and 12 in provincial high schools (with implications for curriculum and secondary teacher education).

The structural changes remain in place, but quite unclear in the upheaval to the school system were the merits of high levels of administrative reorganisation, professional dislocation and financial cost. Webster (2006) found that enrolments in basic education remained inadequate. At secondary level, Maha and Maha (2004) reported that results included unplanned establishment of high schools, engagement of untrained teachers, and a subsequent need to catch up with postgraduate in-service training for hundreds of unqualified graduates who had been employed as teachers by secondary schools. The structuring gave the appearance of educational change, but the curricular substance intended by the Matane Report did not actually require restructuring the whole school system.

In essence, the curriculum directions derived from the Matane Report had four major shortcomings:

1. in claiming to present a PNG tradition of teaching, they overlooked the pre-colonial history of traditional formalism;
2. the assumption of a more child-centred curriculum took little account of the cultural strength of the teacher-centred paradigm;
3. the borrowings of South American neo-Marxism had little relevance to PNG, especially the emphasis on structural change, which caused a great deal of organisational confusion with little apparent benefit, and
4. they repeated mistakes from the previous fifteen years, particularly in re-introducing community schooling and generalist teaching.

Attempts at progressive curriculum change derived from the Report have subsequently encompassed the whole elementary, primary, and secondary school levels. The Education Department was able to resist some of the curricular pressures for a while but progressive influences came back through AusAID projects.

7. Primary Teacher Training. In the 1970's and 1980's, the primary teacher colleges had a prescriptive curriculum based on behavioural objectives, assessment and inspections (McLaughlin, 1995). In support of the Matane Report (of which it became, in effect, a subset), the 1989 McNamara Report argued against the formalistic approach dominating the theory and practice of teacher colleges. It recommended a qualitative shift to progressive teacher education that would encourage students to analyse a wide variety of teaching and learning situations, use 'reflection' on these strategies and their own performance, and learn to modify teaching strategies (McNamara, 1989). Official policy came to reflect McNamara's progressive approach, specifying that the fundamental purpose of primary teacher education was to produce teachers "able to think critically about the curriculum and their teaching; and adjust the learning environment to meet the needs of different children and classroom situations" (Department of Education, 2000, p. 47).

The Australian Community Teachers' College Lecturers Professional Development Project (PDP) provided support with training and higher degree study for college lecturers from 1990-95. PDP took a train-the-trainers approach focussed on subject knowledge as well as curriculum development and pedagogical skills. Implementation reflected the radical elements of the Matane Report. With glib pseudo-radical jargon, the Project Director claimed Freirian principles that went "beyond critical reflection/inquiry to transformative praxis" "Underlying the Project's approach is the reconceptualisation of professional development in

teacher education based on critical reflection and transformative action” “Basically, lecturers were called upon to see themselves as political actors in a process of political (re) socialisation ...” (Burke, 1996, pp. 41, 44, 47). The basis was in a radical form of reflection (Matane, 1991; Burke, 1993; Guthrie, 2003; Pickford, 2003), which viewed formalism as an ‘ideology’ to be replaced, introducing a very value-laden term into a situation where the label ‘cultural tradition’ was rather more appropriate.

Not surprisingly in a well-funded and intensive programme, a mid-term review found that professional development opportunities for college lecturers in Australia and PNG were having a positive effect on participants’ competence and self-confidence (Toomey, Guthrie, & Penias, 1992). However, while the project might have had long-lasting effects on some lecturers, there is no evidence to suggest that radical reflection was sustained widely or that it had any flow-on effect to school teachers. The implication of a statement by Guy (1994), who supported adoption of radical reflection in teacher education, was that any changes were not sustained: “the expansion of teacher education programmes ... were ideal times to reconstruct teacher education. Instead the colleges chose to do more of the same” (p. 47).

8. *Outcomes-Based Education and CRIP*. The turn of the century saw Education Reform efforts turn from structural to professional issues, in particular to curriculum. A central plank was OBE, a key to which was that learning was to be expressed as student outcomes, in contrast to the previous teacher objectives. While OBE has a central focus on measuring student outcomes, it is often packaged with progressive theories of child-centred schooling, as happened in PNG, where its implementation from 2001 was associated with variously-labeled integral human development, social constructivist, and transformational themes (Department of Education, 2001; Norman, 2006a; Agigo, 2010; Neofa, 2010).

OBE had been foreshadowed in the Matane Report and taken up in PDP despite the 1991 Sector Review support for Objectives-Based Curriculum (OBC). Even in 1992 during a PDP mid-term evaluation, in which I participated, teachers and teachers’ college lecturers expressed confusion over objectives and outcomes. A successor project, the AusAID Primary and Secondary Teacher Education Project (PASTEP) from 2000-06, followed initial Department of Education teacher education guidelines with an objectives approach, but was contradicted by the overlapping CRIP outcomes approach (Guthrie, 2005). Nongkas’ (2007) extensive assessment of PASTEP’s impacts on three primary colleges concluded, “little has changed in the pedagogies employed by current teacher educators” (p. 246). The majority of primary teacher educators were lecture-centred formalists, which she primarily attributed to poor work facilities, lack of subject knowledge and weak educational leadership underestimating somewhat the depths of cultural reflex underlying formalism as a deep-rooted cultural paradigm.

CRIP was more widespread than PASTEP. From 2000-05, it carried forward many of the curriculum aspects of the Matane Report including OBE, generalist teaching in primary schools, and progressive subject syllabuses for elementary, primary and secondary schools (as seen for secondary social science) (AusAID, 2002; CRIP, 2002; Guthrie, 2012). These developments were so supported strongly by CRIP that the Australian project was criticised on the basis that its technical advisers drove PNG’s curriculum policy through project activities (Guy, 2009). The criticism was officially denied by the Department of Education but was supported by Ryan (2008), Agigo (2010), and Le Fanu (2011, p.213), who wrote that “expatriate CRIP staff – consciously or unconsciously – exploited their superior cultural capital ... to dominate proceedings”.

CRIP's managing contractor, SAGRIC, was required by AusAID to undertake an over-riding evaluation of the impact of curriculum reform on student learning outcomes and teacher practice by subjecting the progressive assumptions to field experiment (CRIP, 2004). This intent was de-emphasised during project implementation. The project's many weak evaluation processes did not subject CRIP's progressive assumptions to careful classroom scrutiny: baseline data was collected but instruments were not validated; any learning gains were uneven; incomplete longitudinal data was biased towards more able students; there were inconsistencies in interpretation of test results; the assumption that the new curriculum and teaching methods would be superior to the old was not tested; and CRIP evaluators claimed changes in teachers' classroom behaviour but did not present valid evidence in support (Guthrie, 2012). These weaknesses were embedded in a lack of independence in CRIP's self-evaluation, whose findings were much more positive than outside research. AusAID would have done better to contract independent project evaluations rather than leave them subject to a conflict of interest for the managing contractor.

Although there was support for OBE (e.g. Norman, 2006a & 2006b), the outcomes approach meant considerable confusion in the teaching profession (Guthrie 2005). In contrast to CRIP, two independent studies found an absence of school and classroom change. Agigo's (2010) summative evaluation researched CRIP impacts in two secondary and four primary schools in a province from each of the four regions, including questionnaires and interviews with 159 participants. The evaluation found that classroom learning was ineffective under the OBE model. Seventy-eight percent of teachers did not agree that the curriculum was easy to program and teach, while 65% did not agree that students were learning well with it. Only 26% said the curriculum reform had changed their way of teaching. The outcomes approach meant considerable confusion in the teaching profession, Agigo (2010) concluding that it was "unsustainable and not appropriate for the country" (p.47).

Other independent research by Le Fanu (2011) included lesson observation and interviews with teachers and stakeholders in three rural primary schools in the Eastern Highlands Province of PNG in 2008-09. The new curriculum identified various inclusive precepts that teachers should follow, with the research assessing the precepts' impacts on teaching and learning. One precept, as with generalist teaching 30 years previously, required subject integration. The teachers admitted that they found conceptual difficulty in synthesising the different subjects, and that their teaching was more focused and intelligible when they taught them separately. A second precept required teachers to provide students with opportunities to take charge of their own learning. Teachers found difficulty given a lack of learning resources in schools, particularly print materials, so tended to give students identical tasks and control the learning process tightly. A third precept recommended peer tutoring through explanation and demonstration of problem-solving processes. Although the teachers encouraged their students to help one another, lesson observation indicated that peer tutoring generally meant answer-sharing, and students were highly reliant on remedial support from teachers patrolling the classroom. A fourth precept expected teachers to expertly deploy 13 assessment instruments. Teachers said they lacked the time, energy, and expertise to use many of them and tended to rely on previous methods.

The teachers were not necessarily averse to change as such. Although they ignored many of the precepts, some had developed their own approaches for promoting student learning. Changes were predominantly within the formalistic rather than the progressive paradigm, often reflecting cultural tradition in assuming that teachers should centrally control teaching and learning, and were thus contrary to the spirit as well as the letter of the new curriculum

(Le Fanu, 2010). Teachers expertly used a variety of strategies to transmit skills and knowledge, including speaking in short simple sentences, providing examples relevant to students' own experiences, providing concise definitions, using visual aids, and scrutinizing facial expressions for understanding. Like Agigo, Le Fanu found that non-implementation could be partly attributed to the gap between the technical demands of the progressive curriculum and the capacity of teachers to meet those demands. Significantly, Le Fanu added, non-implementation could also be attributed to culturally-embedded teacher resistance to the facilitative roles expected in the classroom and to teachers' skepticism about progressive learning theories. Neofa (2010), who was somewhat more positive in a case study of OBE among 20 teachers in Port Moresby, also commented that the social constructivist theory of knowledge that underpinned OBE's student-centeredness could cause tensions within PNG's cultural contexts of teaching and learning.

Negative findings about teachers' difficulties were actually supported by two AusAID-funded reviews of CRIP. AusAID's Independent Completion Report found limited achievement of CRIP's goals (see AusAID, 2009, pp. 27-28). Despite departmental policy support, many teachers found difficulty understanding and implementing OBE, with confusion and frustration over the substance of the curriculum materials, access to resources, and assessment difficulties. An AusAID-funded sector study of five education projects in PNG from 1997-2006 agreed. It noted the controversial issue of teaching styles and classroom pedagogy, and observed that teaching style is highly contextual and deeply contested across the world (AusAID, 2009). The report also noted many practical obstacles to sustainability of OBE: "many stakeholders in the education system believe the new curriculum to be unsustainable because of the high transactional and financial costs in terms of classroom resources, research facilities, pupil to teacher ratios, evaluation and moderation support" (p. 36). Well-informed and spirited criticisms are also found on a website promoting change back to formalistic objectives (see <<http://rausimobe.wordpress.com.pg>>).

The independent findings support the conclusion in *Papua New Guinea Vision 2050* that "it is imperative that OBE is immediately replaced" (NSPT, 2010, p. 34). Elsewhere, only a few developing countries adopted OBE. Another notable example was post-apartheid South Africa, where it also failed (Guthrie, 2013) and has now been dropped.

The Failure of Paradigm Shift

In PNG, progressive educational theories were superficially attractive in implicitly attacking the classroom formalism that was commonly associated with colonialism. In the late colonial and early post-colonial period, expatriate and national education officials were highly concerned to change the education system to overcome colonial inertia and to make schooling more relevant to the needs of a country newly attempting to govern itself. Progressive philosophies appeared both to reject colonial gradualism and to be relevant to current needs. Since, progressivism has continued to be a major influence on curriculum reforms, which have often assumed that it represents educational modernisation.

These efforts were well meant, but their progressive assumptions usually received little critical scrutiny. A consequence is half a century of progressive primary and secondary curriculum failure. Certainly, many of the reforms had measurable benefits in delivery of technical inputs and outputs, for example in supplying materials to schools. But, none of the eight reforms reviewed had any apparent sustained success at shifting formalistic teaching towards progressive practice despite large professional, administrative, and financial inputs.

In the absence of any solid contrary evidence, the body of findings amounts to a damning case against progressive curriculum reform in PNG. This is a very strong outcome given the imbalance favours formalism 8-0 over progressivism. Nor have matters improved with time. Among the recent reforms, no sound published evidence exists that the curriculum approach from the Matane Report has been successful, or that teaching styles have changed as a consequence, or that any of the goals of the politicised rhetoric have been attained, despite large-scale aid funding. The churning created by the structural changes from the Education Reform appears to have generated a great deal of organisational dislocation for no educationally substantive outcome.

Why were the progressive reforms such widespread failures? The most fundamental explanation comes from Tabulawa (1997), who observed that formalistic and progressive paradigms compete for recognition and supremacy in educational practice. The paradigms arise from opposed assumptions about the social world, the nature of reality, and the learner. They have distinct views about what constitutes knowledge, how that knowledge should be transmitted, and how it is subsequently assessed:

Each position engenders in its adherents (or those socialised into it) a way of looking at the world compatible only with its own tenets. Further, each promotes its own unique orientation towards classroom architecture and desk arrangement, student-teacher relations, interactions and assessment regimes (Tabulawa, 2013, p. xx).

However, to propose that teachers and students shift from a teacher-centered paradigm to a learner-centered one is not just a technical issue or one requiring improved teacher training, but “is necessarily a proposal that they fundamentally change their views of the nature of knowledge, of the learner and his/her role, and of classroom organisation in general” (Tabulawa, 1997, p. 191). The individualistic values in the cultures from which progressivism derives have often led educational reformers to underestimate the countervailing communal and collective values that underlie the formalism that dominates in other cultures (Alexander, 2000). The effect is that paradigms about modern education are usually not deconstructed and their culturally biased and possibly problematic assumptions about teaching styles in other cultures are rarely contested (Guthrie, 2011).

A deep explanation for the lack of success in creating paradigm shift from formalistic classroom practices in PNG is that the progressive paradigm is alien to and inconsistent with the traditional cultural epistemology and traditional education (Guthrie 2003). The curriculum ‘reforms’ failed in considerable part because they underestimated the value and the utility of traditional education. Evidence about previous failures of classrooms to shift from formalism to progressivism was also ignored, in part because of a questionable assumption that more time, money, and technical inputs will be effective despite the evidence that, even with well-resourced aid inputs, change has not sustained and progressivism has repeatedly failed to make a transition from theory to practice.

So, is the problem really with resistant formalism or is it with progressive change that underestimates the cultural authenticity of formalism in PNG and often ignores lessons from earlier failures? None of the curriculum reforms reviewed in this article used the opportunity to develop a culturally intuitive formalistic teaching style; rather they tried unproductively to have teachers adopt non-intuitive progressive methods. Failures occurred in considerable part because the reforms were incompatible and at odds with the traditional formalistic paradigm and did not understand the depths of the issue. The anthropological view of traditional

epistemology is now recognised in PNG, but it has been approached by educators as an ex post facto explanation for their failure to ‘modernise’ teaching styles rather an opportunity to build on the positive aspects of formalistic teaching and learning. As Le Fanu (2010, p. 1) put it, “policy-makers would have been better to work with rather than against educational realities”.

Conclusion

Change away from classroom formalism in PNG is unlikely to occur in any foreseeable future. The failure of progressive reforms to compete with the formalistic paradigm now requires reversal of the progressive worldview. The unfortunate history of misplaced progressive reform demonstrates that the borrowing of fashionable Western, progressive alternatives to formalism, such as OBE, displayed serious misunderstanding of PNG culture. Progressive standard bearers appear to have been blind to previous failures, locked into their own paradigm, and unable to shift outside progressivism to understand formalism’s cultural substance. The progressive paradigm for curriculum development and teacher education has been a values-based policy enforced on teachers rather than a construct subject to field experience. Ironically, in none of the research evidence reviewed have I seen progressive child-centered reforms that started by actually asking students what they needed. In all cases, progressive curriculums were imposed administratively, the teaching force (and often the inspectorate) treated as an obstacle to change and students as passive recipients.

Formalism provides a deep-rooted cultural behaviour capable of modification to perform important educational functions in the foreseeable future. The way forward is to stop assuming that curriculum theory should be used to drive classroom practice. Rather, curriculum development should derive from classroom practice. A solid starting point is the professional judgement of the inspectorate about classroom needs, upon which curriculum should be developed. The clear implication is that the use of ‘progressive’ curriculum reform to foist classroom change on teachers should be abandoned.

References

- Agigo, J. (2010). Curriculum and learning in Papua New Guinea schools: A study on the curriculum reform implementation project 2000 to 2006. NRI Special Publication No. 57. Port Moresby: National Research Institute.
- Alexander, R. (2000). Culture and pedagogy: International comparisons in primary education. Oxford: Blackwell.
- AusAID. (2009). Improving the provision of basic education services to the poor in Papua New Guinea: A case study. Canberra.
- AusAID. (2002). Papua New Guinea: Program profiles 2001- 02. Canberra: AusAID.
- Avalos, B. (1992a). The need for educational reform and the role of teacher training: The case of Papua New Guinea. International Journal of Educational Development, 12(4), 309-318.
- Avalos, B. (1992b). Education for the poor: Quality or relevance? British Journal of Sociology of Education, 13(4), 419-436.
- Barrett, A., Chawla-Duggan, R., Lowe, J., Nikel, J., & Ukpo, E. (2006). The concept of quality in education: Review of the ‘international’ literature on the concept of quality in education. Working Paper No.2. Bristol: EdQual.
- Burke, C. (1996). The changing agenda in teacher education in Papua New Guinea. International Journal of Educational Development, 16(1), 41-51.

- Burke, C. (1993). From basic skills to reflective practice. In C. Thirlwall, & B. Avalos (Eds.), Participation and educational change: Implications for educational reform in Papua New Guinea (pp. 219-236). Port Moresby: UPNG.
- Cheetham, B. (1979). School and community in the Huli area of the Southern Highlands. Papua New Guinea Journal of Education [Special Issue on the Community School], 15, 78-96.
- CRIP. (2004). Impact study 1: Mid-term review report, vol.1. Adelaide: SAGRIC.
- CRIP. (2002). Second annual plan July 2002-June 2003. Adelaide: SAGRIC.
- Crossley, M. (1984). Relevance education, strategies for curriculum change and pilot projects: A cautionary note. International Journal of Educational Development, 4(3), 245-250.
- Crossley, M., & Vulliamy, G. (1986). The policy of SSCEP: Context and development. Research Report No.54. Port Moresby: Educational Research Unit, UPNG.
- Department of Education. (2006). Social science lower secondary syllabus. Port Moresby.
- Department of Education. (2001). Annual report. Port Moresby.
- Department of Education. (2000). Primary education handbook (2nd ed.). Port Moresby.
- Department of Education. (1991). Education sector review. Port Moresby.
- Field, S. (1981). Generalist teaching policy and practice. Research Report No.36. Educational Research Unit, UPNG.
- Guthrie, G. (2013). Prevalence of the formalistic paradigm in African schools, Southern Africa Review of Education, 19(1), 121-138.
- Guthrie, G. (2012). The failure of progressive classroom reform: Lessons from the Curriculum Reform Implementation Project in Papua New Guinea, Australian Journal of Education, 56(3): 241-256.
- Guthrie, G. (2011). The progressive education fallacy in developing countries: In favour of formalism. New York: Springer.
- Guthrie, G. (2005). PNG primary and secondary teacher education project: Independent completion report. Canberra: Educo.
- Guthrie, G. (2003). Cultural continuities in teaching styles. Papua New Guinea Journal of Education [Special Issue on Formalism], 39(2), 57-78.
- Guthrie, G. (1990). To the defense of traditional teaching in lesser developed countries. In V. Rust, & P. Dalin (Eds.), Teachers and teaching in the developing world (pp. 219-232). New York: Garland.
- Guthrie, G. (1980). Towards a new social science syllabus for the 1980s. In R. Lornie (Ed.), Introduction to the revised secondary social science course. Occasional Paper No.3 (pp. 97-110). Port Moresby: Teaching Methods & Materials Centre, UPNG.
- Guy, R. (2009). Formulating and implementing education policy. In R.J. May (Ed.), Policy making and implementation: Studies from Papua New Guinea. Studies in state and governance in the Pacific No.5 (pp. 131-154). Canberra: State, Society and Governance in Melanesia Program, Australian National University.
- Guy, R. (1994). Reconstructing teachers as reflective practitioners in Papua New Guinea. Papua New Guinea Journal of Education, 30(1), 45-59.
- Lancy, D. F. (1979). Introduction. Papua New Guinea Journal of Education [Special Issue on the Community School], 15, 1- 6.
- Le Fanu, G. (2011). The transposition of inclusion: An analysis of the relationship between curriculum prescription and practice in Papua New Guinea. Doctoral dissertation. Bristol: University of Bristol.
- Le Fanu, G. (2010). Promoting inclusive education in Papua New Guinea. EdQual Quality Brief No.7. Bristol: University of Bristol.

- Lipscomb, P. (1985). Teacher development through curriculum innovation. Papua New Guinea Journal of Education, 21(2), 219-228.
- Lornie, R. (1982). A partial evaluation of grade 9 social science. Papua New Guinea Journal of Education, 18(1), 56-78.
- Lornie, R. (Ed.) (1980). Introduction to the revised secondary social science course. Occasional Paper No.3. Port Moresby: Teaching Methods & Materials Centre, UPNG.
- Lornie, R. (1979). The design and adoption of curriculum materials for secondary social science in Papua New Guinea. Journal of Curriculum Studies, 11(4), 336-337.
- Maha, A., & Maha, N. (2004). Education reform and implementation in Papua New Guinea: The missing factor. Papua New Guinea Journal of Education, 40(1), 31-42.
- Matane, P. (1991). Teachers for the future. In B. Avalos, & L. Neuendorf (Eds.), Teaching in Papua New Guinea: A perspective for the nineties (pp. 139-145). Port Moresby: UPNG.
- Matane, P. (Chairman). (1986). A philosophy of education for Papua New Guinea: Ministerial committee report. Port Moresby: Department of Education.
- McLaughlin, D. (1995). Promoting quality in teaching: A Papua New Guinea case study. Papua New Guinea Journal of Education, 31(2), 129-142.
- McLaughlin, D., & O'Donoghue, T. (1996). Community teacher education in Papua New Guinea. Port Moresby: UPNG Press.
- McNamara, V. (1989). Future directions of community school teacher education. Port Moresby: Department of Education.
- McNamara, V. (1982). The long-term effects of 'carrots', school system structure and curriculum, SSCEP and the problem of motivating learning that is functional. International Journal of Educational Development, 1(1), 19-60.
- McNamara, V. (1980). School system structure, curriculum, SSCEP and functional motivation for learning. Papua New Guinea Journal of Education, 16(1), 12-28.
- McNamara, V. (1979). Some experiences of Papua New Guinea primary schools, 1953-1977. Papua New Guinea Journal of Education [Special Issue on the Community School], 15, 10-26.
- Neofa, Z. (2010). A case study of how primary school teachers in Papua New Guinea understand outcomes-based education. PhD thesis. Brisbane: Queensland University of Technology.
- Nongkas, C. (2007). Leading educational change in primary teacher education: A Papua New Guinea study. PhD thesis. Australian Catholic University.
- Norman, P. (2006a). Outcomes-based education: A PNG perspective. Contemporary PNG Studies, 5, 45-57.
- Norman, P. (2006b). Impact of curriculum reforms on some teacher education programs. In P. Pena (Ed.), Sustainable curriculum development: The PNG curriculum reform experience (pp. 65-74). Port Moresby: Department of Education.
- NSPT (National Strategic Plan Taskforce). (2010). Papua New Guinea Vision 2050. Port Moresby.
- O'Donoghue, T. (1995). Educational restructuring gone astray in paradise? The Papua New Guinea experience. Journal of Educational Administration, 33(1), 79-90.
- O'Donoghue, T. (1994). The need for educational reform and the role of teacher training: An alternative perspective. International Journal of Educational Development, 14(2), 207-210.
- Pickford, S. (2003). Dialogue and learning in teacher education: The importance of generative pedagogy. In A. Maha, & T. Flaherty (Eds.), Education for 21st century in Papua New Guinea and the South Pacific (pp. 99-108). Goroka: University of Goroka.

- Ritchie, J. E. (1977). Teaching the social sciences: Innovation in small systems. In R.W. Brislin (Ed.), Culture learning: Concepts, applications and research (pp. 51-63). Honolulu: East-WestCenter.
- Roakeina, G. (Chairman). (1977). Report of the committee of enquiry into standards of high school students entering colleges. Port Moresby: Department of Education.
- Roberts, R. (1978). Primary mathematics in Papua New Guinea. Papua New Guinea Journal of Education [Special Issue on the Indigenous Mathematics Project], 14, 205-220.
- Roberts, R., & Kada, V. (1979). The primary mathematics classroom. Papua New Guinea Journal of Education [Special Issue on the Community School], 15, 174-201.
- Ryan, A. (2008). Indigenous knowledge in the science curriculum: Avoiding neo-colonialism. Cultural Studies of Science Education, 3(3), 663-683.
- Tabulawa, R. (2013). Teaching and learning in context: Why pedagogical reforms fail in Sub-Saharan Africa. Dakar: Codesria.
- Tabulawa, R. (1997). Pedagogical classroom practice and the social context: The case of Botswana. International Journal of Educational Development, 17(2), 189-194.
- Toomey, R., Guthrie, G., & Penias, W. (1992). The Papua New Guinea Community Teachers' College Lecturers Professional Development Project: Report of the mid-term review team. Canberra: International Development Program.
- Trevaskis, G. (1969). The development of a curriculum in social science for secondary schools of Papua and New Guinea. Papua New Guinea Journal of Education, 6(2), 57-73.
- Vulliamy, G. (1985). A comparative analysis of SSCEP outstations. Report No.50. Port Moresby: Educational Research Unit, UPNG.
- Vulliamy, G. (1983). Core subject-core project integration in SSCEP: Practice and possibilities. Papua New Guinea Journal of Education, 19(2), 13-34.
- Watson, P. (1979). The introduction of new curricula: Community life, Papua New Guinea Journal of Education [Special Issue on the Community School], 15, 154-173.
- Webster, T. (2006). The road to universalising primary education in Papua New Guinea: Are we really serious about getting there? In P. Pena (Ed.), Sustainable curriculum development: The PNG curriculum reform experience (pp. 14-22). Port Moresby: Department of Education.
- Weeks, S., & Guthrie, G. (1984). Papua New Guinea. In R. Thomas, & T. Postlethwaite (Eds.), Schooling in the Pacific Islands: Colonies in transition (pp. 29-64). Oxford: Pergamon.

Prior beliefs die-hard: Impact of teacher education on student teachers' prior beliefs of teaching and learning

Arnold Kukari

Abstract

The purpose of this study was to find out if the courses student teachers in a teacher education program in Papua New Guinea took in their teaching subjects and Education Foundations contributed towards reconstructing their prior beliefs of teaching and learning. For this purpose, three student teachers were interviewed in their first year to ascertain their prior beliefs and interviewed again in the fourth year of their four year teacher education program to identify and describe how their prior beliefs had changed as a result of what they were learning about teaching in their courses. It was found that the participants reconstructed some of their prior beliefs while others were expanded. It was also found that the beliefs the participants had come to hold were those privileged by the teacher education program and the faculty. Moreover, it was found that on both the intuitive and analytical levels, student teachers were actively involved in constructing an evolving discourse of teaching.

Introduction

Prior beliefs of teaching and learning play a catalytic role not only in student teachers' learning to become teachers but also in shaping their classroom practice when they become teachers. Research on student teachers' learning-to-teach has shown that student teachers use their prior beliefs as lenses to interpret and make sense of what they learn about teaching in their teacher education programs (Aston & Webb, 1986; Wilson, Shulman & Richert, 1987), to think about and evaluate the practical potential of ideas they encounter in their coursework (Joram & Gabriele, 1998; Knowles & Holt Reynolds, 1991), and influence their behavior and what they extract from their teacher education programs (Calderhead, 1991). Moreover, student teachers' prior beliefs shape and influence their thinking about subject content, pedagogical knowledge, and teaching practice (Bryan, 2003; Joram & Gabriel, 1998; King, Shumow, & Lietz, 2001; Veal, 2004).

Because of their power to influence and shape student teachers' thinking, interpretations of what they learn about teaching in their teacher education programs, and practice of teaching, teacher education programs and faculty have utilized different forms of teacher education pedagogy to better understand as well as enable student teachers to critically examine and, where appropriate, reconstruct these beliefs in light of contradictory pedagogies of teaching and learning. The most common interventions were the use of coursework, particularly specifically designed courses, critical reflection of prior beliefs during student teaching, or a triangulation of these approaches. The former strategy directly targets the beliefs that student teachers hold before enrolling in the teacher education program while the latter strategy allows student teachers to critically reflect on their prior beliefs while interacting with their college supervisors and the student teaching context. Triangulation of coursework and student teaching involves two phases. In the first phase, student teachers' prior beliefs are interrogated and students are guided towards more acceptable perspectives of teaching and

learning, and in the second phase student teachers use the student teaching pedagogical space to practice and critically reflect on their beliefs.

Changing Student Teachers' Prior Beliefs Using Coursework

A number of studies have examined the use of coursework to target and negotiate student teachers' prior beliefs of teaching and learning by focusing on pedagogical interventions by faculty using courses that student teachers undertake as a part of their teacher education program (Bramald, Hardman & Leat, 1995; Joram & Gabriele, 1998; Liljedahl 2002) or through the use of specifically designed courses and methods targeting these beliefs (e.g. see Bird, Anderson, Sullivan & Swidler, 1993; Gill, Ashton & Algina, 2004). Both approaches entailed firstly a survey of student teachers at the beginning of a course to make explicit their implicit prior beliefs about teaching and learning. These beliefs are then targeted during the course using a variety of methods. These methods often include critical reflection, experimental and non experimental groupings, critical constructivist approaches, and problem posing pedagogy. At the end of the course, student teachers are again surveyed to find out if their beliefs were reformed as a result of critically reflecting on their prior beliefs and their exposure to competing perspectives of teaching and learning.

These studies have come up with inconsistent findings on the efficacy of coursework in reforming student teachers' prior beliefs of teaching and learning. While some studies have reported changes in student teachers' prior beliefs (Joram & Gabriele, 1998; Liljedahl, 2002; McDiarmid, 1991), other studies have concluded that targeting student teachers' prior beliefs using coursework does not radically change these beliefs. These studies found that student teachers' prior beliefs of teaching and learning were elaborated rather than radically changed by what they were learning about teaching in their courses (Bramald, Hardman & Leat, 1995; Goodman, 1988; Hollingsworth, 1989; Zeichner, Tabachnick & Densmore, 1987).

This study builds on previous research that utilized coursework as a means of identifying, describing and reshaping student teachers' prior beliefs of teaching and learning. However, rather than designing and implementing specific interventions to target the beliefs that student teachers had about teaching and learning prior to becoming students of teaching, change in their prior beliefs was ascertained from their study of prescribed teaching subject and Education Foundation courses over a period of 4 years. Student teachers who are enrolled at the University of Goroka are educated and trained to teach two subjects. In addition, they are required to take Education Foundation courses, which include Educational Psychology, Sociology, Curriculum, Guidance and Counseling, and Philosophy. In the first instance, student teachers were interviewed in the first week of semester 1 of the first year of their 4 year teacher education program to ascertain and document their prior beliefs about teaching, learning, a teacher's role (s), students as learners, and knowledge. In the final semester of year 4, student teachers were again interviewed to find out if their prior beliefs had changed as a result of what they were learning about teaching in their teaching subject and Educational Foundation courses over a period of 4 years.

The Study

Context of the Study

This study was carried out at the University of Goroka, one of seven universities in Papua New Guinea. The University of Goroka is one of the educational institutions in Papua New Guinea educating teachers for primary, post-primary, and technical and vocational educational institutions. Students who enroll in its teacher education programs come from different provinces and cultural backgrounds in Papua New Guinea, and neighbouring Pacific Island countries. The lecturers who teach at the university are graduates of universities from different parts of the world and come from different cultural backgrounds.

Methodology

The case study approach was employed in this study to provide the conceptual framework to develop an in-depth understanding and make sense of student teachers' prior beliefs about teaching, learning, a teacher's role (s), students as learners, and knowledge, and how these were reformed by what they were learning in their teaching subject and Education Foundations courses. This approach enabled me to also ascertain how each participant's learning about teaching in the teaching subject and educational foundation courses contributed towards reshaping his or her prior beliefs of teaching and learning from his or her own emic perspectives and lived experiences.

Semi-structured interviews

The qualitative data for this study was collected through the use of semi-structured interviews. The three student teachers were interviewed in the first week of semester 1 of the first year of their 4 year teacher education program to ascertain and document their prior beliefs. They were again interviewed in the second semester of year 4 about how these beliefs had been reconstructed as a result of what they were learning about teaching in their teaching subject and Educational Foundation courses over the last four years of their teacher education program.

Procedure

The three student teachers in this study volunteered to participate after all student teachers in the first year of their teacher education program were given an open invitation to participate in the study. The purpose of the study was thoroughly explained and the three participants were given an opportunity to make comments and raise questions about the study. The interviews were conducted using prepared semi-structured interview questions with each of the participants in their first year and again in their fourth year of their four year teacher education program. Opportunities were provided for participants to add additional comments and for clarifications and meanings to be ascertained from participants' responses. Each interview was audio-taped and transcribed immediately after it was completed. Pseudonyms were used in order to protect the privacy and the identity of the three participants throughout the study.

Participants

Participants in this study were three secondary school student teachers who were undertaking a four teacher education program at the University of Goroka. Two of the participants were females and the other was a male. Ruth, one of the female participants, studied Mathematics and Commerce whilst Arleena, the other female participant, studied English and Social Science as their teaching subjects. Desmond, the male participant in this study, studied Practical Skills and English as his teaching subjects. They all undertook the same Educational Foundation courses.

Data analysis

The constant comparative method of data analysis was used throughout the study to analyze and make sense of the data (Bogdan & Biklen, 1992; Goetz & LeCompte, 1984). This method of data analysis allowed me to continuously compare participants' responses with each other and to construct categories for the data. Using this method, I was able to note tentative themes or categories emerging from the data and look for consistencies and inconsistencies from the participants' responses to ensure that there was coherence in the data. As tentative categories emerged from the data, I gave special attention to further evidence that either challenged or supported these categories. Through my constant comparison of the data, the emerging themes and categories crystallized. I took time to re-examine and refine the categories and constantly double-checked and compared data segments within and across categories to make sure that all data segments were assigned appropriately and made sense, until I achieved a satisfactory closure.

Results and discussion

Five major themes emerged from the interview data collected on what the three student teachers believed were changes made to their prior beliefs of teaching, learning, a teacher's role (s), students as learners, and knowledge. In what follows, I discuss with examples and an analysis of the five major themes.

Teaching as an Interactive Process

When interviewed in their first year of teacher education, it was established that the three student teachers in this study believed that teaching was the transmission of prescribed knowledge as well as what the teacher had learned from teacher education to the students. This is typified by Ruth's prior belief of teaching:

I viewed teaching basically as the transferring of what is prescribed or written in the syllabus and textbooks to the learners. By teaching, I mean the transferring of ideas, knowledge, skills, and what the teacher has acquired during his or her training [to students].

When I interviewed the three students again in the fourth year of their four year teacher education program it was found that they had made some changes to their prior beliefs of teaching, which they attributed to what they have been learning about teaching in their teaching subject and Education Foundation courses. Evidence seems to suggest that these changes were individualistic and reflected the decisions of the three student teachers to accept or reject what was espoused in the teaching subject and Education Foundation courses about

teaching. It also indicates that the three student teachers' prior beliefs of teaching were embellished with the perspectives espoused and privileged by their course lecturers rather than dismissing these beliefs entirely. This is manifested in the view of teaching that Ruth had come to hold as a result of what she learned in her teaching subject and Education Foundation courses. It seemed clear that although Ruth now viewed teaching as a two-way communication and experiential process, she did not abandon her prior belief of teaching entirely but expanded on it:

I have learned here that teaching is not just preaching and indoctrinating students. It should involve students in the learning process, it should relate to reality and students' experiences. Teaching is a two-way communication process between those who give and those who receive information.

Arleena had also accepted the view of teaching espoused by her course lecturers that teaching is a two-way, experiential process however, she still held on to her prior belief of teaching as the transmission of prescribed content:

My view of teaching now is that teaching is a two way process. Teaching is not only the delivery of lessons or the transmission of prescribed subject content by the teacher to the students. Teaching involves the acknowledgement and respect for students' views and experiences that they bring to the classroom. The teachers should listen to what the students say and encourage them to participate in class and to share and talk about their experiences.

Change in Desmond's prior belief about teaching was more elaborate than those of Arleena and Ruth. This is further evidence that changes in prior beliefs about student teachers are more individualized, depending on their individual judgment and decision vis-à-vis what to accept and reject from the contradictory discourses of teaching they encounter in teacher education.

I now understand that teaching is not only the delivery of information or required knowledge to the students by the teacher. Teaching is a two-way process that should involve the teacher and the students they are teaching. We are also told, especially in our Educational Psychology classes, that students have different abilities and go through different stages of development. Therefore, when we teach, we should understand that not all students learn the same way or are at the same level of development.

The three student teachers became aware, in light of what they were learning about teaching in their teaching subject and Education Foundation courses, that the beliefs of teaching they held prior to their teacher education program were problematic and hence, needed to be reconstructed. However in doing so, they assimilated the perspective of teaching espoused in their courses without critically thinking about its pedagogical and contextual implications. Moreover, evidence of change in the prior beliefs of the three student teachers indicates that change is incremental and that they are actively constructing an evolving discourse of teaching.

Learning as an Interactive, Experiential, and Inquisitive Process

It was also found at the very beginning of the first year of teacher education that the three student teachers entered their teacher education program assuming that learning was the absorption and memorization of prescribed knowledge. This is epitomized by Desmond's prior belief of learning:

To me, learning was for students to sit in the classroom and listen, hear, and receive what the teachers were delivering without actually taking part. To me, that was learning and it was formal. Learning was the absorption of skills, values, and knowledge passively by the students that are delivered to them by their teachers in the classroom.

However, their encounter with new discourses and contradictory philosophies of learning in their courses had made them conscious of the pedagogical limitations of their prior beliefs of learning. This led them to change these beliefs, but not dismiss them entirely. They assimilated the perspective of learning privileged by their course lecturers, which they believed was valid and conducive to meaningful student learning in the classroom. Stories of change in the prior beliefs about learning, as was the case with prior beliefs about teaching, clearly show that the student teachers were willing to negotiate the meaning of teaching and learning they held prior to teacher education, thereby constructing an emerging discourse of teaching and learning an important pedagogical process that often goes unnoticed by teacher educators and researchers alike.

Desmond accepted the view of learning espoused by his course lecturers that learning is an action thing that involves inquiry and discovery however, this was an elaboration of his prior belief rather than a construction of a totally new perspective of learning:

Learning does not only involve students absorbing and memorizing what the teacher says and doing what the teacher wants. Learning is an action thing. As teachers we must encourage our students to ask questions, and help them to inquire and discover things for themselves. Students have experiences and if we teachers explain well, demonstrate, and give examples students would be able to do what they are asked to do well.

Ruth's prior belief of learning was also expanded through her selective addition from the privileged perspective of her course lecturers:

As teachers we should be able to guide students in discovering their own explanations or answers to their queries and assist them explore and pursue their interest. Learning should be related to students' experiences and real life situations, not too abstract. This way learning will become more effective and not only focus on the memorization of facts and strictly following the established ways of doing things.

Arleena had embellished her prior belief of learning as the memorization and absorption of predefined knowledge with the view that knowledge should be analyzed and not only absorbed by the learners; it should be authentic and relevant to students' lives. She elaborated:

From the courses I have taken here, like I have been taught that learning can be receiving or absorbing knowledge, but it must involve an analysis of that knowledge. Like, in English, which is my minor teaching subject, we are told that learning is a two-way process in which communication is an important part. Teachers should learn from their students and provide an environment that is conducive to student learning.

The three student teachers reexamined their prior beliefs of learning in light of what they were learning about becoming a teacher in their teaching subjects and Educational Foundation courses. They were discontented with the assumptions they held about learning prior to becoming students of teaching and generally agreed that their assumptions were problematic. While not dismissing their prior beliefs of learning as absorption and memorization of prescribed knowledge outright, they agreed that what they were learning in their teacher education program presented them an additional way of thinking about and seeing learning, which they assumed was more acceptable. The changes were incremental rather than radical and were more personalized rather than collective.

Teacher as a Facilitator of Student Learning

The three student teachers entered their teacher education program believing that the main role of a teacher was to transmit prescribed knowledge to the students. In addition, they each viewed the teacher as playing a number of supportive roles. These included: maintaining discipline and order in the classroom; coordinating and supervising students' activities; being a guide, helper, counselor, an advisor, a parent, and a role model. This was embedded in Arleena's prior belief of a teacher's role (s):

My view of teachers' roles was that the teachers were totally different bodies from the students. Their main role is to tell students what to do and transmit to them the subject content that is prescribed in the syllabus and textbooks. Apart from that a teacher should also be a role model for students and help them if they have problems.

However, the three student teachers discovered that their prior beliefs about a teacher's role(s) were not supported entirely and explicitly by what they were learning about teachers' roles in their courses. This led them to reexamine their prior beliefs about a teacher's role (s), thereby (re)constructing these beliefs. They now believed that a teachers' main role is to facilitate student learning, a perspective advocated by many teacher education programs. Although they reconstructed their meanings of a teacher's main role, their prior beliefs of the supporting roles remained unchanged. Desmond, for instance, was critical of the way teachers taught and the roles they played. Contemplating what he was learning in his teaching subjects and Educational Foundations courses about teachers' roles, in an enlightened mode, he said:

I have learned that a teacher's main role is to facilitate students' learning. And also teachers must realize and understand the importance of the roles they play both inside and outside of the classroom. One of their most important roles is to be role models for the students they teach.

Correspondingly, Ruth while she accepted the view advocated in her courses that a teacher's main role is to facilitate student learning, maintained that a teacher must also be seen as a role model and a guide:

I keep using words like role model and facilitator to refer to teachers as being role models for children. What I am saying is that, as teachers our role is to create an environment that is conducive to student learning by being role models, guides, and facilitators of student learning, not obstacles. What I have learned here is that the teachers' main role in the classroom is to facilitate students' learning.

Arleena was also critical of her prior belief about a teacher's role (s). Although what she learned about becoming a teacher had changed the way she viewed a teacher's main role, her prior belief of the supporting roles remained unchanged:

A teacher's main role is to facilitate students' learning and guide them to discover things for themselves instead of giving them everything they need to know. A teacher is also a role model for students, someone who should act as a parent to the students because most of the time they spend with you.

The three participants construed from what they were learning about teaching that what they had assumed about the main role of a teacher was not only unacceptable, it was also detrimental to student learning. They took what they had learned about a teacher's role (s) in their teaching subjects and Educational Foundations courses as an acceptable way of performing as teachers, yet they saw no justification for changing their prior beliefs of teachers' other roles. Evidence indicates that the three student teachers' prior beliefs of a teacher's main role were radically changed. This reiterates the point that student teachers are involved in developing an evolving discourse of teaching which is punctuated by their selective acceptance and rejection of what makes sense to them from what they learned in their courses.

Students as Individually Different

When I interviewed the three student teachers at the very beginning of the first year of their teacher education program it was found that they generally believed that students were "empty vessels". This can be seen in Ruth's prior belief of students as learners:

I see students as having nothing in their heads. They know nothing so the teachers have the responsibility of filling them with facts and subject content. I mean, they need to learn a lot and fill their brains with knowledge given to them by the teacher.

When the three student teachers were interviewed at the end of the fourth year of their teacher education program it was found that they had reshaped their prior beliefs of students as learners. The changes made were a major shift and not just an expansion of their prior beliefs. They have accepted the view espoused in their teaching subject and Education Foundation courses that students already have some knowledge and experience of what is in the curriculum and teachers should take this into consideration in their teaching. Furthermore, they also accepted the view that students are individually different in terms of their cognitive development, stages of development, talents and abilities, cultural backgrounds, interests, and experiences. Arleena, for instance, said:

My view of students now is that students are not empty baskets. Students have knowledge and experiences that they have acquired in life. When teaching them in class, teachers should take into consideration the experiences that students have of what they are teaching. One thing, too, which I have learned in the courses I have taken, is that students have different experiences, abilities, talents, and do not develop in the same way. Therefore, like, when teaching we should understand that students are individually different and will learn differently.

Evaluating her prior belief of students, Ruth now understands that students are not empty vessels but intellectual beings with individual differences in terms of experiences, knowledge, and cognitive development:

From what I have learned in my two teaching subjects and Educational Foundation courses, I now understand that students are not empty vessels to be filled. Students have learned a lot of things and have gone through a lot of experiences before they went to school. They are human beings with abilities, talents, and capabilities to understand and do things. They know something and have experiences, which make them ready to grasp what they are being taught.

Desmond had also learnt that teachers must treat every student differently when they teach so that the learning needs of each student are catered for:

I am beginning to see that when we go out to teach we should see students as individuals with different talents and abilities. We must treat every student that we teach differently because not all students have the same abilities and also, as I have learned from my Educational Psychology classes, students develop at different rates and are not going to do things we ask them to do the same way. As teachers we must treat students differently when we deliver our lessons so that we cater for individual students' needs.

The three student teachers agreed that their prior beliefs of students as learners had changed given what they had learned in their courses. They now viewed students as individually different in terms of their backgrounds, cognitive development, and stages of development, abilities, interests, and talents. Although their prior beliefs of students as learners radically changed, evidence indicates that the perspective of students they had come to hold as a result of their interactions with their course lecturers and the teacher education context was the one privileged by their lecturers, which they now assimilated and took for granted as an acceptable and legitimate view of how students function.

Knowledge as Experiential and Useful for Personal Growth

It was established from interviews with Ruth, Desmond and Arleena in their first year of learning to teach that they believed that knowledge was prescribed, something that was useful for personal growth and society, and something that people possess. Additionally, they believed that knowledge was the content given in textbooks. This was exemplified by Ruth's prior belief of knowledge.

I viewed knowledge as those things we learned in the classroom, for example, Mathematics, Science, and Social Science, how things work, everything nature, the solar system, etc. These subjects are facts or knowledge. The knowledge or

facts [teachers] transferred to us or told us about are already predetermined in the syllabus or textbooks. I say facts because everything taught to us was all facts.

When the three student teachers were interviewed at the end of year four of their teacher education program only Desmond and Arleena had reshaped their prior beliefs about knowledge by accepting the view that knowledge is gained from experience, practice, and discovery. Ruth, on the other hand, continued to maintain her prior belief of knowledge. This is further evidence that student teachers make their own decisions on whether or not to reconstruct their preconceptions in light of contradictory discourses of teaching and learning they encounter in their courses. Desmond embellished his prior belief of knowledge by accepting the perspective espoused by his course lecturers that knowledge is acquired through practice, experience and discovery:

What I have learned here is that knowledge is not just the facts that we know and transmit to our students. It is something that is useful and valuable. Something that we acquire through practice, experience, and discovery, and that we can use to benefit ourselves and our society.

Ruth however, had not changed or expanded her prior belief of knowledge. She was still talking about knowledge as a body of facts, skills and ideas as well as something that was useful and valuable for personal and societal growth:

Knowledge is valuable and useful only when we apply it, I mean use it in our lives and in our daily living. Knowledge is basically those bodies of facts, ideas, skills, and concepts that we have to learn, I mean imparted or taught to us by those who know because they think it's useful for our living and society. I now view knowledge this way because that is what we are taught to view knowledge in Commerce.

Arleena repeatedly talked about knowledge as prescribed, something that was acquired and learned from experience, and something that was useful, or would be useful for the individual and society, a view she attributed to, and had assimilated from, what she had learned about knowledge in her teaching subjects and Educational Foundations:

Knowledge, like, apart from what is given to students in class and acquired from the teachers is also what you as a learner have experienced, learned, and gone through in life. Experiences that we all have gone through in life are an important part of knowledge that I did not think of as knowledge before. Experiences, from what I have learned here, is also knowledge.

Only two of the student teachers decided to reconstruct their prior beliefs of knowledge after four years of learning about teaching in their teaching subjects and Education Foundation courses. The other student teacher did not change her prior belief of teaching probably because what she was learning about teaching in her courses did not convince her to accept what was espoused by her lecturers. While this finding indicates that student teachers extract from teacher education what makes theoretical and practice sense to them individually, it also suggests that on an individual level they are continuously constructing a discourse of teaching and learning, a phenomenon that is often overlooked by teacher educators and researchers.

Conclusion

This study examined the impact of what three student teachers were learning in their teaching subject and Education Foundation courses on their prior beliefs of teaching and learning. It was found that overall the impact of what the three student teachers learnt in their teaching subject and Educational Foundation courses on their prior beliefs was mixed. While their prior beliefs of teaching, learning, and knowledge were elaborated their prior beliefs of a teachers' main role and students as learners were radically changed by what they were learning about teaching in their courses. This finding is consistent with findings from similar studies by Bramald, Hardman, and Leat, (1995); Goodman, (1988); and Hollingsworth, (1989). These studies found that student teachers' prior beliefs were enhanced rather than radically changed by what they learnt in their teacher education programs, with student teachers extracting from what they were learning about teaching whatever suited their own perspectives, which was also the case with the three student teachers in this study. Notwithstanding, the inconsistency of change in the three student teachers' prior beliefs, what is perhaps significant in the perceived change is that the changes were constructivist in nature.

The three student teachers' narratives of change in their prior beliefs indicate that the professed changes were individualized and reflected, to a greater extent, their individual interpretation of teaching and learning perspectives espoused by their course lecturers, and their individual decision to accept what makes sense and reject what does not. This finding is consistent with similar findings by Britzman (1991) and McDiarmid, (1991). Moreover, the narratives of change in the participants' prior beliefs also indicate that although the level and degree of changes in the prior beliefs of the three student teachers differed, on both the intuitive and analytical levels they were actively involved in constructing an evolving discourse of teaching. This discourse will shape and be shaped by the student teachers' interactions with others and different contexts throughout their teacher education program and teaching careers as professional teachers.

The perspectives of teaching and learning that the three student teachers had come to hold after nearly four years of teacher education were the ones espoused and privileged by their course lecturers. Furthermore, what the student teachers believed was a change in their beliefs was merely an assimilation of their supervisors' and teacher education privileged perspective and practice of teaching. The three student teachers assumed that what their course lecturers espoused was not only acceptable and valid, but also legitimate and omnipresent realities of teaching and learning. Therefore, they assimilated these perspectives on teaching, learning, a teacher's role (s), students as learners, and knowledge without thinking critically about their pedagogical and contextual limitations and relevance.

The three participants' stories about change in their prior beliefs suggest that pedagogical opportunities were not provided in both the teaching subject and Educational Foundation courses to enable student teachers to critically interrogate and challenge not only the views of teaching and learning espoused by their lecturers but also their own beliefs in light of what they were learning about teaching in their courses. Consequently, student teachers accepted the views of teaching and learning advocated in their courses at face value without critically analyzing and understanding the teaching and learning assumptions embedded in these views. They were also not convinced enough by teaching and learning perspectives espoused in their courses to radically change their own prior beliefs.

Efforts targeted at changing the prior beliefs of student teachers have generally been unsuccessful not because these beliefs cannot be changed but because as teacher educators we often fail to appreciate the fact that prior beliefs student teachers bring to their study of teaching are an integral part of a discourse of teaching and learning (re)constructed through their many years of interaction with a variety of contexts prior to teacher education. This discourse is legitimate, dynamic and will evolve and change as its privileged ways of thinking, behaving, seeing and doing things are challenged and new perspectives are accepted and integrated, and old perspectives rejected. The prior beliefs that student teachers bring to teacher education and have been the target for change by teacher educators and researchers over the decades are deeply rooted and underpin their teaching and learning discourses. These beliefs provide the hermeneutical lenses in which student teachers construct, perceive and understand teaching and learning. The discursive practices that have shaped these discourses and given them legitimacy and meaning are deeply embedded culturally and it is not easy for student teachers to disregard these and accept a new discourse and a set of new beliefs. Thus, it is unrealistic and futile for teacher educators to think that they can completely reshape the prior beliefs of student teachers while they are undergoing their teacher education.

Rather than approaching student teachers' prior beliefs as though they were pathological and needed to be treated once and for all before student teachers graduate and enter the teaching profession, teacher education programs should transform themselves into pedagogical sites where student teachers' commence on a journey of critical reflection on their prior beliefs as these are challenged by contradictory discourses and tested in practice. This journey is not time bound but is a lifelong process. Critical reflection, action research and meta-cognition skills should become the focus of, and taught in, teacher education programs to equip student teachers with relevant knowledge, skills and attitudes to enable them to continuously reflect on their perspectives of teaching and learning, and teaching practice while being students of teaching and later on as professional teachers.

References

- Ashton, P. T., & Webb, R. B. (1986). Teachers sense of efficacy and student achievement. New York: Longman
- Bird, T., Anderson, A. M., Sullivan, B. A., & Swidler, S. A. (1993). Pedagogical balancing acts: Attempts to influence prospective teachers' beliefs. Teaching and Teacher Education, 9(3), 253-267.
- Bogdan, R. C., & Biklen, S. K. (1992). Qualitative research for education: an introduction to theory and methods. Boston: Allyn & Bacon.
- Bramald, R., Hardman, F., & Leat, D. (1995). Initial teacher trainees and their views of teaching and learning. Teaching and Teacher Education, 11(1), 23-31.
- Bryan, L. A. (2003). Nestedness of beliefs: Examining a prospective elementary teacher's belief system about science teaching and learning. Journal of Research in Science Teaching, 40(9), 835-868.
- Britzman, D. (1991). Practice makes practice. A critical study of learning to teach Albany: SUNY.
- Calderhead, J. (1991). The nature and growth of knowledge in student teaching. Teaching and Teacher Education, 5(1), 430-445.
- Gill, M. G., Ashton, P. T., & Algina, J. (2004). Changing preservice teachers' epistemological beliefs about teaching and learning in mathematics: An intervention study. Contemporary Educational Psychology, 29(2), 164-185.

- Goetz, J. P., & LeCompte, M. D. (1984). Ethnography and qualitative design in educational Research. Orlando: Academic.
- Goodman, J. (1988). Constructing a practical philosophy of teaching: A study of preservice teachers' professional perspectives. Teaching and Teacher Education, 4(2), 121-137.
- Hollingsworth, S. (1989). Prior beliefs and cognitive change in learning to teach. American Educational Research Journal, 26(2), 160-189.
- Joram, E., & Gabriele, A. J. (1998). Preservice teachers' prior beliefs: Transforming obstacles into opportunities. Teaching and Teacher Education, 14(2), 175-191.
- King, K., Shumow, L., & Liet, S. (2001). Science education in an urban elementary school: Case studies of teacher beliefs and classroom practices. Science Education, 85, 89-110.
- Knowles, J. G., & Holt-Reynolds, D. (1991). Shaping pedagogies through personal histories in preservice teacher education. Teachers College Record, 93, 87-113.
- Liljedahl, P. (2002). The 'AHA moment': Students' insights in learning mathematics, Proceedings of the 24th International Conference for Psychology of Mathematics Education, North American Chapter Atlanta.
- McDiarmid, G. (1991). Challenging prospective teachers' beliefs during early field experience. A quixotic undertaking, Journal of Teacher Education, 41(3), 12-20.
- Veal, W. R. (2004). Beliefs and knowledge in chemistry teacher development. International Journal of Science Education, 26(3), 329-351.
- Wilson, S. M., Shulman, L. S., & Richert, A. E. (1987). 150 different ways of knowing: Representations of knowledge in teaching. In J. Calderhead (ed.), Exploring teacher thinking (pp. 104-124). London: Cassel.
- Zeichner, K. M., Tabachnick, B. R., & Densmore, K. (1987). Individual, institutional and cultural influences on the development of teachers' craft knowledge. In J. Calderhead, (ed.) Exploring teachers' thinking. London: Cassel.

Linking indigenous environmental knowledge and conservation education: Lessons from the field

Sangion Tiu and Sheebah Mirisa

Abstract

Indigenous environmental knowledge (IEK) is often described as an intimate knowledge about human relationships with the physical and spiritual worlds. It is knowledge that has been constructed over generations of human experiences and observations. Indigenous education (IE) is education about life and nature, of the natural and the physical world. It is about survival and how one embraces different components of the physical and spiritual environment to one's advantage. This paper presents the lessons from a school-based project on bio-culture activities that was inspired by a study on IEK and its implications for conservation education in Papua New Guinea (PNG). The key lessons from this project indicated socially situated learning as essential for knowledge and skills development, encouraging involvement of children through peer interactions, and development of culture and environmental knowledge and practices. The implications for this project are significant for teaching environment and sustainability education in PNG.

Introduction

This paper discusses the result of a small scale project conducted as part of an environmental education program activity. The project was motivated by the outcome of a research study that identified indigenous education as having flexible and holistic teaching approaches that promoted the use of environmental knowledge to enhance conservation education initiatives in Papua New Guinea (PNG) (see Tiu, 2007). The project began as a trial activity in 2010 and later developed into a fully fledged program in 2011 as more children became aware of its existence as a hands-on practical skill development project. The paper provides a brief theoretical background underpinning the project, the methods used, results of the project and the implications for environment and sustainability education in PNG.

Indigenous environmental knowledge (IEK) and conservation education

Conservation education is a form of environmental education that has its origins in zoos and aquariums and is recognised as a powerful tool for connecting people to nature (IZEA, 2013). Approaches in conservation education include ex-situ and in-situ conservation whereby the former uses exhibits of animals and their habitats to relay messages of biodiversity conservation while the latter involves education of species and their habitats in the wild. In situ conservation is commonly practiced in PNG among environmental organisations through their marine and terrestrial conservation projects to promote conservation issues (Orsak, 2005; Tiu, 2007). One of the key factors of in situ conservation that influences its implementation is the presence of indigenous or traditional people on whose land conservation initiatives are implemented. For these initiatives to succeed, it is important to involve the local people as they own the land and resources. It is also crucial to recognise that these people have their own conservation practices that are derived from their indigenous or traditional environmental knowledge (IEK/TEK). This IEK has been practiced over many generations and influences the way they perceive the world (McGregor, 2004; Berkes, 2008; Verlinden & Dayot, 2005). IEK is "the accumulated knowledge and skills of indigenous

people and their relationship with the environment” (Tiu, 2007, p.18). It is knowledge that cannot be separated from the people who possess it and is inherent in their interactions with the world around them.

This paper draws on three key attributes of IEK identified by Tiu (2007). Firstly, IEK promotes sustainable principles that are embedded in the local environmental knowledge and practices. These principles are demonstrated in various practices such as soil management (Paglau, 1982; Wood & Humphreys, 1982) and harvesting of marine or terrestrial resources (Macintyre & Foale, 2007). Secondly, the possession of indigenous environmental knowledge reinforces the cultural identity of indigenous people. The existing biological and cultural relationship is intricate in indigenous and traditional societies and is exhibited in the way people live and the language they speak (United Nations, 2012). Thirdly, indigenous education uses a variety of teaching and learning strategies to disseminate IEK. It involves diverse areas of knowledge and uses nature as a teaching tool and model for the learning process. Indigenous education also teaches through real situations and favours direct experiences and learning by doing. It takes place between the learners and the community and, is environmental education (Simonelli, 1997). In such circumstances where teaching and learning occurs in a social environment, learners are expected to learn by being apprentices (Tiu, 2007), each with the obligation to learn as much as they can from the experts and use these for personal and tribal survival.

This principle of indigenous education emphasises learning in a social context. It is underpinned by the theory of situated learning which views learning as a process of participation within a social context whereby as the learner’s participation in the communities of practice increases (Lave & Wenger, 1991), the internalised knowledge and skills acquired are eventually exhibited in some form. A key implication of this process of learning is the act of interacting with other apprentices as well as the expert that encourages exhibition of the acquired internalised knowledge and skills. This principle underpins the purpose of the bio-culture project discussed in this paper.

The Study

The methodological underpinnings for this project followed the interpretive paradigm which is concerned with individuals and their experiences. It endeavours to build theory that emerges from the data yielded from the individuals’ interpretations of the world around them (Cohen & Manion, 1989). The data from these interpretations are used to understand people’s behaviour at different times and places. This project used an interpretive paradigm to explore human interpretations of their interactions with the environment through Indigenous Education approaches and how this influences the way they learn traditional environmental knowledge and skills. This approach also acknowledges the notion that indigenous research involves rich contextual data (Sanga, 2004) that needs to be interpreted in order to develop theory.

The project was designed in two phases over a three year period from 2010 to 2012. The first phase involved a preparatory stage to establish the kind of skills and knowledge children were interested in learning. With the help of the school teachers and parents, interested children registered for the classes by completing a registration form in which they chose the activity they wanted to participate in. This form included a section for parental consent where parents signed to allow their children to participate in the project. The activities were categorised into two groups called ‘Lainim Tumbuna Save Skul’ (a class on traditional knowledge and skills) and ‘Alekan Tokples Skul’ (a class on the Alekano language

commonly spoken by the Gahuku tribe of Goroka District in the Eastern Highlands Province of PNG). A summary of the different activities within these two categories is provided in table 1.

Table 1: Summary of activities conducted

Alekano Tokples Skul	Tumbuna Save Skul
<ul style="list-style-type: none"> • Words and phrases • Construction of simple sentences 	<ul style="list-style-type: none"> • Basic bilum making • Advanced bilum making • Construction of traps, bows, arrows, arm bands • Painting local designs • Constructing a traditional Highlands hut

For the Tumbuna Save class, after the children indicated their choices, activities with high preference were short listed and local instructors, who were also skilled artisans, were identified to provide instruction. Children were mostly from lower primary school with ages ranging from 9 to 12 years. For the Alekano language class, the composition of children was mostly from elementary to lower primary school with an age range of between 6 and 11 years. The instructors and registered children were then briefed separately on the purpose of the project and their specific roles.

The second phase involved the actual staging of the class activities whereby the artisans provided instructions in Tok Pisin and used a variety of instructional approaches which suited their purposes. For example, one instructor had the children in the bilum making class sit on the lawn in big or small groups as the weaving skills and techniques were demonstrated. Similarly, the instructor in the Alekano Tokples Skul conducted classes in Tok Pisin to gradually introduce words and phrases in the Alekano language to the children and later taught them to construct simple sentences using these. Most of the classes were conducted for one to two hours weekly throughout a full school term of ten to twelve weeks.

At the completion of the project, both the children and instructors were given the opportunity to provide feedback on the project activities they were involved in and follow-up interviews were conducted with a total of 22 former participants including six instructors, ten children, four parents and two teachers.

Results and discussion

The results of this project indicated a greater interest from the school children in learning about their culture and traditional knowledge and skills. Over the three year period from 2010 when it was first introduced to 2012, there were a total of 149 children who participated in this project. A summary showing the total composition of male and female participants is provided on Table 2.

Table 2: Total number of children in bio-culture classes from 2010-2012

	Alekano	Tumbuna save
2010		
Male	5	6
Female	9	22
<i>Total</i>	<i>14</i>	<i>28</i>
2011		
Male	6	9
Female	6	27
<i>Total</i>	<i>12</i>	<i>36</i>
2012		
Male	11	18
Female	10	20
<i>Total</i>	<i>21</i>	<i>38</i>
Grand total:	47	102

Table 2 shows that over the three year period the number of children who participated in bio-culture classes increased from 42 in 2010 to 59 in 2012. Generally, there were more females than males enrolled in the bio-culture classes. This was mainly due to children's interest in enrolling for these classes. The figures also showed that while the number of participants in the Alekano language class was consistent from 2010 to 2012, the Tumbuna Save class was inconsistent. Initial registration in 2010 indicated that 6 male participants completed the class compared to 22 females. This trend continued in 2011 with 9 male and 27 female participants. Eventually an almost equal number of male and female participants of about 80 and 90 respectively were reached in 2012. This was a big increase triggered by many factors including the choice of activities for male participants, more children being aware of the existence of the project, and participants' perception of the relevance of what they were learning. This is illustrated in the following comment from a student:

I learnt how to mix colors and make local designs. I learnt how to use sticks and rope to set a trap on the ground. I also learnt how to do all things that needs to be done to build a hut. I had knowledge of how a hut was built.

This child's participation in various activities under this project over a period of three years demonstrated his or her interest to learn different skills described. The hands-on activities were quite rewarding as the younger learned these better.

In addition, the informal nature of this project encouraged learners to participate as apprentices (Lave & Wenger, 1991) in learning different knowledge and skills to improve themselves. The assessment of the outcomes was based on the end product, so children were encouraged to learn at their own pace but, at the same time, compare the progress of their apprenticeship with others. Being instructed by local artisans and resource people also meant that there was a lot of flexibility in the approaches used as the learning process was generally informal. This stimulated high interaction among the children and their instructors as they sought to assist each other. This was reiterated by one instructor:

I enjoyed teaching children who had no idea about making bilums. The knowledge and skills I imparted to them gave me satisfaction.

The children's enthusiasm was also obvious in school as they interacted with others. One teacher observed:

The children were interested in discussing lessons concerning traditional customs and contributed constructively to class discussions.

The implementation of Alekano language class was a milestone as it was not only unique but had an added effect on the community and the way they viewed the class. For example, at the completion of the class in 2010, some parents expressed their concerns about involving older children in the project as they felt that these children were losing touch with their local dialect. Moreover, those children who participated in the project observed differences in their own understanding of the local language. One child observed:

Before attending class, I didn't know a single word in my language or even understood what people were saying. After attending this class, I can now understand and speak basic words in my language.

Such responses are not surprising as language is seen as a powerful defining element (Mutu, 2004) that holds a set of beliefs and values that make a group of people who they are. Taumoeofolau (2004, p.64) adds that once the language is lost, the uniqueness that defines a particular group of people and their world is also lost.

Follow-up interviews with instructors, former participants, parents of the children and their teachers revealed favourable views on the project and its significance in the preservation and the promotion of cultural knowledge and practices. The findings showed that children who participated in these bio-cultural activities developed knowledge and skills in a particular area that they did not have earlier. For example, two former female participants described how they were able to develop bilum [string bag] making skills involving yarn preparation by hand to weaving different coloured yarns to make patterns. One student said:

It was my first time to learn how to make a bilum. I never knew how to make a bilum but when I attended the basic bilum making class, I learnt how to twist the yarn and actually make the bilum.

In addition, a former male participant described how he learnt the skills of constructing arrow heads; using sticks and strings to make bush traps for wild life; and build a traditional hut using local timber posts, kunai grass and other raw materials from the environment as follows:

I had now learnt how to weave the blind, bundle the kunai grass for the roof thatch and erect posts for the traditional hut.

The skills development process involved learning the correct procedures for what the children were making. This required clear instructions and an environment outside the formal school setting that the children felt comfortable working in. One instructor recognised this in stating that "learning in a new environment and setting is rewarding for students". This underpins the notion that socially situated learning environment enables participants to learn the required

knowledge and skills at their own pace and within a given time. The interaction with other learners also encouraged skills development, participation and confidence building in the children.

All the parents interviewed described notable changes in certain aspects of their children after participating in the bio-cultural classes. One parent indicated that his child had scored good grades in subjects related to environment and culture as his level of confidence and interest improved.

I have noted differences in my son's marks where he scored good grades. His confidence has also improved and he has developed interest in this area.

Another parent described his child's progress as having no knowledge to being more interested in learning about the processes involved.

My child had no idea about making bilums but she has now become more interested. She has also influenced her sibling to make bilums.

One other parent expressed an element of surprise when his child described the stages in building a traditional hut and the kind of tree species used for various parts of the hut.

I was surprised to hear my child describing the stages of building a hut and the type of trees we use to construct the frames. My child has acquired very good knowledge and skills.

Reaction by this parent is consistent with Tiu (2007) who reported a case study where elementary children in one of the rural communities in PNG had no problem identifying local vernacular names of tree species used for various construction purposes. Children who are given the opportunity to learn outside of the formal classroom will develop knowledge and skills that they did not possess earlier. The implication from parents' view is the significance of involvement in social activities and development of skills and knowledge that a child perceives as significant for his or her own personal interest and development.

The instructors also noted specific changes in the children who completed bio-cultural classes and emphasized the need to continue such projects. They noted that students developed a greater interest in lessons concerning traditional customs and practices and contributed effectively in class discussions. One teacher said that "children are researching more about their environment and why it needs to be conserved and kept safe". This emphasizes the significance of the project in promoting environmental and cultural knowledge and protection. As pointed out by another instructor:

The introduction of western cultures, contemporary cultures and intermarriages taking place has caused children today to not know their languages, traditional customs and culture which are their identity. I for one am thankful for this project and would encourage such classes to continue.

All the instructors interviewed expressed satisfaction in the project and described the outcomes as fruitful. One instructor said, "I like the program because it met the desire of the parents in the community for their children to learn the local dialect". The instructors also

indicated their interest to continue providing instructions in their respective areas of expertise if given the opportunity. One of them elaborated:

It is important that children must learn their culture so that they can improve their life in the future. I am ready to provide instructions whenever invitation is given.

The instructors' responses reiterated the significance of children's ability to understand their culture and environment and incorporate these knowledge and skills that are essential for improving their livelihoods. The implications are that skills and knowledge taught to children must be relevant and applicable for real life situations. If children are able to recognise these principles, they can actively participate in the learning process to improve their own lives and of those around them.

Conclusion

The bio-culture project discussed in this paper emphasises two key issues. Firstly, conservation efforts in PNG need to utilise indigenous education approaches in promoting conservation messages. This is because indigenous education involves diverse areas of knowledge; uses nature as a teaching tool and model; teaches through real situations, favours direct experiences and learning by doing; takes place between the learners and the community; and is environmental education (Simonelli, 1997). This nature of indigenous education emphasises IEK, which is practiced by the local people on whose land conservation initiatives are implemented. IEK is about survival, focuses on ecological knowledge and practices of indigenous or traditional people, and reinforces their cultural identity. Secondly, teaching and learning strategies in formal education practices in PNG can integrate various approaches used in indigenous education. One reason for this is that indigenous education is socially situated and hence creates conducive environment for learners to interact with each other and improve their knowledge and skills. However, it is a complex process because it is culture and language specific. One needs to be prepared to identify the challenges of merging IEK with formal education strategies and find a win-win situation for the two to work together.

The results of this project indicated that using indigenous education approaches in bio-cultural activities not only enhance children's ability to develop knowledge and skill of interests, but also provides them the opportunity to interact with other learners and progress as they travel the journey of learning together. The untailored learning environment, which is a key characteristic of indigenous education, creates a conducive learning hub and encourages children to freely explore their abilities without fear of being ridiculed. With an expert as the instructor, the children confidently embrace the learning processes and in doing so produce outcomes that they are satisfied with. For example, one child might complete a traditional hut; while another can weave colourful patterns on bilums or speak the local language with confidence.

The implications for environment and conservation education in PNG are that:

- (i) learning activities that are socially situated will enable children to learn required knowledge and skills at their own pace within a given time;
- (ii) teachers and instructors who create a conducive learning environment both within and outside the classroom will enable learners to interact freely; and,
- (iii) knowledge and skills taught to children need to be relevant and applicable in real life situations.

References

- Berkes, F. (2008). Sacred ecology. New York: Routledge.
- Cohen, C., & Manion, L. (1989). Research Methods in Education. London: Routledge.
- IZEA. (2013). Conservation education definitions. Retrieved March 3, 2012 from http://www.izea.net/education/38_conserveddef.pdf
- Lave, J., & Wenger E. (1991). Situated learning: Legitimate peripheral participation. New York: Cambridge University Press.
- Macintyre, M., & Foale, S. (2007). Land and marine tenure, ownership and new forms of entitlement on Lihir: Changing notions of property in the context of a gold mining project. Human Organization, 66(1), 49–59.
- McGregor, D. (2004). Coming full circle: Indigenous knowledge, environment and our future. American Indian Quarterly, 28(3/4), 385-410.
- Mutu, M. (2004). Researching the Pacific. In Baba, T.; Māhina, O.; Williams, N., & Nabobo-Baba, U. (eds). Researching the Pacific and indigenous peoples: Issues and perspectives, (pp. 54-62) Auckland: University of Auckland.
- Orsak, L. (2005). Visualizing effective conservation education. 1st PNG conservation education conference, Research & Conservation Foundation, Goroka.
- Paglau, M. (1982). Conservation of soil, water and forest. In Morauta, R., Pernetta, J., & Heaney, W. (eds). Traditional conservation in Papua New Guinea: Implications for today, (pp.115-119). Port Moresby: Institute of Applied Social and Economics Research.
- Sanga, K. (2004). Making philosophical sense of indigenous Pacific research. In Baba, T.; Māhina, O.; Williams, N., & Nabobo-Baba, U. (eds). Researching the Pacific and indigenous peoples: Issues and perspectives, (pp. 41-52) Auckland: University of Auckland.
- Simonelli, R. (1997). Partnering with indigenous education. Retrieved March 22, 2013 from <http://www.yale.edu/ynhti/pubs/A20/simonelli.html>
- Taumoeofolau, M. (2004). A Place to stand. In Baba, T.; Māhina, O.; Williams, N & Nabobo-Baba, U. (eds). Researching the Pacific and indigenous peoples: Issues and perspectives, (pp. 63-67) Auckland: University of Auckland.
- Tiu, S. A. (2007). The Role of indigenous knowledge in biodiversity conservation: Implications for conservation education in Papua New Guinea (Master of Science Thesis). Hamilton: University of Waikato.
- United Nations. (2004). Indigenous peoples and the environment. Retrieved on March 22, 2012 from <http://www.ohchr.org/Documents/Publications/GuideIPleaflet10en.pdf>
- Verlinden, A. & Dayot, B. (2005). A comparison between indigenous environmental knowledge and a conventional vegetation analysis in north central Namibia. Journal of Arid Environments, 62, 143-175.
- Wood, A. & Humphreys, G. S. (1982). Traditional soil conservation in Papua New Guinea. In Morauta, R.; Pernetta, J., & Heaney, W. (eds). Traditional conservation in Papua New Guinea: Implications for today, (pp. 93-114). Port Moresby: Institute of Applied Social and Economics Research.

Notes on Contributors

Dr. Gerard Guthrie has some 40 years of experience involving Papua New Guinea. He was the Foundation Professor of Education at the University of Goroka from 2002-2003. He is the author of *The Progressive Education Fallacy in Developing Countries: In Favour of Formalism* and a co-author of *Basic Research Methods for Papua New Guinea*. He is also the author of numerous reports and journal articles. He now resides in Wellington, New Zealand.

Dr. Arnold Kukari is Associate Professorial Research Fellow and Leader, Universal Basic Education Research Program, The National Research Institute, Papua New Guinea. He has over 30 years of teaching, research, and consultancy experience in education and development. He is the editor of *Universalizing Basic Education in Papua New Guinea: Experience, Lessons Learnt, and Interventions for Achieving the Goal of Universal Basic Education* and author of several research publications and journal articles.

Sangion A. Tiu works with the Research and Conservation Foundation based in Goroka, Eastern Highlands Province, Papua New Guinea.

Sheebah Mirisa works with the Research and Conservation Foundation based in Goroka, Eastern Highlands Province, Papua New Guinea.

Notes for Contributors

Publication Criteria

The main criterion for publication is relevance to Papua New Guinea, and papers should bring out the potential applications of their findings. Material on other countries will be published provided that direct relevance to Papua New Guinea is established in the text.

Manuscripts

1. Manuscripts should be no more than 6000 words and should be typed double-spaced on one side of A4 paper, with generous margins all around. The Journal will also publish Book Reviews, Thesis Abstracts, Education Bibliographies and Research Notes of 1000 words.
2. For anonymity in the review process, authors' names, affiliations, postal addresses, emails and telephone numbers should appear on a separate covering page.
3. An abstract of not more than 150 words should accompany each manuscript.
4. Manuscripts should conform to the style of papers published in the *Papua New Guinea Journal of Education*
5. References should be included in the manuscript by giving the author's name, with the year of publication in parenthesis. If several papers by the same author and from the same year are cited, a, b, etc. should be placed after the year of publication. References should be listed in full at the end of the paper in the following standard form:

For books: Britzman, D. P. (1991). Practice makes practice. A critical study of learning to teach. Albany: SUNY.

For articles: Calderhead, J. (1991). The nature and growth of knowledge in student teaching. Teaching and Teacher Education, 7(5/6), 531-535.

For chapters within books:

Basnyake, P. (1992). Computer usage and training needs in Sri Lanka. In Bhatnagar, S.C. (ed). Information technology manpower: Key issues for developing countries, (pp. 85-91). New Delhi: McGraw-Hill.

For conference proceedings:

Fova, T. (1994). The teaching of computer studies in national high schools. A Sogeri experience. In proceedings of the 1st Workshop in computing innovations in Papua New Guinea High Schools, (pp. 53-64), August 29-September 1, PNGUoT, Lae, Papua New Guinea.

6. Three good quality copies of the manuscript should be submitted, preferably by emailing them to the Editor.
7. Manuscripts not conforming to the above guidelines will not be considered for publication.

Peer Review of Articles

The journal maintains a blind review policy. Articles received will be submitted to three reviewers to review. Major emphasis will be given to clarity of organization and expression.

Writing Style

The authors should follow the conventions in the latest available issue of the Journal.

