

Policy Issues Arising from Key Findings of the Pilot Curriculum Standards Monitoring Test Study

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In Papua New Guinea, reform of systemic education has been underway since the early 1990's, involving initially, structural reform and more recently curriculum reform (National Department of Education, 2002, 2003a, 2003b and 2005). New outcomes-based curricula have been developed for Elementary and Primary and a new outcomes-based curriculum for Lower Secondary is currently under development. These initiatives are designed to make systemic education more responsive to individual student needs and aspirations and more inclusive of cultural heritage and community needs.

As a result of these major changes to the education system, there is widespread interest in knowing, how successful curriculum reform has been in Elementary and Primary, particular in raising achievement standards of students and schools. Even though it is too early at this time to gauge the success of the new curricula, for implementation in schools has only just commenced, the National Department of Education (NDoE) plans to regularly monitor curriculum standards (see *A National Plan for Education 2005 – 2014*). The resulting information will prove not only valuable for evaluating the success of curriculum reform in improving teaching and learning in schools, but also for monitoring the impact of curriculum reform on the growth of actual achievement standards, locally and nationally, in relation to standards prescribed in the curricula.

To provide an objective, scientific picture of actual standards in learning, as opposed to intended standards embodied in syllabuses, quality data must be collected from students, teachers and schools, and analysed appropriately to reveal how actual standards differ from intended standards. A well-designed monitoring program, applied regularly, will reveal trends in actual (measured) standards, and this information will be valuable for facilitating educational planning and policy formulation to improve education, specifically and generally.

Although educational policy is often formulated and enacted without recourse to strong, objective data/evidence, it is clear that educational policy that is based of quality data/evidence is likely to be more reflective of real conditions rather than imagined conditions, and thus more likely to succeed and be accepted by recipients of the policy, whether they be students, teachers or education administrators (Green, 1994). Policy that is far from the conditions, practice and thinking of recipients is unlikely to be effective in guiding or changing behaviour. Moreover, policy based on hearsay, anecdotal evidence, or poor data is unlikely to have much credence and unlikely to lead to good educational outcomes and practices. It is also well to note that "According to conference presenter Jacob Adams...Policy can profoundly affect what goes on in the classroom, often reflecting the broad goals and sweeping visions of public officials who sometimes are far removed from the day-to-day work of instruction" (Ready, Edley, Jr., Snow, 2002). Moreover education policy should lead to reform that is consistent with efficient management of the education system

because it is more likely to be effective and accepted than reform that simply personalises education and makes it more difficult to manage (Covaleskie,1994). The pilot Curriculum Standards Monitoring Test Study (CSMT) was a trial exercise conducted in 2003 – 2004, and it was the first significant, large-scale educational survey of literacy and numeracy standards in Papua New Guinea (Freeman, Anderson & Morgan, 2005). Samples of primary students in Grades 3, 4, 5 and 8 across the country were tested in basic literacy (reading and writing tests) and numeracy (mathematics test). Curriculum standards in the new outcomes-based curricula for Elementary and Primary were embodied in the tests by mapping test items to outcomes in syllabuses, and this allowed student achievement in reading, writing and mathematics to be measured in terms of intended curriculum standards. In addition to evaluating the feasibility of conducting in PNG a curriculum standards monitoring program, CSMT also attempted to determine the impact that teaching and learning in vernacular was having on student achievement in literacy and numeracy. Current government policy encourages local communities to choose the vernacular or lingua franca for teaching and learning in Elementary and Lower Primary, progressively bridging to teaching and learning mainly in English in Upper Primary. The policy recognises that early learning is best facilitated if done in the home language, but there is also the intention that learning in the home language will strengthen the student’s connection to his or her language and cultural heritage; thereby improving the student’s potential to contribute to his or her community.

CSMT also collected information on a number of student background variables, including variables measuring students’ attitudes to learning, schooling and the community, and some of this information was selectively applied to try and understand (“explain”) why the students sampled had performance in the ways observed. Collecting data on background variables that are suspected to be correlates of achievement helps in analysing and understanding student performance. Many background variables are known to be correlated with student learning and performance in an assessment, and the strength and direction of the relationship between a particular background variable and a variable measuring educational performance may be stronger in one circumstance than in another (Mortimore, 1998).

Clearly many factors (background variables or correlates of achievement) also seem to affect students’ ability/capacity to benefit from teaching and learning in mathematics, such as student factors (e.g. motivation, attitude, interest in mathematics, absenteeism), home background factors (e.g. father’s and mother’s education, location and distance of home from the school), school factors (e.g., condition of the school, student-teacher ratio, qualification and experience of teachers, school climate), and community factors (e.g. community facilities and cohesion, social problems). These and other factors are in a sense the policy issues that policy makers need to address when formulating policy to improve learning and achievement.

For a given student population, for example, some background factors (variables) of the students, like gender, are “fixed” and not amenable to manipulation, whilst others, like class-size, are “not-fixed” and are amenable to manipulation through intervention (eg. regulations and policy). If the strength and direction of a relationship between a background variable and student performance is known, this might suggest policy that

could influence manifestation of the background variable in a way that enhances student performance. Thus in the example of class-size, research evidence might show that in a particular population of students the larger the class-size the poorer the achievement of students. In order to lessen the negative impact of large class-size on achievement, policy makers could formulate policy that encourages provinces and schools to restrict class-size where possible to below a certain size. In this case, policy is based directly on research evidence, and if enacted is likely to result in improved student performance.

Nevertheless, it is important to appreciate that a correlative relationship between a background variable and a variable representing student performance provides only supporting, and not definitive, evidence of a causal relationship from the background variable to the performance variable. The relationship may be spurious or accidental and other variables (factors) not measured (identified) may be better causal predictors of the student performance. In educational research, the situation studied is often very complex and teasing out or determining which variable(s) are the “real” causes of student performance is a major challenge for the researcher. Moreover, policy makers, basing policy on research evidence, must be careful not to adopt or rely on “wrong” or misleading variables/factors and their effects.

This paper presents some findings of the pilot CSMT study and considers related policy issues with implications for improving student achievement in primary schooling. In doing this the paper also presents some background and attitudinal information from the pilot study that help to understand why students performed in the ways observed. Two examples of the formulation of education policy based on the findings of the pilot study are given.

The policy challenge for NDoE, province education departments and schools is to formulate strategies that will enhance growth of student learning as students move through the grades. Capacity building is also important. According to Darling-Hammond (1998, p.646), “...telling schools to change has never worked to produce markedly different teaching over many decades of efforts at curriculum reform... Studies of change effort have found that the fate of new programs and ideas rests on teachers’ and administrators’ opportunities to learn, experiment, and adapt ideas to their local context. Without those opportunities, innovations fade away when the money or enforcement pressures end.” Hopefully these opportunities will come with progressive implementation of the new outcomes-based primary curriculum, and this will eventually see a general rise in achievement levels.

Some Key Findings of CSMT

This part of the paper summarises some of the findings presented in the main report of the pilot curriculum standards monitoring test (Freeman, Anderson & Morgan, 2005), and for further detail the full report should be consulted.

Student Achievement

Numeracy: Mathematics

The pilot CSMT study revealed that students generally performed better in abstract mathematics than in applied mathematics, and that students' ability to solve everyday mathematical problems develops more slowly than envisaged by the curriculum. The study also observed that many Grade 5 and Grade 8 students find multi-step mathematical problems and computations particularly difficult. Many students in these two grades also experience difficulty understanding or applying basic concepts of measurement and space, and perform well below the expected curriculum outcomes for the grade they are in. Indeed the CSMT revealed that there is little effective growth in mathematical knowledge and skills of many students between Grades 4 and 5, and between Grades 5 and 8.

Literacy: Reading

The pilot CSMT study revealed that lower primary students generally develop ability to read in English more rapidly than the curriculum expects, but this ability seems to be at a basic utilitarian level. By Grades 5 or 8, few students appear to have developed complex language skills that allow them to formulate opinions with evidence from text, including the ability to critically analyse texts for meaning and intent. Moreover, the pilot CSMT study showed a considerable overlap in the performance of students in Reading from Grades 4, 5 and 8, as well as a wide range of reading ability in each of the grades tested.

The performance of students who did the Grade 3 vernacular tests and the performance of students who did the Grade 4 English Reading test were similar. However the mean for the vernacular group was higher than that of the students who responded to the English versions of the tests. The suggestion was made that "A hypothesis to be tested might be that students go backwards for a time when the medium of instruction changes from the vernacular to English. This would be consistent with the data." (Freeman, Anderson & Morgan, 2005, p.xiv)

Literacy: Writing

Generally students' writing ability was very low at the grade levels tested, and this evidence suggested that writing skills are poorly developed in primary schooling, and that growth in writing skills is largely in non-narrative writing. According to Freeman, Anderson & Morgan (2005, p.xvi) "Students' writing tends to show limited understanding of the narrative genre. Generally Grade 5 and 8 students' writing, in response to the CSMT prompt was repetitive and pedestrian in style and language. Most students demonstrated a basic understanding of English grammar and used a small functional vocabulary to convey some simple ideas.

There is a wide variation in the performance of students from different regions. However there is a trend that shows limited growth in writing skills in the lower primary school. More detailed information provided later in the report shows about twice the rate of growth in ability between Grade 5 and Grade 8 compared to the growth in ability between Grade 3(4) and Grade 5."

Policy Issues Arising from CSMT

Following is a selection of the findings of the pilot CSMT study, and some policy issues that arise.

Poor growth of literacy and numeracy skills

What are the reasons for the poor growth of literacy and numeracy skills of many students in primary education? Why are students generally much poorer at solving practical mathematical problems than abstract mathematical problems? Are these problems largely curriculum design issues or largely curriculum implementation issues?

What can NDoE and province education departments do in the short-term/long-term to improve literacy and numeracy in primary education? What kind of policy might be developed to fast track growth in literacy and numeracy standards in schools, and who should be the main recipient(s) of the policy?

Automatic promotion

The reality in PNG is that the grade structure of schooling does not reflect well the ability and achievement levels of students in grades and across grades. The wide range of reading abilities within a grade and the considerable lack of progress in developing basic literacy and numeracy skills as the student is automatically promoted up through the primary grades poses serious teaching difficulties. If students are promoted to the next grade when they are not adequately prepared to undertake the work in that grade, the teacher will be forced either to ignore the students handicap or expend a great deal of effort to try and bring the student up to standard for the grade. In a large class or where the teacher is inexperienced this may be an insurmountable challenge. What can be done to overcome the problem of wide range of student abilities, particularly in enhancing teachers' ability to develop flexible teaching and learning approaches to satisfy the learning needs of student who differ greatly in terms of their capacity to learn new knowledge and skills? Is automatic promotion a practice that ought to be reviewed?

Location of school and time taken to get to school

In Reading urban students achieved higher mean scores than rural students. In Writing the performance of both Grade 5 and Grade 8 students in urban schools significantly exceeds that of students in rural schools.

Moreover, performance is generally affected adversely the longer it takes a student to get to school. The data revealed that the performance of students in Reading and Mathematics reduces the longer it takes for a student to get to school. Approximately 20 per cent of the students in Grade 3 took an hour or more to get to schools. Similar percentages were obtained for students in Grades 4 and 5.

What can be done to improve students' access to primary schools; can the problem be alleviated in the short-term by improving roads and transport facilities and in the long-term by better siting of primary schools?

Student absence from school

About 55 per cent of all students were absent at least one day in the week prior to testing; males being absent more than females. The main reason for absence was sickness and about 15 per cent indicated a need to help parents.

A child with a high rate of absenteeism effectively reduces his or her effective (in-class) learning; with the result that coverage of the intended curriculum as envisaged by curriculum designers is not possible. The learning outcomes of the child will likely be less than that expected at the particular grade level of the child.

To what extent is the poor growth of literacy and numeracy skills due to absenteeism? What might be done to assist families who keep their sons and daughters at home to rather send their children to school? Are there any realistic short-term/medium term options for education authorities, or is large absenteeism a natural consequence of poverty and an issue that can only be resolved over the long-term, with sustained development of the country?

Teachers using vernacular to teach

Twenty-two per cent of Grade 3 students said that their teacher does not speak their vernacular, which rose to 64 per cent of Grade 4 students surveyed. It seems that schools are not adhering to the bridging policy of gradual transition from vernacular to English.

What can education authorities do to encourage primary schools to bridge gradually from vernacular to English? The fact that many schools fully adopt Tok Pisin or English as the medium of instruction in Grade 3 means that children taught in vernacular in Elementary are not being allowed in these schools the opportunity to use and improve their vernacular skills. What might be a suitable educational policy response to deal with language diversity? Levine and Riffel (1994) provide an interesting discussion of this problem in the context of bilingualism in Canada.

Use of textbooks/story books and materials to study at home

According to the survey, a large percentage of students in Grades 3 and 4 (40 per cent or more), do not use either textbooks or storybooks to study at home. About 40 per cent of the students in each of Grades 3, 4 and 5 do not use books/writing papers to study at home, but of the Grade 8 students most (three-quarters) do use books/writing paper. However, it is interesting, that when asked about the use of a pen/pencil to study at home about 45 per cent of students in each of the grades said they did not use these. These findings reveal that large percentages of primary students are not properly equipped to study at home or even do homework.

Clearly a student's capacity to learn is affected by his or her educational environment, including the learning resources that can be accessed in the school and in the home. Rural schools in Papua New Guinea, particularly those that are remote, tend to have less developed educational infrastructure and poorer access to teaching and learning resources than urban schools. Home and community resources for study are also much poorer in rural schools. These deficits are reflected in the poor scores rural students earn in nation-wide testing programs compared to that of urban students. Trying to alleviate the educational disadvantage of being a rural student is not an easy matter. An obvious strategy for education authorities is to try and improve allocation of resources to schools on a fair basis, perhaps using a *formula of disadvantage* that is built from various specific indicators of disadvantage, such as performance in a national monitoring program, location of school, school resources, nature and size of teaching staff, community facilities, and size of student catchment areas. Such a

formula might also be used to determine the allocation of curriculum materials, textbooks and other reading materials to schools. On equity grounds, and in order to improve education generally across the country, it can be argued that a well-off urban school should be allocated less support in resources, textbooks and other reading materials than a poor remote rural school that cannot obtain these resources in other ways.

If a student's education is not to be restricted just to school hours, should NDoE in conjunction with province education departments consider mechanisms for increasing availability of textbooks and other materials? Might local publication/printing and sale of materials at affordable cost be encouraged and supported?

Attitude to culture

About 15 per cent of Grade 5 students and 20 per cent of Grade 8 students said that they were not proud of their culture. Across the country these figures represent substantial numbers of students but the worrying thing is that the dissatisfaction increases from Grade 5 to Grade 8.

What can education authorities do to instil in these dissatisfied students greater pride in their cultural background? How will the effectiveness of the new outcomes-based primary curriculum for strengthening students' cultural links and building relevance of culture in teaching and learning be gauged and monitored? This is a particularly important issue considering substantial weakening of cultural links as a result of urban drift and increasing mobility of people across the country.

Using CSMT Results to Formulate Policy

Two examples of policy formulation based on key findings of CSMT are suggested below. The first example is concerned with strengthening evidence-based policy formulation within NDoE by utilising scientifically-obtained, objective information, as would be obtained from a curriculum standards monitoring program. The second example is concerned with developing a *standards accountability system* for schools, which would enable schools and education authorities to evaluate students' and school's achievement standards in relation to national benchmarks established by a standards monitoring program.

Evidence-Based Policy Formulation

Although CSMT has produced interesting and informative evidence, this evidence is specific in form and generally says little about how to enact strategic policy that will bring about positive change to existing practices so that performance standards can be made to rise. What is needed is a formal mechanism to analyse and interpret the research findings of CSMT in order to apply research evidence to inform practice and policy formulation by NDoE and other education authorities.

An evidence-based approach to policy formulation is highly desirable in order to objectively determine priority areas for intervention and support. The research findings from CSMT can inform and support educational thinking and operations at all levels – for example, in curriculum development, in development of teaching

programs, in production of teaching and learning materials, in monitoring of school standards by inspectors, and in in-servicing of teachers.

One of the great benefits of a standards monitoring program is that it provides objective data on aspects of education that can't be obtained in other ways. This data and information provides a picture of how well students, teachers and schools are meeting performance standards embodied in the national primary curriculum. The monitoring data and information also can be used to judge how well schools are meeting broader education goals set by the national government. Without such information government and policy makers will be unable to judge whether education is working in the ways they expect it to work. They also will not know whether education standards are growing rather than staying static or, even worse, declining.

Establishing a Standards Accountability System

The second example is concerned with NDoE formulating policy in conjunction with other education authorities to establish a standards accountability system for primary schools in Papua New Guinea whose explicit purpose would be to direct schools to monitor their educational standards against nationally established benchmarks of achievement in literacy and numeracy. Many countries have developed such systems, and the features of a good standards accountability system are discussed by Sirotnik and Kimball (1999). Mehrens (1998) gives a good overview on the consequences of assessment for school practice.

Attaching such an accountability system to the functions of the primary inspectorate system would seem to be the best course. Inspectors would liaise between NDoE and schools in reporting actual school standards and monitoring school initiatives to improve standards. This would tie in with current initiatives to strengthen the standards monitoring capacity of inspectors.

The accountability system should be based on multiple indicators of performance (e.g. literacy, numeracy and attitudinal measures) to evaluate a school's standing at the district, province and national levels. In addition to these benefits, the data and findings obtained by the pilot study would serve as benchmarks against which future student performance and the impact of curriculum implementation can be judged.

For the accountability system to function properly it must have credence and be taken seriously by all those involved in its operation. For this reason there ought to be a mechanism to encourage and acknowledge improvement if a school raises its education and achievement performance standards, in terms of national benchmarks - the acknowledgment must have a positive educational orientation that encourages schools to see the value of change, taking into account school conditions and resources, staffing and local needs.

The system should also incorporate opportunities for training and professional development of teachers in utilising monitoring and benchmark data to raise educational standards. This will include training teachers to use and interpret item level data in examining student performance in terms of specific outcomes of literacy (reading and writing) and numeracy (mathematics), and in using test level data to

examine overall student performance against benchmarks. Training should also be provided to senior teachers to evaluate their students' performance in terms of the performance levels of students in their province and nationally, and also by gender, location and type of school. A rich source of benchmark data will allow a school to determine where its strengths and weaknesses lie and how teaching and learning should be improved in order to raise educational standards of the school.

Constructing national benchmarks of performance so that teachers and schools can determine their students' performance relative to national standards, rather than just internal (local) school standards, is a primary goal of a monitoring program. Schools must know whether their teaching and learning activities are effective in producing achievement standards that are commensurate with national achievement standards. For a school to be effective in this regard it must have valid and reliable benchmarks against which to judge its students' and the school's performance. Valid and reliable benchmarks must come from properly based studies of performance and, preferably, they should have national relevance.

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