Edith Cowan University

Research Online

Theses: Doctorates and Masters

Theses

2001

The Derivation Of Principles For Appropriate Vocational Education In Papua New Guinea

Calvin Graydon
Edith Cowan University

Follow this and additional works at: https://ro.ecu.edu.au/theses

Part of the Teacher Education and Professional Development Commons

Recommended Citation

USE OF THESIS

The Use of Thesis statement is not included in this version of the thesis.

The Derivation of Principles for Appropriate

Vocational Education in Papua New Guinea

By

Calvin Graydon B.Ed

Faculty of Community Services, Education and Social Sciences

Submitted

24/04/2001

Abstract

Restructuring an education system provides an opportunity to select appropriate programmes for schooling. This thesis develops principles to select an appropriate vocational education for schools in Papua New Guinea. History and past programmes in developed and developing countries have provided a comparison of examples where successful elements and problems have been associated with acceptance of vocational education. Developed countries have highly advanced vocational education systems catering to a range of industries. The United States of America, Britain and Australia have begun an integration of general and vocational subjects to improve cross-disciplinary relationships of subjects to students. Transnational transfer of programmes into developing countries has not been successful because of major cultural differences and quality of teaching.

The principles that need to be noted when designing programmes to achieve stated goals are:
- *Culture and traditions are to be considered during curriculum development and selection of innovations;*
- *The level of infrastructure and the economic capacity of the country;*
- *Teachers and their education levels are crucial to the acceptance of an innovation as are in-service programmes;*
- *Appropriate content for graduates future career paths;*
- *The assessment of formal versus in-formal education structures to ascertain which would best serve the population; and*
- *Graduates ability to respond rapidly to changes in the economy.*

Parental concern for their children's future provides planners with a powerful force to influence the selection of appropriate content. Students also have goals related to a specific lifestyle ambition. In Papua New Guinea it has been found that a teacher's confidence to teach innovative programmes is low because their level of education is not high. Teaching creatively is rare because examinations determine student progress through the education system. A high priority is placed upon academic subjects, as these are the basis of the Papua New Guinea school certificates.

Vocational subjects, in developing countries, are often not seen as valuable because many students return to villages where small-scale subsistence production is the norm. The benefits, therefore, are not as great as those for a graduate who gains modern sector employment. The differences between academic and vocational education are evident in initial set-up, capital and recurrent costs, which affect the implementation process.

Adoption of Western education practices has caused traditional methods and indigenous knowledge to be undervalued or regarded as an invalid element of formal education. Papua New Guinea high schools have contributed to a diminished understanding of culture and traditions with an increase in law and order problems as youths migrate to urban areas in search of jobs.

Continued reliance on academic subjects is of questionable value given the lack of infrastructure, a stagnant economy, and lack of jobs. Appropriate education focuses on giving students skills that are valuable to them in what they will most probably work at after school. As the majority of Papua New Guineans are self-sufficient a prominent agricultural component should be included and the population educated about the benefits that can be derived from staying on the land.

Declaration

I certify that this thesis does not, to the best of my knowledge and belief:
- *(i.)   Incorporate without acknowledgment any material previously submitted for a degree or diploma in any institution of higher education;*
- *(ii.)   Contain any material previously published or written by another person except where due reference is made in the text; or*
- *(iii.) Contain any defamatory material.*

Calvin Graydon

Acknowledgments

I wish to acknowledge the help of various people who have contributed to this thesis in many different ways. Some of the following have given me encouragement to continue with my studies, read drafts and suffered through my good and bad times.

Firstly, Dr. John Williams, my supervisor, for his suggestions and help with the completion of this thesis.

Secondly, my former colleagues at the University of Goroka who listened, encouraged and supported me in the initial stages of my data collection and proposal writing.

Thirdly, my family and friends who put up with me during the times I spent writing and agonizing over the problems. I can now tackle a new project, which they can be an integral part instead of on the periphery.

Finally, to all those people who, although I have not met them, have contributed data or materials.

To all thank you for your input.

Calvin Graydon

Table of Contents

Chapter 1

Introduction

Background to the study

A lack of status has been a problem for the acceptance of vocational education into educational systems by teachers, educators, politicians, parents and students, particularly in developing countries. The focus of this research is Papua New Guinea (PNG), the development of its vocational education, and the general restructure of its education system, to allow its younger citizens to become more productive members of society.

Papua New Guinea students sit examinations at the end of Grade's Six, Eight and Ten to determine who will progress on to the next two years of education (Richardson, 1994). Vocational education is available for students in Grades Seven through to Ten, after Grade Ten there is usually no further vocational education available at high school. Those students who have not been able to achieve the cut-off mark in their examinations, which allow them to progress to the next two years of schooling, have limited opportunities to continue with their education. Specialized vocational education centers enroll students from the Grade Six and Eight leavers to give them some skills, which may allow them to gain entry to a technical college.

Year Ten graduates have a much better chance of attaining employment with several options available. Grade Ten leavers can access a technical college to complete a pre-employment technical training course (PETT) from which they can enter an apprenticeship, or they might find employment in government or private sectors.

Crossley (1990, p. 148) indicated that "in 1988 only 33% of Grade 10 graduates were receiving offers of modern sector employment or further education on leaving schools". The rest would have returned to their villages or stayed in the urban areas hoping to find a job. Given that PNG's Gross Domestic Product (GDP) has been slowly contracting (due to factors such as the closure of the copper mine on the island of Bougainville in 1989 and the devaluation and float of the Kina in 1994). It seems unlikely that the situation described by Crossley has improved with more jobs becoming available for job seekers.

A number of external factors contribute to the status of vocational education. Parental and student attitudes, the adoption of colonial educational structures and practices, combined with economic and political expediency designed to maintain the popularity of the politicians, have continued to allow the academic stream to dominate the education systems in PNG and other developing nations (Grubb, 1984; Burns, 1986; Lillis and Hogan, 1983; Garrido, 1987). Vocational innovations, with a rural emphasis, have been successful in attaining their educational objectives, but have not changed parents or student perceptions in the long term.

Developed nations, such as the United States of America, Britain and Australia are changing the paradigm within vocational education so that students understand the "relationship of technology and the physical, life and social sciences" (Wright, 1996 p. 4). The current trend is towards an integrated education (International Technology Education Association, 1996; Curriculum Corporation, 1994; Board of Studies NSW, 1991). Vocational education teachers facilitate student learning to understand the relationships involved in the design, production and evaluation of products, materials,

the environment and society, rather than merely teach skills. This is intended to allow students to realize the relationship of materials and their properties, the process involved, design and the effect of their decisions on society and the environment. It also shows the interaction between disciplines and their interaction in the development of products, industry and society.

Vocational education in developed and developing countries has long been identified with the less academically able student, which contributes to its lack of status (Seeman & Talbot, 1995; Lewis, 1995). Considering the positive influence and status of early craftsmen (Deforge, 1979; Scobey, 1968) the juxtaposition in status and attitudes towards vocational subjects in modern times seems difficult to understand as vocational subjects can provide a basis for students to select a career. Parents, understandably, want their children to have good social and economic standing in the wider community.

Papua New Guinea education changed in 1997 (draft curriculum document National Department of Education, 1997) to allow schools to develop curriculum to suit their needs. As an example of an innovative PNG school, Hoskins Secondary School teaches Rural and Applied Technology and includes agricultural socio-economic & marketing, alternative technology - energy, and electronics (Hoskins Secondary School, 1996a & b) to respond to community needs. Papua New Guinea's curriculum changes appear to reflect the changes in vocational education in countries like Australia, Britain and the United States of America where school-based curriculum development is an accepted practice. PNG's changes allow all students experience in a variety of (technical and domestic) subjects.

Within the context described above, this study aims to extrapolate principles of appropriate vocational education for PNG. It argues that educational decision-makers need to be cognizant of the factors of culture, traditions, economics, infrastructure, the politics surrounding vocational education, and the country's limitations in producing a viable technically trained populace for PNG. Unquestionably accepting vocational education trends in developed countries, where more technically trained graduates are required, inhibits the progress of developing nations where a focus on a vocational orientation that is appropriate for day-to-day living in that country is required.

Significance of the Study

The speed that technology changes in the world – especially the developed world – has forced a change in the content, curriculum paradigms and teaching methods of vocational subjects (Wright, 1996). Changes during any era have caused much debate, argument and discussion in all sectors of the community. Educators and politicians alike have commented on how they believe education should cater to student and national needs. John Dewey (1915 p. 7) argued for a "broader or social view" when new innovations are discussed; Edward Semper, headteacher of Doncaster Technical High School said that Doncaster had "a broad vocational aim and [was] unashamedly science-based" (McCullock, Jenkins & Layton, 1985 p. 15); and British Labour Party Leader Harold Wilson in 1963 (ibid p. 1) restated Labour's aims which "in terms of the scientific revolution … cannot become a reality unless we are prepared to make far-reaching changes in economic and social attitudes which permeate our whole system of society." Wilson was arguing that Britain needed more technically trained people to regain its place as the leader of the industrialized world because the academically

trained were making up the bulk of Britain's trained workforce. Bierhoff and Prais (1993) stated that Britain lost its valuable global economic and trade position because of what they perceived as a more academic education being given to students.

Indeed, the increasing integration of cross-discipline work into vocational education offered to students in a developed country opens multiple pathways to higher education. The hope of most parents for their children is to achieve academically and attain a well-paid job and higher status than they have achieved. Parents and students in developing nations have for a long time known the value of an academic education from which the pathway to well-paid high status occupations is available. Vocational education in developing countries is commonly perceived as educationally terminal with no path to further education, and of lower status employment.

Vocational education is problematic in developing nations, as an academic education is perceived as the best way to gain high employment status (Lillis and Hogan, 1983; Dore, 1976; Heyneman, 1985; Lauglo, 1983; Psacharopoulos, 1991). Vocational education is perceived as not providing a suitable alternative to the high status of academic education. Unfortunately, the acceptance of an academic education as a way to achieve status and economic development without a corresponding infrastructure capable of supporting a highly educated workforce produces its own problems such as high unemployment (Irizarry, 1980; Selvaratnam, 1988) and the resultant urban drift (ibid; Isos, 1977).

There is a contradiction in developing nations between contemporary and traditional lifestyles. Parents want their children to move up the social ladder and to attain well-

paid jobs available in government, business, and less so, industry. In PNG, even when a job is secured, the person has to contend with the traditions and the culture of the village. There are obligations to the parents and clan members to repay favours granted so the child can obtain an education. PNG has a strong sorcery influence coupled with the 'wantok' system where the gains made by an individual are shared with the clan (Weeks, 1987). Sorcery is used to maintain social structure and against enemies.

The infrastructure and manpower needs do not support a large academically or technically trained populace in many developing nations (Carnoy, 1982) like PNG. Whilst it is recognized that some form of education in language, mathematics, humanities and the sciences is important (Psacharopoulos, 1987), the need for the populace of a developing nation to have ten or twelve years of an academically dominated education could be questioned. Jamison and Lau (in Psacharopoulos, 1987) indicated that four years of education increases productivity by an average of 9 per cent. Therefore, a primary education that gives basic knowledge and understanding in language, mathematics humanities and the sciences for a primarily agrarian economy, where self-sufficiency is the main concern, potentially improves the child's quality of life. Productivity can then be converted to increased living standards, nutrition or cash, for the improvement of the local environment. Local improvements do not generally require financial, or infrastructure development from high technology enterprises or governments.

The specific issue is the level and type of vocational education given to students. Highly industrialized nations depend upon advanced technology to provide goods and services demanded by its citizens. Consequently, vocational education is predominantly of a

technical nature. PNG, by contrast, is predominantly agrarian and self-sufficient at the family and community level. An appropriate level of technical education aims at providing at a level that meets the immediate needs of the populace (Soelaiman, 1994). PNG introduced the Secondary School Community Extension Project (SSCEP) in 1978 and students gained an understanding of the relationship between academic and practical subjects. SSCEP was based on the integration of core-subjects (Mathematics, English, Social Science and Science) with core-projects (projects that were designed to incorporate the above into a project). The programme was designed to allow graduates to either go on to higher education, or return to their home village and become self-reliant. SSCEP initially started with three trial schools and was to expand every year to finally encompass all PNG secondary schools. SSCEP suffered from a number of problems from the beginning including The World Bank's changed focus away from vocational education; "limited education, training and experience" of the indigenous teaching staff (Crossley & Vulliamy, 1986), and the slowness in appointing key personnel for in-service and support (Bray, 1985; Cummings, 1982).

Developing countries often experience difficulty in recruiting technicians and artisans to teach in schools and the quality of those who accept a teaching position is not always high. Beeby (1966), Vulliamy (1983) and Bude (1983), indicate that the quality of teaching in developing nations is formalistic and traditional. Many teachers ask simple questions and allow their students to recite answers directly from the textbook, teach rote learning methods for mathematics and spelling, and many projects that are taught in practical skill lessons are the same ones the teacher learnt during their time at teacher training. The formalistic didactic teaching style and regurgitation of facts by students

makes it difficult to attain higher order affective objectives such as choice, appreciation and value judgements.

Developing nations tend to organize around the same economic principles as developed capitalist economies, "but the dynamic center and focus is in the highly industrialized countries" (Carnoy, 1982 p. 169). Many of the companies in developing countries that export and process goods are based in developed countries and are multi-national. Developed countries use advanced technology to produce high volumes of goods, have high GDP's, and population dependent on others for sustenance. Developing nations have a low GDP, tend to import more and export a minority of unprocessed and semi-processed goods. The populace is largely self-sufficient with low incomes. Yet lessons can be learnt from the development process that other nations have experienced. It is impossible to have developing nations with a small gross domestic product, limited infrastructure and a underdeveloped economy attempt to become a highly developed, highly technological and affluent economy without going through a number of the stages of development. To try to do so would only be detrimental to the nation because the huge amounts of capital required building the necessary infrastructure. Loan repayments would be difficult to meet if there is a downturn in the economy. Lauglo (1983) believes this course of action is fraught with frustration and danger.

Cargo cults are an example of a clash between two different societies in the absence of mutual understanding. The less developed society does not have the same understanding or knowledge of a developed society. Consequently, friction between the affluent and technologically literate, and those who are poorer and unable to access and use

contemporary technology begins. One result in is a rise in law and order problems as evidenced in PNG.

Statement of the Problem

The purpose of this historical comparative study is to identify factors that have contributed to vocational educational development in selected developed and developing nations (specifically PNG). Developed nations, a number of which were colonial administrative powers, contribute to educational development and theories, supply specialist manpower to developing countries, and are leaders of world economies and educational practice. PNG has specific problems brought about by the adoption of educational practices and structures from developed nations, which conflict with traditional mores. Papua New Guinea's educational structure was originally modelled on New South Wales' during Australia colonial administration.

An analysis of published literature evidenced a number of issues relevant in designing future vocational education programmes for PNG students. The issues include:

- The transfer of curriculum and structures from developed to developing nations (Soelaiman, 1994);

- Culture and tradition (Raina, 1999);

- Infrastructure and the economy of the country;

- The knowledge base and teaching quality of teachers (Bude, 1983);

- The promotion of educational qualifications for high status jobs (Dore, 1976);

- A historical comparison of vocational education in developed and developing nations;

- Vocational education programmes initiated in developing nations and their subsequent demise; and

- Vocational education in Papua New Guinea (Vulliamy, 1983; Weeks, 1987).

The idea of a developing country adopting a curriculum structure, or system, from a developed nation, with its high demand for 'qualified' graduates, is not appropriate given the manpower available in the developing nation (Soelaiman, 1994). Impediments to progress, such as problems of tradition, culture and socio-economic conditions, amongst others, lead to a populace unable to fulfill the developmental requirements of the country. Often, the developers of programmes ignore, or fail to understand that tradition and culture is a major constraint when deciding upon the direction which education should take in a developing country. Technology is the generator of progress in developed countries (Grubb, 1984) unlike developing countries.

The constitution of Papua New Guinea calls for "Integral Human Development" where "every person is to be dynamically involved … in freeing himself/herself from … domination or oppression [and] for education to achieve the National Goals through self-reliant effort" (UNEVOC, 1995 p. 9). Matane (1986 p. 6) calls for development "in the sense that every individual has the potential to grow in knowledge, wisdom, understanding, skill and goodness." This study aims to develop principles that will enable educational planners to choose and develop appropriate curriculum.

Research Questions

UNESCO (1973 p. 59) states that "some exposure to technology should be part of the cultural baggage of school children and young adolescents, whether or not they work

later in a technical field", and that technical education should "not simply teach them how to make bowls and baskets". Johnson (1985) argued that developing countries do not have the capabilities (physical, financial or human) to prepare students to the extent that UNESCO advocates.

It is from these two ideas that the question arises as to what is appropriate vocational education? The research questions are:

1. What principles should Papua New Guinea, given its history and socio-economic level of development, use to develop an appropriate form of vocational education?

2. Derived from these principles, what type of vocational education would be best suited to Papua New Guinea?

Education that focuses on the post schooling needs of the country's citizens enables them to improve their standard of living. Choosing the kind of education to enable people to improve is important, and by reviewing past programmes gives educational planners a foundation from which to base their decisions. The level of infrastructure, development and economy play a significant part in any selection, as too high a level of innovation may be unsustainable and predispose the country's education system to failure. The principles derived from this study can be used to facilitate the introduction of the new programme and educate the population as to what benefits will become available.

Definitions

The study uses a number of terms, many of which overlap. Some terms are elements of others; for example, technical education is encompassed by vocational education. There

are some terms for which there is no consensus of the definition, for example technology. For the purpose of this study, the following are the interpretations used.

Terms	Definitions
Developed nation	Nations with a high degree of primary and secondary industry, a substantial export base of manufactured goods and a majority of citizens who use and develop advanced technologies.
Developing nation	A nation largely dependent on an extended subsistence economy and on the importation of technical expertise. A term previously used to describe a developing nation was Third World.
Diversified education	A combination of academic and general education that includes vocational subjects. Students are encouraged to select the combination of subjects that will help them with their future career, or suit their interests.
Parallel education	A system that segregates academic and vocational education. The academic stream is prepared for higher education whilst the vocational stream is seen as terminal and graduates are preparing to enter the workforce (Psacharopoulos, 1989).

Rural area
A rural area, as in a developing nation, is defined as one that is remote from concentrated urban groups and where the grouping of people is relatively small and isolated; is poorly serviced by roads and communications; has low dependency and use of energy; and is heavily dependent on soil for personal maintenance (Axim in Akinpelu, 1984).

Rural orientation
An aspect of some programmes that focused on the realization of the curriculum. Some interested groups have claimed that this is a second-class education and it ties them to the land.

Technical education
Education for progression into a trade, apprenticeship or commerce. Technical education is a component of vocational education with its emphasis on a cash transaction for work performed. A graduate can be self-employed after (a qualifying period, usually post-compulsory education) or employed by a company or individual.

Technology
A general term used to describe a body of knowledge and processes, we as human beings, use to fashion tools and machines to extend the human potential and

control of the natural and human-made environment by which we meet our needs and wants and improve our surroundings (Wright et.al. in Hall, 1996 p. 5).

Technology education

The study of technology in an educational program that helps students develop an understanding of and ability to use technology in designing and producing products and systems, and in taking responsibility for and assessing the appropriateness of technological actions (Wright et.al. in Hall, 1996 p. 5).

Vocational education

A term that covers a range of subjects that students can study; including Agriculture and Home Economics. It allows progression to technical employment or for the student to return to the home community in an agrarian society. Its purpose for the village is to improve the quality of life for the village community, and to allow the graduate to become self-sufficient and self-reliant. In some settings, students in developed countries are able to progress to tertiary education through this route. It covers education in developing nations as developed nations predominantly focus on technical education.

Academic education

An education that prepares secondary students for higher education and a subsequent career in a

profession. This form of education focuses on higher order, more abstract theories, and concepts of humanities subjects.

Chapter 2

Methods

Historical Comparative Study

This study used historical comparative methodology. It reviewed the historical aspect of education, compared the progress of vocational education in those areas referred to in Chapter One – transnational transfer of education, the promotion of educational qualifications, vocational education generally and vocational education in PNG. As a basis for comparison, Scobey's (1968) investigation of the history of technology education from the Grecians to the 1960s in the United States of America (USA) was used to formulate an understanding of the development of education – formal and informal – in the developed world. The USA, as an educational leader, has had much of its educational theory and practice adopted in other countries over time. The difficulties facing technology education with its acceptance and status in education in Britain are described in McCullock Jenkins and Layton (1985). Here the main resistance came in the influential academic area of science.

The introduction of vocational education in PNG (Derrick, 1952) Secondary Schools Community Extension Project (SSCEP) (Vulliamy, 1987, 1988; Crossley, 1984, 1990; Weeks, 1987) and the latest educational reforms contrasted sharply with the experiences of Britain and the USA. Developed countries teach technical orientation where the processes of design and manufacture have become a focus. Some developing countries have instigated programmes to provide some vocational education. For example,

- The Philippines – Barrios High Schools (Orata, 1977);
- Cuba - Schools to the Countryside (Corvalan, 1988);

- Tanzania – Education for Self-Reliance, Vlaardingerbroek, 1994);

- Panama – Production Schools (Isos, 1977);

- Papua New Guinea - Secondary Schools Community Extension Project (Vulliamy 1980, 1983, 1987,1988, Crossley & Vulliamy 1986, Cummings 1982;

- Nigeria – (Akinpelu, 1984);

- Botswana – Swaneng Hill School (Ishumi, 1988; Akinpelu, 1984);

- Kenya – Village Polytechnics (Akinpelu, 1984); and

- Tanzania – Folk Development (Akinpelu, 1984).

Such countries attempted to introduce a rural orientation into their formal and/or non-formal vocational education curriculum, but often their clientele did not accept ruralisation of the curriculum. The comparison between developed and developing countries was used to select the criteria indicated in the section on data collection methods and parameters.

A comparison of selected European countries by Bierhoff and Prais (1993) led to an argument for developing appropriate vocational skills in schools to avoid a decline in economic status. One of these countries, Britain, changed its curriculum from a predominantly skills orientation to one incorporating design and a cross-discipline approach to teaching Craft, Design and Technology. The effect was a deterioration of hand skills by school graduates, with a significant impact in the lowering of the standard of Britain's production quality (Bierhoff and Prais, 1993). Bierhoff and Prais argued that graduates of the system lacked the skills required to enter the workforce without additional basic training. The British system originally used an assessment weighting of

60 per cent theory/folder presentation, and 40 per cent manufacture of the product. This subsequently was reversed as deterioration was noticed in the quality of the graduates' hand skills. Bierhoff and Prais (1993) indicated that maintaining traditional hand skills orientation in vocational education benefited industry more than one that integrated academic subjects and hand skills. "A foundation for the skills needed in a technically-advanced economy" (Bierhoff & Prais, 1993 p. 237) and not just an academic education should be provided to avoid a decline in economic status as academic subjects don't teach hand skills.

Bierhoff and Prais' (1993) comparison of developed countries highlighted the differences between countries that retained hand skills and one that introduced more academic work. A comparison of British and Continental vocational education (Bierhoff and Prais, 1993) highlighted the importance for planners identifying appropriate methods for education in specific countries, according to their level of development (Soelaiman, 1994).

Literature Collection and Parameters

The study involved the analysis of selected literature dealing with comparative education, educational development, industrial arts, design and technology and the history of vocational education. The areas considered in the selection of the literature included:

a) Transfer and subsequent adoption of educational structures from the colonial administrative power to the colonized country. Former colonies commonly adopted an academic orientation to education, often with the same structure of classes in primary and secondary schools;

b) vocational education and the i) attitudes of parents and students leaning towards an academic style, ii) attitudes of educational planners and economists, iii) cost effectiveness - where vocational education costs more to maintain and graduates have less financial rewards than academic graduates, and iv) political and social factors;

c) The history of vocational education in developed and developing nations with specific reference to PNG;

d) Present developments in vocational education in developed countries with design and technology and vocational education in schools in Australia;

e) Projects in vocational education in developing countries that were oriented towards a rural education; and

f) The Secondary Schools Community Education Project (SSCEP) in Papua New Guinea.

The timeframe chosen for the study was post World War II. During this time many countries, such as those in Africa, gained independence from colonial rule. The history of mass formal education in developed countries is generally much longer and includes significant events and eras. Post war activities included the development of educational systems and structures which were adapted by developing countries and promoted education for development. Moreover, during the 1970's, education systems throughout the world came under pressure to diversify their curriculum to make it more meaningful for students (Carnoy, 1982). Education systems expanded and included more subjects into the curriculum. Students were encouraged to stay at school longer as business and industry began to demand higher qualifications and better educated graduates (Dore, 1976).

Sample and Procedure

The literature was collected for a comparison of vocational education in developed and developing countries, with specific reference to Papua New Guinea. As Papua New Guinea began to reform in its education system in 1994 a comparison with other countries, both developed and developing, is a way of informing policy makers of past problems and other issues concerned with reforms, and the adoption of curricula and structures.

Programmes, or innovations, were selected because of the origins of many education theories from the United States and the United Kingdom. Australia was included because of its close political, economic, and educational ties with Papua New Guinea, and its role as colonial administrative power from 1945 to independence on 16 September 1975. Programmes in developing nations (taken from Africa, Asia, South America, and the Caribbean) were chosen because of similarities in socio-economic and political development, adoption of education structures from their colonial administrators, and attempts at projects in vocational education with a rural orientation.

The literature selected aimed to provide a balanced perspective between all sectors involved in educational development. Psacharopoulos (1991) indicated there were a number of reasons why vocational education failed in its endeavours and gave an economist's perspective of cost and benefit, but importantly he did not entirely rule out the value of vocational education to students and the country in question. He claimed vocational education is expensive and the justification for its inclusion in the curriculum must be able to be supported against an economic viewpoint. Triangulation of selected

literature provided a way of assessing diverse opinions with parents and students' views, economists, planners, and government of vocational and academic education as elements within the complex nature of education.

The study used a historical analysis of the changes in vocational education in developed countries such as Britain, the United States of America and Australia. It compared these to PNG's history of education from its introduction to the present day. The disparity in vocational education between the developed and developing worlds was noted with respect to the development phase. Many developing countries such as PNG have "jumped" from a non-formal traditional education to a formal and complex Western-style education system in a relatively short time. Education is a rapidly expanding sector in many developing countries as people attempt to use education to gain status and monetary benefits.

The analysis of vocational education projects in PNG, with a specific emphasis on SSCEP, identified weaknesses and successful elements of the programme. Published critical literature explained the negative reaction to vocational education through measurable, objective and subjective factors, which have influenced its success and status in both developed and developing countries. The contrast between political and commercial objectives in the training of students in vocational education explained the agenda of the agencies and the required qualifications of the graduates.

Longitudinal and space triangulation (Denzin's typology in Cohen and Manion, 1994) validated the study's objective of appropriate vocation education for PNG, as a developing country with its cultural identity, traditional lifestyles and

socio/political/economic differences as opposed to the technically advanced countries of the developed world. A cross-sectional approach at various times in countries where vocational programmes had been attempted, to investigate attitudes, costing, strengths and weaknesses was considered the best method of identifying common factors. The use of triangulation (Cohen & Manion, 1994) overcame the limitations imposed by the study of a single system or programme. Factors of influence investigated for space triangulation include societal (education and wealth of the people and country), cultural (ideologies of religion, government, communities), and institutional (business, industry and government). Research literature was used to draw out similarities and to define the principles used in vocational education initiatives.

Conceptual Framework

Historically, vocational education in developed countries, under review, has progressed from an individual learning from a master at home to a mass education system. Societal beliefs have governed the development of education with political ideologies representing the feeling of society during that era. Economic decisions made based on the needs of the country (McCullock, Jenkins & Layton, 1985; Keating 1998) have impacted upon vocational education.

The factors in Figure 1 were found to be significant indicators in a number of the studies and used to derive the principles for appropriate vocational education. Within each, sub-factors were also found. Similarities between developing and developed countries were evident in the research with a major element being the developing country's choice to adopt the Western structures inherited from the colonials rather than

develop their own. This has led to an adoption of Western societys' thoughts on education.

Tradition and culture vary significantly in each of the countries investigated. Evidence was presented to indicate that, even within the developed countries, culture was problematic in the acceptance of innovations (Soelaiman, 1994). The issue of cultural differences within a group of countries of similar values and structures tended to show conflicting beliefs and non-acceptance of the vocational education programme.

Government policy for political and economic expediency promoted further conflict. Early attempts at vocational education, such as the Phelps-Stokes Report, attempted to ruralise the curriculum to make people more productive at post-schooling activities but were not favourably accepted by the participants. Many initiatives may have been economically viable as long-term programmes, but the attitudes of some participants often forced politicians and policy makers to revert back to an academic orientation.

Infrastructure of a country's economy played a vital part in the manpower needs of a country. Larger and more developed countries have a consumer base upon which to develop and maintain large enterprises thus absorbing high school graduates. The economy, subsequent post-schooling requirements of graduates and student attitudes provided important indicators for the selection of curriculum. Technological advances in industry and commerce require that infrastructure in schools be capable of delivering some form of education that resembles a workplace. The ability of governments to provide for these needs in PNG was suspect as the infrastructure of electricity, transport and the education of teachers remained poor.

The educational level of teachers in developing countries is a factor in their delivery of lessons, and the acceptance of innovations remained an impediment to their successful implementation of programmes (Soelaiman, 1994). Teachers tended to revert to a formalistic teaching style if they could not understand, or did not have the necessary knowledge to teach new objectives or subject content. New programmes must reflect a level of professional development suitable for an easy implementation and allow a gradual transition for teachers.
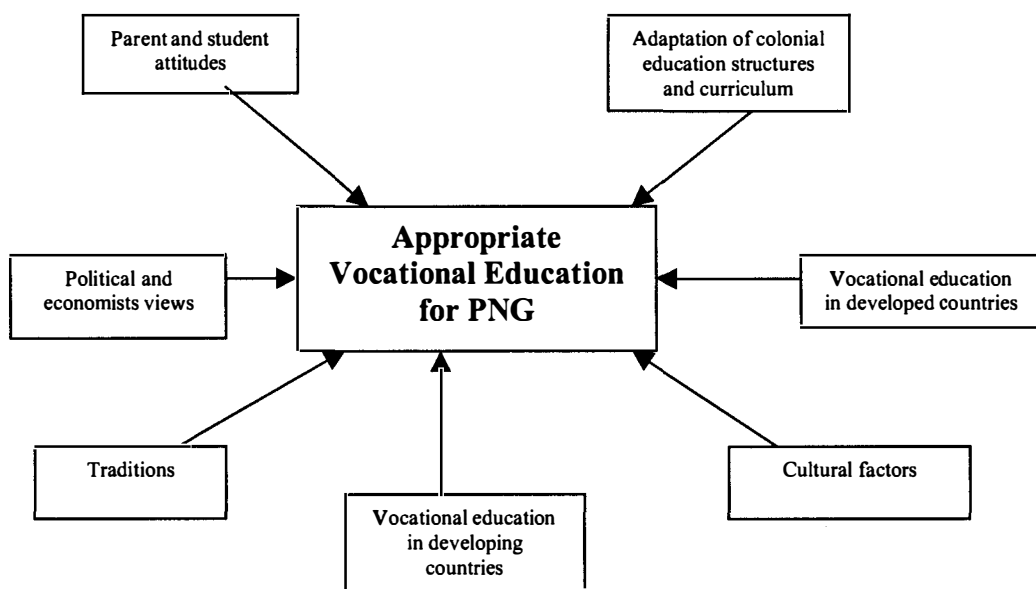
Figure 1. Factors to be considered in the selection of appropriate vocational education in Papua New Guinea.

The comparison of structures in the chosen countries investigated highlighted the type of vocational education available to students. Developed countries tended to focus on a technical orientation with a movement towards a design, make, and appraise focus, which includes more academic content. Many of the developing countries had a technical orientation, although a number of previously tried programmes tended to have a focus on agriculture or self-sufficiency.

The factors in Figure 1 influenced education and the development of the curriculum structure for appropriate vocational education. The analysis of the literature provided a framework upon which the principles were derived. The influences and interactions between developed and developing nations, parental and student attitudes have a strong bearing upon political decisions. The study's intention is to provide educational planners with a broad overview of the problems associated with vocational education, from which a more informed choice can be made, and development of programmes to facilitate a smooth transition to appropriate vocational education.

Literature Analysis

The literature was analyzed under the four headings:

1) Adoption of educational systems,

2) Community views,

3) Vocational education programmes in developing countries, and

4) Vocational education in developed countries.

The literature explored problems in vocational education and the overall position of PNG within the world economy. The present structure of the world economy enables a sustainable introduction of a suitable strategy for the development of vocational education in PNG. Aid programmes in education need to focus their resources on appropriate vocational education as adoption and/or transnational transfer of curriculum and support materials from developed countries are becoming more expensive (Soelaiman, 1994).

The cost of vocational education when compared to academic education determines the policy direction for many educational planners and politicians, although politicians tend

to use positive rhetoric when referring to vocational education. In PNG an academic education has caused some problems with law and order. Graduates expect to begin a well-paid job, even though limited employment opportunities exist. Subsequently many youth migrate to urban areas where there is even higher unemployment. PNG''s technically trained graduates requirement is not the same as a developed country where a highly developed infrastructure and demand for middle-level technicians is present The majority of PNG's population continues to rely on subsistence agriculture for survival.

The evolution of industrial processes in the developed countries provided the influences that shaped the metamorphosis of vocational education from its inception to its present position in schools. Dewey (1915), in particular, provided the catalyst for change with his book *The School and Society*. It provided the influences that are prominent in today's vocational educational philosophy where manual training supplements traditional academic subjects.

The mid-to-late 1800s (Victor Della Vos's 'Russian' system, and Gustaf Larson's 'Sloyd') provided two influential methods of teaching vocational education. These two influences are still noticeable in vocational education in developed countries today.

These two systems developed in Europe during the late 19th century and were later transplanted to America. Victor Della Vos introduced the Russian System to America at the Philadelphia Centennial Exhibition in 1876. The Russian system organized tool processes and materials into a systematic learning order, which is based around a series of exercises designed to develop hand skills. John Runkle of the Massachusetts Institute

of Technology (MIT) and Calvin Woodward were so impressed that they introduced the system to their respective universities the following year. Later, the system spread throughout America (Scobey, 1968).

The Sloyd System used the Swedish tradition of families making articles during the winter months for sale in the summer. It was introduced into America in 1886 (Scobey, 1968). Much of Sloyd is reflected in the practice of students manufacturing projects to take home to promote vocational education to parents. Thus, Manual/Industrial Arts for secondary schools in many developed countries has grown out of these two systems. The Russian System, however, has tended to focus on the development of trade skills for apprentices (Scobey, 1968).

PNG instigated an innovative trial project in a limited number of schools from 1979 to the mid-1980s, which embodied Dewey's thoughts. The Secondary Schools Community Extension Project's (SSCEP) significance in PNG vocational education as an innovation, and a precursor to all schools operating by this method was investigated as an appropriate method of vocational education. SSCEP used community projects to give students an understanding of the practicalities of a small business or project within their own community.

Inappropriate technologies do not provide students with skills to survive in the traditional village system. Programmes like SSCEP attempted to reorient students to rural life, which is more appropriate than a technical education given the socio-economic development of PNG and the traditional life style of the population.

The history of vocational education highlights major differences between educational development in developing and developed countries. A link between early attempts at vocational education towards a rural orientation, and the adoption of contemporary educational practices where academic subjects are highly valued, have inhibited development. Furthermore, they have caused an escalation of law and order problems and resulted in high youth unemployment, urban drift, and an alienation of national and community culture.

Limitations

Some limitations of the study pertain to the literature and its interpretation of history. The authors of the literature may have different attitudes and feelings in their interpretation of the time. The history of mass formal education – both general and vocational - has been reasonably short compared to informal education. Informal education was the traditional way the majority of human understanding was transferred between generations and individuals. The rapid changes to vocational education in developed countries may limit the capacity of the developing nation to adapt educational practices because of the formalistic teaching methods (Beeby, 1966). The character of vocational education in the different socio-political settings where reliance is upon the individual and the immediate community in developing countries and on others to supply needs and wants in developed countries, limits the choice of content. Culture, lack of infrastructure and inadequate teaching skills prevent the rapid adoption of change.

Adaptation of education systems is limited to the context of academic versus vocational education in the developing countries. The introduction of vocational programmes in an

attempt to change the attitude of parents and students, to reorient youth towards rural life, and as a measurement of success for vocational programmes depends on the interpretation of success by employers, parents and students. Success has different meanings to the various sectors involved. For students it may mean a high mark in the subject, but for employers, it may mean being able to immediately perform certain tasks.

This study does not generalize about any situation other than Papua New Guinea, but in the global nature of contemporary vocational education, similarities may have been highlighted that could be applied to other situations. The investigation of the principles of vocational education is aimed at educational planners choosing an appropriate vocational education for PNG after consideration of the issues identified in the study. These are derived through the understanding of a range of issues - cultural, traditional and inherited influences - that educational planners, governments and schools need to heed, in order to satisfy manpower needs of PNG.

Chapter 3

PNG, An Overview

PNG Structure, Development and Character

Papua New Guinea is situated to the north of Australia and shares a common land border with Indonesia to the west, and a water border with the Solomon Islands to the east. The coastal and island indigenous populations have had contact with the rest of the world for about 150 years, but the interior of the country was not explored until 1931. The first explorers encountered tribes wearing traditional clothing, and who, due to the rugged terrain, had minimal contact with other tribes. Explorers used aircraft for the delivery of supplies and equipment and guns for hunting and self-defence. In 1931, the highland people of PNG saw a few innovations from the industrialized world and in a short time period have had to comprehend and assimilate new cultures and technologies into their lifestyles.

Foreign goods have been integrated into many of the traditional ways of life. Certain items have replaced antiquated ones – steel axes have replaced stone axes as weapons and tools, money has replaced traditional items of value (shells), motor vehicles and aircraft have replaced walking for travel. One notable feature that has not been fully utilized by individuals, or corporations, is large-scale agriculture. This is not due to infertile soil as PNG has some of the most fertile soils on earth. Rather it is due to the unique system of land ownership. The government owns approximately three per cent of all the landmass. The people hold ownership of the rest in small lots, which may be regularly disputed by neighbouring clans. Tribal wars can last several years, cost

numerous lives and destroy crops and property. Because of the nature of PNG land ownership, clans who sell their land to the government, or to any other concern, may return years later requesting further compensation for any development of the land. Buildings and capital are considered to make land more valuable. Therefore, the landholders believe they should be compensated for the new value of the land. During the mid 1990s The World Bank encouraged PNG to develop a land register to document landownership and prevent clan arguments over land. This was bitterly opposed by the landholders and eventually abandoned.

The majority of the PNG landmass is rugged and mountainous. The highest peak in PNG, Mt Wilhelm, is 4509 metres above sea level. Many villages are so remote the only means of access is by air, or many hours walking. The remoteness of each village has given rise to more than 800 separate and distinct languages. English, Pidgin and Motu are the three official languages of PNG. English is the language of education and commerce with pidgin, the "lingua franca". Motu is spoken mostly in the Papuan region around the capital of Port Moresby.

PNG's "highly accelerated development in a few decades has been to produce a small modern sector lying within a vast traditional economy and way of life", with "approximately 85 per cent of the country's population … found in the rural areas from which they gain their livelihood" (UVENOC, 1995 p. 3). Since PNG minimal large-scale agricultural industry (sugar, rice) it is necessary to import the majority of goods and services. This corresponds to Carnoy's (1982 p. 169) summation of developing countries and some of the growth problems facing them where the contention is that developing countries are "highly dependent on the wholesale importation of

consumption patterns, production processes, technology, institutions, material outputs and human resources'. This then contributes to "the structural tendency toward increasing external imbalance … capital accumulation trends become highly concentrated and wasteful … creating very little new employment, while pre-existing activities are starved of capital and stagnate or are seriously disrupted". Ishumi (1988 p. 163) indicated that "social development and population growth … [can] outstrip the resources available to sustain" the larger population. PNG has high population growth. This combined with the fall in the value of the kina, isolation, and lack of significant and sustainable infrastructure means the government has difficulty in providing services to the population. People realize the value of education so there is a desire to stay at school longer and gain higher paid jobs and status, which increases the strain on public funds.

Many elements of Papua New Guinea's social structure remain traditional with some of the following aspects remaining influential. The 'bigman' of the village gains his status by granting favours, which then need to be repaid. This position is not hereditary. Weeks (1987) indicated that sorcery is a strong social influence, and even amongst the educated this can hold great sway. Social obligations of clans are very strong. If a dispute or tribal fight erupts, even the wantoks who live away from their tribe are deemed to be part of the dispute. Wantoks literally means those who speak the same language.

The social structure of PNG has been disrupted by the introduction of Western style education. Status is now accorded to people who have a paid job. Ironically they are still

obligated to the clan. Monetary and educational gains mean other clan members expect the wealthy and educated to distribute their 'wealth' within the clan.

PNG Education

The Matane Report (1986) was commissioned by the then Papua New Guinea Government with several tasks, one being "to analyze the implications of this philosophy for the future development of all sectors of the National Education System" (Matane, 1986 p. v). The committee called for submissions, asking that the following questions to be explored:

> What kind of citizen should we now be educating?
>
> What kind of education is necessary to produce this citizen?
>
> How can we improve the Education System in order to provide this education?
>
> (Matane, 1986 p. v)

The committee acknowledged that "the National Goals and Directive Principles in the National Constitution" must be used as a basis of the philosophy. The five goals are:

- Integral Human Development;

- Equality and Participation;

- National Sovereignty and Self-Reliance;

- Natural Resources and Environment; and

- Papua New Guinea Ways (Matane, 1986 p. 7)

Parents and students have a high ideal of what education can do for their children and themselves. They expect a paid position to be available at the end. Unfortunately, in

Papua New Guinea, for the majority that ideal has not been realized. Matane maintained that it is because of "the expectations that most parents and young people have of education. **That kind of expectation is misguided.** That kind of mentality must be changed ... Education is provided so that the young can be liberated from ignorance and acquire cognitive and practical skills and positive attitudes to others for the purpose of becoming self-reliant and living useful lives in their society (Matane, 1986 p. 1). The philosophy also indicated "[s]tudents must be taught to appreciate the relationship between the body of knowledge ... the practical use [of knowledge] and the relevant underlying values (ibid p. 8-9). "The current curriculum should "aim for less and do it better" (ibid p. 39). Matane maintained there should be a fewer number of subjects, but the content of those taught should be more detailed and thoroughly taught. Thus, the students' knowledge base would increase in nominated subjects. Ultimately a flow-on effect would ensue. Graduates would be better equipped to handle the basics of their chosen career, and as each generation of school children leave school, society's knowledge base would increase incrementally.

PNG society has a tradition of male domination and the desire of the philosophy's authors clearly indicated that a change should occur as the government "is committed to universal primary education and more equal opportunity for the education of females and students from disadvantaged areas" (Matane, 1986 p. 32). The government decreed in 1994 that all children were entitled to free primary school education. This however, is not new as "in 1950 the policy for universal primary education in English was promulgated by the Australian Colonial Government" (Suari quoted in UVENOC, 1995 p. 10).

Giving all school age children primary education is an admirable sentiment and meets the goals expressed in Matane (1986 p. 6) for "development, in the sense that every individual has the potential to grow in knowledge, wisdom, understanding, skill and goodness". School aged children can be made more aware of the importance of goals for themselves and for the "medium and long-term aims and goals for human and economic development" as Pari (Post Courier, 1997 p. 10) wrote in his view of the purpose of education. Children can also be acquainted with the concept of personal development and education as a lifelong process, that both rural and urban work is productive, and further training when there is an economic upturn (Education Sector Review from UVENOC, 1995). Matane states that PNG education requires its clients to learn an increasing "range of social and political skills" and questioned if in "attempting to answer a multitude of needs and teach a variety of skills, has education lost some of its basic traditional principles?" (Matane, 1986 p. 4). Matane summed up traditional education as a long process in order for one to become a valuable member of society. Contemporary education has similar aims, but broader in scope. Relevant education needs to address the issues that confront people in their daily activities thus making them productive citizens.

One significant feature of Papua New Guinea education and business has been the reliance upon imported expertise, although the government has attempted to reduce the need for expatriate teachers, technicians and other professions since independence. PNG's education structure and curricula is basically unchanged, and because of the shortage of skilled people, it continues to import needed expertise. Expatriates were essential from prior to World War 2 (Derrick, 1952), as mission and administration schools needed highly trained teachers to fill shortfalls. Mission schooling provided

elementary levels of education and supplied technical labour required for maintaining and expanding its infrastructure. The curriculum given by missions was at an elementary level (Richardson, 1994), whilst the colonial administration schooling was divided into four years of village schools, and four years of higher grade schools. Figure 2 (taken from Derrick, 1952 p. 137) shows the education structure that existed in PNG administration schools. These schools provided the colonial administration with personnel required to fill less important positions of bureaucracy. Fragmentation and differences in curriculum between the two education systems eventually caused the establishment of the National Department of Education (NDOE), responsible for developing common curriculum. Church run schools still maintain autonomy for their day-to-day arrangement and maintenance although the curriculum is set by the NDOE.

Figure 3 (Richardson, 1994 p. 6) shows the structure adopted by the government. Prior to its implementation Grades Eleven and Twelve were taught at five National high schools and Grades Seven and Eight at Provincial high schools with community schooling to Grade Six. National high schools cater for students with high grades from the Grade Ten examinations. The restructure means that community (primary) schools can now offer Grades 7 and 8 and high schools can top-up to Grade 12. Students now have the opportunity to complete twelve years of education without the pressure of examinations.

Whilst the NDOE provides curriculum, the nineteen provinces are "responsible for development and provision of basic essential services" (Richardson, 1994 p. 2) and budgetary provision. Unfortunately, provinces do not have equitable resources available. A number of the highland, island and Sepik provinces are disadvantaged by

lack of development, distance from large urban centers and their population size. "Urban centers are attracting the young whether they be educated or not" (Richardson, 1994 p. 2.). This drift to the urban areas can be attributed to rapid development experienced by PNG in a relatively short time. Rapid development has not allowed for adjustments from an isolated, self-sufficient barter-based economy to a vast capitalist cash economy.

TRAINING PATTERN	STANDARDS

HIGHER VOCATIONAL TRAINING
LOCAL & OVERSEAS

TECHNICAL TRAINING

MEDICINE, EDUCATION AGRICULTURE, FORESTRY ADMINISTRATION, NURSING

TRADE APPRENTICE-SHIP

TERTIARY
PERIOD OF TRAINING AS NECESSARY

AGE 17 YRS

PRE-VOCATIONAL SECONDARY COURSES

MANUAL TRAINING COURSE (1 YEAR)

BOYS GIRLS

DOMESTIC TRAINING COURSE (1 YEAR)

SECONDARY 2 YEARS

CENTRAL SCHOOLS BOYS

CENTRAL SCHOOLS GIRLS

1 YEAR OPTIONAL COURSES
INTERMEDIATE
2 YEARS GENEARL COURSE

AGE 13 YRS

HIGHER VILLAGE SCHOOLS

COEDUCATION TO THIS POINT, EXCEPT IN CERTAIN SCHOOLS

AREA SCHOOLS

(GOVERNMENT)

PRIMARY
4 YEARS

IN LARGE VILLAGES AND AT MISSION STATIONS

AGE 9 YRS

1 YEAR IN ENGLISH

MISSION VILLAGE SCHOOLS
3 YEARS IN VERNACULAR

VILLAGE (SUB-PRIMARY)
4 YEARS

Figure 2 Papua New Guinea school structure in 1952.

37

Richardson (1994) believed that PNG has the potential to become a leader in the Pacific region, but expressed concern that its education system is not catering for the workplace needs. Furthermore, bias towards academic education is detrimental to technical and vocational education. This view is further supported by the United Nations International

Figure 3. The accepted model for Papua New Guinea's education structure showing the inclusion of Grades Seven and Eight in primary school and eleven and twelve in high school. Ed. Sector Review, 1991

Project on Technical and Vocational Education (UVENOC, 1995 p. 14) that critically indicated:

- [There is a]highly academic structure of the Provincial High School curriculum.
- Vocational education remains a deprived area in the educational system, and with low manpower resources and financing, it maintains a low public image.
- The majority of children who benefit from education and schooling do not enter the formal employment sector. This alienates them from the way of life of the people.

Likewise, the education they receive does little to equip them with the knowledge, skills and attitudes needed for community or national development.

- There is a great deal of resource wastage.

PNG's "formal sector employs thirteen per cent of the employable population" (Richardson, 1994 p. 5). Additionally, "in 1988 only 33.8% of Grade 10 graduates" obtained paid employment or further education (Crossley, 1990 p. 148). The rest of the population are unemployed or have returned to the village. Bray (1985 p. 192) further explored the inequity in education claiming that "high school selection systems ... favour the urban minority more than the rural majority."

Another disadvantage faced by rural students, once relocated to an urban area, is that positions are initially given to students from the school's province first, then to non-natives. This appears to contradict the values expounded in the *Philosophy of Education for Papua New Guinea* and the National Constitution.

There is much concern about education in PNG. Associate Professor Stein of Macquarie University (Australia) indicated a concern about low standards and that these are possibly falling (in Richardson, 1994). The Education Sector Review (in UVENOC, 1995 p. 3) stated, "educational status is actually worse than the average for Low Income Countries". Stein further says that a high proportion of the Gross National Product is allocated to education, but the returns are very disappointing, that there "is an acute shortage of qualified artisans ... caused by the school system not imparting appropriate skills". Matane's contention that, "[c]ontent is fragmented and teachers teach subjects rather than educate the whole person" (Matane 1986 p. 8), partially accounting for the low standards. Pari (Post Courier, 1997) argued that, "many people automatically come

to the conclusion that because we are not behaving like the developed countries, our standards are low". The knowledge and understanding required for a Western style education can inhibit a developing country as the population's needs for a mostly traditional environment are not considered.

PNG's Restructure

PNG's restructure of 1994 introduced an additional two grades to both the community and high schools. The Education Sector Review also proposed:

- Increasing primary education to nine years,
- Increasing access to technical training institutions,
- Giving greater recognition and access to vocationally oriented schools,
- Increasing the number of "National High Schools",
- Modifying the school curriculum to make it more relevant,
- Developing biases at matriculation level in agriculture, technical and commercial areas,
- Having greater co-operation between educational agencies. (quoted in Richardson, 1994 p. 5-6)

Although a number of the following issues have been addressed the success of the above relies heavily upon the following:

- The financial resources to establish the restructuring,
- A mass media campaign to promote the benefits of a more relevant and vocational-oriented education,
- An increase in supply of trained and qualified teachers,
- Improving societal attitudes towards education and employment, and
- The need to increase teacher education personnel (Richardson, 1994 p. 6).

Matane (1986 p. 45) postulated that PNG should maintain "the existing [teacher] training period procedures but raise the entry qualifications to at least Grade twelve." The University of Goroka raised its entry level to Grade twelve in the late 1980s and in 1995 began a four-year Bachelor of Education replacing its three-year diploma course. Consequently a number of Goroka's staff are upgrading their qualifications through

study at overseas institutions and student intake has increased. The major problem is in attracting the best students to teacher training as other professions offer greater remuneration. Australia, recognizing the situation has committed funds through its international aid agency AusAid to support Goroka.

Vocational Education

Richardson (1994 p. 9) indicated that "[t]here appears to be an increasing amount of support for the improvement of vocational and technical education" in PNG. Jerry Tetaga, the Secretary for Education in 1990 "suggest[ed] that the real challenge for schools is to identify the vocational needs of the community they are serving, and to develop projects which will equip students with the necessary skills" (ibid p. 9). Although vocational and technical education is seen as a priority the facilities and manpower are not sufficient to handle vocational needs at the technical level. Tetaga appears to have suggested a more school-based curriculum. The Honourable Bernard Mollok (Togarewa and Kaniniba, 1998) highlighted the problem in parliament claiming "many schools which had introduced the extra two years did not have the necessary facilities ... and that many teachers were not qualified, because they were trained for community schools." There are a number of teachers in PNG schools who have incomplete teacher training, and yet have been able to secure a teaching position because of the acute shortage of teachers. Community school teachers receive minimal training in vocational education unlike specialist high school teachers from the University of Goroka. Facilities at the majority of provincial high schools are minimal. Often machines are left unused, or, when broken are set aside because no one has the expertise to repair them. Aid agencies have sometimes supplied equipment that no one in the school has experience with and consequently, equipment is left idle. Power tools

can be wasted in rural schools due to generators only used to to provide night lighting. Papua New Guinea does not possess sufficient power stations, and electricity is generated by diesel generators or small hydro-electric power stations to a limited area. Although it is possible to rectify some of the problems above, insufficient skilled teachers and poor infrastructure, vocational and technical education will remain an unattractive alternative to academic education.

Akinpelu (1984 p. 316) identified "vocational training [as]... training for employment and other economic ends." Akinpelu also indicated that training for a life on the land is part of vocational education. Vocational education should be recognized as being for the purpose of providing students with an understanding of work after schooling. Selvaratnam (1988 p. 133) indicated that "the form of vocational education ... was essentially to teach school leavers useful skills and attitudes as well as prevent them from developing negative attitudes towards manual labour". Unfortunately, employers, parents and students have negative attitudes towards vocational education. Parents often dictate acceptance of vocational education:

> Vocationalization at the primary level in developing countries takes the form of ruralizing the curriculum, combining education with production or introducing manual labour. The logic of the argument appears impeccable – youth should learn about what they will engage in, e.g. agriculture. Although rigorous evaluations of such programmes hardly exist, what we do know runs against introducing vocationalism at the primary level.

> The best evidence of the failure of ruralized curricula is their rejection by parents (Psacharopoulos, 1987 p. 192).

Advocating that agriculture should not be included in the curriculum appears to further alienate children from their heritage and the community. Children are at school when production activities take place at home. Thus previous informal education is

eliminated, or severely limited. Children learn how to read, write and do arithmetic but not how to sustain themselves if they don't secure a job after school. Parents contribute to the alienation of vocational education with acceptance towards academia. During the 1970s Tanzania and Zimbabwe expounded philosophies of education whereby the curriculum allowed students to be productive members of society and catered for those who returned to their villages (Psacharopoulos, 1989).

The development of social change is discussed by Scobey (1968) who adapted *The Pyramid of Culture* from Quillen and Hanna to describe levels of development. The pyramid can be ascribed to developing countries. Initially, the environment supplies basic needs. Then, intelligence, skills and prior knowledge satisfy people's basic needs. As society develops and explores the environment, inventions result in new tools. Techniques are developed to maximize the tool's efficiency and refine their qualities. Patterns and routines emerge to become embedded in the culture. In this way, culture and tradition become an integral part of daily life. But, when an abrupt, violent or permanent intrusion is made, the ideals of the original society may contrast or clash with the new. For PNG, foreign methods of education interrupt tradition and the 'Pyramid' must be reinvented. Consequently a rejection of tradition by the educated ensues. Western education is seen to be the method for attaining a job and status.

Developed countries have evolved vocational education over many years from informal to formal. Instead of apprentices learning their trade solely from their employer, governments use educational institutions to impart theoretical knowledge and practical skills to apprentices. Developed countries require a different level of vocational education, as their economy is dependent on modern technology. Today even farming

uses lasers, satellites and substantially complex machines for mass production goods, thus technical expertise, is required to maintain such machinery. Technological literacy can be defined as "the ability to use, maintain and understand technology" (ITEA, 1996 p. 6) and is necessary for highly technologically dependent countries. Thus some exposure to what a student utilizes after school needs to be taught at school. In PNG it may be that students who return to villages to become self-reliant, still need exposure to contemporary technology as possible, otherwise technological alienation will be the result.

Gerbach and Robinson (in Scobey, 1968 p. 5) described how industrial arts helps students. It also applies to vocational education in an agriculturally dependent developing country, helping them to:

1. Understand the people and the things around them through study of industry or the way things are made and the work of the people who make them.
2. Develop valuable skills of tool use, repair, maintenance and product analysis.
3. Compare individual abilities with those of others; try different kinds of work and decide upon a vocation.
4. Have experiences leading to hobbies. (Scobey, 1968 p. 5)

Each of these could apply in a developing country meaning:

1. That production techniques in a village setting are learnt and then integrated.

2. That the selection of appropriate products for the immediate setting is made with an understanding of appropriate technology and techniques, and how to improve output by judicious choice.

3. Individual abilities could be enhanced to sell the skills outside of the community as in a capitalist economy.

4. Skills to develop other interests that may become a business, rather than a hobby.

Vocational education can produce a graduate who performs a valuable skill in the community. It can also be used to develop an appreciation of human activity. In today's milieu of educational criticism, content relevant to the surrounding environment and developing positive attitudes and values need to be taught. Teaching appropriate vocational education for a particular situation can develop these attitudes and values. Arguably, a technical education is not appropriate vocational education for PNG at this time as there should be provision for village production activities to be taught at school.

Education in Developing Countries

Previous generations used informal education to teach younger members of a society. Methods used included imitation, trial and error, role modelling and simulations to educate youth about traditions, culture and lifeskills. The introduction of formal education has reduced the amount of time available to disseminate this information. Parents in developing countries no longer believe traditional education is best for their children. Parents believe that formal education is the means for their children to gain paid employment (Matane, 1986; Lillis and Hogan, 1983) and status in the community.

During the 1920s, education in colonial Africa came under scrutiny. One result was the Phelps-Stokes Report (Bude, 1983), which advocated that education should have more rural orientation. This was rejected because it was felt that this type of education would tie people to the land resulting in exploitation by white colonists as cheap labour (Bude, 1983). The population demanded a Western style education system so they could access the same opportunities as the colonists.

Carnoy (1982) discussed the issue of matching the aspirations of students and the socialization aspect of education. Carnoy believed that an expansion in schooling, with students staying at school for longer periods, could be the catalyst for change, provided the time was right. Political and class repercussions would change the political and social structures within the country. Better-educated workers would demand equality so creating chaos in the class system. The education does not produce jobs and social mobility is not the goal of a capitalist system

Thomas Balogh (in Barber, 1981) saw elementary education as alienating students from their environment and as such, they were unable to participate in the welfare of rural areas. Balogh believed that teaching "rural science, elementary technical knowledge, and knowledge of crop and animal management" (ibid p. 220) would raise the status and prestige of agricultural work. Carnoy's (1982 p. 173) reforms include a "push for educational alternatives which would create attitudes and skills more useful in an endogenous, worker controlled development than in capitalist wage production". Since the majority of the population in developing countries, as in PNG, is self-sufficient, Balogh and Carnoy's interpretation is correct. Educating for rural living and teaching self-sufficiency will develop graduates' attitudes and skills to provide an improved standard of living. This fosters the attitude that their efforts are recognized and valued.

Sifuna (1992) indicated that post independence education policies of many African countries were for manpower development. In PNG, as noted earlier, it was to produce an academically trained elite to govern the country. Irizarry (1980) described the need to develop an autonomous and dynamic industrial base to raise the population's living standards, an industrial base to processes materials and manufacture goods. This can

only occur when significant money improves the infrastructure and electricity production is not dependent upon small generating plants.

Lee, Adams and Cornbleth (1988) stated that the imitation and intervention model, where Western education and knowledge were invested in projects, was the dominant method of increasing educational levels during the 1950s and 60s. Developing countries education problems were supposed to be cured through the international aid agencies of the developed countries providing Western knowledge (Lee, Adams and Cornbleth, 1988). Bude (1983) listed the reasons for the failure of education in many developing countries:

1. Primary teachers suffer from high workload, large classes and unrealistic requirements of the education system,

2. A lack of teacher training and support,

3. Lack of teacher flexibility, creativity and adaptability created insecurity and disadvantage when necessary deviations or student needs weren't recognized,

4. Cost of training, materials, textbooks and operational costs,

5. Structural problems,

6. No higher order teaching skills or techniques,

7. Dependency upon individuals, and

8. Rejection by educators, parents and students.

D'aeth (in Soelaiman, 1994 p. 16) claimed that Western culture is a threat to indigenous values and cultural identities. Diversified education, where academic and vocational integration occurs, was introduced into in an attempt to eliminate the costly duplicity of both forms existing (Sifuna, 1992) and to give students access to higher education.

Kenya, Sierra Leone and Zambia have all attempted some form of diversification (Sifuna, 1992). Notable vocational education programmes are Tanzania's Education for Self-Reliance, Botswana's Youth Brigades, the Philippines Barrios High Schools, and Papua New Guinea's Secondary School Community Extension Project. These programmes were introduced to provide clients with alternatives to academic education and develop an appreciation of manual labour. Banya (1986 p. 187) says it is "the concept of self-reliance that most advocates of abolishing education for rural development tend to ignore". This is unfortunate as the number of jobs available in bureaucracy and private enterprise are limited. The World Bank noted (Heyneman, 1985 p. 285) that education systems in developing countries are designed for an elite.

Religious groups were often the first organizations to build schools and teach skills after a colonial power had taken control. The religious ideology was the main objective of the churches. Crossley (1990 p. 143-4) explained that missions were interested in "vernacular literacy and agriculture and practical skills", most of which were directed to expand the religious order to other parts of the country and maintenance of mission buildings and equipment. In PNG, once the administration began an education system there were two ideologies (religious and administration). The colonial administration's education was for the lower levels of the civil service.

A common theme leading up to independence in most developing countries is the rapid expansion of the indigenous administration by the colonial administration towards the end of their governance. Concurrent to this is the expansion of education to provide personnel for the new country's bureaucracy. Many colonial administrations were unprepared for the rapid changes involved, and as Bude (1983 p. 352) indicated "the

effects of their reforms … train the child to make his [sic] way in a society … less traditional" than prior to colonization. The expansion of Nigerian education saw material, rather than curriculum, changes for the new societal structure (Bray, 1994). Carnoy (1982 p. 160) said "that the increased education brought to Third World populations was not relevant to the development of their societies and, for that reason it did not fulfill the distribution and employment needs of those economies".

Carnoy (1982 p. 169) further indicated that "literature suggests that the present organization of production in the Third World capitalist economies, especially the types of technology used in the modern sector, and the types of goods being produced there, is intimately tied to a transnational development pattern, a pattern whose dynamic center and focus is in the highly industrialized countries". With regard to Papua New Guinea, goods produced are usually unrefined, or semi-processed, requiring further value-added work to produce marketable items. Large foreign companies, who import their technical expertise into Papua New Guinea and own large mineral mines and extensive forestry logging operations, generally use the indigenous population for lower status manual jobs. The majority of the profits then leave the country to give the company large profits and a return for their shareholders.

The basis upon which populations of many former colonial countries have formed their opinion of an education system can be traced back to the colonial administration. Lewis and Lewis (1985 p. 159) explained "The focus … was on meeting the clerical needs of the civil service" and as academically educated colonists held the top administrative positions, an academic education was equated with attaining an administration position. It seems, in hindsight, that arrogance, self-interest or perceived supremacy excluded

independence for citizens, and a perception that land holds no potential. Beckford (in Lewis & Lewis, 1985 p. 159) noted that, as a consequence, "this was at odds with the needs of a dynamic society in that it was at the expense of a technical component". Failure to encourage a potential sector of education, developing industry and commerce results in a country not developing technical expertise. Economic considerations lead to losses for the country. The importation of technical and managerial expertise for example results in high wages for expatriates, a drain of qualified indigenous people seeking monetary rewards elsewhere, and a loss of revenue for individuals and the country as there are few nationals involved in the upper levels of management and industry.

Not only was foreign capital and expertise for industry imported into developing countries. Education theory was also imported. Economic conditions in many developing countries have led them to seek foreign educational assistance (Soelaiman, 1994). For example, Lee, Adams and Cornbleth (1988 p. 238) indicated, "Korean scholars were enraptured by new theories imported from the West" although the experience did not meet societal expectations. In many developing countries reforms often "occur in rapid sequence" and do not receive time needed for adequate evaluation of their progress (Surakhmad in Soelaiman, 1994 p. 7). Participants are often required to adapt quickly to new methods and objectives without sufficient support or resources.

Soelaiman, (1994) further indicated that innovations are more likely to be rejected if they are complex, whereas simpler, easier to understand ones are more likely to succeed. Innovations, like SSCEP, a school-based approach, required teachers to be familiar with content and comfortable with its implementation. Guthrie (in Vulliamy,

1983) argued that because of the formalism of PNG indigenous teachers they found the SSCEP innovation difficult to implement. Factors contributing to teacher's problems teachers were:

- The level of general education and specialist training of the teachers involved (Beeby, 1966);

- Teachers' own lack of higher order teaching skills (Currin in Cummings, 1982); and

- The ability of an already overloaded staff to cope (Weeks, 1987).

Despite the strong influence of headquarters in Papua New Guinea's attempt for an integration of subjects with SSCEP the ERU Report 41 (Cummings, 1982) suggested that problems created by the complex curriculum innovation were insurmountable for the developing country.

Bray (1994) proposed leaving the Micronesia area to live a traditional lifestyle, or alternately, educating them in skills to survive in an industrialized context. The Trust Territories of the Pacific Islands placed a "strong emphasis on vocational education, which is aimed to include skills from both the industrialized Western world and indigenous cultures" (Bray, 1994 p. 43). This type of education gives students insights into both worlds, but as Bude (1983) warns, tribalism could become dominant thwarting political groups from making meaningful decisions. Creating indirect domination through education, when one interest group has the power over the selection of curriculum, progression and status could result in tribalism becoming dominant.

A recurring theme in published literature on developing countries is that of self-reliance and rural development (Ishumi, 1988; Akinpelu, 1984; Cummings, 1982; Bude, 1983; Sifuna, 1992; Crossley, 1990; Psacharopoulos, 1987; Castro, 1987). Education that

allows this is seen as the most appropriate, given the development level of the country and the daily activities of the majority of the population.

Growth and Cost of Education

PNG's education reforms include increasing time spent at school and provision for extra places. These incur added costs through additional material, curriculum infrastructure and human resource needs. It is cautioned that any assessment of the significance of a growth pattern must be cognizant of the costs of provision, the balance of resources and the patterns of participation.

Goals for any developing system or programme and matching these to the participants ability levels is vital. Lewin (1985 p. 126) indicates that "well founded goals ... provide a framework of intentions within which it is possible to plan curricula and provision". If the goals are achievable, and resources are available for teachers and students, then a better educated and more viable workforce could be the result. Burns (1986) claimed that an unskilled workforce is less productive and the country weaker. Jamison and Lau (in Psacharopoulos, 1987) cited four years of primary education, rather than none, increases agricultural productivity by nine percent. Some ambitious programmes such as SSCEP have benefits to the student but may carry larger administrative burdens and financial costs (Vulliamy, 1980).

As a source of financial support, The World Bank has a number of education policies. The World Bank supports formal education systems, yet in 1974, claimed that formal education "had been irrelevant to the needs of developing countries for the last two decades" (Pytlik, 1983 p. 56). It then began to shift its stance away from a ruralised

curriculum, and money for academic programmes was enhanced, because it was felt vocational education "proved difficult and tended to create a dual system of education" (Heyneman, 1985 p. 285). Vocational education's value has changed in recent years, becoming a focus of education in both developed and developing countries. Dual systems of vocational and academic education, though not necessarily taught at a single institution, create a duplication of buildings and teaching staff. Papua New Guinea possesses such a system of education. Government schools teach practical skills (wood, metal and technical drawing), agriculture and home economics; and International schools teach a predominantly academic curriculum. Crossley (1990) says that Papua New Guinea gives covert support to a dual system with International schools, and Australian aid giving places to Papuan New Guinean students in Australian schools where it is perceived that they will receive a higher quality of education.

Industrialisation and Education

The Industrial Revolution destroyed the tradition of family trades being passed down through generations, forcing craftsman to work in the factories. Apprentices were drawn from surrounding communities rather than indenturing a relative. The era of informal education was nearing an end. Mass schooling began to prepare children for work. As time passed, educational standards for apprenticeships increased from primary to Grade Ten to Grade Twelve. Today, many employers require Grade Twelve to be the entry standard for apprenticeships in technical and service related industries.

The services sector in developed countries accounts for a major proportion of the workforce. Services are defined as "finance, trade, real estate, commerce, and public and private services" (Irizarry, 1980 p. 347). Products are not produced, instead

something of 'value' is exchanged. In order for any industry to be viable, there needs to be a sound economic base upon which to support the personnel employed in the services sector. PNG has a largely traditional hidden economy where large amounts of money are exchanged but correspondingly there is no tax paid. This has the effect of limiting government revenue, reducing services and developing reliance upon external sources to supply the shortfall in budgetary requirements. Australia supplies PNG with external aid through its international aid agency AusAid. In 1998-99 Australia supplied an estimated $320.9 million to PNG, which was 21.7 per cent of the total Australian international aid (AusAid, n.d. p. 34). PNG education benefits through addressing the low female ratio of participation in education and the workforce, the construction of classrooms and teacher housing, supplying materials and equipment and promoting teacher training (AusAid, n.d. p. 37) which PNG's budget is unable to provide.

Society in developing countries changed as colonial administrations began to rule. PNG society is becoming more fragmented with traditional and contemporary lifestyles. Part of the problem with vocational education and its suitability in a "pluralistic society pursuing the ideas of democracy and egalitarianism" (Urevbu, 1984 p. 223) is lifestyles conflict. Traditions are not taught in schools thus students miss out on elements of their culture. The mix of values causes confusion about their participation in development.

Ukaegba (1985 p. 175) points out that "National self-reliance entails an authentic societal development ... plac[ing] great emphasis on the human factor because development is conceptualized not as things, but as the realization of human potential". Students tend to lose elements of their traditional values and culture when at school. one example is the village food production, which takes place during the day therefore the

superstitions behind ways of doing things are not openly apparent. As the majority of high schools in PNG are boarding institutions, the traditional rites of passage to adulthood are inhibited or non-existent for extended periods of time. Authentic values can only be learnt by immersion in those values and by living through the experiences. By adopting an academic or technical type of vocational education the alienation of students from the traditional ways is increased. As Selvaratnam (1988) indicated of adopted vocational education; it is designed by a Western expert, who's limited experience and research time in the country means their findings are usually based on their own cultural perception and educational background.

Pursuing this type of vocational education locks "the domestic economies and education systems into the world capitalist system" (ibid p. 134). There is an exaggerated inequality of imports and exports between developed and developing countries. Developing countries have difficulty producing qualified graduates able to research and develop innovations suitable for export to other countries, thereby bringing in foreign currency. This leads to a dependency on foreign aid and the importation of expertise. National development comes when the population is capable of applying their knowledge and skills in such a way that they are comfortable. Likewise the speed of progress, standards of living improve and self-sufficiency at a national level is attained by citizens at their own rate of development.

With the end of World War 2, massive amounts were spent on rebuilding Germany. This intervention method is supposed to bring a developed country status. Unfortunately, this does not seem to work. Post war Germany already had technical, scientific and industrial expertise and once the material infrastructure was rebuilt

imported expertise returned. Developing countries do not have such technical, scientific and industrial expertise. For example, a modern factory may be built but imported expertise. is required to run the enterprise simply because the education system is not capable of producing the required graduates (Oxtoby, 1977; Irizarry, 1980).

Employment needs dictates how many graduates will be absorbed into the workforce at any one time. Unfortunately, according to Blaug (in Barber, 1981) manpower forecasting has its inaccuracies. Yet, if manpower needs were predictable then education could train for those requirements. Attempts to match the education system to manpower requirements have been unsuccessfully attempted in Swaziland and Tanzania (Magagula in Psacharopoulos, 1989). These attempts have lead to surpluses or shortages (Hinchliffe in Psacharopoulos, 1989). The reliance on expatriates to fill technical and professional positions was an intricate part of Zambia's experience in 1986 (Achala in Psacharopoulos, 1989).

In attempting to raise the living standards of developing countries, accelerated industrialization has been tried but eventually is recognized as failing. The belief that benefits would spread as the "traditional and backward" sectors began to emulate the modern economy are fallacious (Irizarry, 1980 p. 338). In the United States, it is recognized that the advancement of technology and the identification of new technologies are the generators of economic and social progress (Grubb, 1984). Raising the living standards requires "an autonomous and dynamic industrial development to be established ... the formation of heavy industry to process raw materials ... and to manufacture capital goods" (Irizarry, 1980). Developing countries have come late to the industrialization process and modern production requires complex scientific and

technical knowledge (ibid.) largely unknown to them. In Zambia and other developing countries the importation of expatriate expertise mainly comes from developed and highly industrialized countries. Dependency upon external sources to provide the capital and credit to acquire the goods (Irizarry, 1980) becomes a perpetual cycle of importing the personnel to maintain new technology.

The ultimate aim of education is the development of individuals and the nation. Psacharopoulos (1991 p. 193) advocated that vocational education is "necessary for a country to modernize and acquire technical skills needed for economic development" What needs to be considered is Marsden's (n.d. p. 478) opinion that in developing countries "the aim of national development may not be achievable if inadequacies and ineffectiveness exist in schools". The acquisition of basic technical skills by students from under-trained teachers and inadequate infrastructure is unlikely to modernize the economy. Rather, it will increase economic pressures as well as maintaining the need for expatriate expertise and capital.

Conclusion

Whilst it has been noted that parents and students have high expectations for education with graduates attaining well-paid high status jobs (Matane, 1986; Lillis and Hogan, 1983) and that vocational education is seen as a valuable subject (Richardson, 1994; Psacharopoulos, 1987), its status remains low (UVENOC, 1995). It is perceived to be educationally terminal and undesirable as a subject for study (Selvaratnam, 1988). The differences between benefits of vocational and academic education tends to keep vocational education as low status schooling with academic subjects maintaining a high profile. Subsequently, the attention of parents and students is on academia. The need to

develop a country's human resources to improve the people's standard of living, provide fundamental services, and with self-esteem in their daily endeavours, should be at the forefront of government policy.

Removing children from traditional ways and indoctrinating an academic orientation through education alienates them from the life to which many will return (UVENOC, 1995). Developed countries have different vocational education system as needs due to the large highly technical sector of employment. For them a vocational education that is primarily of a technical nature is required. Many developing countries in Africa and the Pacific do not have highly developed technical sectors, subsequently, their need for a technical education is much less. But the reluctance of parents and students to accept a rural orientation lies in the belief that it makes them subservient to the more educated (Bude, 1983). Improved societal attitudes towards vocational education, especially one with a rural orientation, needs to be fostered by governments and education authorities in order for negative attitudes to be allayed.

Self-reliance is a dominant objective of developing countries. In Papua New Guinea, self-reliance of the individual in their daily lives is achieved through agriculture. However their economy is not balanced as it relies on aid from a variety of outside agencies to provide basic services. Papua New Guinea suffers problems similar to many other developing countries: poor roads, underdeveloped and poorly maintained public utilities, low foreign exchange reserves (Morauta, 1999) and a reliance upon imported knowledge, capital and expertise to develop industry. A predominantly agrarian society, such as PNG, needs to maintain its links to the rural sector. Thus to be credible the knowledge being taught must be compatible with the country's development plans and

its natural resources (human and organic). Acceptance of a technical or academic education without regard for the populations' daily lifestyle is wrong. In contrast to the daily activities of the people of Papua New Guinea, the workforce statistics (Richardson, 1994; Morauta, 1999) and the small percentage of high school graduates who gain paid employment (Crossley, 1990) indicate pure academic education is inappropriate.

Suitable goals need to be set for any programme or structural changes, and enough time allowed for their implementation to have an effect. Educating parents and students of the benefits of the programme are essential. Educators and politicians need to explain and clarify the systems objectives – both short and long term and for the national good - through the media (Richardson, 1994). Any media campaign should have factored into it times for re-emphasizing and re-education of the benefits and objectives for the people whom it is intended to help.

There is increasing support for vocational education, and identification of people's needs is required to help communities cope (Tetaga in Richardson, 1994). SSCEP was successful in PNG as a school-based curriculum method, and this may be the required strategy for teaching vocational education in a country with diverse needs. For effective teaching and learning to occur the curriculum needs to be of a less complex nature. Vocational education teachers need professional support to become competent in their teaching. Teachers need to be able to teach at a level higher than Beeby's (1966) formalistic level. Financial support to improve the quality of their training should be available and their skills regularly in-serviced by competent, well-qualified instructors. Recruitment of teachers should be a priority with incentives to entice quality school

graduates. Teaching must be made more attractive so other professions do not receive the best high school graduates.

Chapter 4

Education and Its Effects

Vocational Education

Vocational education could generally be defined as preparation for every career. For the purpose of this study, it is meant to cover practical subjects taught in high schools, including agriculture, industrial arts and design and technology. Traditional vocational subjects led to manual occupations and were not perceived as a pathway to university education. Vocational subjects have been seen as educationally terminal, and their acceptance into schools in developing countries has not been favourable even though vocational education is a powerful educational element in developing countries (Grubb, 1985).

The majority of vocational education technologies used in developed and developing countries are usually vastly different. Developed countries tend to integrate computer use into their curriculum and educate students for a technologically advanced future. Developing countries have limited technological infrastructure in schools. Remote schools have even less access to facilities than urban schools. Therefore, the level of technical education is of a more basic nature than in a developed country.

Drugger and Satchwell (1996 p.14) state that, "technology is human innovation in action" which allows mankind to solve problems and thus increase our capabilities through the development of innovations." Scobey (1968) identified "Industrial Arts [as] a field of general education that involves the study by which man changes the raw materials of his [sic] environment to meet his [sic] daily needs." The definition is as

appropriate today as when it was written as industrial arts studies mankind's use of the environment to meet their daily needs. With the many differences between developed and developing countries and the needs of their citizens this statement provides a principle which educational planners should draw upon when developing curriculum.

Vocational education should be appropriate to post-schooling opportunities and prepare students for work. Psacharopoulos (1987 p. 192) indicated that in developing countries the vocational curriculum should be of a rural nature, or as an alternative, introduce manual labour. The logic of Psacharopoulos' argument is that youth must learn about their most likely activity after school, and as the majority of the populations of developing countries are agriculturally based a rural orientation may be the most appropriate. Vocational education teaches skills and attitudes that can prevent the development of negative attitudes towards manual work (Selvaratnam, 1988), therefore a programme must include positive aspects related to rural work. Some past programmes included production for the school's needs rather than the stated aims of education (Psacharopoulos, 1989; Ishumi, 1988). De-emphasizing educational components and making production the chief focus reduces vocational education to a manual/craft base and the real processes of work are not learnt (Scobey, 1968). Therefore, students may not develop positive attitudes and values for and about work through their schooling. Students can gain an understanding of the value of manual occupations, and in time, a change of the perception that manual work is of lesser status than non-manual forms of work can occur. Benefits of vocational education include graduates becoming self-reliant and more responsive to the demands of industry. They are then able to use, manage and understand technologies in their chosen career through their experiences at school.

Vocational Education – Parallel, Diversified, and Non-formal

Many education systems rely on a diversified system for their students. Such systems allow students to choose their subjects by interest or ability. Vocational education in schools may be parallel, diversified and non-formal to cater for student needs.

A diversified education provides graduates with a more balanced curriculum of academic and vocational subjects. De-emphasis on book knowledge gives academics some practical application of their knowledge, and the possibility of reorientating attitudes (Ishumi, 1988). A diversified education's benefits relate to the skills students learn which have a vocational relevance (Lauglo and Narman, 1987; Grubb, 1985; Psacharopoulos, 1985) and benefit the country through the acquisition of middle-level technicians (Psacharopoulos, 1991). The skills and attitudes learnt are useful in gaining employment (Lauglo and Narman, 1987; Psacharopoulos, 1985), but may become redundant if higher education is pursued (Grubb, 1985). It was suggested that industry can absorb the graduates, but in most developing countries, the size of industry is not large enough to absorb all of the graduates and higher qualifications are seen as a way of attaining a job (Psacharopoulos, 1983; Dore, 1976). "Expansion and improvement in educational systems may create the possibilities for some youth to do better" (Carnoy, 1982 p. 170) through higher education qualifications. Graduates may fill positions within the country without the need for expatriates, but education has not created these jobs. Vocational subjects can be used to influence attitudes, stimulate interests and assist the acquisition of aptitudes and basic skills (Ishumi, 1988). Additionally students are given an understanding of the uses of academic subject content in real life situations.

Problems associated with diversified education systems include the high costs associated with setting up both academic and vocational elements in the one school, the aims and objectives of vocational education often lack clarity, a shortage of vocational teachers and the low status of vocational education (Sifuna, 1992). Lauglo and Narman (1987) indicated that industrial subjects are more expensive subjects due to capital and maintenance costs, and a lack of expertise required to maintain and manage the equipment is problematic. Although diversified education costs 30 to 40 per cent more than a parallel system (Heyneman, 1985), a number of African countries accepted diversification because of their links to American schools and the integration of education and production (Ishumi, 1988; Lillis and Hogan, 1983). Psacharopoulos (in Sifuna, 1992 and 1985) indicated that the high cost of diversified education does not bring benefits with it, such as the time that graduates take to find employment or higher wages at commencement of employment

PNG introduced an innovation called the Secondary Schools Community Extension Project (SSCEP) and Vulliamy (1988) indicated that the main lesson learnt was that a parallel system of education could be avoided. All students were given some form of integrated academic and vocational education that allowed them to continue with their education or return to the village. For this to occur, a well developed and founded strategy for the implementation of projects such as SSCEP is necessary. African countries such as Tanzania, Kenya and Uganda recognized the need to diversify their curriculum to include more technical and vocational education for their industrial and agricultural sectors (Psacharopoulos, 1989). Diversified education produces several benefits such as students staying at school for longer, which defers when choices concerning their future are made, a single curriculum with students choosing elective

subjects to study and a reduction in the dropout rate. Also, better organization of support teachers for disadvantaged students, and valued completion of secondary education (Kupisiewicz, 1979). The success of diversification can be seen in Colombia where diversification drew "more secondary students from lower socio economic backgrounds" (Psacharopoulos, 1985 p. 510). Diversification has also been attempted are the Pacific and Asian regions.

Parallel systems have twin schools (academic and vocation) with the vocational bias specialized (Ishumi, 1988; Lillis and Hogan, 1983). This type of system tends to make vocational elements of second class education more prominent as academic schools provide the more academically able students with an education designed for progression to higher education. Unfortunately, "the magnet of academic school destroys many desirable goals" of vocational education (Lillis and Hogan 1983 p. 173), although given tools, equipment and "an intellectual atmosphere to match their kind of specialization" these institutions can produce middle-level technicians (Ishumi, 1988 p. 165). Vocational schools allow students a wider range of experiences within specialization than in a diversified system because more time is given to specialization. Historically, European schooling was set-up to provide a parallel system of education (Bierhoff & Prais, 1993), and many Latin American countries of the 1980s still maintained parallel systems (Corvalan, 1988). Weeks (1987) maintained that PNG has a unified system of education (in its public system) and that it has resisted streaming although Vulliamy (1988) indicated that there was an elite school system operating.

Non-formal systems are low-cost and cater to mainly early school leavers. This system suffers from a lack of status and its institutions are recognized as being for the less

academic student or those who do not have a secondary school education. Secondly, production (without a lot of intellectual input) is a main consideration. Thirdly, financial and material survival is dependent upon external support, either from the government or other sources.

Academic and Vocational Education

Teachers present discrete pieces of knowledge to students so they may use that knowledge to become better citizens and obtain a job. Lauglo (1983 p. 289) indicated that "knowledge should always be made present to the learner ... adapted to the learner's development, and in such a way that it arouses his/her natural intellectual curiosity." Knowledge presented to students may be seen as of value or not as the career aspirations and interests of the student make such knowledge valid or not. Therefore, the student can make choices as to whether the content is worth learning.

Early 20th Century education had its roots in employment for specialized jobs (Wilms, 1988). People were trained for jobs and rarely changed careers, or employers, throughout their lives. Late 20th Century work habits have changed. Employees are more mobile, work less as full-time employees and retrain regularly for new jobs (Marginson, 2000). Thus young people should be trained to be adaptable (Lauglo, 1983; NCVER, 2000) as the nature of work changes, with the focus of education moving from job specific to job adaptability and flexibility.

Education requires some form of evaluation in order to achieve the goals and aims that it has set. Students are expected to graduate with skills that make them flexible and adaptable to new situations but these attitudes are difficult to assess. Education results

have to be assessable with "tangible, useful outcomes ... [as] behavioural objectives or lists of minimum competencies" (Lauglo, 1983 p. 290). These are 'hard' variants of concern to upper levels of education. Primary schools are used to teach attitudes essential to success in the higher levels of education and life (ibid).

Academic education tends to focus on learning mastery of the subject's content to assess student progress whilst vocational education assesses student progress through examination of skills based on certain criteria However, it tends to neglect the important aspects of attitudes to work and work ethic. The dichotomy between academic and vocational education (Selvaratnam, 1988) becomes more apparent when the expected careers of students are categorized as professions (academic) and manual labour (vocational). In the past categories of schools were highlighted by use of streaming for academic or vocational ability. Colonial administrations perpetuated this form of education as the administration's children received an academic education and the indigenous population, one's for low level public service jobs or village life (Crossley, 1990).

With the introduction of a formal Western education system, colonies adopted many elements of Western society into their culture. Selvaratnam (1988 p. 131) indicated that "Western models of education are potent and pervasive culture carriers" that are resistant to structural change. McRobie (1994) claimed that distortion occurs in culture and economy by concentrating economic activity in cities and breaking down the rural structure. Western education effects culture through its dominance that the knowledge presented is the only valid kind to give access to jobs, and a newly introduced class system.

Western education perpetuates class divisions and teaches members of society their place in that society (Carnoy, 1982) which is what has happened with many developing countries. As a reinforcer of the class system, the dominance of the elites is maintained (Lillis and Hogan, 1983), because they, as academic graduates, are viewed as having better access to high status jobs. Vocational education is seen as inferior as its graduates work with their hands and are not seen as having status, or as innovators. Its clientele are deemed to be low achievers.

Capitalist education perpetuates class systems. To make structural changes requires modifications to the foundations of society's structure. Marxist and socialist views of society are examples of radical restructures from capitalist society. Ho Chi Minh used education as a major plank for political change in Vietnam. Changes to Vietnamese education included curriculum and methodologies where people trained for the tasks of the revolution (Bray, 1994). People were expected to stay on the land and produce. Ho Chi Minh's purpose was political, but as Psacharopoulos (1989) indicated, the change may be for pedagogical, economic or for any cause which has a particular purpose. The political revolution in Vietnam was successful, and although still a developing country, this success can be seen in the majority of the population remaining farmers.

Contrary to Vietnam's use of education is the view held by some where there is disdain for manual work (Psacharopoulos, 1989), that vocational education is inferior (Grubb, 1985), and that it ties people to the land (Bude, 1983). Grubb (1985) indicated that the inferiority of vocational education was particularly evident after independence in many African countries. At this time newly independent states were building their bureaucracies and strengthening their political system. African policies attempted to

orient the population towards agriculture but had marginal results because people perceived that they could not be promoted through social classes (Psacharopoulos, 1989). Academic education carried a perception that it was valid schooling and therefore the legitimate process of schooling in Africa and rewards were available to all who succeeded.

The Ugandan and Kenyan governments reasoned that vocational education should not be taught in primary schools. Selvaratnam (1988) indicated that the introduction of a vocational specialization, agriculture for example has limitations. Young children are incapable of manipulating heavy tools or of understanding the economic context in which vocational skills are used. Vocational education can be an important element in primary school as attitudes are formed early in life. These children would have worked alongside their parents at home so it seems appropriate to include an agricultural component in primary schooling. Thus, schooling in developing countries is to teach students a "broad, balanced range of subjects" (academic) which are perceived as being "educationally more beneficial and rewarding" to the student (Selvaratnam, 1988 p. 141) rather than subjects and skills which may be more appropriate to their needs after leaving school.

Pigeonholing students to a particular employment opportunity narrows their ability to develop cognitive skills (Selvaratnam, 1988). Therefore, to avoid limiting the intellectual development of the child, vocational components in high schools can be used to broaden the curriculum allowing students to expand their knowledge of how things work. Western academic education is supposed to provide a base upon which graduates can find employment, as academic graduates are believed to have skills

required by employers which enable them to be able to interact with others. Western academic education was adopted in many parts of Africa (Bude, 1983) because vocational education, which promoted the aims of reports like the Phelps-Stokes Report in the 1920s, advocated an agricultural bias.

Two schools of thought about vocational education exist. Firstly, pre-vocationalism provides students with a hobby, and secondly, technical-vocational education which can provide an alternative path to university and job specific skills. Psacharopoulos (1985) has indicated that the introduction of diversification in Colombia did not diminish of secondary student's desire for a higher education. Lillis and Hogan's (1983) study of published vocational literature repeatedly found suggestions that, where access to academic education is limited, vocational courses became popular and often became a temporary diversion from university for their clientele.

Bude (1983), Psacharopoulos (1989) and Chapman and Windham (1985) maintain that there was a perception that academic education provided monetary gains and upward social mobility for students. Gains for employers from academic education were attitudinal rather than specifically job skills (Grubb, 1984) and so employees must become active participants in selecting the training they require for a 'better fit' for work (Marginson, 2000).

Curriculum changes in the United States during the 1950s developed because there was an "increasing concern about the need for highly trained scientific manpower" (Crossley, 1984 p. 77). Graduates were simply not prepared sufficiently for new technologies. Technologies used in industry and business are undergoing rapid changes

in the way they are developed and used. An example is computers which have infiltrated almost every area of human endeavour. Industry requirements for unskilled labour have significantly decreased over time resulting in a need for more highly trained graduates to operate more sophisticated machinery. The cost of this to the economy in terms of provision of educational facilities may be seen in a cost comparison between academic and vocational education. Selvaratnam (1988) wrote that the Commonwealth Secretariat report of 1987 into Malaysian education said that M$ 720 per academic student was spent compared to M$ 2800 for vocational students. Vocational education funding is approximately 3.8 times higher than that given to academic education. Lauglo and Narman's (1987 p. 240) reasoning for the higher costs are that vocational education requires "managerial experience and initiative for their establishment and maintenance". When comparing measurable factors such as the financial rewards between vocational and academic graduates, the capital and maintenance costs for schools, and benefits to the employer, academic education appears to be better placed to provide a more cost effective education.

Vocational education though provides valuable skills for its graduates and whilst consideration of cost is important there are many other benefits that are difficult to place a monetary value on. Chapman and Windham's (1985 p. 270) analysis of cost effectiveness is "defined ... as occurring when training promotes an increase in the graduates suitability for the labour market sufficient to justify the extra cost of education." While it has been argued that there is a higher cost associated with vocational education, the suitability of academic graduates to immediately work in manual skill areas of the labour market is suspect. Academic graduates do not possess the same hand skills as vocational education students but they have a higher standard of

generic skills (higher literacy, numeracy and communication) that employers are seeking (NCVER, 2000).

The imposition of academic education, and its continuation as the dominant method is highlighted by Lillis and Hogan (1983 p. 95) who said that the "power elite … willy nilly, impose the model of their own success on would be mobile lower social sectors". Much of the career planning and guidance programmes for high school students are directed towards higher education. Academic education fails to cater for those who do not wish to, or are not capable of, further study (Chapman & Windham, 1985; Burns, 1986) and who would prefer to work in a manual occupation. The creation of programmes that have general academic content suitable for vocations (as is happening in Australian schools) could be more suitable. Government policy for the creation and development of vocational education allows a country to build a technological culture in the labour force (Castro, 1987), to prepare students for practical work (Lauglo, 1983). Clearly academic education is inappropriate in countries where much of the 'real world' is agricultural (Selvaratnam, 1988).

Preparation for future careers is required in order for the graduate to function in their chosen field quickly and efficiently upon gaining employment. To achieve this as new machines and technology make people redundant, but at the same time creating new jobs (Lyle in Wilms, 1988), graduates are required to have skills they can use to adapt to new situations. If graduates are given an education that raises skill levels, economic growth and professional expertise can be supported (Sifuna, 1992).

The use of education to produce highly qualified graduates as an attempt to solve economic problems cannot be supported as education is unable to solve the problem (Grubb, 1984; Lillis and Hogan, 1983). The economic circumstances of the country will produce vacancies for graduates to fill provided the economy is growing. Educational programmes properly planned and implemented can have the effect of redirecting, or reorienting students to a more desirable outcome for the country. Some outcomes of vocational education are to reorientate student attitudes to work. In a developing country with substantial subsistence agriculture, and little secondary industry, it should be towards agriculture. Additionally, a reduction in unemployment by developing appropriate attitudes and skills in students towards agriculture, which in turn reduces unemployment and urban migration in search of modern sector jobs (Lillis and Hogan, 1983).

High schooling in Europe and North America expanded rapidly between 1890 and 1920 and became increasingly vocational (Grubb, 1985). Yet, late in the 20th Century enrolments have increased towards an academic type of education (Lauglo, 1983). Fortunately, some developed countries have realized that practical education for some students is necessary, as evidenced by the growth of VET in schools in Australia (Keating, 1998). To retain student numbers in post-compulsory schooling, vocational initiatives in Australia include work experience for students and school-based apprenticeships and traineeships. Historically, there has been a realization that some kind of practically oriented education is necessary. Selvaratnam (1988 p. 133) noted that Sir James Kay-Shuttleworth in the 1840s said that students should be given "instruction ... 'interwoven' with labour ... [providing] useful skills ... [and preventing] a distaste for practical work." The National Society for the Promotion of Industrial Education in

1908 lobbied for all American boys [sic] to be given an industrial education from the earliest possible grade "and make it a free as the air and sunlight" (Wilms, 1988 p. 44).

Whilst the ideal of vocational, or practical, education has been proposed for over one hundred and sixty years as desirable in schools, the status of the subject has not been raised. Technical and vocational education continues to be "considered of a lower status and exclusively for preparation for the world of work" (Corvalan, 1988 p. 76) In Europe, in the 1970s, vocational education taught knowledge and attitudes sufficient for the job but not for the worker to be given higher status (Deforge, 1979). It could be argued that diversified contemporary education systems offer students a wider combination of academic and vocational subjects that do not restrict graduates to the narrow focus of a parallel system. Dewey (1915) argued that education should promote thought in students. Where vocational and academic subjects are integrated students are given the opportunity to use both kinds of subject content to solve problems. Lauglo and Narman (1987 p. 24) indicated "the most realistic justification for such subjects are their merits on general education grounds, rather than relevance for employment or self-employment." Knowing what, where and how to use knowledge can be used to develop attitudes in students that employers want.

Vocational education uses practical examples to develop attitudes and skills in graduates to enable them to enter the workforce promptly. Students without the aptitude or motivation to study in higher education are catered for through development of physical skills and an appreciation of manual work. A hidden result is that these students use the content of the subjects they are not interested in as part of vocational education. The content of academic subjects is assimilated into vocational education

giving the student an opportunity to understand the value of academic content, and its application in production and design processes. This objective was particularly evident in SSCEP.

Dependency Theory

Many developing countries rely on aid programmes from developed countries and financial institutions to provide finance and expertise to improve the quality of life for their citizens through health, education and other social programmes. Australia provided PNG with an estimated $320.9 during 1998-99 in four main areas: programmed activities, budgetary support, retirement benefits and other flows (AusAid n.d. p. 34). There are many examples in private industry of external expertise being used in PNG because of the lack of indigenous capability. The dependence of developing countries on external expertise can be traced back to colonial administrations.

Colonial administrations and religious missions trained a small element of the indigenous population to provide for their own needs. The indigenous workers then depended upon their employers to give them wages to purchase goods and services, as they no longer had the time to produce them for themselves. As independence neared the need for an indigenous bureaucracy increased. More people had to be educated to take control of their country's destiny. Traditional subsistence ways of life changed for most of the workers. There became a reliance on external sources to provide many of their basic needs and the desire for Western goods developed. Irizarry (1980 p. 344) says that developing countries "have come to depend on external sources of financial capital investment and credit to acquire these industrial goods, and even food products

from the developed countries". McRobie (1994) added that there is an increasingly dependence for skills, loans, spare parts and markets.

Imported products include educational structures and theories. Soelaiman (1994) indicated that the transnational transfer of education, from the developed to developing countries, is often accepted without any adaptation to suit the country where the transfer is effected. Walumbwa (1999 p. 52) said that in transnational transfer "economics and political urgencies have been the driving principle … not the status of the end users. Consequently, disappointing results have ensued." It has been noted in other sections of this paper that parents and students accept that a Western style of education is the best for their children to achieve paid employment and move up the class system. Selvaratnam (1988 p. 131) says that "Western cultural and value orientations, one of them being the notion of supremacy of the elitist form of academic oriented education" is because both the "colonial rulers and indigenous elite … succeeded … through a Western academically-biased general and non-technical education". The emphasis is on an academic style of education without any vocational content.

Soelaiman (1994), Selvaratnam (1988) and Walumbwa (1999) indicated that an introduced vocational education needs to be cognizant of the realities of the context of development and that cultural differences need to be addressed. Selvaratnam (1988) indicated that the European Economic Community abandoned attempts to develop a common vocational education programme because of the recognized cultural differences between its member states.

The World Bank, UNESCO and other international aid agencies have been strong supporters of vocational education. Encouragement has been given through educational programmes and financial support to promote economic development in developing counties. Crossley (1990) indicated that whilst educational change is an element in development, other factors influence, or constrain the change. Support needs to come from economic and social policies that affect the "distribution of resources between urban and rural dwellers" (Crossley, 1990 p. 152). Political ideologies determine the amount and type of vocational education given in schools. SSCEP in Papua New Guinea and Education for Self Reliance (ESR) in Tanzania are two examples. These two programmes were introduced because it was perceived that a re-orientation to self-reliance was required to refocus the population away from a predominantly academic education for those who were unable to find paid employment.

The 1970s saw an emergence of the dependency theory and an awakening of cultural consciousness in developing countries (Lee, Adams & Cornbleth, 1988). The dependency of the developing countries upon developed countries for educational theories and trade is "compounded by [the] historical dependence upon the metrople [colonial administration] for movement in the economy" (Lewis & Lewis, 1985 p. 169). This stems from the initial introduction of education by the colonial administration and the subsequent adoption of the administration and educational structures.

Pseudo-colonialism

In many instances, colonialism created a stratified system in the colonized country not unlike that of the home country. The administration could be likened to the ruling upper classes, the indigenous worker to the middle class and the villager to the working class.

There were a number of areas of education that gave the indigenous population the idea that they were subservient to the administration. Firstly, children of the administrators were given a different kind of education to indigenous children. Often the children of the administrators were sent back home to receive an academic style of education at boarding schools. Even for schools in the colony the "colonial elite continued to receive a metropolitan style academic curriculum" (Crossley, 1990 p. 145).

Secondly, the type of education given to the indigenous school children by the colonial government was not designed to prepare young people for the service to their country. Instead, it was motivated by a desire to impose the values of the colonial society and to train individuals for service to the colonial state. Clerks and the 'lesser' manual type of labourer were the kind of people that the colonial administrations required to maintain their supremacy. Carnoy (in Crossley, 1990 p. 142) indicated that "far from acting as a liberator, Western formal education came to most countries as part of imperialist domination."

Thirdly, parents usually perceived academic education as their children's pathway to higher education. Wilms (1988) believed that employers tended to see academic graduates as having good work ethics. Rewards gained by graduates of academic education are higher than vocational education (Zachariah & Hoffman, 1985) and the Asian Development Bank (1999) indicated that academically educated workers earn approximately 16 per cent more than a vocationally trained graduate. Lillis and Hogan (1983 p. 177) claimed that the Western model of education is perceived as closely linked to "occupational recruitment, social status and material well-being." Accessing a position because of the applicant's higher educational qualifications gives them status.

They are able to afford better quality housing, services, and other items because of the higher financial returns from their job.

Parents and students see vocational education as not leading to further study because it provides training for a job and flexibility to chose a career is limited. In developing countries, there has been a perception that vocational education is designed to maintain the status quo with working classes kept in an inferior position (Vulliamy, 1988; Grubb, 1985; Urevbu, 1984; Lillis and Hogan, 1983; Dore, 1976). Lillis and Hogan (1983 p. 182) further indicated that the power elites are linked to "academic education and its dominance in schools." Many of the vocational education programmes in developing countries have been directed towards the rural sector and agricultural development has not succeeded (Lillis and Hogan, 1983). The new indigenous elite, though, have expressed support for a parallel system of education rather than a diversified system.

The issues involved in vocational versus academic education in developing countries can be traced back to colonial administrations. The perpetuation of systems imported by the colonial power tends to maintain the status quo as children of the power elite attend academic schools perpetuating the class system.

Relevant Education

An education that provides graduates with the basic skills needed to function within their primary living community, and then in the wider community, is one that has appropriate skills and knowledge to live in that environment. Technologies used in local environments have been tried and tested over long periods of time. Education that uses, or integrates these has a greater chance of success (Walumbwa 1999). In developed

countries many of the activities of production are performed or operated by highly skilled technicians using modern equipment. In a number of developing countries where there is a small high technology industry, the need for highly skilled technicians is limited. Courses in vocational education should focus on appropriate requirements of the system's graduates. Gibson (1996 p. 6) explains it as follows: "modern, highly developed, high technology western society ... emphasize[s] the study and use of computerized machines, or systems ... [and] cultures where ... technological sophistication is not ... centered upon a 'high tech' technological base, the focus of specific courses in technology should be appropriate and relevant technological capabilities".

Richardson (1994 p. 7) indicated that in PNG "vocational and practical education must begin in the primary school" and focus on simple technologies for the local situation, whilst Walumbwa (1999 p. 52) identified the use of "local institutional frameworks to identify problems and opportunities". Richardson believed that students would be provided with better understanding and the establishment of basic skills and knowledge for secondary schooling. The appropriateness of the equipment and tools should be at a level that schools have the capacity and capability to provide and maintain the facilities. It is no use providing power tools if there is no electricity, or tools are used by the untrained.

The comparison between developed and developing countries indicates the amount and level of technology use and access by the majority of the population. Papua New Guinea, with its lack of infrastructure, can provide a guide to implementing a curriculum suitable for a developing country. Australian students, for example, have

access to much advanced technological equipment and tools, such as computer-operated machines, electrical tools and hand tools for various processes that cannot be completed with electrical tools. Papua New Guinea students do not have the same access to computers and electrical equipment and the maintenance of hand tools may not be adequate to successfully complete the job.

Therefore, when the quality and quantity of technology and tools in schools is low, and the perception that an academic education is more valuable in the pursuit of paid employment, then students tend to choose an academic education. The choice of an academic education by students in developing countries creates large numbers of highly qualified graduates who then have to be absorbed into the employment sector. Papua New Guinea's education structure, prior to adoption of the new system in 1994, provided for exclusion from further studies if examination results did not reach a specified criteria, or if there were not enough places in secondary schools. The new structure allows more students to obtain higher qualifications, as more places are available. Education is an investment that can be used to create attitudes in students for social and economic development. However, by increasing educational qualifications and exit levels, the chances of development are likely to be hindered (Dore, 1976). The uncritical transfer of Western style education, be it the type that was seen as 'typical' Western education during colonization or of a contemporary nature, is both culturally and cognitively (Vulliamy, 1988) inappropriate.

The comparative study of education in developing and developed countries is important as it can provide appropriate guidelines (Zachariah & Hoffman, 1985) for curriculum development and warn of any hazards involved in the development of educational

systems. Comparing developed systems of education, with their history of changes relevant to the needs of industry and their clientele, and developing countries struggling to provide basic education for their students can provide some indicators as to what is appropriate.

In developing countries, there are two "competing ideologies of education ... village life or the modern economy" (Crossley, 1990 p. 146). The differences between the two are enormous and highlight the difference between formal modern education and traditional non-formal education. Developed countries have their own problems as to what preparation to give their students for employment because the uncertainties of employment and career changes are more frequent.

Many occupations require regular retraining and upgrading of knowledge and skills. Formal education for developing countries in many parts of Africa, the Pacific, and particularly parts of PNG is an innovation introduced by colonial administrations, primarily for their own administrative duties, or by churches for their religious activities. The issues determining whether formal education is successful or not lie in the rate of return of investment (Psacharopoulos, 1985; Asian Development Bank, 1999), and its use as a development strategy (Wilms, 198; Grubb, 1984), the quality of teaching (Beebe, 1966), the ability of vocational education to clarify its aims (Lewin, 1985), physical facilities and education for employment (Asian Development Bank, 1999).

Rates of return of investment can be classified into three areas: 1) the rate of return to the graduate in earnings, 2) provision of education inclusive of academic, diversified

and vocational education, and 3) social benefits. Graduates are interested in the immediate return in the form of wages or salaries. Academic graduates earn more than those with vocational education (Psacharopoulos, 1985). The Asian Development Bank (Asian Development Bank, 1999) indicates that the difference is approximately 16 per cent. The provision of education costs rise in the following order – academic as the lowest followed by vocational education and finally diversified education (Psacharopoulos, 1987). "The social cost of education does not match the social benefits" (Psacharopoulos, 1991 p. 193) as many graduates from vocational education tend to work in fields other than the specialization they have studied. Academic graduates often refuse to work in areas other than those they have chosen and some wait significant periods of time before becoming employed (Lauglo and Narman, 1987) because they see manual work as below their status.

Education has been touted as the panacea for curing employment problems (Grubb, 1984; Akinpelu, 1984). Education does not affect employment or the division of labour (Carnoy, 1982) as it cannot influence economic growth without basic social structural change as evidenced in Vietnam. Many programmes, such as SSCEP in PNG and ESR in Tanzania, have been attempted to enable graduates to return to their villages and become self-reliant or self-employed (Vulliamy, 1983, 1987; Crossley & Vulliamy, 1986). Yet, they have ignored creativity and enterprise as elements of education in order for students to use these skills to develop business activities.

An inadequate knowledge base, lack of pedagogical skills and higher order teaching skills, and a lack of resources prevent quality teaching occurring. Beeby (1966) and Vulliamy (1988) indicated that a formalistic teaching style relies heavily on the use of

textbooks, rote learning and factual recall Teachers' inability to deviate from the syllabus for fear missing out on teaching 'vital' parts of the syllabus results in students being disadvantaged as creative people. This is because in many developing countries, (certainly PNG) the progression up the educational ladder depends upon good examination results.

The Secondary Schools Community Extension Project (SSCEP) in PNG was an attempt to direct formal education towards the rural sector (Crossley & Vulliamy, 1986). This project focused on the use of outstations or community projects, where practical work was integrated with academic subjects. The nature of the project still allowed for the syllabus content to be taught in formal classroom setting and used away from a school environment. An example is where business studies students kept the books and accounts of a tradestore to highlight the relationship between academic and practical subjects.

John Dewey focused upon pedagogy of manual training to make student learning meaningful in the context of the community (Lewis, 1995). Dewey used the Swedish Sloyd movement as part of his philosophy where students make a project to be taken home to show parents the value of manual training and for future career guidance. If the particular environment is that of an agrarian country, where the majority of the graduates return to their villages, then it is important that schools develop a curriculum that will prepare them for their future lifestyle. There is little sense in preparing a student to climb each successive rung of the education ladder if he or she is to return to the village. Dore (1976) indicated that an examination system effectively prevents a

more relevant curriculum from being taken seriously, or even being genuinely suited to the needs of the majority of the students.

The focus of education is different in a developed country. Students today live in uncertainty as jobs are superseded and replaced with new ones when new technologies are developed. Ellyard (1998) postulated that seventy per cent of the job categories, products or services for the year 2020 have not been invented yet. Kupisiewicz (1979 p. 27) advocated that where "elementary education should be to provide sensory training and impart a basic *savior-faire* ... secondary education should prepare adolescents for a working career and provide instruction leading to high professional qualifications". All graduates need to be capable of life-long learning and adapting to change, often, quite rapid change. Essentially, if learning ends after schooling they may be unemployable. An excessive amount of unemployed people is not a pleasant reality (Fluitman, 1999), especially for a developing country. The need for an appropriate and responsive curriculum is important in whatever situation. The system's graduates need to be able to respond to fluctuations in demand, but also to be able to be self-sufficient, or self-reliant.

To be self-reliant/sufficient, graduates need to be able to comprehend and assimilate knowledge to suit specific situations. This means they should learn the kinds of knowledge that will be useful. It follows that when, where and who applies knowledge makes it useful. Therefore, being able to apply knowledge at the applicable time is something that can be taught in schools. As a basic skill, in education application of knowledge should be taught. Teachers, as the means of teaching knowledge, need to be flexible in their approach to the dissemination of knowledge and give examples of its

use outside of school. Currently teachers in PNG deliver lessons formally but changes must be made so that the difference between 'input' of their understanding and 'output' of the way they teach is improved. Traditional formal education systems of recall, learn and recite need to be assessed as to whether they meet the needs of school students and what would improve their knowledge and understanding of the subject's content.

In North America, diversified education has been the traditional model (Heyneman, 1985), whereas British and European schools had traditional parallel systems until they began to change to diversification during the 1960s. This coincided with the expansion of schooling with students staying at school longer. Expansion was intended to benefit the working class (Heyneman, 1985) and allow social mobility.

The aims of education need to be clear, accountable and promote human development (Matane, 1986). This means that those in government should "have a clear, intimate understanding of, and respect for, what people in the much maligned institutions known as schools do" (Zachariah & Hoffman, 1985 p. 280), as well as where the country is going. For teachers to provide an education that will give students skills for paid employment, there needs to be vibrant industrial and manufacturing sectors with significant employment opportunities. The Asian Development Bank (1999) indicated that PNG's share of manufacturing in GDP has hardly changed. This indicates that the graduates who intend entering the manufacturing sector are competing for a smaller pool of jobs.

Education needs to provide graduates with means to survive in order to be 'relevant'. The knowledge learnt and the way in which that knowledge is used can provide for self-

reliance/sufficiency. PNG with a slow, or stagnant, economy might be better served if *the education system provided for the majority of its graduates through skills that will be required after completing school.*

Teachers, the Workload and In-service

Teachers are the main source of knowledge in schools, in conjunction with textbooks and other aids. Their instructional methods allow students to learn. The Asian Development Bank's (1999) research indicated that the instructional methods in technical colleges of developing countries like PNG were mainly through lectures, practical work and demonstrations. Teachers admit that there is very little difference between their teaching methods and those by which they were taught. Beeby (1966) said that where a teacher uses symbols to teach they have only a vague notion as to their meaning. This is opposed to a teacher who can utilize the subject matter to make meaning clear. Reciting the content of a lesson, or merely regurgitating sections of a textbook are akin to the methods used in Victorian England (Dore, 1976). Whilst it is pertinent to note that Victorian English education did not rely on examinations for progression, Papua New Guinea places great emphasis upon examination results. Fact memorizing, rote learning and other drill methods for examinations tend to produce teachers who perpetuate this teaching style (Dore, 1976). Todd (1985) indicated that all countries go through stages of development as the technology and knowledge of the population increases, but Beeby (1966) indicated that forcing a developing country to prematurely move from one stage to the next stage, or even jumping stages, can cause regression to formalistic teaching. The ability of an education system to progress through the stages relies on two professional factors "a) the level of general education of the teachers in the system, and b) the amount and kind of training they have received

(Beeby, 1966 p. 38)." Teachers who lack a high level of general education and do not have training that allows for higher order teaching skills revert to drill methods of teaching when faced with subject content they do not understand.

SSCEP identified problems with teachers' skill levels and introduced an in-service programme to overcome potential problems. Teachers' were identified as lacking basic skills in planning, curriculum and analysis, and curriculum development (Cummings, 1982) and had trouble implementing their own syllabi. Another area of deficiency was teachers' "higher order teaching skills [which] restricts their ability to plan programmes which focus on those same skills" (Currin in Cummings, 1982 p. 20). Vulliamy (1980 p. 45) found that for teachers "the curriculum in-service aspect of SSCEP [was] ... both hard work and difficult" and Currin later found that teachers were unable to sustain their own programmes (Currin in Cummings, 1982). One positive aspect is that SSCEP participants were supported during its implementation rather than merely being provided with materials and resources and left to their own devices (Vulliamy, 1988).

Papua New Guinea's teachers face a demanding workload, with teaching duties, preparation, assessment, and pastoral care on a roster basis. Most rural schools are boarding institutions. Teachers are provided with accommodation, usually on campus, and are therefore exposed to students on a twenty-four hour basis. The ability of these teachers to instigate innovations and changes is severely restricted because of their workload. Weeks (1987) was skeptical about the ability of teachers to cope with innovations considering the workload they were expected to undertake. SSCEP's core project teachers were under strain because their own limited education made it difficult to teach the rudiments of core (general) subjects (Vulliamy, 1988), and lack of

understanding of the projects by the generalist teachers (Vulliamy, 1983). All of the factors above make teaching in PNG hard work.

Adoption of Educational Structures and International Transfer

With colonization came education to meet the clerical needs of the administrative power and religious missions which settled in the new country. As the new countries grew into independent states, education was expanded rapidly to cater for the larger numbers of indigenous public servants required as the colonists reduced their involvement in the affairs of the country. However, education systems continued to be a reflection of the colonial administration's home country.

Carnoy (1982) states that education systems were designed to perpetuate the class system and President Nyerere of Tanzania claimed that formal education reinforced social ethics whilst preparing students for their place in society. Lewis and Lewis (1985) and Lillis and Hogan (1983) indicated that there was an obvious inheritance from Britain in Commonwealth Caribbean countries. Lewis and Lewis (1985) stated that the main feature of education systems in the Commonwealth Caribbean was their acceptance of British style grammar school with its academic bias of preparing students for higher education. Technical education is poorly accepted as a result (Lewis & Lewis, 1985). There has been little change in policy in these countries from the late nineteenth century through to the 1960s and 1970s (Lillis and Hogan, 1983). Lillis and Hogan stressed that throughout the colonial period provision of vocational education issues recurred regularly, but changes did not last.

Vocational education in PNG has received attention in the form of the SSCEP programme. Although it was not initially proposed as vocational, it did provide for self-reliance and self-employment in a rural setting. When The World Bank's focus on education changed there were proposals to integrate SSCEP into the Education III plan to avoid it being seen as vocational (Crossley & Vulliamy, 1986). An indication here is that there is a dependency upon maintaining international aid and that the adoption of formal Western style education is dominant. Soelaiman (1994) believed that developing countries are hindered in the development of their own education programmes to maintain dependency on the developed countries. European and American theories are imported by many countries without modifications to match the culture and traditions of the recipient country (Crossley, 1984; Lee, Adams & Cornbleth, 1988; Walumbwa, 1999). Adoption of programmes and theories from a donor country to a recipient county must take into account socio economic and infrastructure conditions (Soelaiman, 1994; Walumbwa, 1999). The success, or failure, of the transfer relies on the following identified by the Centre for Educational Research and Innovation (CERI) (in Soelaiman, 1994 p. 31):

1. The compatibility of the systems to be transferred with the ongoing program in the recipient country.
2. The availability of personnel who have the knowledge and skills necessary to design and manage the transfer efforts, and who have experience in the theories and procedures which underlie the education system to be transferred.
3. Evidence that the transferred system has achieved the specified objectives.

Pytlik (1983 p. 56) stated "when the development of Third World [sic] countries first became a major world issue ... almost everyone agreed that the key to development lay in the transfer of already known and tested technologies." Whether the 'known and tested technology' was compatible with the recipient country appears not to have been taken into consideration (Lee, Adams & Cornbleth, 1988; Lewin, 1985; UVENOC,

1995; Ukaegba, 1985). Consequently the programme failed (Lee, Adams & Cornbleth, 1988).

Marked differences between developing and developed countries have not discouraged the replication of Western models of education in developing countries (Selvaratnam, 1988). Western education perseveres because of its perceived notion of supremacy and success, as a "potent and pervasive cultural carrier" (Selvaratnam, 1988 p. 131), and that "technology is not culturally neutral" (McRobie, 1994 p. 13). In 1976 the then Chancellor of the University of Papua New Guinea, Sir Alkan Tololo, identified the belief that Western style formal education was a 'cargo cult' in that it was a "guarantee of material goods' (in Crossley & Vulliamy, 1986 p. 3). Unfortunately, Tololo's wisdom was not heeded and a Western style continues to be dominant.

Akinpelu (1984) and Walumbwa (1994) noted that comparative education researchers recognize that when transferring education's programmes, institutions and systems, attention to local conditions is necessary. A detailed knowledge of the culture into which the programme is to be transferred is required. Yet, 'outsiders' continue to believe that this is unnecessary (Vulliamy & Carrier, 1983) as curriculum is still designed with little or no knowledge of local culture (Asian Development Bank, 1999). Seeman and Talbot (1995) argue that most transfers have been of little benefit to the recipients. Often their culture and traditions are destroyed. Crossley (1992) and Walumbwa (1994) maintained that any benefits are derived through an analysis into the significance of the context at socio-political and institutional levels. As an example Marsden (n.d. 480) reflected that "[d]ecades or even centuries cannot be compressed into the couple of years it takes to build a plant and get it running" Many requirements

of technical and managerial expertise to maintain a plant in working condition are non-existent in the majority of the recipient country's citizens. The completion of the process is not possible until indigenous workers control the majority of the positions in management and workforce. (Siggel in Soelaiman, 1994). To this end, it is important that education orient itself towards the labour market.

The Asian Development Bank's (1999) assessment of PNG education indicated there was a high social demand, as opposed to labour demands, for technical education as an alternative to returning to the village even though the labour market remained stagnant. This becomes another way to continue with their education. The aim of education in both developing and developed countries is to produce graduates for labour markets (Sifuna, 1992). Unfortunately, in many developing countries the majority of these graduates do not find employment as industry does not have the positions available to absorb them. There have been many programmes (such as SSCEP, ESR, and Barrio high schools) providing reasons as to vocational education's success or failure. Todd (1985) argued that this accumulated knowledge allows questions to be asked as to the appropriateness of the transfer of programmes from developed to developing countries. Western vocational education has been developed "for a totally different cultural, economic and technological milieu" (Soelaiman, 1994 p. 134) than that found in a developing country. In a country such as PNG, where there is a large number of languages and cultures all in a very small country, the need is for a model that takes into account the mix of cultures. Raina (1999 p. 15) illustrates this point in a study of Indian teacher education, where it is argued that in a multicultural, multilingual situation, a standard pedagogy is unsatisfactory and that pedagogy "must be responsive to such socio-cultural pluralities."

The illustration of teachers in developing countries who operate in a formalistic teaching methodology is not suitable for contemporary students. Bude (1983) indicated that even newly trained teachers who were trained in the methods of a newly adopted concept revert to teaching formalistically due to the pressures of an examination-dominated system. The transfer of educational theories and practices from developed to developing countries is a complex process (Soelaiman, 1994). Developing and integrating these innovations is an expensive proposition, although costs to the recipient country are significantly reduced to less than half (Perrott in Soelaiman, 1994). The adaptation of these theories into a new culture has been tried by educationalists "who dealt with the curricular and organizational aspects, in situ" (Bude, 1983 p. 344) in an attempt to find a mutual dependence. During the 1930s, Clarke in Northern Nigeria and Mumford in Tanzania attempted integration of Western and traditional education. Clarke attempted to take "into account the local socio-economic conditions and the needs of the population", whilst Mumford sought to "integrate elements of tribal organization into schooling" (Bude, 1983 p. 344). Raina (1999 p. 15) noted that "there is an increasing realization now that family and community structures, traditional knowledge and ways of communication and discourse … have a critical role in the future of these societies." Soelaiman (1994) indicated that the similarities of cultures of Western Europe and the United States make transfers more readily accepted than to countries where cultures are vastly different. Crossley (9184 p. 76) said "contrasting cultural contexts impose major constraints upon the transfer" and that "the transfer process is acknowledged to embody certain undesirable characteristics in itself." Ignoring these factors appears to relegate transnational educational transfers to failure causing the demise of cultures. Teachers with higher order teaching skills and a more analytical outlook of innovation would be able to recognize the problems and be able to

correct them, whereas the formalistic teacher in a developing country would not necessarily be able to rectify problems, or have the capacity to identifying them.

Adopting innovative theories and practices without extensive investigation of the innovation and its inherent bias is fraught with dangers. Conditions in the recipient country may not be suitable because of the country's level of development, the quality of teaching staff and cultural differences. Teaching staff with a deep understanding of the innovation and an ability to be flexible in their teaching methodology are required for successful implementation of innovations.

Perceptions of the Major Users of Education

The two major users of education are students and employers. Parents have a vested interest in education for their children. The perceptions of each of these groups differ in a number of aspects. Employers use student results to make 'value judgements' of applicants and their suitability to fill vacancies. Students use the results of their education as an indicator to employers of their suitability to fill a vacancy after completing school. Parental concern for their children places them in a unique position, as their perceptions of the kind of education received by their children can have repercussions as to the acceptance of the kind of education given in schools. Parents also have a bearing upon when their child leaves school and the subjects studied.

Globalization has become an issue in recent years as travel, export of goods and services, and the transfer of knowledge and document times have been significantly reduced. Marginson (2000) has indicated that Australian providers of vocational education and training "will need to become more global, better networked and closer to

the technological edge in every industry" to be competitive. This means that schools, as Registered Training Organizations, will need to be more aware of the changes taking place globally in the world of work. Skills once deemed to be sufficient for teachers to pass on to students would need to be re-evaluated against the needs of employers. Research conducted by the Allen Consulting Group in 1999 (NCVER, 2000) indicates that employers are increasingly looking for employees who posses 'generic' or core skills. Students who apply for jobs are expected to have good levels of numeracy, language and people skills. These skills are required so the employee can be, as Marginson (2000) termed it, skill-reflective. Post-school training is increasingly being left to the employee to undertake on their own accord, and by being skill-reflective, they can make their own judgements about what is important knowledge.

The type and nature of work in today's global economy is changing significantly, even compared to a decade ago. Significant numbers of Australian workers are now casual or part-time and have been retrained in other careers (NCVER, 2000). The Commonwealth Department of Employment, Education, Training and Youth Affairs (2000 p. 1) indicated that as an instrument of employment vocational training had developed in "response to economic and social change to facilitate adaptation to the changing structure of activity and content of jobs." With rapid technological change and the competition of globalization schools need to be able to change to meet the demands placed upon them by industry. Power (1999) illustrated that diversified and well-educated workforces have an advantage over academically qualified graduates, as the former is much more productive at an earlier stage. Education that is general, but at the same time specific to the vocational subject gives a student an advantage. Subjects such as Trade and Business Mathematics and English Communications are examples.

Eighty percent of PNG's population live in rural areas where they are self-sufficient (Asian Development Bank, 1999). The innate intelligence and productivity of any people, even though they live in isolated, underdeveloped areas and have low literacy rates, is not challenged. Rather, they have a narrow, limited experience with education (Beeby, 1966). Oxtoby (1977 p. 230) said, "education … serves mainly to raise the aspirations to a level well beyond that which is capable of being satisfied." He further argued that the opportunities available do not match the aspirations of many graduates. Stagnant economies, such as PNG's, contribute to the lack of jobs available for graduates (Fluitman, 1999; Selvaratnam, 1988; Asian Development Bank, 1999) – whether they graduate from school, technical college or university.

Tololo recognized that parents would reject a reorientation from an academic to a relevant, community-oriented style of schooling for PNG (Crossley & Vulliamy, 1986). Educated people are expected to have well-paid jobs and so have personal status within their community. Any reorientation towards community education must take into account the local environment. With the majority of PNG citizens' being self-sufficient, education would be better served if it were reoriented towards the main activity of the population. The expectation that formal education is able to create jobs cannot be sustained given that it only supplies graduates and an increased demand for jobs comes from a growing industry sector. A reason for large numbers of students in schools is social demand (Asian Development Bank, 1999). As the educational requirements for a job increases so does society's demand for students' to stay in school longer and gain higher qualifications to become more marketable to employers (Dore, 1976). Indeed, in Queensland, Australia there is a significant push for a post secondary retention rate of 88 per cent (Queensland Board of Senior Secondary Schooling, 2000) to give students

better access to jobs and to increase the knowledge base of graduates. In developing countries, the influence to stay at school originated in the colonial period (Grubb, 1985) not because of a need for higher qualifications, but because education was seen to provide higher status.

PNG's reforms have extended the length of time students have available to remain at school and offer a greater chance at higher education to all. Foster (in Vulliamy, 1987) argued that socio-economic factors, and the attractiveness of an academic education, would not be changed by initiating changes to the curriculum. Parents and students believe that an academic education will improve job prospects, but Lewin (1985 p. 119) argued that expanding schooling is "unlikely to result in optimizing social benefits." Carnoy (1982) believed that governments expand education not for students, but rather, as a means of maintaining their hold on government because they give people greater access to schooling and thus maintain the social strata.

Published literature suggests that schooling and training may be expected to deliver jobs, increased wealth and social mobility (Matane, 1986; Lewin, 1985; Fluitman, 1999). Hindson (1985) indicated that in the country of Kiribati non-sanctioned church schools attracted significant numbers of students, although these schools did not have government recognition of awards. Hindson's illustration shows how parents attempt to increase their children's advancement in society even though there is no recognized qualification at the end, and government jobs most frequently available in Kiribati cannot be accessed using this qualification.

As far as employers are concerned, a limited number of positions are available and the applicant who provides them with the best results and performs well in an interview using the required generic skills will be employed. Parents and students use education as a means to improve their position in society and to provide a better quality of life. The kind of education that is perceived to be the best in developing countries is an academic type, as vocational education has the connotation of a rural and second-class education.

Economic Relevance

The greatest natural resource of any country is its people. Educated people can provide a country with the skills needed to become progressive and provide leadership in all aspects of micro and macro environments. These include the home, the community, politics, business and industry. Kupisiewicz (1979) opined that the world recognized education provides for economic, social and cultural progress. The argument is that globalization is destroying individual cultures and the 'Eurocentric' concept is impacting on other cultures to varying degrees (Sullivan, 1997).

Increasing educational standards (Dore, 1976) have been used as a panacea for economic problems faced by countries (Grubb, 1984; Akinpelu, 1984). Keeping students in school longer has been the reaction of governments (Lewin, 1985) to students become better educated and capable of filling jobs. Dore (1976 p. 144) argued that "early recruitment into work" allowed only a small percentage of 16-year-old graduates to find a job whilst increasing the time spent at school, either as post-compulsory, or by increasing the number of places available, delays the inevitable decision as to a future career, and increases educational qualifications of graduates.

Students may be more mature and have higher qualifications but they do not have experiences that allow them to make objective decisions about future career directions. Matane (1986) argued in the *Philosophy of Education for Papua New Guinea* that the number of subjects in the curriculum should be reduced, but studied in greater depth to increase knowledge.

Lillis and Hogan's (1983) research into vocational education and training indicated that it has a dysfunctional nature which may be the result of people making decisions which cause them to train for jobs that do not exist, or are not what the graduates expect. Economic and job increases in countries such as those in sub-Saharan Africa (World Bank, 1994) did not eventuate and a large pool of educated unemployed appeared (Lewin, 1985). Many of these graduates did not return to their villages after schooling preferring to remain in the urban areas in the hope of finding a job.

Vocational education in schools has difficulty in providing job training, job creation, and job improvement (Lillis and Hogan, 1983). Training influences job prospects of graduates but schools have difficulty attaining work related knowledge in the required area. The lack of resources and the rapidly changing conditions in the world of work (ibid; NCVER, 2000) are reasons cited. Education cannot create jobs although Lillis and Hogan (1983) indicated that non-formal education could possibly create jobs though only through a highly specific set of skills and a deep understanding of local conditions. Job improvement concerns the training given to raise the levels of available skills, but newly trained graduates are not in a position to exercise any power and are unable to create changes in the workplace. Students are given information that is supposed to allow them to function in the workforce but not how the workplace functions. Skills

learnt are for the job, not how to function within the structure of a workplace, or how to change attitudes and influence colleagues to take suggestions seriously It is argued that the conceptual difference lies in "education FOR work and education ABOUT work" (ibid p. 174-5).

One of the aims of vocational education programmes is to prepare students for the world of work. However, vocational education programmes tend to "fail to resolve the problems that they are designed to address, and generate new problems for educational systems" (Grubb, 1985). This is despite claims of economic relevance, linked to economic growth. Yet, if economic growth does not happen then the result is an over supply of educated people without the expected jobs.

Many vocational educational programmes have been devised and implemented to meet the needs of a country Although Lewis and Lewis (1985) indicated there were serious concerns as to whether vocational education lead to economic growth. Grubb (1984) explained that vocational programmes are seen to be more akin to economic growth than academic education. This may be evidenced by Australia's use of vocational education and training (VET). Australia is attempting to use VET as a means to improve its economic position and to be ready to make the best of economic opportunities (Keating, 1998). The manufacture, or production, of a tangible product can be sold more readily than a service to a developing country. Grubb (1985) argues that vocational programmes tended to be ineffective because of their status, the perception of a lack of social mobility, and the way some students use it as an alternative pathway to higher education. Vocational education in Africa, he argued, changed little from colonial times. Bude (1983) describes the attitude of Black Africa during the 1920s when education

attempted to provide a more rural orientation and its rejection by Africans because it was seen as tying them to the land. Grubb (1985) indicated that vocational education should be explained in terms other than economic effectiveness and that there are social benefits.

Vocational education's ineffectiveness in promoting growth, combined with economic deterioration during the 1980s led The World Bank to reduce funding for education (World Bank, 1994). The reduction was noticed especially in Sub-Saharan Africa, although Papua New Guinea was not immune to cutbacks (Crossley, 1990). Crossley (ibid) indicated that academic education and vocational education are unable to provide solutions to non-educational problems. Education can, however, place a country in a position to take advantage of an economic upturn. Cutting back on vocational education reduces the ability of a country to these fill positions. The provision of jobs is economic, and the ability of education to respond to fluctuations of the job market can be slow because of the time it takes to adequately train people.

Educational planning needs to have in-built flexibility to allow for economic changes within the country, and increasingly, globally. This becomes more important in developed countries where the rate of technological progress is rapid. Educational structure and content adopted by a given country needs serious consideration. Their economy should be able to sustain levels of funding appropriate to the quality of its institutions and graduates. Selection of students to study for progression to higher education, a trade, or agricultural life may reduce the costs of education in developing countries. It could reduce the number of unemployed youth, as they would be educated in the value of the work they will be undertaking after school. Psacharopoulos (1985)

indicated that diversified curricula is difficult to implement for a number of reasons: it is expensive; there is no evidence of monetary benefits over 'conventional' schools; problems of policy rationales concerning 'better fit' of graduates to jobs; a reduction of the desire to continue with higher education and that students do not necessarily study their high school specialization at university. Psacharopoulos therefore argued that whilst diversified education has its place, it appears that developed countries are better able to afford it. Diversification is used as a legitimate pathway to upward mobility (Psacharopoulos, 1985) but in a developing country, manpower needs in industry are left unfulfilled.

Upward mobility in developing countries with stagnant economies is difficult to achieve for the majority of students (Asian Development Bank, 1999) as there are no jobs to fill. Papua New Guinea with its large subsistence economy (Richardson, 1994; Asian Development Bank, 1999), must prepare its people for life in the community of their choice in order for them to make a living. In a number of developing countries, most notably in Africa, education has caused a drift of the educated youth to the urban centres. Papua New Guinea is experiencing this phenomenon at an increasing rate. The strain placed upon facilities in these centres then leads to lower standards of living, the overtaxing of utilities (Akinpelu, 1984), and as evidenced in PNG, a deterioration of law and order. Another hidden effect of urban migration is a reduction in food production (ibid). Urban communities have a limited capacity to support people. Vocational education needs to make the benefits of an agrarian lifestyle more feasible and agreeable to graduates.

It has been argued that education should relate to the development capacity of the country and the immediate needs of its people (Walumbwa, 1999). The Phelps-Stokes Report into African education in the 1920s advocated this and suggested a ruralization of the curriculum (Bude, 1983). Ruralization has been attempted in many other settings since. A further method, advocated by some educationalists, is setting up small artisan workshops and factories using simple technologies (Illich, 1971). The Asian Development Bank (1999) indicated that graduates of technical institutions in Pakistan, PNG and Sri Lanka were prepared to seek out jobs, but did not feel adequately prepared for self-employment. The Asian Development Bank indicates that this is because the present curriculum is aimed at providing training for employment, not towards enterprise and entrepreneurship. In the age of globalization one of the major requirements for progress is the ability to change rapidly to suit new challenges and environments. Grubb (1984) indicated that new technologies are the generators of economic and social progress. The United States is a major user of advanced technology and a major force in the production and development of new technologies. Its ability to change to suit the new order keeps it at the forefront of world economies.

Australian industry and education is evolving to be more competitive in the global economy and changing industry environments. Vocational education and training (VET) has become a major element of senior schooling in Australia during the 1990s, and its importance in providing qualifications for post-compulsory education is gathering support from government, industry and students (Keating, 1998). Changes such as VET in schools, New Apprenticeships, traineeships, private registered training organizations and a standardized framework are providing students with more flexible ways to seek and use training for jobs. Employers can now employ graduates who

possess required skills more quickly than in the past when all training was given after schooling. This type of vocational education is appropriate for a country with a substantial degree of technology. Being able to keep pace with technology and flexibility with the delivery of programmes is a necessary requirement. However, where a country is unable to maintain its existing training institutions, it is impossible to keep pace. The Asian Development Bank (1999) research compared the physical facilities of training institutions in Pakistan, PNG and Sri Lanka of the 1980s with the late 1990s and found that teachers generally believe that there had been a deterioration during that time. The Asian Development Bank provided substantial funding for technical institutions during the 1980s and the economic benefits were seen for a few years after the project's completion, but the failure of governments to adequately continue the funding has eroded any gains.

A stagnant economy will not generate jobs from which from schools or technical institution graduates expect to fill. There is a need is to "stimulate socio-political awareness and self-confidence in rural peasantry" (Akinpelu, 1984 p. 320). For this to happen, education needs to educate for the national, or collective benefit, rather than for the individual (Lewin, 1985). The expansion of an educational system does not solve broader social and economic problems (Crossley, 1990; Grubb, 1985). It is merely easier to expand education than solve the problem (Dore, 1976). Creative and innovative entrepreneurship is required to expand individual businesses. Papua New Guinea must develop students' creativity and innovation during their school years. As an example of innovative business acumen, Dore (1976 p. 95) stated, "Hong Kong does have an unusually high quotient of clever, innovating businessmen who are capable of expanding tiny workshops into larger, wage-employing viable firms". It is further

argued that schooling in developing countries is less effective because there is a tendency to develop the 'memory muscle' rather than developing attitudes to "find intrinsic satisfaction in creative mental activity" (Dore, 1976 p. 95). Schools tend to prepare students for particular models such as the labour market, citizenship and the replication of the class pattern (Grubb, 1984).

Citizens of developing countries have rejected programmes in vocational education because they are seen as having a hidden agenda. Walumbwa (1999) indicated that citizens should have an education by studying what they are most likely to do after school through a needs assessment. In the case of PNG, where there is 80 per cent of the population are subsistence farmers, the need is to develop a system that accommodates both the graduate who will go on the become a wage or salary earner and those who return to the land. The economies of providing an academic education for paid employment without an alternative for self-employment/reliance places a strain on the urban areas where the jobs are situated. Australian Education Council (1994 p. 3) explained that "if systems are to change significantly in effective ways, all need to be aware of the overall strategy, the general direction of change and the objectives being pursued, as well as the opportunities and benefits likely to stem from achieving them"

Evolution of Development

All people, cultures and countries go through change. Changes promote efficiencies in manufacturing processes, better health and living standards and the expansion of the economy amongst others. Every country is unique in the way it develops, but as Todd (1985 p. 19) said, there are "some common phases of development."

Historically the most technologically advanced country holds hegemonic power at a particular time. Examples of this include the Greeks, the Romans, Britain and more recently the United States of America (USA). Corvalan (1988) said that Europe held the hegemonic international power until the end of World War II when it was transferred to the USA. With the increase in research in the 1960s and 70s, many education theories emanating from the USA were transferred to other countries.

Papua New Guinea is a complex country to position in the level of technological development using Todd's (1985) levels of technological development (indigenous, emerging, developing, industrialized and cybernetic). Most of PNG would be at an emerging level because the majority of its inhabitants live in conditions similar to early societies. Yet, technology has come at an extremely rapid rate for the highland provinces. In 1931, when the Leahy brothers explored the highlands, stone axes were still used, but now steel axes and chainsaws have replaced the stone axe. Communication, transport, education and electricity are some of the multitude of changes seen by the highlanders. However, access to many of these changes is usually limited to the larger towns and cities. The contrast between 1931 and today is immense.

Education suffers as urban schools have more facilities and resources than rural schools. Before the introduction of formal education knowledge was disseminated through non-formal means where the young learnt from storytelling and other methods thus passing down knowledge, customs and traditions. It was not until the late 1960s when independence started to become a reality that the indigenous people were required to assume full decision making responsibility and formal education systems were expanded.

A country must go "through a cumulative process of technological evolution" (Pytlik in Todd, 1985) which means that there is a progression and accumulation of knowledge and development in technology, how it is used, and a pool of people capable of using the technology. ITEA (1996 p. 25) stated "[i]t is important that the nature and evolution of technology be included in the cognitive basis of the study of technology" and all students should be exposed to some form of technology.

The essence of development is to attain some form of infrastructure at one level before moving to the next. Consequently there is often an overlap between levels and movement up and down. This may be occurring at the same time for two different levels and in the same workplace.

Unemployment and Urban Drift

Unemployment and idleness amongst society's youth has been a contentious issue for over 150 years. Dore (1976) indicated that in 1852 a colonial leader, referred to the half-educated youth who contemptuously looked back upon their birthplace and created nuisances of themselves by not wanting to return to their birthplaces and assume the village lifestyle. Instead, the prospect of a job, money and urban lifestyles lured them to the towns and cities.

In Britain, the Industrial Revolution changed the social structure. Children and youth came less and less under immediate parental control when mass public education began. Schooling was clearly an attempt to reduce the problems created by idle children and youth. Similarly, previous non-formal education began to be replaced with formal education.

Power (1999) indicated that educational programmes and activities should provide students with skills for employment including self-employment and entrepreneurship. In many developing countries there are limited opportunities to develop skills required for self-employment and entrepreneurship. It has been noted that schooling in these countries is aimed at formalistic, syllabus directed, examination driven education where creative problem solving is almost non-existent. Without small enterprises to absorb graduates, large numbers become unemployed and migrate to urban areas rather than return to their villages. Consequently, and towns and cities become overpopulated. Selvaratnam (1988) noted that there are numerous regional and country studies that highlight unemployment in Africa, Asia, the Pacific region, Latin America and the Caribbean. Former colonies adopted an educational dependence upon Western intellectual models in their outlook, attitudes and philosophy (Raina, 1999). Developing countries who adopt these create problems when their capability to afford graduates, who for the most part, are over qualified for their jobs is diminished (Barber, 1981; see Dore, 1976 for examples). Furthermore, Barber claims they are more likely to be better citizens. The serious law and order problems in PNG may not give much credence to this claim as youth gravitate to urban areas in search of non-existent jobs, have little money and are unproductive.

Human resource wastage is a potent threat to political, social and economic order in developing countries (Selvaratnam, 1988) brought about by over-education (Irizarry, 1980). Irizarry (1980 p. 342) characterizes over-education as a "surplus of educated labor in relation to employment opportunities and a high degree of underutilization of the employed educated groups". The International Labour Office and World Bank studies indicate that these phenomena are brought on by "demographic factors,

imperfections in the labor markets, misguided public policies for education and employment, and institutional deficiencies of the education system" (Irizarry, 1980 p. 342). These phenomena are still evident today when governments such as PNG's expand the educational system yet parents and students shun vocational education in favour of an academic education. The paradox is that in developing countries expatriates fill many managerial and technical positions in private industry, with the majority of the indigenous workers doing the manual work.

Most developing countries have a large unorganized agrarian sector, and a limited industrial base to absorb the products of a vocationally oriented education (Selvaratnam, 1988). Oxtoby (1977) said "the neglect of out-of-school training" in agriculture is a "most serious shortcoming" with which unemployment in the Caribbean could have been alleviated. Oxtoby (1977 p. 238) indicated that "formal education in developing countries ... makes school leavers unemployable because of unrealistic expectations on behalf of the graduates and provision of the wrong skills and ... inappropriate attitudes". vocational education where the curricula is "rooted in the practicalities of work is the solution" (ibid).

Curriculum policies drive the direction of education either as academic or vocational. Policies in PNG tend to be academically oriented. Bray's (1985) discussion of political decentralization in PNG indicated that the introduction of provincial governments influenced the selection of the urban minority over the rural majority for places in high schools. Irizarry (1980 p. 343) claimed "curriculum policies ... contribute to oversupplies of educated manpower" by preparing students for urban lifestyles and occupations which "promotes rural-urban migration." Other social and economic factors

for migration include those identified by Isos (1977) where in Panama there was an inadequate structure of land tenure, ineffective equality in education, and poor government services. The factors identified have a strong resemblance to those encountered in PNG.

Raina (1999) identified the issues of family and community structures, traditional knowledge and communication to preserve Indian culture. Raina argued that an indigenization of the curricula is needed, and a critical look at the Western paradigm and its applicability to the situation undertaken, because of the importance of indigenous knowledge for development. It is argued that Western education provides irrelevant content and ignores the rich knowledge of the country that has contributed to its development until the introduction of Western education.

Unemployment is a legacy of an education irrelevant to the needs of the majority of people in developing countries. School graduates are forced to migrate to areas where their education can be utilized.

Education Reform/Deschool

In the early1950s Papua New Guinea mandated universal education for all primary school age children in the past (Derrick, 1952) and from 1994, it has been reactivated in conjunction with the expansion of secondary education. Carnoy (1982 p. 162) explained that governments believe that "through education expansion, improvement and some social/economic reforms, such as progressive taxes, the worst of society's social and economic ills can be cured". Carnoy proposed a second analysis (of a capitalist society with its class distinctions) where a change to the overall structure of society is required.

The current changes to the political and educational hegemony do nothing to change the basic structure. The present system in PNG continues to create and perpetuate a class system with the elite coming from those who can afford an education.

Progressive taxation of a citizenship, where earnings are very little, does not help to raise the revenue required for expansion of the system. Expansion of the system may not be the solution, but rather dissolution of the system replaced with a non-formal system is appropriate for developing countries. The traditional method of non-formal education is a powerful and tried means of spreading knowledge. Non-formal systems have been a part of cultures for as long as humans have been in existence. Indeed, in a country such as PNG formal education is a recent innovation. Illich and Freire were staunch advocates of 'deschooling' during the 1970s and 80s advocating that trained individuals be encouraged to offer courses for interested people (Illich, 1971). Hall (2000) indicates that small specialized groups of businesses and industries, in Sydney Australia, have banded together to provide training to their employees because formal education did not provide a suitable course. The implication is that formal institutions can not provide all of the required training experiences Therefore, if post-school institutions are unable to provide the services, what hope do schools have. Another facet of compulsory schooling and its implications for employers is that academic graduates require training before being able to move into the workplace (Kupisiewicz, 1979).

In Cuba a programme was instigated to take schools to the countryside. Participants were taught to value manual work and that "work ... is not to be chosen for its extrinsic characteristics ... choice should spring from the intrinsic interest of the work itself" (Dore, 1976 p. 109) It was expected that by developing an intrinsic value in people they

would stay on the land and produce foodstuffs for the urban areas, thereby maintaining a balanced economy. Respect for the land and its value were part of the objectives. Likewise, objectives of "equality and respect for human dignity; sharing of the resources ... work by everyone and exploitation by none" (Dore, 1976, 113) were part of the Tanzanian ESR programme.

Seeman and Talbot (1995) devised principles for Australian Aboriginal education, in the Northern Territory, where students worked on projects that are 'community driven'. The integration of technologies, materials and cultural knowledge are used to support the community and culture. The programme's design gives students skills in identification, prevention and solutions to community problems in order to support their chosen lifestyle. This type of education preserves the cultural aspects of community life, because traditional communities have developed a relationship with the environment and often de-emphasized in Western education. The Papua New Guinean society and economy requires education in the non-formal sector to provide the skill for livelihood because of limited formal sector jobs (Asian Development Bank, 1999).

Issues associated with formal education in developing and developed countries revolve around the amount and type of development, and the capacity of industry's to absorb the graduates. Reforming the system in favour of expansion has merit. In Australia, VET reform was instigated because of high levels of youth unemployment and an increasing national debt (Keating, 1998). The provision of non-formal education where individuals provide services to a clientele who have specific training requirements may have a positive effect by providing users of the system with a clear idea of their aims and goals. The best proposition appears to be that which takes into account the development

requirements or needs of the country. Non-formal education methods could be adapted into current pedagogy to promote a system similar to the past. It could be valuable to mix the two into a system where participants are comfortable with the delivery and accept validity of the content.

Education for Employment

Education is supposed to allow school graduates to become employable or self-employed so they can earn a wage or salary to maintain or improve their lifestyle. In many developing countries, parents of the graduates are poor and expect their children to be more socially mobile than they are.

Competition for jobs has caused what Dore (1976) named the 'Diploma Disease'. His hypothesis was that as jobs become scarce students stay at school longer to obtain higher qualifications, supposedly to give them a greater chance of success (Vulliamy, 1988). An example from Dore occurred in India where the 'authentic' university educated bus conductor could be found. Lauglo and Narman (1987) argued that the credentials of graduates are weakened during a time of job scarcity and that personal contacts become important in obtaining a job. The clan system becomes an obvious and strong influence in this scenario. In developed countries, the student with the best qualification, or preparation, has a greater chance of obtaining a job than that of a less prepared graduate (Grubb, 1984). In Australia, governments have realized the importance of a well-trained, highly qualified workforce and are encouraging students to stay at school. Secondary school students who are disadvantaged, or would normally leave school early are being given greater access and equality through VET programmes (Keating, 1998).

Schools prepare students for jobs, which according to Grubb (1985 p. 538) is "training for unemployment" and as Spender (2000 p. 14) indicated schools should "think less about fitting into employment – and more about employability" as many of the jobs in the future have not been 'invented' yet (Spender, 2000; Ellyard, 1998). Corvalan (1988 p. 87) argued that education "did not allow them to secure better jobs or a vertical positive occupational mobility" which is Carnoy's (1982) maintenance of the class structure. A factor that may explain high unemployment is that graduates prefer unemployment to an inferior job and thus remain unemployed for years (Pytlik, 1983).

Education systems in developing countries are more prone to using examination results to determine student progress. Subsequently, large numbers of graduates with high qualifications means employers can chose the highest qualified applicant (Dore, 1976). Dore named this phenomenon "The Late-Development Effect." which has an expectation that the higher the qualifications, the faster development will be for the country. Primary education can be beneficial for agricultural development, for as Barber (1981 p. 224) indicated "a literate peasantry ... is a prerequisite to the adoption of a more productive agricultural technology and of a more prosperous rural society". Productivity then increases. People learn to learn through schooling making it easier for them to accept and adopt change (ibid). Burns (1986) indicated that employers in America require high school graduates to have a sound basic education that allows them to adapt quickly to change, analyze and solve problems logically, understand change and seamlessly incorporate these changes. Change is expected to be rapid. Burns' interpretation of employer demands corresponds with research from the NCVER (2000) where changes in the modern workplace require workers to be adaptable and often multi-skilled.

Oxtoby (1977) indicated that almost 25 per cent of vocational graduates do not work in the areas in which they studied. VET courses in Australia suffer similar problems as many of the graduates pursue higher education after completing a vocational course. Polesel, Teese and O'Brien (2000) in a tracer study of the 1997 Victorian VET graduates, found that two years after graduation, 19.3 per cent were studying at university. A further 21.7 per cent were studying at Technical and Further Education (TAFE) institutions where theoretical elements of apprenticeships are studied. This is consistent with other research, from developing countries where vocational education is a second pathway to higher education.

Vocational education lacks status and future earning potential for academic graduates (Psacharopoulos, 1987), but Barber (1981) indicated that if there was satisfactory income from farming, there is a greater likelihood of people remaining on the land. The exception to this is an education designed, or perceived to be, for the maintenance of a class system (ibid). Deforge (1979 p. 20) argued that education should "intersect professional and life situations, and that are at a certain level of generality the types of knowledge and behaviours are common to all situations." Deforge maintained that commonalities should be taught, even though none may be readily apparent. Graduates require attitudes, communication and numeracy skills as well as the work ethics common in all facets of their work.

Chapter 5

Vocational Education

What Constitutes Vocational Education?

Vocational education subjects prepare for careers in trades, domestic tasks, commercial enterprises, hospitality, agriculture and other areas. Australia's post-compulsory VET schooling identified industry standard content for students undertake as an introduction to future careers. Vocational education teaches student's useful skills and attitudes for employment and manual labour (Selvaratnam, 1988).

In developing countries vocational education at elementary levels has often meant a rural curriculum orientation (Psacharopoulos, 1987) and led to schools using gardens to teach agriculture and to supply school's with fresh vegetables - an education with production (ibid). Secondary education introduced students to industrial subjects for possible future employment, or as an introduction to a hobby (Scobey, 1968). Olsen, Wilber, Gerbracht and Robinson (in Scobey, 1968) defined industrial arts as man using materials and tools to shape their environment and to change raw materials into useable items.

Technology Education

Technology education has grown out of British Craft Design and Technology as a response to a number of influences. The British Labour Party promoted changes to technical education in the 1960s as a means of improving Britain's position as an industrial leader (McCullock, Jenkins & Layton, 1985). Earlier, the Crowther Committee recommended that students "discover how things work, and ... acquire

considerable theoretical knowledge" in doing so (Bierhoff and Prais, 1993). Traditional industrial arts courses were designed for when students left school at the minimum school leaving age, or upon the completion of Grade Ten. Technology education has introduced 'intellectual elements' for students to match the Crowther Committee's recommendations.

Prominent philosophers wrote about and influenced the thoughts of technology educators since the Sixteenth Century. John Dewey's influence on Twentieth Century education has initiated major changes during this century, as he believed that manual training should supplement the learning of established subjects. Technology education involves integrated practical and academic content for students to understand the application of academic content in solving problems, and as part of manufacturing processes.

The development of technology education from an industrial arts curriculum attempted to eliminate any hint of vocationalism (Bierhoff and Prais, 1993), and rather than use products to teach skills, it uses the "technological method" of "human needs and wants to present problems and opportunities" as learning experiences (Lewis, 1995 p. 623). Students are given broad parameters from which they develop a solution to the problem (Bierhoff and Prais, 1993). Importantly opportunities are created for "inventive imaginative creative work" (Kimbell, 1982 p. 41). Students need to be technologically literate to be able to "use, manage and understand technology" (Technology for All Americans, 1996 p. 6) which includes generating "knowledge and processes to develop systems that solve problems and extend human capabilities" (Drugger and Satchwell, 1996 p. 14).

As with academic subjects, there is a lot of paperwork involved in technology education as students are expected to document all processes of the solution. Folios are the main method of documentation of the design, make, and appraise aspect of the subject. Student research is then linked to the intellectualization and legitimization of technology education to improve its status (Bierhoff and Prais, 1993). Although the teachers of technology education are trying to improve the subject's status, Lewis (1995) indicated that it remains at the margin of American curriculum, and in Britain, students are not given the opportunity to "develop their practical skills to high levels" (Bierhoff and Prais, 1993 p. 238).

Developing a suitable mix of practical skills and the application of these skills is needed in developed countries in order to fulfill the requirements of employers (Marginson, 2000). Bierhoff and Prais (1993 p. 219) indicated that "British school-leavers ... [should] be educated to high standards in vocationally relevant subjects" so employers are able to use graduates skills immediately. Developing countries often follow developed countries in educational innovations (Todd, 1985), although there are major differences between the two. Developed countries can be classified as producers and users of technology as there is a close and well-developed interrelationship between the two (Marsden, n.d.). Education supplies trained workers who can maintain and expand production industries. More technical fields have also started to be included in some schools. Some examples include mechanics, pneumatics, hydraulics and electronics (Todd, 1985).

Consequences of Technical and Vocational Education

De Vore (in Lewis, 1995) posed the following benefits of technical education:

- Provision of a better base from which to implement purposes and objectives of general education;

- It's not limited or isolated by geographic boundaries, thereby evidencing the true nature of disciplined inquiry;

- It's concerned with man, regardless of national origin, as the creator of technology;

- Provides a meaningful relationship between technology and man's culture; and

- Identifies a knowledge base meeting the criteria of a discipline in the truest sense of the term.

Recognition as a discipline would mean that technology education could break from the perception of a second-class education to become a recognized and valid pathway to higher education. Lauglo (1983 p. 287) identified a discipline as "providing a common framework of ideas, it facilitates the construction of new coherent structure of understanding, and has the power to lead to further understanding". Design and technology education attempts to develop "practical manipulative skills" through "concepts of design, production and problem-solving skills within a practical environment" (Gibson, 1996 p. 6) for understanding. British curriculum emphasizes students using "imaginative design and problem-solving capabilities" (Bierhoff and Prais, 1993) through an interdisciplinary approach. Student learning involves active use of all disciplines as vehicles for knowledge and understanding. Unfortunately, Bierhoff and Prais (1993) noted that instead of gaining the interest of students' technology education has tended to de-motivate students, in the 14 to 16 year age group. During this time students are not given any career specific education (ibid).

By not being career specific, coupled with the lack of hand and tool training and a focus on academic subjects, students who have lower achievement levels tend to be disadvantaged and de-motivated to study design and technology (Bierhoff and Prais, 1993). Considering the introduction of technology education was supposed to extend student capabilities and experiences (Kimbell, 1982), its failure to accommodate less able students may necessitate a return to a more vocational orientation. This would mean that the physical and emotional development aim of industrial arts would be catered for and that practical skills give students "an essential foundation for understanding and efficient working of modern automated machinery which also promotes "motivation ... general learning skills and good work habits" (Bierhoff and Prais, 1993). Bierhoff and Prais criticized the 'intellectualization' of vocational education because it does not achieve specified aims thus students are actually prevented from learning and acquiring the skills they need for their chosen career.

The Benefits of Vocational Education

Vocational education benefits students in a tangible way. Students use knowledge gained to make judgements about a range of issues when applying that knowledge. As Kimbell (1982 p. 47) stated reasoning and judgement "is regarded as one of the foremost intellectual skills." As consumers, being able to make accurate assessments about the suitability of products leads to better economic choices for individuals (Lewis, 1995). There is also an element of appreciation of quality, aesthetics, creativity and the impact on the environment.

Apart from students becoming more discerning consumers information about industry, workers and the opportunities offered by industry are distributed (Lewis, 1995). Knowledge gained about industry can be converted to an appropriate choice of career. As indicated, Australian VET students have the opportunity to experience the world of work whilst still at school and the opportunity to complete their Grade Twelve Certificate. The World Bank (in Pytlik, 1983) advocated that technical and vocational schools should give students skills capable of being used in a variety of situations including preparation for on-the-job training and apprenticeships.

Governments of developing countries need to realize that graduates may not gain a job if there is no industrial infrastructure. Ishumi (1988) and Vulliamy (1987) maintained that students returning to their village lacked skills and that some parents did realize that agricultural, business and practical skills should be taught (Vulliamy, 1987). Fifty per cent of graduates from PNG's "technical, vocational and academic schools ... intend to pursue further studies", and a further 40 per cent indicated their intention to actively seek employment (Asian Development Bank, 1999 p. iv-v). Industry's ability to absorb this number of graduates, given the stagnant economy, seems improbable. Industrialized countries can more realistically justify a higher technical content in their vocational education because of the size of their industrial infrastructure and their stronger economies.

Vocational Programmes in Developing Countries

Developing countries have instigated many programmes in an effort to give their people some vocational education. Some of the countries and their programmes include:

- Africa – The Phelps-Stokes Report of the 1920s

- The Philippines – Barrios High Schools (Orata, 1977);

- Cuba - Schools to the Countryside (Corvalan, 1988);

- Tanzania – Education for Self-Reliance, Vlaardingerbroek, 1994);

- Panama – Production Schools (Isos, 1977);

- Papua New Guinea - Secondary Schools Community Extension Project (Vulliamy 1980, 1983, 1987, Crossley and Vulliamy, 1986, Cummings, 1982)

- Nigeria – (Akinpelu, 1984);

- Botswana – Swaneng Hill School (Ishumi, 1988; Akinpelu, 1984);

- Kenya – Village Polytechnics (Akinpelu,1984); and

- Tanzania – Folk Development (Akinpelu, 1984).

These programmes were both formal and informal in nature and most were designed with an agricultural orientation. This indicates that past governments in these countries have realized the need to give their citizens an education they will find useful when returning to the village.

When developing programmes it is crucial not to overwhelm the school with too great a change, resource availability, and that objectives are attainable. Papua New Guinea's SSCEP initiatives of in-service and central headquarter's help was designed to reduce the problems of implementation. Money was a relatively insignificant problem as there were only a limited number of schools participating. A problem with an innovation of this kind is that "what can be achieved in a limited number of schools over a decade or so … is not necessarily indicative of what can be achieved on a large scale in a national

system" (Lauglo and Narman, 1987). This is borne out by the failure of SSCEP to expand. Provincial governments would not accept the financial responsibilities associated with SSCEP for full implementation (Vlaardingerbroek, 1994). Vulliamy (1987) indicated that other similar educational innovations have suffered from either parental and student perceptions of courses as second-rate alternatives, or they became more academically oriented. Additionally, manual work lacks the status of professions and that returns, in financial terms, are less.

Past attempts to vocationalize education have been through agriculture and non-formal education. Unfortunately, they have been perceived as a second-rate alternative in what Foster called the 'vocational school fallacy' (Vulliamy, 1987). Changing school curriculum into an academic type is not always appropriate for developing countries (Marsden, n.d.), although the expertise required to manage either vocational or academic education remains the same (Heyneman, 1985).

Reasons for the Failure of Vocational Education

Some vocational education programmes have failed to maintain the standards set during the implementation stages, or were changed to include greater academic content. Parental and student attitudes influenced the outcomes of the programme as does funding. There are a number of other issues that vocational education in developing countries itself has to accept as reasons for failure. The complexities in design of programmes often began outside the initiating country. Issues of inappropriate curriculum, equipment and technology, the rate of change in education and structural changes in the workforce are important to consider.

A recurrent theme throughout literature reviewed concerning vocational education is the attitudes of parents and students and the status and opportunities offered to graduates. Ishumi (1988), Psacharopoulos (1989), Vulliamy (1983) and Urevbu (1984) indicated that parents and students believed that vocational education was second-rate because it involved agriculture or manual work. Such skills could be construed as an attempt to keep people on the land (as perceived in Africa), or as a production activity to supply the school with its food needs. Ishumi (1988) said that the balance towards production "implies a deficiency (sooner or later) of the intellectual-educational component of achievement".

Returning to an academic style of education can be traced to issues involving curriculum and performance criteria. Vocational education curriculum issues revolve around the "clarity of aims and objectives … [and] the pedagogy tend to be academic and inflexible and incapable of change to suit local conditions" (Lillis and Hogan, 1983 p. 96). Vocational education's attempt to broaden its focus to be more 'general' has not succeeded because there has not been any clear definition of what general vocational education is (Grubb, 1984). The focus of vocational education is to train students to enter the workforce has had a tendency to be narrow (ibid) and not really fulfilling the balance of general or vocational education (Ishumi, 1988).

The ability of teachers to implement new curriculum was also identified by the Asian Centre of Educational Innovation for Development (Pytlik, 1983). Teaching techniques do not adequately allow teachers to use strategies suitable for their clientele. Raina (1999) indicated that there is no single pedagogy for countries where there are numerous variations in the population. A reversion to formalistic teaching methods is

common (Beeby, 1966). Problems associated with curriculum changes are exacerbated by lack of resources, physical facilities and equipment (Pytlik, 1983; Lewin, 1985).

Finding suitably qualified and experienced indigenous teachers capable of using modern equipment was often difficult for developing countries (Dore, 1976) and because of this poorly qualified people were recruited to teach in schools (Sifuna, 1993). These people often lacked basic pedagogical and communication skills and came from the exact occupations that students were attempting to avoid (ibid). Innovations require teachers to use teaching methods that do not always match the objectives of the programme (ibid; Lillis & Hogan, 1983). Teachers within the ranks of vocational education have had limited opportunity for promotion, because, as Lillis and Hogan (1983) indicated promotion is based on academic criteria, which many vocational educators are unable to satisfy.

The use of artisans in education as advocated by Whawo (1993) brings with it problems such as upgrading the artisans educational qualifications, their school activities experience, and loss of earnings. Non-professionals earn less than professionals (Asian Development Bank, 1999) and retraining as a teacher means a loss of income. The ability of these people (many of whom are mature age and have families) to finance further education maybe a reason for the difficulty of recruitment of suitably qualified and experienced people. This gives a high cost – low return rate for educational institutions. Costing of vocational education varies, but the common finding is that vocational education is more expensive (Castro, 1987; Psacharopoulos, 1987; Lauglo, 1983, Lauglo and Narman, 1987) and that "the social costs … may not match the social benefits" (Psacharopoulos, 1989) or economic benefits (Grubb, 1985).

Vocational Education Status

Vulliamy (1983) Lauglo and Narman (1987) indicated that the status of vocational education could be improved given the appropriateness of the programme. In PNG some SSCEP teachers stressed that SSCEP had raised the status of agriculture and opened up promotional opportunities (Vulliamy, 1983). Kenyan attitudes to industrial education (IE) were quite high and the subject was seen as worthwhile and examinable. Its status was also quite high amongst parents (Lauglo & Narman, 1987). In these two instances vocational education gain acceptance and status and promotes success. Lauglo and Narman (in Sifuna, 1992) also noted that IE students have an edge in the labour market, although Lauglo (1983) it was not usually taken seriously by clients or employers. Vocational education is not seen as terminal anymore and further study is expected of employees with life-long learning encouraged by many employers, industries and governments (NCVER, 2000; Commonwealth Department of Employment, Education, Training and Youth Affairs, 1997). Lauglo and Narman (1987) indicated that post-school opportunities would determine the success of increasing status. Students will always try to find ways into higher education (Psacharopoulos, 1991; Lauglo and Narman, 1987), and by diminishing the educationally terminal perception more students will study vocational subjects.

The goals and objectives of vocational education in the past were not clear (Pytlik, 1983) and schools were not equipped for "entry-level vocational training ... because ... their institutional tradition and protectionism ... organized to resist change" (Ishumi, 1988 p. 163). VET in Australian schools requires provision for courses that are of relevant industry standard, but may find it difficult to provide all of the requirements

because of the lack of funding to purchase industry standard equipment. Other training organizations, such as TAFE, can provide these, although schools do have their place by providing entry-level courses and qualifications. With industry leading innovations, employers will take vocational education seriously, and schools will provide graduates with the necessary skills. This may be comparable to an academic education (Psacharopoulos, 1987) although the cost will remain high.

Vocational Education in Schools (Australia)

Australian vocational education in schools has undergone reform in the last decade. Prior to the late 1980s all states and territories had some technical schools with historic links to apprenticeships (Keating, 1998). Apprenticeship numbers declined between 1975 and 1997 (Australian Centre for Vocational Research in Keating, 1998), and high school retention rates for post-compulsory education increased. There has been a drop in the employment numbers in the labour force since 1980 (Australian Bureau of Statistics in Keating, 1998). Serious structural problems became evident in the Australian economy by the 1970s related to the loss of international competitiveness, vulnerability of export markets to demand and pricing, and the decline of the manufacturing industries (Keating, 1998).

The Commonwealth Government adopted policies to increase high school retention rates and expanded the higher education sectors when research showed that graduates with poor results were not succeeding in the labour market. Giving these students better access to vocational education programmes at school, redesigning the way apprenticeships were structured, and introducing traineeships, allowed the government to improve Australian industry. New programmes were expected to make the response

time to economic changes much quicker (Keating, 1998). Students can be employed as apprentices or trainees whilst still attending school and work placements are negotiated between the participants (Commonwealth Department of Employment, Education, Training and Youth Affairs, 1997). Schools, TAFE and other training organizations are contracted to supply skills, knowledge and attitudes off-the-job. At the conclusion of Grade 12, participants graduate with a Grade 12 Certificate and a certificate in their vocational education specialty. In certain cases, the whole qualification can be studied at school. All qualifications are recognized nationally, transferable, and of an industry standard.

The industries involved in the scheme are the leaders of the programme and they have set minimum competency standards. For VET to succeed, industries need to be dynamic and capable of accepting change. At present, there are nationally accredited training packages ranging from the traditional metal and wood trades to more recent growth industries such as hospitality and tourism.

Chapter 6
PNG Vocational Education

Introduction

Papua New Guinea introduced a major innovative project in vocational education that ran from 1978 through to the mid-1980s. The project was an attempt to maintain the academic standards of its graduates for access to higher levels of education, or become self-sufficient. Educational issues were not the only ones that students had to contend with. Traditions and culture form a large part of the fabric of village society and may be impediments to a student's productive future in the village, as values learnt at school may conflict with traditional village ones. The value that is placed upon education by parents and students in Papua New Guinea may result in changes to the traditional community, or for the young person to be alienated from tradition and culture.

Secondary Schools Community Extension Project

The philosophy behind SSCEP was that students were to be given an education that would allow them to cope with tertiary studies, equip them with valuable skills and attitudes for use in the village, and be able to use these skills for self-reliance (Weeks, 1987). Vulliamy (1988 p. 80) stated that when "SSCEP was formulated in 1977, there was considerable concern that Papua New Guinea would follow African precedents of large numbers of unemployed secondary school leavers". A concern expressed by Weeks (1988) focused on the relevance of secondary schooling for village life and this was a major factor in the introduction of SSCEP. As has been noted previously, rural oriented education can provide more relevant education for those who remain in the village, and so, avoid the problems of a dual curriculum (Vulliamy, 1988). SSCEP

provided an integration of academic and practical subjects for village life. Practical subjects include agriculture, wood, metalwork and business skills.

The intended implementation of SSCEP was to be phased in over a period of time starting with two pilot schools in 1978 and eventually all PNG high schools were included during the 1980s. Yet, SSCEP was abandoned in the mid 1980s. A SSCEP objective was "to introduce better methods of teaching and learning, in which 'academic' and 'practical' work [were] fully integrated" (Vulliamy, 1980 p. 8). SSCEP objectives were to be fulfilled using outstations and community based projects where students could see practical uses of subjects. Some schools included tradestores and boat building to learn about practical aspects and "to contribute to rural development through self-employment" (Vulliamy, 1980 p. 8). The government's aim was for rural development through "vocational training appropriate to village life" (Vulliamy, 1983 p. 5). SSCEP's design was to use either an outstation, or a community project, to integrate the teaching of core and non-core subjects. Cameron High School used Hihila outstation where students experienced a school farm, a tradestore, and purchasing and marketing coconuts and copra to gain practical experience. Ultimately the practical value for academic subjects was observable by students. Students' involved in community extension projects lived full or part time in a village whilst undertaking a planned learning experience (Crossley & Vulliamy 1986), in conjunction with the villagers. An example of a community project was a well for clean drinking water.

Although "evaluations of innovatory programmes began to reveal that, despite massive investment in centrally institutionalized curriculum development, much of this effort had relatively little impact on the curriculum in practice" (Crossley, 1984 p. 78), thus an

academic bias was maintained. The successful introduction for SSCEP required all participants (students, parents and teachers) to be fully conversant with the relevant curriculum aim of SSCEP. Participation in SSCEP was not designed to be detrimental to the student's final results, therefore allowing them to continue on to higher education (Weeks, 1987; Vulliamy, 1980). Vulliamy (1988 p. 52) indicated that for outstations to be accepted as valid schooling they needed "to be seen as an academic extension of the school". If SSCEP inhibited progression, then the project would fail. Whilst SSCEP introduced students to practical skills for the village, the intention was that it should not be vocational. SSCEP encouraged skill development related to leadership, initiative, and problem solving.

With SSCEP students could stay at school after Grade Eight, and provided sufficiently good results were attained in Grade Ten, they could possibly study at technical colleges, nurses colleges and some other training institutions (Weeks, 1987). Weeks' 1987 tracer study of SSCEP graduates indicated that 13 per cent of students who would normally have left school at the end of Grade Eight were selected for further training. Another 13 per cent of these students found jobs they would never have had access to had they left school earlier. Education Research Unit research (Vulliamy, 1980, Crossley & Vulliamy, 1986, Cummings, 1982) indicated that SSCEP provided students with additional chances at higher education. Students who decided to return to villages were positive about SSCEP and what they could achieve because of the training received (Weeks, 1987). Students who would normally have progressed through all levels of education benefited from involvement and experiences in SSCEP with no discernable disadvantage to their educational, or employment prospects (ibid.).

Attitudes towards SSCEP from students and their parents were initially positive, even though parental preference was for their children to find paid employment rather than return to the village. Parents recognized the benefit of useful skills if their children were unable to find paid employment (Vulliamy 1980). Factors influencing positive attitudes were the maintenance of school examination results, the proportion of graduates who found paid employment, and the attitudes and behaviour of graduates who did not obtain a paid job (Vulliamy, 1908b). Positive factors identified would probably have given status to the programme if it had not been discontinued before full implementation.

Initially concern focused on SSCEP disadvantaging students and their ability to progress through high school (Weeks, 1987). Counteracting that concern, Weeks indicated that SSCEP results "compared more than favourably with the national figures on graduate placements' (Weeks, 1987 p. 37). The success of SSCEP was noted through generally high levels of student, teacher and parental support (Vulliamy, 1988), the information students were given about the programme and positive attitudes (Vulliamy, 1980).

Unfortunately, some non-SSCEP practical subjects felt that a national examination should be introduced for their students, because their subject did not influence student results (Crossley & Vulliamy, 1986). Bray (1985) and Crossley (1984) believe this to be one of the symptoms of 'Dore's diploma disease': the desire for more qualifications. Fortunately, the dangers of extra examinations were recognized and defused by SSCEP personnel (Crossley & Vulliamy, 1986). Even so the flexibility afforded by skill-based

examinations had been eroded (ibid.), although other initiatives of SSCEP remained intact.

Vulliamy (1983) indicated that the integration of core subject skills into core projects, allowed students to identify and use practical skills included in the assessment of the core project. Academic components were integrated into the core projects where students were able to see practical applications of academic subjects in use. This is in contrast to other countries where there was no attempt to integrate academic and practical work in similar types of projects (Vulliamy, 1983). This integration gave status and acceptance to SSCEP by the students and teachers who discovered promotional opportunities. Teachers in non-SSCEP schools did not have similar opportunities for promotion.

SSCEP by virtue of its innovative curriculum presented two areas of concern. Papua New Guinea's education system is highly dependent upon examinations to determine progression through the levels of schooling. New reforms may reduce this as more places in schools are made available. Students and teachers were concerned that because of the way content was taught not enough time would be available to cover the syllabus. Secondly, because of the school-based nature of SSCEP, and the introduction of core skills and core projects, limitations were placed on teachers' understanding of the content, as many were only operating at a functional level. Factors identified inhibiting SSCEP included the level of teacher education (Vulliamy, 1983), formalistic teaching styles and comprehension difficulties of subject matter.

Acceptance of any programme depends on the difficulty of comprehension (Soelaiman, 1994) Papua New Guinea teachers found it difficult to apply the complex innovations of SSCEP (Vlaardingerbroek, 1994; Crossley & Vulliamy, 1986). Further, Vlaardingerbroek indicated that the adoption of courses and application of the new methods of teaching real-life situation content by indigenous teachers was a problem for SSCEP. Expatriates often wrote and implemented of SSCEP's original programmes that were taken over by indigenous teachers. Such teachers appeared to be incapable of applying most new requirements of courses (Vlaardingerbroek, 1994) because they lacked training and experience. Their own limited education restricted them to an innate formalistic teaching style (Crossley & Vulliamy, 1986).

Indigenous teachers not only found implementation difficult. They became demoralized because of the extra workload without compensation (Vlaardingerbroek, 1994).

Other problems to beset SSCEP's indigenous teachers included the following:

- A lack of classroom resources;

- Core subject teachers lack of knowledge of the core projects;

- A fear of missing important topics in the syllabus and the difficulties of deviating from the syllabus that may be included in the nation-wide Grade Ten examinations;

- New staff in SSCEP schools lacked an understanding of the programme's rationale;

- Difficulties with timetabling (students stayed at outstations for weeks at a time giving administrators timetabling problems at school. For the first year, two SSCEP project teachers at Hihila were expatriates who expressed concerns that they were on duty 24 hours a day, seven days a week) (Vulliamy, 1983)

- Writing course modifications;

- The application of weighting to non-cognitive skills; and

- Cultural difficulties – parents not willing to learn from their children (Vlaardingerbroek, 1994).

Cummings (1982) raised the in-service issue and questioned the results – did in-service produce better teachers or merely a teacher who used different teaching styles to non-SSCEP teachers? He further questioned whether the answer would ever be found with the abandonment of SSCEP. Vulliamy (1988) indicated that most core project teachers of SSCEP were agriculturally trained and the expectation of teaching even elementary aspects of the core subjects proved unrealistic, as most of the indigenous teachers teacher training was inappropriate to the topics and approaches. For instance, students were observed copying the teacher's notes directly into their exercise books, with no teacher acknowledgment of the methodology used to find the solution (ibid.). Teachers were given substantial in-service on programme writing and implementation, but implementation proved too difficult.

SSCEP's critics argued against a shift from a centralized curriculum, where the National Department of Education (NDOE) controlled content, to a school-based curriculum. Guthrie, in an interview in September 1981, (Crossley & Vulliamy, 1986) argued against the introduction of a school-based curriculum because he believed that it had failed in Australia and other developed countries. Guthrie cited a previous PNG programme of generalist teaching, which "required teachers to integrate the teaching of subject content without the benefit of in-service and little or no material support" (Crossley & Vulliamy, 1986 p. 59). SSCEP to its credit did have in-service programmes

and support for its teachers, although as Vlaardingerbroek (1994 p. 134) said "the fatal blows [to SSCEP were] ... the removal of the 'halo' effect by the removal of additional logistic support to all the SSCEP schools after 1982". Support for a limited number of schools is easy to maintain but expanding programmes to include all 113 provincial high schools at one time would have placed significant strain on key personnel, without a commensurate expansion in support areas.

SSCEP's impact on PNG remains hypothetical, but as noted in the research literature, many of the "ambitious achievements [were] ... inspired, led or conducted by expatriate personnel (Crossley, 1984 p. 83), and the "centralized curriculum development plan [was] implemented by a small team of highly skilled expatriates (Cummings, 1982 p. 16). Vlaardingerbroek (1994) and Vulliamy (1980) indicated that indigenous teachers had difficulties with SSCEP's implementation, and "[a]lthough the national government spent a considerable amount of money ... the expansion from pilot ... [was] restricted by the national government's inability to force the project on provincial governments" (Bray, 1985 p. 191) causing SSCEP to be discontinued. SSCEP's budget was 800 000 Kina (US $800 000) over four years to a limited number of schools. Its replicability, in financial terms, could not be matched with the expansion of the project.

SSCEP's integration of practical and academic subjects allowed its graduates to function in higher education, the job market, or the village, and gave students oracy, literacy and numeracy skills that could be used in the formal and informal sectors of the economy (Weeks, 1987; Selvaratnam, 1988). The national development strategy, through which SSCEP was funded, allowed it to focus on relevant rural development (Cummings, 1982). Towards the end of SSCEP reviews were undertaken and as an

option it was suggested to integrate SSCEP within the proposed Education 111 World Bank funding (Crossley & Vulliamy, 1986). This would have made possible SSCEP obtaining World Bank funding. Cummings (1982) said that SSCEP was "generally misperceived as a practical program of vocational training" instead of as a more relevant curriculum without a deterioration in academic results (Crossley, 1984).

Even further back in PNG's school history individual schools attempted programmes based around the integration of academic subjects and agriculture. At the same time as SCCEP was in its infant stages, Awala High School was using a potentially viable plantation to teach appropriate technology for a rural situation (Vulliamy, 1980a), and in 1952, Vunamanai School "attempted to base its academic courses around the school's agricultural programme" (Vlaardingerbroek, 1994 p. 131). Parental concerns about the amount of time students were reputedly wasting in the gardens eventually caused an academic bias to be reintroduced at Awala (Vulliamy, 1980).

Under SSCEP student results were to include a combination of core subject and core project assessments (Vulliamy, 1987). The NDOE analyzed Grade Nine and Ten examinations using English, Mathematics, Science and Social Science to ascertain which of the core subject skills should be used in SSCEP (Weeks, 1987). The methods used for inclusion in a student's final assessment results did not always conform to SSCEP policy. Vulliamy (1987 p. 52) indicated that in two out of his three research schools "core projects were assessed mainly on academic core subject skills", not as a combination of academic and practical skills. At the other school "practical work and student initiative and effort were included in a significant way in core project assessment" (ibid). Consequently, marks were not included in academic subject results.

An important issue with the third school is that marks from the core project were included in practical subjects, and not in the core subject assessment, which effectively did not count towards the academic component of a student's leaving certificate (ibid). Therefore, there was no real meaning to SSCEP because it did not give integration of subjects in student results. Any initial concerns that parents and students had of SSCEP's ability to provide pathways for the future would appear valid if used in this manner. Weeks (1987 p. 35) said "the greatest concern over SSCEP has been found in Kagua District [in the Southern Highlands province]... where people are more instrumental in their educational expectations". Because tribal elders themselves had minimal or no formal education they wanted the best for their children seeking social upward mobility following Western economic theory.

Culture, Tradition and Impediments

Culture and tradition play a large part in how external influences are assimilated or rejected by a society. Conflict with traditional cultures creates problems and disruption to the structure of society. Scobey (1968 p. 1) indicated that, "social problems related to technological developments are constantly influencing political ideologies, socio-economic patterns and philosophical values". This found support in the document ITEA (1996) indicating technology "has created a complex world of constant change".

A major change that colonial administrations introduced into PNG was that of a formal political system. With the politicalization of PNG, citizens became users of government and private services. The published literature revealed that political policy changes have been made through pressures exerted by the users of the system (parents and students),

and the methods employed by the users to more suit their needs (academic education). The politics of changing patterns of thought and practices contribute to the socio-economics of the country, therefore a successful SSCEP would have seen beneficial and observable, as indicated in the National Goals and Directive Principles.

In Papua New Guinea, the "process of modernization, far from destroying the village, [has] been incorporated within it, leaving many aspects of traditional social structure and culture intact" (Vulliamy & Carrier, 1985 p. 19). Traditional aspects of village life have made it difficult for SSCEP graduates to enact the objectives of the programme. Vulliamy (1980 p. 42) claimed that, although students were aware of problems associated with wantoks, age and land shortages, they showed a willingness to return to the village. It was through the influence of SSCEP that student attitudes towards returning to the village were positively developed. He also indicated that modernizing rural life could strongly conflict with traditional culture. Sorcery was an overriding concern expressed by students (Vulliamy, 1980; Weeks, 1987; Vulliamy & Carrier, 1985). Vulliamy and Carrier (1985 p. 21) said that "sorcery ... exists [as] a device for social control", therefore SSCEP graduates may experience conflict with their parents and traditional cultural structures if they challenged traditions with their newly found knowledge.

The location of youth in traditional social structure is also a problem when attempting to live a contemporary way. As an example, single males are denied "positions of influence or leadership" (Vulliamy & Carrier, 1985 p. 20).

With young males introduced to food production the work done by women, as the traditional food producers, is diminished. The ability of females to progress up the educational ladder also provided difficulties. Vulliamy (1980 p. 41) said *"from the students point of view*, simply having the skill to promote projects was not in itself enough". Tradition plays a part in the acceptance of youth participation in village life. Although elements of Western society have been accepted, some traditions, such as the subordination and manual work of village women, continue to be practiced.

Education provides an alternative to working on the land. Consequently, there has been a rejection of manual labour (Lewis & Lewis, 1985) and the idea that a rural curriculum offers a lower status of education (Vulliamy, 1988). Unfortunately, for a predominantly rural country, education cannot provide jobs that industry is supposed to provide (Vulliamy & Carrier, 1985; Lillis and Hogan, 1983). Negative issues attached to vocational education need to be addressed so that "basic needs [food, fuel, water, health care, housing], overpopulation, and rural development" (Vulliamy, 1988 p. 79) can be addressed. The positives of remaining in the village may alleviate negative effects of urban migration and unemployment.

Changes in developing countries from their non-formal traditional education to an academic Western style education initially provided low level administrative jobs and lead to an "undervaluing, and often arrogant dismissal, of traditional belief systems having no place in the modern school curriculum" (Lewin, 1985 p. 128). Cultural and traditional factors need to be addressed during the selection of curriculum content that is both relevant to an early leaver who returns to the village, and a student who continues their education to gain employment.

The Western idea of time is inconsequential in the Papua New Guinea village (Vulliamy, 1980). Seasonal changes are relied on to plant crops and other activities, not watches and calendars. AusAid (n.d.) and the Asian Development Bank (1999) indicated that over 80 per cent of the population have little more than subsistence incomes, so earning money only provides for clothing and other semi-basic non-production items.

Culture and traditions of a society play a major part in the acceptance of innovations and changes. Benefits of the new way must be seen as an improvement on the old. Nevertheless, some changes will not be accepted irrespective of the benefits derived because they challenge authority within the village, or require physical handing over of parental control before traditionally appropriate. These changes cause conflict in the culture, which cannot be easily resolved because of the traditional position of youth. What may be seen as an undermining of parental authority thereby makes it difficult for education to overcome cultural obstacles.

Values in Education

Changing values in education can cause alienation from traditional community existence. Richardson (1994) said that inappropriateness of the skills taught in PNG high schools does not allow the graduates of the education system to be effective and productive in the village. Banya (1986) indicated similarities in Sierra Leone where there is an inheritance of an irrelevant academic education for the majority of its citizens. Banya (1986 p. 175) argued that the education systems of 1961 and the 1980s were still "divorced from the life and culture of the local people". An education that values the development of the local community improves the quality of the life of the

people and also "strengthen the citizen's identification with, rather than alienation from, their own communities" (UVENOC, 1995 p. 11).

Boarding high schools, such as those in rural PNG, alienate students from their homes. The efforts of these students are channeled into academic study for modern sector jobs rather than for village life. Parents believe that their children are preparing for employment. But if there are no jobs, it is a waste of education. Developing countries, argued Ukaegbu (1995 p. 180) "should consider the uniqueness of the natural, social and economic environment … [where the focus lies in transforming] some herbs, roots and leaves for human consumption" whereas some developed countries "are concerned with space explorations and nuclear power". The vast differences between the two areas highlight the developmental stages in which each operates.

Some of the issues that education needs to address are:

- Teaching students to be adaptable in a rapidly changing environment for self-employment and entrepreneurship (Power, 1999);

- Provide for life-long learning (Power, 1999)

- Provide training to "serve precise and useful purposes" appropriate to the graduates probable future lifestyle (Fluitman, 1999 p. 56);

- Provide a curriculum which is relevant and has industry input (Asian Development Bank, 1999); and

- Offer staff professional development to change teaching styles (Asian Development Bank, 1999).

As the development of cognitive abilities varies from individual to individual so it is with communities (Egan, 1984). Therefore the amount of development depends upon the environment and the survival skills required. Before the Industrial Revolution in developing countries, "there was no pressing need to challenge conventional practices and thought (Seeman and Talbot, 1995 p. 762). The economies, the social structures and the technologies of human settlements had changed little. Now longer was most production of essentials done in the home. It was now done in factories and the labour structure changed forever. If a developing country is to become part of the developed world then it must identify itself with the ideologies of the developed world, which requires it to follow conventions and practices associated with development. Teachers will need to be conversant with technology and its influences and be able to teach and use these technologies.

Developing countries have traditionally used non-formal education to disseminate the important content from generation to generation. Colleta and Holsinger (in Pytlik, 1983 p. 60) found that "non-formal education was better than formal education in promoting cultural and social change because it operated within the reality structure of the socio cultural milieu". Therefore, for a major change to happen it must occur at family and community levels through education of the benefits of the innovation.

Because of the way in which the community "views education in political and economic terms" (Matane, 1986 p. 8) the issue of community expectations of education should be taken into consideration, and education given as to the community of the needs for national development. Vulliamy and Carrier (1985) indicated that the dynamics of the village culture must be considered in the aims of any programme. With parents wanting

their children to be in a better socio-economic position than themselves, the economy of the village could change. It has already been shown that as youth are taken from the village that tradition and culture has been disrupted. Furthermore with urban drift, the elderly rely more on other members of the village than their own children. An education not designed for rural life places strain not only on the urban centres, but also on the village.

The effect of maintaining the traditional culture needs to be addressed. The contrast is shown as "the educated Indian ... was more familiar with Western culture than his or her own" (Zachariah and Hoffman, 1985 p. 273) whereas the Chinese have much more exposure to their own culture as China was never colonized. Therefore, their culture has not been influenced. Former colonies assume aspects of the administrative country and have not generally placed as much emphasis on maintaining their own culture. A perception that the foreign culture is better that traditional ways is often accepted. Raina (1999) indicated that there are many benefits in teaching indigenous culture and knowledge for national development. In Lee, Adams and Cornbleth's (1988) example of the Korean social context, tradition and culture not being addressed during the transnational transfer of educational theories led to a subsequent failure of the programmes.

Addressing issues of social, cultural and economic concerns must be developed by individual countries (Selvaratnam, 1988). In PNG, small projects to make some money are influenced by the motivation and the social climate of the village (Weeks, 1987). Weeks' (1987) reasoned that money was wasted on projects. Also, poor infrastructure,

and the lack of essential services caused potential SSCEP entrepreneurs to ignore commencing projects.

Serious consideration of the current situation and future prospects in the employment market needs to be undertaken before the introduction of any innovation in vocational education is attempted (Selvaratnam, 1988). Educational planners would then have an objective analysis upon which to base their planning and objectives for the project. SSCEP used a two-pronged approach where graduates could either progress to higher education or return to the village and be self-sufficient. Whilst recognizing SSCEP's rural community objectives it should be noted that the major aim of many living in a developing country is self-sufficiency. Yet, a "humanistic education over manual, technical and scientific training" (Irizarry, 1980 p. 338) would be more profitable.

A problem lies in vocational education claims with regard to job placement. Whether " vocational education can reduce unemployment, increase productivity, and stimulate international competition" (Grubb, 1984 p. 444) lies in the economics of the country in question. Educational planners need to look at which areas of industry have the jobs. Essentially, in a developing country, where the majority of the population is self-sufficient, individuals need to realize that agriculture is the base upon which to develop their future (Selvaratnam, 1988). This is the major barrier for vocational education to overcome. The socio-cultural values vocational education faces are entrenched and nobody shows a willingness, or ability, to change (Lillis and Hogan, 1983).

As an example, those charged with the responsibility of developing a report for the Kiribati government into its Community High Schools, failed to include the

145

government's policy of community development. The commission's report was influenced by public attitudes advocating an academic style education, whereas the government had opted for a "strong island environment bias" (Hindson, 1985 p. 290). Many parents believed that academic education paved the way for paid employment and that parents should teach local culture. It was viewed that some elements of culture were not open for public viewing and should only be taught by certain members of the clan to specific groups or individuals (ibid). Content of teaching must relate to user requirements, therefore vocational education for rural living is seen as worthless given the above.

With education systems of the capitalist class countries transferred to the almost classless society of developing countries, the goals of education became blurred. As Corvalan (1988 p. 87) said, "the content, methods and goals of teaching were ill-adapted to the socio-cultural background" and "that their education socialized and convinced them of their social position". Classless societies where every male could eventually become a 'bigman' of the village through favours have now changed. Anyone with paid employment can achieve status within the village without being an internal part of it. At least this much, according to Lillis and Hogan (1983 p. 180), was evident in parental views of education: "parents who had invested so much in their son's [sic] education ... were most reluctant to accept the result of their investment the return of their sons [sic] to the homestead". A return to the land is not what many parents have in mind when their children commence schooling. Colonial education promoted an educational elite that alienated youth at school from the village culture (Richardson, 1994) because of the belief that valued knowledge only comes from school.

Understanding the reasoning behind parental attitudes concerning the promotion of their children on social status ladders may bring awareness to educational planners of factors that could help shape educational content. Changes in the developed world happen through "the ingenious creation of material objects has thus resulted in problems related to changes in man's way of life" (Scobey, 1968 p. 2). Some of these problems relate to technology and its use, to content taught in school, leisure activities and lifestyle.

Many rural schools in PNG have little or no experience with technologically advanced equipment, such as computers. Lillis and Hogan (1983) claimed that the use of resources should be appropriate to the situation. The Asian Centre of Educational Innovation for Development (Pytlik, 1983) identified problems such as facilities and equipment in developing countries schools being lacking. The content of school subjects has not always been relevant to a student who returns to their village. Added to this is the perception that education designed for village and community life is best taught in the home. Students do not see value in learning something at school which they can learn equally well at home (Zachariah & Hoffman, 1985). Leisure and lifestyle changes include those within the social strata of the clan where youth begin to question the elders and their decisions. As previously mentioned parents are unwilling to give their children any land to instigate projects. Antagonism and ill-will may be generated towards their parents.

Conclusion

Education in the developing countries, far from solving problems, at times appears to increase as parental and student expectations are not realized. Educational programmes such as SSCEP in Papua New Guinea and ESR in Tanzania have attempted to provide

graduates with a rural orientation, yet still allow progression along the education road to eventually gain paid employment. Many parents prefer an academic curriculum for their children, but as Egan, (1984 p. 51) in his discussion of Plato's philosophy said, "an academic education is not ... an education at all; and a curriculum drawn from experience of the local environment is a formula for remaining a captive of *eikasia*", (eikasia being the lowest of Plato's levels - that of a concrete learner without the ability to use abstract concepts). The need here is to integrate both academic education and the local environment so students can value both.

SSCEP attempted to use the abstract of academic subjects and integrate these in practicalities of everyday work. Ultimately, it was successful on certain levels but failed because of redirected World Bank financial priorities, provincial governments not accepting financial responsibility for funding and teachers' inability to cope with the programmes innovations. The values and attitudes of parents, students and teachers also changed. But as indicated, there were areas of resistance that may have eventually crept into the project. The value that one places on education is learned from "experience, environment, and social interactions" (Egan, 1984 p. 65) and developing countries, such as PNG, have only seen sections presented to them through academically trained colonial administration governing their country.

Issues in developing countries that vocational education should address, are "promoting cultural needs [and], serving political ideology" (Psacharopoulos, 1989 p. 181), which means village values need to be upheld yet still allow the government to work for economic growth. This is a fine line to walk. However, the needs of the country must be assessed and met before those of individuals. As the country becomes more developed

the individual is able to access better quality social services. The benefits of an academic education may be in opposition to the traditional values that parents have and so cause conflict. SSCEP proved an education that valued the integration of academic and vocational education is effective.

Chapter 7

Principles of Appropriate Vocational Education

Introduction and Principles

Published literature has elicited principles that should play a significant role in the selection, subsequent adoption and acceptance of specific types of vocational education. These principles are extremely important for the selection of content as they dictate what, how and why teachers teach and whether parents and students accept this type of education. History and socio-economic levels of development must be applied to the selection of the principles for appropriate vocational education.

The effects of using a long timeframe to assess the changes and influences in education in a variety of settings has given rise to a number of principles that have not significantly changed over time. If major shifts in attitudes, culture and socio economic positions were noted, then the underlying factors involved would have altered the principles below. Thus generalizations would not have been able to be made. The fact that changes were minor indicated that these factors had not been given the prominence that they deserved.

Using studies from both lesser and more developed countries eliminated a narrow view and allowed comparison of the types of vocational education in a variety of different settings. Similarities within the socio economics of individual countries tended to create the headings under which the principles became noticeable. Programmes did tend to follow the same basic philosophy where students were educated for a particular lifestyle, but attitudes of parents and students influenced their eventual future.

The following principles were elicited from the literature and experience of PNG, and justified the timeframe used in the study.

1. Culture and traditions.

Culture and tradition play a significant part in the way people live and how they explain phenomena. Violent changes to accepted ways create conflict and in the case of a developing country, the difference between generations is exacerbated. Cultures and traditions that have contributed to a country's development should not be ignored. Superstitions have some basis for inclusion in day-to-day life and their importance should not be undervalued as part of a country's vocational education.

2. Infrastructure levels and the economic capacity of the country.

The level of infrastructure must be capable of providing the physical requirements of the system and the ability to support any capital improvements. School buildings and equipment need to be suitable for the delivery of curriculum with an appropriate budget for maintenance. Power should be provided to all schools and work places if the appropriate curriculum includes elements of power tool use otherwise students must apply local culture and traditions to school activities similar to that found in the village. Aid agencies must be aware that there are problems in schools with some of the equipment they supply and be prepared to facilitate changes so the equipment is appropriate to the local environment. With a stagnant economy, PNG would be better served if the incentive were intrinsic rather than monetary (extrinsic).

3. Teachers and their education level.

Teachers need to have a high level of understanding of the content of their subject and be creative in the delivery of their lessons. In-service training should to be readily available and appropriate to the requirements of the teacher and the curriculum. Programmes must have in-service elements built into them incorporating culture and tradition. Trainee and beginning teachers must be prepared to influence any older teachers who may have ingrained habits and to provide leadership to sustain the innovation. Teacher training should focus on better understanding and knowledge of the content of the subject.

4. Appropriate content for the graduate's career prospects after schooling.

Because of limited jobs and a heavy reliance on self-sufficiency the focus of content should be agriculture as the main priority. Agriculture needs to be more prominent because most graduates will return to the land. At school they miss the day-to-day agricultural activities of the village. Contemporary technical elements should not be neglected as they can be used to improve life in the village and allow graduates to gain jobs in industry. The population needs to be educated of the benefits of a traditional lifestyle and focus on the positives of maintaining this lifestyle. However, they must also incorporate more desirable elements of contemporary technology.

5. Formal versus in-formal education.

The benefits of formal versus in-formal education should be assessed to see if there is some means of providing specialized education to those who require it. People should be encouraged to share their knowledge and skills with others from the same locality.

Successful farmers and artisans could help others to increase their production or to effect repairs to machinery and buildings.

6. The need to be able to adapt rapidly to changes in the economy.

There needs to be a rationalization of subjects in education. Students need to be given an education in agriculture as this is what the majority of citizens will work at after school, together with some form of technical education. Academic subjects should include practical projects to enable the population to understand the applications of many aspects of daily living and work. Employers will then be able to take advantage of this when there is an improvement in the economy. Potential employees in business and industry will not need extended training as there will be a partially trained labour force available.

Conclusion

The selection of appropriate content for such a programme is dependent on the infrastructure of services such as electricity, water supply, local industry and education levels of teachers. Todd (1985) indicated that there are a number of levels of development that countries move through as they develop from indigenous to cybernetic. Countries are never wholly within one level of development but rather various elements may be indigenous, emerging, or much further advanced. Papua New Guinea is spread over many of the defined categories of development, but the majority of the population may be categorized as emerging. UVENOC (1995) indicated that eighty per cent of the population is self-sufficient within their own community. Infrastructure for electricity and water is not well developed and remains limited to the major urban areas and their surrounds. Remoteness caused by the rugged terrain is a

major constraint for the supply of these services. Road networks are not highly developed and often are in poor condition due to the unstable ground. Earthquakes and tremors are common, as is subsidence. Economically, PNG is not in a growth pattern and possibly remains stagnant (Asian Development Bank, 1999). Substantial budgetary provision is made by Australia with many international aid agencies and NGO's operating in PNG.

Aid agencies and consultants often do not have a full understanding of the culture and traditions of many of the clans of PNG. Vulliamy and Carrier (1985) indicated that consultants use their own experiences and education to choose appropriate content for new programmes. Diverse cultures and languages require teachers who have many strategies to be able to teach well (Raina, 1999). Local knowledge and history should be valued and taught in schools (ibid), as this knowledge was the source of the development of PNG society before the introduction of Western education. Ignoring this rich heritage and adopting a formal Western education destroys local cultures Western education perpetuates the class system (Carnoy, 1982), therefore the perceived social mobility expected from education may not eventuate.

Parents want their children to be more upwardly socially mobile than they were and hold positions of financial security and status. To enable this to occur teachers must be able to present educational content in such a way that students can use the knowledge productively. Teachers in developing countries are often formal in presentation and teaching methods (Beeby, 1966; Vulliamy, 1987; Asian Development Bank, 1999). Children are not taught to be creative in the application of content to different situations. Teacher reluctance to deviate from the syllabus may cause a perception that vital

elements of the course were not to be taught (Vulliamy, 1987). Students are therefore deprived of a chance at higher education levels.

Many teachers in PNG cannot be creative with methodologies, nor are students given opportunities to apply knowledge to problems outside of the syllabus. Currently, validity of knowledge lies in how well it is used to explain textbook situations. Vulliamy (1987) indicated that teachers of SSCEP found it difficult to apply new methods and work programmes even though they may have been involved with the development of the programme. School-based curriculum uses the environment in which the student lives to provide relevant content. SSCEP used this to allow students to solve community problems with creative solutions.

All participants accepted the design and implementation of SSCEP and consequently the status of vocational education components was improved. Other vocational programmes have suffered from low status and a perception that vocational education ties people to the land and that it is a second-class education (Bude, 1983). Educating the clientele about the benefits of the programme tends to ensure the success of the programme. There needs to be a realization that the complexity of an innovation plays a vital part in how teachers accept the goals and in their ability to implement the programme. A theme in the published literature was the cost of vocational versus academic education. Vocational education graduates usually receive less financial return upon employment after graduation (Asian Development Bank, 1999). The status of the subject needs to be evaluated in the planning so as to improve the perception of vocational education being a less desirable subject to study. Education about the benefits for the individual, community and country and awareness that other pathways

to further education are available for the graduate should be made available and provided. Integration of academic content in vocational education should be more prominent and similar to that used in SSCEP.

Appropriate Vocational Education for PNG

Vocational education for Papua New Guinea needs to be structured to allow for rapid changes to the economy. Globalization of the world economy is creating changes for all countries and industries. The majority of the citizens of Papua New Guinea are subsistence farmers and vocational education should reflect this. Yet it must also include a technical element to allow for contemporary materials, tools and equipment that can be used in a village community. Many villages use these materials to build houses and to improve the quality of life.

Including a technical component would allow industries to be able to recruit as needed as well as train employees quickly when there is an improvement in the economy and industries are initiated. This will allow expansion to take advantage of the market. An education that includes academic, technical and agricultural elements would help integrate Papua New Guinea as part of the world economy.

Bray's (1994) question concerning leaving a society (PNG) as traditional or including enough education to allow it to compete against the rest of the industrialized countries is relevant here. Past experience has shown that it is not acceptable to allow PNG to be left as traditional. Culture must be an integral part of education because Papua New Guinea developed its own identity through time honoured traditions, and Western education does not allow for these to be included as part of the curriculum.

Learning does not necessarily need to happen in a formal setting and the SSCEP style of informal education, which integrates individual curriculum, may be more appropriate after basic primary schooling. This type of system would allow the user to meet needs as they arise. Education must provide for what a student will most probably do after school - subsistence farming - yet still allow the opportunity to develop personally, and for the collective good of the country.

Bibliography

Akinpelu, J. (1984). Post-Literacy and Vocational Training in the Context of Rural Development and Income Generation in Africa. *International Review of Education.* 30, 315-328.

Asian Development Bank. (1999) Impact Evaluation Study of the Technical and Vocational Education Projects in Malaysia, Pakistan, Papua New Guinea and Sri Lanka. http://www.Asian Development Bank.org/Documents/PERs/IE61.pdf 26/03/2000.

AusAid. (1999). Chapter 4 Country and Regional Programs, http://www.ausaid.gov.au/publications.general/budgets98/chapte04.pdf 26/03/2000.

Australian Education Council. (1994). *Technology: A statement on technology for Australian schools.* Curriculum Corporation: Victoria, Australia.

Banya, K. (1986). Education for Rural Development: the case of Sierra Leone. *Compare.* 16 (2), 175-188.

Barber, E.G. (1981). General Education verses Special Education for Rural Development. *Comparative Education Review.* 25 (2), 216-231.

Beeby, C.E. (1966). *The Quality of Education in Developing Countries.*Cambridge, Massachusetts & London, England Harvard University Press.

Bierhoff, H. & Prais, S.J. (1993). Britain's Industrial Skills and the School-teaching of Practical Subjects: comparisons with Germany, the Netherlands and Switzerland. *Compare.* 23 (3), 219-245.

Board of Studies New South Wales. (1991). *Design and Technology Syllabus Years 7-10.* New South Wales Australia: Board of Studies.

Board of Studies Victoria. (1995). *Technology: curriculum & standards framework.* Victoria Australia: Board of Studies.

Bray, M. (1985). Education and Decentralisation in Less Developed Countries: a comment on general trends, issues and problems, with particular reference to Papua New Guinea. *Comparative Education.* 21 (2), 183-195.

Bray, M. (1994). Decolonisation and Education: new paradigms for the remnants of empire. *Compare.* 24 (1), 37-51.

Bude, U. (1983). The Adaptation Concept in British Colonial Education. *Comparative Education.* 19 (3), 341-355.

Burns, W.E. (1986). Skills for Lifelong Careers America's strength depends on our graduate's work skills, productivity & attitudes. *Industrial Education.* March, 9-10.

Cantor, L. (1985). Vocational Education and Training" the Japanese approach. *Comparative Education.* 21 (1), 67-76.

Carnoy, M. (1982). Education for Alternative Development. *Comparative Education. Review* 26 (2), 160-177.

Castro, C. de Moura, (1987). Is Vocational Education Really That Bad? *International Labour Review.* 126 (5), 603-610.

Castro, C. de Moura. (1999). Vocational and Technical Training: setting the record straight. *Prospects.* 24 (1), 37-54.

Chapman, D.W. & Windham, D.M. (1985). Academic Program 'Failures' and the Vocational School 'Fallacy': policy issues in secondary education in Somalia. *International Journal of Educational Development.* 5 (4), 269-281.

Cohen, L. & Manion, L. (1994). *Research Methods in Education 4 edition.* Routledge: London and New York.

Commonwealth Department of Employment, Education, Training and Youth Affairs. (1997). *Vet and the Senior Secondary Curriculum.* Melbourne: Curriculum Corporation.

Corvalan V, O. (1988). Trends in Technical-Vocational and Secondary Education in Latin America. *International Journal of Educational Development.* 8 (2), 73-98.

Crossley, M. & Vulliamy, G. (1986). *The Policy of SSCEP: context and development.* ERU Report 54, National Research Institute, Port Moresby: Educational Research Division.

Crossley, M. (1984). Strategies for Curriculum Change and the Question of International Transfer. *Journal of Curriculum Studies.* 16 (1), 75-88.

Crossley, M. (1990). Curriculum Policy and Practice in Papua New Guinea. *Compare* 20 (2), 141-154.

Crossley, M. (1992). Teacher Education in Papua New Guinea: a comment on comparative and international observations. *Journal of Education for Teaching.* 18 (1), 23-28.

Cummings, R. (1982). *A Review of Research on SSCEP: 1978-1981.* ERU Report No. 41, University of Papua New Guinea, Port Moresby: Educational Research Division.

Deforge, Y. (1979). Systems of Knowledge Production and Acquisition. *Prospects.* 9 (1), 3-21.

Derrick, R.A. (1952). *Vocational Training in the South Pacific Chapter 13.* London: Oxford University Press.

Dewey, J. (1915). *The School and Society.* Chicago: The University of Chicago Press.

Dore, D. (1976). *The Diploma Disease: education, qualification and development*. Suffolk, England: Unwin Education Books.

Dugger, W.E. & Satchwell, R.E. (1996). Technology for all Americans: a rationale and structure for the study of technology. *The Technology Teacher*. 56 (3), 13-15.

Egan, K. (1983). *Education and Psychology*. Methuen & Co: London.

Ellyyard, P. (1998). *Creating and Preparing for Jobs in the 21st Century*. Keynote address presented to Working 2001 Employment Futures Conference, Freemantle, Western Australia 20 February.

Fluitman, F. (1999). The Roots and Nature of Reforms in Vocational Education and Training: an analytical framework and some examples. *Prospects*. 26 (1), 55-65.

Follis, B. (1989). Staff Development for Technical and Vocational Education: an international perspective. *Compare*. 19 (2), 69-81.

Fraser, D.C. (1996). *Tall Oaks From Little Acorns Grow – Even in Scotland*. A paper presented to ACET conference Perth, January 8-12.

Garrido, J.L.G. (1987) Methodological Approaches in Comparative Education. *Compare*. 17 (1), 29 –37

Gibson, J.W. (1996*) Fencing the Paddock – Defining the Boundaries for Studies in Technology*. A paper presented to ACET conference Perth, January 8-12

Grubb, W.N. (1984) The Bandwagon Once More: vocational preparation for high-tech occupations. *Harvard Educational Review*. 54 (4), 429-451

Grubb, W.N. (1985) The Convergence of Educational Systems and the Role of Vocationalism. *Comparative Education Review*. 29 (4), 526-548.

Hall, R. (2000). 'It's Not My Problem': the growth of non-standard work and its impact on vocational education and training in Australia. *The 'Changing Nature of Work and the Implications for Training* A paper presented to NCVER Research Forum Parkroyal Hotel, Brisbane. 24 August.

Heyneman, S. (1985). Diversifying Secondary School Curriculum Developing Countries: an implementation history and some policy options. *International Journal of Educational Development*. 5 (4), 283- 287.

Hindson, C.E. (1985). Kiribati – The Search for Educational Alternatives in a Pacific Micro-state. *International Journal of Educational Developmen*. 5 (4), 289-294.

Hoskins Secondary School (n.d. a). *Technology* Hoskins High School work programmes, West New Britain Province, Papua New Guinea.

Hoskins Secondary School (n.d. b). *Rural Technology* Hoskins High School work programmes, West New Britain Province, Papua New Guinea.

Illich, I. (1971). *Deschooling Society.* London: Calder & Boyars.

Irizarry, R.I. (1980). Overeducation and Unemployment in the Third World: the paradoxes of dependent industrialization. *Comparative Education Review.* 24 (3), 338-352.

Ishumi, A.G.M. (1988). Vocational Training as an Educational and Development Strategy: conceptual and practical issues. *International Journal of Educational Development.* 8 (3), 163-174.

Isos, R. (1977). Production Schools in Panama. *Prospects.* 7 (3),395-400.

ITEA (1996). *Technology for All Americans: a rationale and structure for the study of technology.* Virginia, USA: International Technology Education Association.

Johnson, J.R. (1985).The Nature of Our Technological Society. *Technology Education: a perspective on implementation.* International Technology Education Association: Virginia, USA 11-13.

Keating, J. (1998). *Australian Training Reform Implications for Schools.* Curriculum Corporation: Melbourne.

Kimbell, R. (1982). *Design Education: the foundation years.* London: Routledge & Kegan Paul.

Kupisiewicz, C. (1979). School Reforms in the Industrialized countries: trends and contradictions. *Prospects.* 9 (1), 22-31.

Lauglo, J. & Narman, A (1987). Diversified Secondary Education in Kenya: the status of practical subjects, and effects on attitudes and destinations after school. *International Journal of Educational Development.* 7 (4), 227-242.

Lauglo, J. (1983). Concepts of 'General Education' and 'Vocational Education' Curricula for Post-compulsory Schooling in Western Industrialised Countries: when shall the twain meet? *Comparative Education.* 19 (3), 285-304.

Lee, J.J., Adams, D. & Cornbleth, C. (1988). Transnational Transfer of Curriculum Knowledge: a Korean case study. *Journal of Curriculum Studies.* 20 (3), 233-246.

Lewin, K. (1985). Quality in Question: a new agenda for curriculum reform in developing countries. *Comparative Education.* 21 (2), 117-133.

Lewis, T. & Lewis, M.V. (1985). Vocational Education in the Commonwealth Caribbean and the United States. *Comparative Education.* 21 (2), 157-171.

Lewis, T. (1995). From Manual Training to Technology Education: the continuing struggle to establish a school subject in the USA. *Journal of Curriculum Studies.* 27 (6), 621-645.

Lillis, K and Hogan, D. (1983). Dilemmas of Diversification: problems associated with vocational education in developing countries. *Comparative Education.* 19 (1), 89-107.

Marginson, S. (2000). The Big Picture: globalisation, international trends and the nature of work. *The 'Changing Nature of Work and the Implications for Training* A paper presented to NCVER Research Forum: Parkroyal Hotel, Brisbane 24 August.

Marsden, K. (n.d.). Progressive Technologies for Developing Countries. *International Labour Review.* 475-502.

Matane, P. (1986). *A Philosophy of Education for Papua New Guinea.* Ministerial Committee Report.

McCullock, G., Jenkins, E. & Layton, D. (1985). *Technological Revolution? The Politics of School Science & Technology in England & Wales Since 1945.* London: Falmer Press.

McRobie, G. (1994). *Technology for Development – What is Appropriate for Rich and Poor Countries: global perspective.* A paper presented to MAGHTECH conference.

Morauta, M. (1999). *Road to Recovery.* Budget speech for 2000 Papua New Guinea budget. http://www.treasury.gov.pg 28/03/2000.

NCVER (2000). What the Research Has Said About CNW. *The 'Changing Nature of Work and the Implications for Training* A paper presented to NCVER Research Forum: Parkroyal Hotel, Brisbane 24 August.

Orata, P.T. (1977). Barrio[1] High Schools and Community Colleges in the Philippines. *Prospects.* 8 (3), 401-412.

Oxtoby, R. (1977). Vocational Education and Development Planning: emerging issues in the Commonwealth Caribbean. *Comparative Education.* 13 (3), 223-241.

Pari, B. (1997). Wrong Use of Education. Viewpoint, *Post Courier* Friday October 31 p 10.

Polesel, J., Teese, R. & O'Brien, K. (2000). *Two Years Out – The Class of 1997: a report on the 1999 destinations of the 1997 VET in schools cohort.* Victoria, Australia: Department of Education, Employment and Training.

Power, C. (1999). Technical and Vocational Education for the Twenty-first Century. *Prospects.* 24 (1), 29-36.

Psacharopoulos, G. (1985). Curriculum Diversification I Colombia and Tanzania: an evaluation. *Comparative Education Review.* 29 (4), 507-525.

Psacharopoulos, G. (1987). To Vocationalize or Not to Vocationalize? That is the Question. *International Review of Education*. 33, 187-211.

Psacharopoulos, G. (1989). Why Education Reforms Fail: a comparative analysis. *International Review of Education*. 35, 179-195.

Psacharopoulos, G. (1991). Vocational Education Theory, Voced 101: including hints for 'vocational planners'. *International Journal of Educational Development*. 11 (3), 193-199.

Pytlik, E.C. (1983). The Role of Technology Education in Third World Development. *Epsilon Pi Tau*. 9 (2), 55-62.

QBSSSS (2000). Enrolment Trends, 1987-1999. *Briefing Notes 1/2000, April 2000*. Spring Hill, Brisbane: Quantitative Research Services, Queensland Board of Senior Secondary School.

Raina, V.K. (1999). Indigenizing Teacher Education in developing Counties: the Indian context. *Prospects*. 24 (1), 5-25.

Richardson, R. (1994). *Vocational Education in Papua New Guinea Secondary Schools*. A paper presented to the International Conference on Technology Education: 92, Weimar, Germany, April 25-30.

Scobey, M. (1968). *Teaching Children About Technology*. Bloomington, Illinois: McKnight & McKnight.

Seeman, K. & Talbot, R. (1995). Technacy: towards a holistic understanding of technology teaching and learning among Aboriginal Australians. *Prospects*. 25 (4), 761-775.

Selvaratnam, V. (1988). Limits to Vocationally-oriented Education in the Third World. *International Journal of Educational Development*. 8 (2), 129-143.

Sifuna, D.N. (1992). Diversifying the Secondary School Curriculum: the African experience. *International Review of Education*. 38 (1), 5-18.

Soelaiman, D.A. (1994). A Critical Analysis of the Processes and Problems Involved in Transferring a Competency-based Teacher Education System from a Developed to a Developing Country. A Doctoral Thesis submitted to Macquarie University, Australia.

Spender, D. (2000). *Ferny Grove*. A paper delivered to an Information Technology in-service: Ferny Grove High School, Brisbane 16 August .

Sullivan, K. (1997). Education and Change in the Pacific Rim; meeting the challenges, Introduction: education issues in the Pacific Rim. *Oxford Studies in Comparative Education*. 7 (1). http://triangle.co.uk/osc/osc-07_1htm 05/10/2000

Todd, R.D. (1985). Technology Education: an international perspective. *Technology Education: a perspective on implementation.* International Technology Education Association, Virginia, USA.

Togarewa, N. & Kaniniba, A. (1998). PNG 'not prepared for top-up system' *The National.* Monday March 9 p2.

Ukaegbu, C.C. (1985). Educational Experiences of Nigerian Scientists and Engineers: problems of technological skill-formation for national self-reliance. *Comparative Education.* 21 (2), 173-182.

UNESCO (1973). *Technical and Vocational Teacher Education and Training.* Bristol: John Wright and Son.

UNEVOC (1995). *National Profiles in Technical and Vocational Education in Asia and the Pacific: a regional synthesis.* Bangkok.

Urevbu, A.O. (1984). Vocational Education in Nigeria: a preliminary appraisal. *International Journal of Educational Education.* 4 (3), 223-229.

Vlaardingerbroek, B. (1994). A Human Capital Approach to the Relevance of Lower Secondary Education and Science Education in Agrarian Developing Countries, with Special Reference to Papua New Guinea. A Doctoral Thesis submitted to Macquarie University, Australia.

Vulliamy, G. & Carrier, J. (1985). Sorcery and SSCEP: the cultural context of an educational innovation. *British Journal of Sociology of Education.* 6 (1), 17-33.

Vulliamy, G. (1980). *SSCEP and High School Outstations: a case study.* ERU Research Report No. 33, Port Moresby: Educational Research Unit.

Vulliamy, G. (1983). Core Subject – Core Project Integration in SSCEP: practice and possibilities. *Papua New Guinea Journal of Education,* 19 (2). 13-34.

Vulliamy, G. (1987). Assessment and the 'Vocational School Fallacy' in Papua New Guinea. *International Journal of Educational Development.* 7 (1), 49-58.

Vulliamy, G. (1988). Adapting Secondary School Science for Rural Development: some lessons from Papua New Guinea. *Compare* 18 (1) 79-91.

Walumbwa, O.F. (1999). *Rethinking the Issues of Technology Transfer.* http://scholar.lib.vt.edu/ejournals/JTS/Summer-Fall-1999/PDF/Ideas.pdf 06/01/2001.

Weeks, S. (1987). Education for Village Life? What Has Happened to Grade Ten Leavers from the Five SSCEP High Schools? *International Journal of Educational Development.* 7 (1), 33-48.

Whawo, D.D. (1993). The Utilisation of Skilled Artisans as Vocational Instructors in Secondary Schools in Edo and Delta States of Nigeria. *International Review of Education.* 39 (3), 223-229.

Wilms, W.W. (1988). Training for Technology: a questionable investment. *International Journal of Educational Development.* 8 (1), 43-54.

World Bank (1994). The World Bank's Role in Human Resource Development in Sub-Saharan Africa: education, training and technical assistance. Study No. 13449 http://wbln0018.worldbank.org/oed/oeddoc...b48d43c8efa8525681c00549b7c?Open Document 13/09/00.

World Bank (2000). Country Assistance Note Number 20183, http://wbln0018.worldbank.org/oeddoc...de5ec40beb5852568dd00764798?Open Document 31/09/2000.

Wright, T. (1996). Is Your Paradigm Shifting. *The Technology Teacher.* 55 (6), 3-4.

Zachariah, M. & Hoffman, A. (1985). Gandhi and Mao on Manual Labour in the School: a retrospective analysis. *International Review of Education* 265-282.

Appendix

List of Technical Education Institutions

4.1 Technical Education Institutions

a) Administrative College of Papua New Guinea
b) Burns Phillip Automotive Training Centre

4.2 Agricultural Colleges

a) Highlands Agricultural College
b) Sepik Agricultural College
c) Vudal Agricultural College
d) Air Niuguni Training Centre
e) Civil Aviation Training College

4.3 Colleges of Allied Health

a) College of Allied Health Sciences, Madang
b) College of Allied Health Sciences, Port Moresby
c) College of External Studies
d) Defense Academy of Papua New Guinea
e) Divine Word Institute
f) Elcom Training Centre
g) Fire Services Training College
h) Laloki Co-operative College
i) National Arts School
j) National Computer Science
k) National Fisheries College
l) National Posts and Telecommunication Training Centre
m) National Weather Service Training School
n) Nautical Training Institute
o) Papua New Guinea Banker's College
p) Papua New Guinea Defense Force Training Depot
q) Papua New Guinea Forestry College
r) Papua New Guinea Harbours Board Training College, Lae
s) Papua New Guinea University of Technology
t) Papua New Guinea Dental College

4.4 Schools of Nursing (Church)

a) APCM Balimo School of Nursing
b) Kapuna School of Nursing
c) Lutheran School of Nursing, Madang
d) Nazarene School of Nursing
e) Sacred Heart School of Nursing
f) St. Barnabas School of Nursing Dogura
g) St. Genard's School of Nursing, Veifa'a (Bereina, C.P.)
h) St. Mary's School of Nursing, Vunapope
i) Sopas Adventist Hospital
j) Tinsley School of Nursing

4.5 Schools of Nursing (Government)

a) Arawa School of Nursing

b) Goroka School of Nursing
c) Lae School of Nursing
d) Mendi School of Nursing
e) Mount Hagen School of Nursing
f) Port Moresby School of Nursing
g) Rabaul School of Nursing
h) Wewak School of Nursing

4.6 Secretarial Colleges

a) Port Moresby Secretarial College
b) Rabaul Secretarial College

4.7 Technical Colleges

a) Goroka Technical College
b) Lae Technical College
c) Madang Technical College
d) Mount Hagen Technical College
e) Port Moresby Technical College
f) Department of Works and Supply Training Centre
g) Timber Industry Training College
h) University of Papua New Guinea

4.8 Technical Teachers' Training Institution

a) University of Goroka, formerly University of Papua New Guinea – Goroka Teachers' College

4.9 Institutions Relating to Technical Education

a) Curriculum Unit, Technical Division, Department of Education

(List adapted from UNVEOC (1995). A full list of addresses and courses offered is available in the original text.)