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Reform of Vocational and Technical Education
in Latin America

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The globalization of markets is creating increasing pressure for educational reform in Latin America. Indeed, it has been suggested that one of the main objectives of educational transformation in the region today should be to prepare "human resources for increased national competitiveness in an increasingly global economy" (Reimers and Tiburcio 1993, p. 57). Some change has already been introduced, especially to meet the burgeoning demand for vocational education and training (VET). Nevertheless, experience to date suggests that many vital issues still need to be addressed. The existing VET systems, their deficiencies, and suggestions for improvement are the subject of this paper. It draws on published and unpublished materials, plus the experience of the author in the region and elsewhere.

What Is Reform?

Educational reform can be defined as "a thorough change in the structure of the educational system of a country" (Fagerlind and Saha 1989, p. 145). Such change entails "a fundamental alteration in national educational policies." It touches every aspect of the system: the allocation of national resources to education, the allocation of resources within the system, the percentage of students completing different levels of education, the percentage of students from different social and economic strata, and the aims of the

curricula and their content. The purpose of this change is to eliminate defects systematically; this is the "perpetual quest" of policy makers (Covaleskie 1994). A notable characteristic of reform is that it proceeds in a *cumulative* fashion: its "innovative processes are based on the lasting effects of earlier events" (Aguerrondo 1992).

Some of the specific aims of educational reform are to (a) correct abuses, (b) enhance efficiency, (c) improve effectiveness, (d) adjust the policy process, (e) accommodate new groups, and (f) revise goals (Merritt and Coombs 1977). The "innovative processes" by which these aims are achieved usually evolve in three main stages: preparation, implementation, and development (Aguerrondo 1992).

As mentioned at the outset, one focus of attention in Latin America at present is VET reform. VET courses and syllabi are probably in greater need of renewal than academic ones because of "changing labor market conditions and work requirements" (Lauglo 1993, p. 1). That is why the objectives of reform are now being linked to factors outside the education sector. At present, few "reforms seriously consider how school-based academic knowledge is linked to life outside the school" (Bragg 1994). The problem for many countries in the region, however, is how to determine precisely what investments they should be making in order to meet this need.

Traditionally, their training policy and investments have been guided by assessments of skills demand, "most often through a manpower requirements forecast, and a plan for expanding skills supply, generally through construction of public training institutions." Although such assessments are not without merit, they tend to miss completely "the more dynamic aspects of the economic environment, including distortions in incentives for employers and workers to invest in skills training" (Middleton, Ziderman, and Adams 1993, p. 253). This view is bolstered by evidence from current reform initiatives in developed and newly industrializing countries (NICs), which suggests that data on the national demand for human resources (manpower) should be supplemented and possibly replaced by local labor market information. Such information at the local level enables policy makers to ensure that curriculum and course renewal efforts keep abreast of changing work force conditions.

Another problem for policy makers is that much of the information they rely on to make their judgments comes from rather narrow studies undertaken in individual nations (Wilson 1993a). In other words, they lack the comparative insights that would provide a broader basis for their reform efforts, both in revising educational policy (i.e., deciding how to implement reform) and in restructuring the system itself (i.e., applying specific mechanisms). At the same time, many observers caution, change should not be initiated at either level without in-depth study of the specific conditions that the reforms are supposed to address.

"Reforms," says one observer, "should be based on facts about the system and input from its practitioners" and "should not be undertaken without reliable evidence . . . of experience to back them up" (Berliner 1993, p. 4). In fact, all the stakeholders should be consulted. These reminders should be addressed not only to policy makers but also to

policy analysts: a recent World Bank policy paper on VET, for example, was criticized for failing to emphasize "each country's need to formulate its own policy with regard to its own particular context" (Lauglo 1992).

Care should also be exercised in applying precepts across groups of countries. In some cases, the basic premises about school reform may be "faulty" (Berliner 1993).

Yet another pitfall for reformers, as experience in Brazil demonstrates, is that rhetoric often "stands in for educational reform." That is to say, reforms are readily proposed but not put into practice because the political will is lacking (Plank 1990, p.557).

How Is Reform Undertaken?

Reforms can be achieved through (1) innovative, stand-alone projects, (2) sectoral and/or policy changes, and (3) various forms of decentralization (Oliveira 1989). Whichever approach is adopted, its effectiveness will depend on devoting *integrated attention* to all the essential ingredients of a reform effort. These ingredients include adequate resources, financial autonomy and security, efficient educational management, incentives to increase resources and improve the quality of education, adequately trained and remunerated teachers, adequate amounts and a high quality of instructional materials (including training consumables), and appropriate evaluation of student learning. In the case of VET, additional ingredients would be the participation of, cooperation with, and continuing liaison with the industrial and service sectors (Wilson 1990a).

On the basis of their scope, educational policy reforms may be classified as *additive*, *external*, *regulatory*, and *structural* (Plank 1987). Additive policy reforms require the least amount of organizational change, whereas structural reforms require the most. Additive policy reforms might include new revenues, salary increments, and computer usage. Moving along the spectrum, external reforms would encompass certification changes, revised admissions criteria, subsidies for teachers, enhanced mathematics and science curricula, increased graduation requirements, and exit tests. Regulatory reforms would include the transfer of VET responsibility from one ministry (or authority) to another, a lengthened school day and/or year, smaller class sizes, increased basic skills, fewer extracurricular activities, and national and/or statewide assessment. Structural policy reforms could include in-service teacher tests, career ladders, merit pay, smaller classes, and tax credits. To these categories might be added *systemic reform*, which would refer to a drastic raising of standards in public secondary schools, to bring them up to those in the best private and public institutions (Carnoy and Castro 1996).

The general framework in which educational reform might take place, that is, the nature of the project, policy, and institution, is outlined in Table 1.

Table 1. Three Policy Frameworks: Institutional Correlates

Project	Policy	Institutional
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			Correlates
Instrument	Project	Regulations	Institutions
Time Frame	Short	Short/medium	Medium/long
Scope	Intervention	Specific policy	Locus and quality of decisions
Source of Motivation	Visibility of results	Economic	Political
Measure of Success	Project completion	New policies	Self-correcting institutions
Structure	Ad hoc	No change	
Incentives	Bureaucrat	Policy-makers	Strong schools/leaner administrations
Initiative	New Minister/donors	External	School-level
			Any actor

Source: Oliveira (1989)

As has also been pointed out, "the effect of modifications throughout an educational system is . . . important, since the 'ripple,' or 'multiplier' effects of any changes induce both anticipated (planned) and unanticipated (serendipitous) changes throughout the entire educational system (and often beyond)."

Selected Examples of VET Reforms in Latin America

Thus far, the countries of Latin America appear to have been successful with their VET programs financed by payroll levies, such as the Serviço Nacional de Aprendizagem Industrial (SENAI) in Brazil, SENA in Colombia, and Instituto Nacional de Aprendizaje (INA) in Costa Rica. These can best be described as "vocational/technical centers," as opposed to regular schools or in-firm training programs. This financing mechanism seems to have provided "a greater incentive to establish closer ties with employers than do academic vocational/technical schools. Such programs are therefore also more sensitive to changes in demand with structural adjustment. They are more likely to prepare young people for jobs in the rapidly expanding service industries and small enterprises that can adjust rapidly to changing product demand" (Carnoy and Castro 1996, p. 34).

Most VET reform initiatives in the region have occurred in periods of industrial and economic growth. One such period was 1942, when exports from Europe and North

America were disrupted owing to the Second World War. In response, some countries began industrializing on a large scale but quickly discovered that they were deficient in technological training. To train the number of semiskilled workers who would be needed to assist in this industrialization, Brazil created SENAI. Since there was a shortage of qualified instructors, Brazil adopted the *seria metódica ocupacionais* curriculum originally developed by Ricardo Mange of the São Paulo Polytechnic in 1934 for the Centro Ferroviario de Ensino e Seleção Profissional of the São Paulo State Railways. Mange subsequently became the regional director of SENAI-São Paulo, serving from 1942 to 1955.

Colombia decided to adopt the SENAI system after one of its senators (who later became president) visited Brazil in 1952. Subsequently, the director of training at SENAI-SP, João Batista Salles de Silva, came to Colombia under ILO auspices to assist with the creation of SENA. This development coincided with the expansion of import-substitution industries and export diversification in Colombia during the 1950s. The creation of the ILO Research and Documentation Center for Vocational Training in Latin America (CINTERFOR) in 1961 facilitated the further replication of the SENAI model in 19 other Latin American nations (Wilson 1991a). Since that early period of reform, VET has undergone a variety of changes, which can be summarized as upward expansion; decentralization, privatization, and sectoralization; management reform; and external initiatives.

Upward Expansion (Differentiation)

Some countries in Latin America are currently expanding the VET system from the secondary to the post-secondary level of training to provide the technicians and technologists required by the region's modernizing industries. Some writers label such system expansion as "upward differentiation". This reform is proceeding with considerable difficulty, however.

Once again, Brazil's SENAI appears to be on the leading edge of VET reform. In the past decade, SENAI has developed a post-secondary sector to complement its training of apprentices at the post-primary level. This expansion began in the São Paulo SENAI with the development of post-secondary technician and technologist courses at existing CFPs in collaboration with universities. The new sector now consists of Centros Nacionais de Tecnologia (CENATEC), modeled on the Centro Tecnológico de Indústria Química e Têxtil (CETIQT) in Rio de Janeiro, which has had two-year post-secondary technician-training courses since 1979. Because the Brazilian textile industry ranks sixth worldwide, the training of competent and competitive human resources has become imperative. In response, CETIQT has added training components for (a) materials testing and applied research, (b) technical assistance to industry, and (c) the provision of technological information services to industries. In 1991, the 14 SENAI Special Technical Courses developed on the CETIQT "model" were renamed Centros Tecnológicos and SENAI began discussing how to update the technological content of its training programs (Wilson, 1995a).

In 1990, with assistance from the Canadian International Development Agency (CIDA), SENAI developed two new CENATEC centers: Centro de Tecnología Industrial (CETIND), located in Salvador, Bahia, to train chemical process and instrumentation technologists for the petrochemical industries; and Centro Regional de Tecnología de Alimentos (CERTA), located in Petrolina, Pernambuco, to train biochemists and quality-control technicians for the food processing industries. These two centers differ from other CENATECs in that they only offer training at the post-secondary level. This is a completely new departure for SENAI. This development parallels the creation of technical colleges in Europe and North America from the 1930s onward.

Another case in point is the trend in Mexico to push technical education into the tertiary level. Here, relatively low-cost polytechnics have been created by linking students to local businesses "with students working at local firms part-time during their studies as part of their training program" (Carnoy and Castro 1996, p. 34).

Decentralization, Privatization, and Sectoralization

Another notable reform initiative has been the move to decentralize and privatize the previously centralized VET systems and also to introduce sectoral specialized training. Brazil began its decentralization efforts as early as 1942, with the inception of SENAI, and the SENAI CENATEC infrastructure has developed in response to industrial sector needs in the various SENAI regional departments: textiles in Rio de Janeiro, food technology in Pernambuco, petrochemical technology in Bahia, and the automotive industry in São Paulo.

Chile has perhaps been the most prominent "laboratory" for decentralization. Between 1964 and 1973 Chile's reforms concentrated on increasing TVE enrollments, which, in relative terms, rose from about 31.3 percent to 36.6 percent at the secondary level. Little attention was given to curriculum content, teaching methods, teachers' skills, or the relationship between TVE and the labor market (Corvalan 1987, p. 9). Over the past twenty years, however, Chile has undertaken a major overhaul of its system by diversifying and decentralizing in the context of increasing private provision of education and training services. It has also expanded its post-secondary education capacity through the establishment of new private institutions, separate from universities. These are known as Technical Education Centres (Centros de Formación Técnica, CFT) and Professional Institutes (Institutos Profesionales, IP). They offer three to four year programs in advanced technological education. By 1989, CFTs were drawing a higher percentage of secondary school graduates than universities (Martínez Espinoza 1994, p. 4).

With decentralization at the middle level, the management of former public schools passed either to federations of industries or to local governments (municipalidades). The central authority, through the ministry of education, now concentrates on basic curricula standards and allocations for school operations. Decentralized school management appears to be responding to industrial needs, especially in industry-managed establishments. By 1990 Chile had 70 Upper Secondary Technical Schools (Liceos de

Educación Técnico Profesional) being managed by industrial federations such as Sociedad de Fomento Fabril (manufacturing sector employers) and Sociedad Nacional de Agricultura (agriculture sector employers). These technical schools have close ties to industries: for example, employers participate in school planning and curricular design, teachers and students make "study visits" to industries, industry professionals and technicians lecture in technical schools, industry cooperates in work experience programs, and industry contributes equipment and materials to schools (Martínez Espinoza 1994).

One of the main steps in privatizing VET was to discontinue direct public financing of Chile's official national training institute (Instituto Nacional de Capacitación, INACAP) and turn it over to the private Trade and Production Federation (Confederación de la Producción y el Comercio). The Institute remains one of the country's most important vocational training institutions but now functions as a market-oriented agency selling its services to subsidized firm-based training and publicly sponsored programs (for example, the Youth Training Programme). Its clientele are secondary school graduates seeking advanced technological education as an alternative to university education. "Overall," it can be said, "direct public provision of vocational training services through INACAP has been replaced by a demand-side subsidy to more than 12,000 firms performing training activities and by publicly financed training grants for workers not covered by firms' programmes. On the supply side, more than 1,700 private training agencies actively compete to capture private and public training demand" (Martínez Espinoza 1994, p. 5).

Interestingly, these reforms paralleled the unprecedented economic and industrial growth Chile experienced between 1986 and 1992. This was also the period of the privatization of the Chilean economy. Note, too, that with the privatization of INACAP, its clientele changed: from poorer urban students to the offspring of the well-to-do who were unable to gain entrance to universities and used INACAP as an alternative means of obtaining post-secondary credentials (Castro and Bas 1991).

The reforms in both Brazil and Chile have shifted the focus of VET from generalized preemployment and in-service training to sectorally specialized training. As noted earlier, Brazil's new SENAI CENATEC infrastructure comprises post-secondary institutions that offer technician and technologist training geared to various sectors of industry and the economy. Chile's move toward privatized training has also had a sectoral focus. These developments are in all likelihood the result of the decentralization of training to local venues in Brazil and the market-orientation of training in Chile.

Management Reform

Some Latin American countries have experienced serious problems with the management of training activities. Venezuela, for one, found that its National Institute for Educational Co-operation (INCE) was perceived to be not only providing irrelevant training but was also suffering from mismanagement. As a result, a senior executive of the human resources department of Venezuela's largest oil company was named president of INCE

and asked to reorganize the institute. As part of the reorganization, the institute is seeking closer participation with the private sector in the provision of training, endeavoring to rationalize and modernize its course offerings, conducting surveys to identify employers' needs, and developing "flexible modular training emphasizing skill development rather than credentialism" (Reimers 1993). These management and curricular reforms appear to have brought INCE in line with other national training agencies in Latin America. In 1990, the institute trained 360,000 workers in over 28,000 courses (Reimers 1993).

Management reform has also received close attention in Honduras. During the reform of private sector training in Honduras under a USAID project, the government established the Centro Asesor para el Desarrollo de Recursos Humanos de Honduras (CADERH) in 1984 to redress the perceived inadequacies of the national training board, Instituto Nacional de Formación Profesional (INFOP). This board was found to be experiencing numerous problems: high overhead expenses, under qualified instructors, lack of instructional relevancy and quality, and poor coordination. Furthermore, "although employers were paying the bill for INFOP, they had little say in the way training was delivered or in establishing standards for its quality and substance" (Hershbach, Hays, and Evans 1992, p. 81).

With the financial support of USAID, CADERH began an in-depth assessment of these various problems and Honduras' training capabilities. One of the first steps it took in response was to increase employer membership, which rose to 300 by 1990. The institution also established departments of Vocational Education and Testing, In-plant Training Needs Analysis and Programs, and Multimedia and Materials Production. With these initiatives, CADERH shaped itself along the lines of a service center capable of addressing training-related problems together with other problems encountered by employers. It can provide these services directly or make referrals to other agencies.

In addition, CADERH has developed competency-based instructional materials in six trade areas. To this end, it has instituted volunteer trade advisory committees composed of employers, highly skilled workers, and vocational training instructors, whose task is to develop specific performance objectives and assessment criteria. It has also developed certification tests in six trade areas and is preparing tests in four others. As a result of these and other efforts, CADERH claims a 50 percent "reduction in instructional time ... a program retention rate of 80 percent, and a job placement rate of 70 percent," with instructional cost averaging "about \$0.25 per person-hour of instruction" (Hershbach, Hays, and Evans 1992, p. 28).

Despite these successes, CADERH will need more time to fully recover its costs. Thus it will require continuing external assistance, as well as possible access to the INFOP payroll tax. It also needs to negotiate a constructive working relationship with INFOP, the key institution in the country's publicly financed nonformal training system, to ensure that the two institutions do not become rivals.

With the help of USAID, CADERH has developed into an instructional delivery system that can be reproduced in other Latin American countries. Brazil has already experienced

a similar initiative (Gomes 1991). When a group of businessmen in the municipality of Montes Clares had their request for a SENAI CFP denied, the local district decided to create the Educational Foundation of Montes Clares (FEMC) in 1976 to address the lack of a qualified local labor force and the difficulties in recruiting skilled workers for a small provincial city. Such local initiatives could be repeated elsewhere, but success will depend on ensuring that training programs are designed in accordance with local needs, salaries and turnover are kept down, and trainees are employed at relatively low wages. It should also be pointed out that most students in FEMC programs are poor, and that "the income of the FEMC comes from the fees paid by students and their families, from scholarships and other contributions provided by local firms, and from the sale of services. It is a part of the operating philosophy of the school that the student should pay at least a part of the cost of the training provided. The fees that each pays vary with family income, with most students paying between 30 and 70 percent of the total cost" (Gomes 1991, p. 6).

External initiatives

Occasionally, an external reform initiative leads to a structural reform. In Brazil, for example, one component of Canadian aid, the Women in Development (WID) initiative, promoted women's awareness of opportunities in VET and employment through increased access to SENAI training. These initiatives began with assistance to the SENAI Bahia Regional Department and were rapidly adopted by other state SENAIs, and eventually incorporated in SENAI National Department planning and budgeting within the short span of three years.

What Does Introducing Technological Education involve?

Since its creation, SENAI has experienced continuous *additive reform*. Its original practical training system has undergone constant modification. Perhaps in part because of this pattern, it has evolved into a highly integrated training system in which every component (e.g., facility design, equipment procurement, instructor training, the just-in-time delivery of consumable training materials, etc.) is cross-referenced to the *seria metódica ocupacionais curriculum*.

This SENAI "culture" is currently undergoing a painful modernization, as its post-secondary sector is being developed. The highly centralized, didactic, and authoritarian approach that has characterized SENAI since its inception is being changed to conform to the new realities in modernizing workplaces. Instead of training workers capable of dutifully following orders, SENAI is now faced with training *knowledge* workers or the technician and technologist levels. In other words a knowledgeable worker must be able to diagnose and solve production problems, undertake sophisticated laboratory analyses, and use their knowledge for innovation, rather than replication. In sum, they must be capable of *logical-abstract thinking*.

These transformations are embodied in the 1994 SENAI Strategic Plan for the Restructuring of Models of SENAI Occupational Training:

A introdução da microeletrônica nos processos de trabalho exige novas capacidades, destacando-se a capacidade do pensamento lógico-abstrato, na medida em que essa base técnica opera basicamente através de símbolos e do pensamento científico. Na difusão da automação, poderá ser muito alta a demanda sobre o sistema de formação profissional por uma mão-de obra com um novo perfil: capacidade de resolver problemas novos, habilidade para trabalhar de modo cooperativo, capacidade de comunicação, entre outras. (1994)

The SENAI spirit of innovation and adaptation, combined with an emphasis on technological education and competency-based occupational training, appears to have prevailed over the hierarchical system epitomized by the *seria metódica ocupacionais*. Moreover, this emphasis on competencies more than on professions or occupational roles seems to be permeating all the nations in the region. As has been pointed out:

Los mecanismos de formación profesional deben adaptarse a estas nuevas demandas y flexibilizarse ante este conjunto heterogéneo de trabajadores y trabajadoras.

and

el concepto de competencias, y sobre todo el de *competencias básicas*, definido como la capacidad de responder a determinadas y variadas demandas en aspectos específicos. Este conjunto de conocimientos y aptitudes requiere quizás menos destrezas manuales y capacidades operativas, pero exige cada vez más la capacidad de abstracción, de pensamiento lógico. (Gallart and Novick 1994, p. 16).

This new emphasis on technological education means that greater attention must be focused on instruction in mathematics, science, and technological concepts directed toward the understanding of and ability to apply technology (see Wilson 1993a). That is a tall order in countries without a long tradition in these areas of education. Yet, it is widely agreed that "scientific learning is an area that merits high investment priority": "In a context of economic uncertainty and rapid technological change, HRD policy must seek to improve the quality and flexibility of manpower. Experience shows that this is more easily achieved when students have benefited from long and solid basic science training" (Hallack 1990, p. 123). Indeed, "la necesidad de un replanteo de los conceptos de ciencia, tecnología y técnica en la organización del conocimiento y de una articulación crítica entre las estructuras curriculares y la aplicación del conocimiento en el mundo del trabajo" (Gallart 1992).

As already indicated, these transformations also involve collaboration between post-secondary training institutions and productive enterprises. Such interaction has become vital since modern industries require a labor force with "capacidad para procesar información y para resolver problemas, de capacidad para el trabajo en equipo, de un muy buen manejo de los códigos básicos en los cuales circula la información (la

lectoescritura, las matemáticas, la computación), de la capacidad, incluso, para participar en las decisiones" (Red Latinoamericana de Educación y Trabajo Seminar 1991).

The necessary transformation has also been described as a move away from training the "standard worker" to training a "polyvalent worker" (Leite 1992). That is to say, in the modern work environment personnel must be able to assimilate new production technologies and processes, as well as management techniques. Their capabilities must be broad in scope, encompassing operation, programming and maintenance of CNC (Computer Numerical Control), measurement and instrumentation control, basic mathematics, reading and interpretation of technical mechanical design, and statistical process control.

At the same time that they are expanding into polyvalent functions, training institutions are finding it necessary to become more self-reliant. This change is part of the burden of structural adjustment, which has meant a reduction in education expenditures, both in real terms and relative to total government expenditures. Thus, in addition to conducting training, applied research, and technical documentation, many institutions are being forced to contract their services to industries. This constitutes a new method of financing these institutions and may become increasingly important. In Brazil, for example, the industrial levy of 1.5 percent of payrolls (collected by INSS, the Ministry of Social Security for SENAI) is in danger of being eliminated. SENAI is therefore preparing to move to a cost-recovery system of financing its training and services to industry. The Chilean system, too, has experienced considerable dislocation and similar pressures as a result of privatization measures.

Current Deficiencies

One of the greatest problems with VET reform is that it is taking considerably longer than initially estimated to yield the planned results. Experience outside the region confirms that the "gestation period" can last anywhere from 10 or 15 years (Singapore and Taiwan) to 25 years (Japan and the Republic of Korea) (Wilson 1993a). Despite a major expansion in secondary education enrollment in Latin America and the Caribbean since the 1950s, which is the level of schooling that most young people have when they enter today's rapidly changing economy, the structure of secondary education is changing all too slowly. Little change has occurred in four areas in particular:

First, its *objectives* have hardly changed. Second, the *delivery* of both traditional academic and vocational secondary education remains essentially the same as in the 1950s, when student bodies and educational quality demands on this level were very different. Third, the *resources* available per student at this level have generally declined relative to both primary and university education. Fourth, secondary schooling has responded very slowly, if at all, to the *changing skills demanded* of their graduates entering directly into rapidly changing labor markets. (Carnoy and Castro 1996)

Furthermore, it appears that some VET students are aspiring to university entrance and thus downgrading the value of training in the technical trades. A related concern is that although VET training has become less "vocational" and more "technical" and is giving less shop instruction and more academic instruction, the preparation in academic subjects and occupational training are both of rather low quality.

Another problem is that VET reform is paying too little attention to "the routine and preventive maintenance of facilities and equipment" (Wilson 1990a, p.103). Even policy analysts have tended to overlook maintenance, except in a few instances (Hallak 1990; Wilson 1990a; and Kanawaty and Castro 1990).

Yet another problem is well illustrated by the Chilean VET reform effort. With a decentralized system it is more difficult to "(a) co-ordinate nationwide educational policies and strategies; (b) benefit from economies of scale in administrative tasks and general purpose activities such as teacher training, teaching material production and education technology research and development, and (c) correct regional disparities" (Martínez Espinoza 1994).

The root problem, others say, is that the reforms have failed to (a) see the *need* for reform; (b) conceptualize reform as an all-embracing process; (c) properly diagnose problems; (d) interpret reform documents; (e) begin implementing reform; (f) provide logistical support; (g) avoid discontinuities in implementation; (h) emphasize integration; (i) introduce a monitoring mechanism; and (j) seek the support of stakeholders (Oanya 1989). Some also believe that the difference between successful and unsuccessful reforms lies in the nature of the processes involved (Aguerrondo 1992). Successful change, on the one hand, is marked by consolidation, as innovation takes root. Failed reforms, on the other hand, are often marked by bureaucratization, which waters down the innovation to such an extent that it loses its character. In the end, the project may be halted.

Suggested New Modalities

A number of suggestions have been put forth to rectify the various problems just described and to strengthen the reforms already under way. Some of them focus on the content of the curricula, urging a greater emphasis on mathematics and numeracy skills, the sciences, and computer science. "Training for narrow specialisations without the requisite conceptual and broader content," some analysts argue, "induces rigidity in the occupational structure." They want to see programs becoming "broader, richer and modular to facilitate adaptation from one technology to another and upgrading from one occupation to others of the same type" (Kanawaty and Castro 1990). Many are also concerned about the need to prepare their citizens "to fight the economic wars of the next century" (Wilson 1990b). Indeed, the growing emphasis on higher-technology subjects is moving in tandem with the focus on global competitiveness and the modernization of the extractive, productive, service and informatics sectors of the economy (Wilson 1993a). The Latin American nations, like those in other parts of the world, are recognizing that they must reform their educational systems to re-equip industry and update the

knowledge base in both the existing and future labor force (see Neave 1988). The "complementarity between education and new technology" is such that "a more literate, numerate and socialized labor force would raise the rate of return to investing in new technology because it would be cheaper to train it to apply the new processes and to work in new kinds of work organizations" (Carnoy 1993).

This suggests that reforms promoting a convergence of technological education and VET may be a precursor to the successful adoption of new technologies in the workplace. "Recent developments in technology and work organization," it has been suggested, are "blurring even further the distinction between education and training."

Others, however, have been suggesting that occupational training should be postponed until after completion of one's academic education. This view can be traced to what is known as the "vocational school fallacy" (Foster 1965), which posits that developing countries should invest in academic secondary education rather than VET, because schools are very clumsy instruments for addressing manpower shortages. A World Bank policy paper on VET appears to continue this thread, because of the Bank's reliance on rate-of-return studies that favor investment in academic education.

Evidence from regions other than Latin America indicates that the demand for an academic, rather than a technical-vocational, education reflects the realities of the labor market and levels of remuneration. In Ghana before its industrialization period, for example, a number of students perceived an "academic" secondary education as their appropriate "vocational" education, since it led directly to the clerical and white-collar occupations they valued (Foster 1965). With the development of industries and the expansion of the service sectors, however, VET graduates were the ones who found remunerative and prestigious opportunities. To give but one example, successful A-Level (academic secondary) graduates unable to find employment entered VET programs at the Accra Technical Training Centre (where the entry qualification was only a Middle School Leaving Certificate) to be trained in technical fields which did lead to employment opportunities.

The point is that an optimal balance between academic education and VET must be determined by the traditions, requirements, and capabilities of each nation. There is no universally applicable criterion, or standard, or even model. For all those countries in which VET has produced many graduates for whom there were no employment prospects, it is possible to cite other countries, or even more precisely, regions within countries, in which the demand from the industrial and service sectors for VET graduates cannot be met by VET institutions and in which VET graduates are valued by employers.

Furthermore, the choice does not have to be "either/or," but rather "both/and," because *quality* VET must be built upon an identical "academic" education. Even critics of VET would acknowledge the "complementarity of general education and skill training" (Psacharopolous 1985), although they might add that "policies that have sought to solve large-scale problems of youth unemployment by expanding vocational schooling have not been effective where economic growth is too slow to provide sufficient employment

opportunities. In too many countries, inefficient vocational education and training systems have simply wasted scarce educational resources" (World Bank 1990).

One example of an educational system in which this reform pattern has been successful is Israel. The 1988 Reform of Technological and Scientific Education was aimed at exposing students in non-vocational streams to technological education, attracting girls to scientific fields and technology, opening up student mobility according to ability, providing an improved scientific education for technology students, and improving in-service professional upgrading for teachers and inspectors. More specifically, the reform was designed to

1. Give every student the chance to study and be examined according to personal ability and not according to paths.
2. Postpone the choice of stream and specialization until Grade 11 instead of Grade 10.
3. Concentrate streams in technological education from 90 to 25 main streams.
4. Change the nature of training for the better pupils in technological education on the assumption that they will continue to post-secondary education.
5. Provide greater choices and vocational specializations for the weaker students.
6. Develop the subject of "technology" in primary schools so as to give students (both boys and girls) an understanding of the basic processes in technology and familiarize them with innovative subjects such as electronics, robotics, and computerization.

Several VET reforms being considered and adopted by VET systems in Latin America originated in Japan. Virtually all training in Japan takes place on the job, by means of job rotation. Because Japanese firms are overtly structured as learning organizations, the task of passing on knowledge and new techniques is assigned to a "key worker," who is highly trained not only to perform a technical function but also to teach (Wilson 1995c).

Another Japanese notion being adopted in the region is that of quality control, which was originally developed by the U.S. industrial engineer, physicist, and statistician, W. Edwards Demming and then picked up by Japan in the 1950s. That along with key worker training put the emphasis on quality in the skills training system. As a result, *kaizen*, or continuous improvement, became central to the learning organization. In addition, the Japanese "system" has recently begun promoting cross-training through job rotation to encourage workers to become trained in more than one skill area, usually in both mechanical and electrical or electronic fields. The Japanese consider this kind of training essential for the installation operation, maintenance and repair of robotic equipment.

The SENAI Centro de Tecnología Industrial is currently adopting elements of cross-training and total quality management (TQM), as well as aspects of continuous

improvement. Similar initiatives at the SENAI national level have resulted in the CENATEC Sistema de Avaliação Categoria Bronze, based upon the Demming Prize in Japan and the Malcolm Baldrige National Quality Awards in the United States (Wilson 1995a).

In the area of financing, the provision of VET has been greatly affected by national income and trade policies. Income policies that reduce market competitiveness, although designed to correct social inequalities, often distort the demand for VET. Minimum wage policies, for example, influence enterprises to reduce skill training.

VET reform in Latin America has also been influenced by the shift from protectionist economic policies to competitive policies (associated with the globalization of trade) and, as mentioned earlier, by the structural adjustment undertaken in many countries. With the opening of markets to international competition, workers in Latin America have had to upgrade their skills and knowledge during pre-service training in order to improve productivity and, thus, competitiveness. The electronics (particularly computer) industry in Brazil is a case in point.

Another reform has been the addition of a training stage, or work experience component, to technician and technologist training. This development has been complemented by the addition of pilot plants to technologist training institutions in which both research and instruction take place. The polyvalent role of such institutions is reinforced by the presence of facilities used to replicate the industrial processes taught.

The fact that Latin American vocational training institutions (VTIs) are having to diversify their sources of financial support has already been mentioned. This has entailed broadening the base of funding sources, "doing away with structural rigidities that derive from the pressure applied when contributions stem from a single source," selling "appropriate products and services," and decentralizing financial management so as to confer greater autonomy to provincial or state centers and departments, as well as to regional or municipal units (Ducci 1991). These financial reforms stem almost entirely from initiatives that were external to VET, yet that induced major changes in the systems. These changes involved not only overall resource inputs but also reallocations within sectors of VET systems.

Lessons Learned from Previous Reforms

Numerous assessments have been made of previous educational reforms. Their observations can be broken down into several categories: policy formulation; funding; political considerations; curriculum reform; project implementation; monitoring and evaluation; the delivery of training; facilities, equipment, training consumables, and maintenance; and management of reform.

Policy Formulation

It has been found that educational policy reform is approached in a number of ways. One strategy is known as "the-quiver-of-arrows" (Heyneman 1988) or "piecemeal" (Oliveira 1989) approach: choices are made from a "menu" of policy options. These options cover a variety of critical issues, such as textbooks, teacher remuneration, budgeting and resource allocation, educational technologies, examination of students' performance, and changes in the educational input mix and technical-vocational education.

Another approach, "sector reform," involves much broader intervention in the entire education sector, or in selected areas of education. Sector reforms are usually driven by forces external to the education sector, since they consist of major departures from existing practice. The introduction of broad curriculum changes in VET to make education more responsive to the perceived needs of employers is a good example of an externally driven sector reform (Oliveira 1989).

It has been said that the successful reform of policy formulation depends on the choice of issues, the establishment of priorities, the existence of adequate information, and the local capacity for implementation (Schiefelbein 1988). Some reforms succeed because they reinforce existing practices, whereas others require more radical measures, such as the use of media and distance delivery to supplement untrained or undertrained teachers or increasing teacher remuneration (as SENAI has recently done). Externally induced reforms, it has also been noted, rarely last long enough to ensure sustainability (Rondinelli, Middleton, and Verspoor 1989) and are unlikely to succeed if sectoral policies are backed by an inadequate institutional framework (Johanson 1986). Where the institutions are strong, the sector reform is successful, as in the case of the World Bank's involvement in the sector reform of technical training in Brazil, which operated in association with SENAI and SENAC.

Funding

One of the most prevalent observations about educational reforms is that they are typically underfunded (Oliveira 1989). SENAI in Brazil and the former Vocational and Industrial Training Board (VITB) in Singapore were described as being among the "best" national training systems in the world because their funding was ample and secure (Wilson 1991a). Both systems benefit from a viable industrial levy system that allocates between 1 and 2 percent of all industrial payrolls to occupational training. Although many other nations have similar levies in place, they do not contribute enough to keep their VET systems viable. By way of example, competition between the Ministries of Labour and Education in Kenya appears to have reduced access to levy funding by the Kenya Technical Teachers' Training College and the Harambee Institutes of Technology (Wilson, 1990a).

Another lesson concerning funding centers on notions advanced by some economists seeking to infuse cost-effectiveness considerations into the policy debate over funding to VET and "academic" secondary schools. They cite rate-of-return findings as a reason for slowing investment in VET in developing nations (e.g., Psacharopoulos 1985; McMahon 1988). Others, however, question the precision of these findings, and see them as

unrealistic (Klees 1986; Wilson 1990c). As a case in point, they note that the age-earning profiles and rates of return between graduates of technical and academic secondary schools in Indonesia decreased by 11 percent over a ten-year period (measured in five successive studies). A 3 percent difference between the social rates of return for male academic and technical-commercial senior secondary school graduates is said to be a questionable foundation for recommending reductions in the growth of VET. While the cost differentials between academic and technical secondary schooling will always favor the academic, since quality technical schools consistently require greater investment, it is considered unwise to recommend policy changes at a time when a decade of investment in VET is beginning to "pay off" (Wilson 1990c). Abrupt changes in policy are also dangerous in the longer term. Note, too, that "reforms are . . . at the mercy of economic decisions taken outside the educational field" (Aguerrondo 1992, p. 162).

If economists are concerned about returns, an instructive case is Colombia's SENA industrial apprenticeship program. This program has increased lifetime earnings, which have been referred to as the "SENA effect" (Puryear 1979). Also noteworthy, this effect on earnings varied with the amount of basic education received prior to the commencement of VET at SENA, as well as with the size of the employing establishment. These factors point to the immense complexity of the effects and impact of participation in both VET and academic education and warn against using narrow research to infer "prescriptions" for other jurisdictions with different VET systems.

Political Considerations

Many a reform process has failed to achieve its expected results because of political impediments. A classic case is that of Argentina, which after World War II was said to be ripe for an economic "take-off." What early development economists had neglected to factor into their predictions was the political impact of Juan Domingo Peron on Argentine development. That case should be a reminder that reforms can fail even if one essential factor is mistakenly taken for granted (Wilson, 1990a). This example also emphasizes the interrelatedness of all factors in the reform process.

The extent to which VET policy decisions have been based on political considerations is difficult to determine because few studies have addressed this issue in depth. Also, political considerations are often couched in terms of other criteria to justify decisions. Some factors of this nature that affect VET policy decisions appear to be labor market conditions, improved labor productivity, school-leaver unemployment, social demand for education and training, the need to distribute training opportunity widely, and the vocationalization of education "in the hope that a supply of trained people will generate its own demand" (Lauglo 1993). As this discussion shows, to this list should be added privatization and decentralization.

Some have even blamed political factors for the failure of reform in general. Some see education as an "eminently political" subject and argue that "the right time to act does not always coincide with the politicians' needs" (Aguerrondo 1992, p. 357).

Curriculum Reform

Curriculum reform in Latin America has been proceeding reasonably well, in part because of the regionalization of VET through the activities of CINTERFOR. The focus upon regionalisation reflects the remarkable similarities observed in several regions (of Asia, North America, Europe and Latin America) between VET curriculum reform efforts. One observed curricular reform is the 'upward differentiation' of specialisations: that is, deferring streaming students into specialised VET tracks in early grades until either the last two years of secondary school or post-secondary studies. Another reform initiative involves permitting access to post-secondary education by secondary technical school graduates. The promotion of competency-based modular curricula has kept Latin American VET current with worldwide trends. The countries of the region appear to have side-stepped the "institutional constraint" imposed by the lack of a national capacity for curriculum development (see Middleton, Ziderman, and Adams 1993) by relying on regional cooperation in VET curriculum development.

Among the impressive curriculum innovations in the region are the individualized instruction instituted at the Euvaldo Lodi SENAI CFP in Rio de Janeiro and the modular approach developed by INA in Costa Rica.

Project Implementation

Reform efforts in Latin America are often hampered by weak management, shortages of matching funds, slow recruitment of technical assistance, the delivery of equipment before completion of technical assistance, and cost overruns due to high inflation (Oliveira 1989). As a result, it takes an average of 7.5 to 8 years to complete a reform project in the region. The World Bank has determined that externally funded initiatives generally take twice as long to be implemented as originally planned.

Some ideas about how to speed up implementation come from projects outside the region. An innovative project manager, for example, was able to "turn around" the poor implementation performance of the Kenya Technical Teachers' College by persuading the Kenyan authorities to have project equipment delivered in bonded containers to the project site, and then opened and cleared at the same time as the equipment was installed. This strategy (which is not unlike the "just-in-time" concept behind Japan's system for component delivery) made it possible for a project eighteen months behind schedule to be completed on time (Wilson 1983).

Implementation is also bound to suffer when reforms are based solely on technocratic assumptions, with little attention paid either to institutional realities or incentives (Wildavsky and Pressman 1974). A typical mistake of Latin American "technocrats" has been their failure to understand these realities before acting (Oliveira 1989). As a result, they repeatedly encounter the same obstacles and have no sense of how to frame alternative strategies.

In addition, implementation is adversely affected when the intended policy faces "social rejection" or is unrealistic. To guard against these failings, "policy statements should be *concrete* and *feasible* in terms of objectives," and "the *substance of a policy* should be based upon research-proven cause-and-effect relationships, rather than upon 'good-will' and 'intuition'" (Psacharopoulos 1987).

Monitoring and Evaluation

Abundant evidence is now available to show that monitoring and evaluation are integral components of the educational planning process (e.g., Wilson 1977, 1984, 1995b). Yet mechanisms to monitor the implementation of reforms, or to evaluate their effectiveness, are seldom put in place. One approach to this task is known as "formative evaluation" since it takes place during the implementation phase. This approach is useful for making adjustments during implementation, but its results often appear to be an inconclusive and random array of data. The problem here is that the planners have neglected to identify at the outset the intervening factors that actually affect the chances of a project's success. Another approach is the summative evaluation, which is undertaken at the conclusion of a project. While useful for final reports or for providing the basis for new projects, it is of little use for improving a project during its implementation.

Project monitoring has received even less attention. Early VET aid projects had no built-in monitoring functions whatsoever, and both multilateral and bilateral agencies did not begin to add monitoring functions until the 1970s. Furthermore, early monitoring efforts failed to alert project personnel and donors to events that could have been corrected during the implementation phase. This is not to say that project monitoring has been a failure; rather, a commitment to monitoring and action based upon monitoring must be built into VET projects. The evaluation and monitoring experience of CIDA/SENAI projects in Brazil suggests that these functions can make significant differences. As a result, SENAI appears to have become interested in adding evaluative and monitoring components to its institutional planning processes. It is hoped that future projects undertaken by other agencies will also include such commitments.

After two decades of hearing practitioners and authors stress the importance of evaluation to the planning (and re-planning) process, most international finance institutions such as the World Bank, Asian Development Bank, and Inter-American Development Bank have been motivated to institutionalize evaluation. In fact, some of these institutions are now being criticized for perhaps going too far in their commitment to evaluation in that they are at times evaluating projects and reforms before it is worthwhile to do so. The danger here is that the results of such early evaluations may sink a project that might have eventually been successful. Indeed, it is unwise to judge "any educational change the year after it has been introduced" because premature evaluations often "are not made on the basis of hard and fast criteria derived from the fundamental principles of the reform process" (Aguerrondo 1992, p. 362). Taken together with the current fixation on sustainability, this trend leads one to ask whether evaluation is being misused by some agencies and governments, especially in view of the fact that many reform projects, as already mentioned, take up to eight years to be effectively implemented. The point is that

every effort must be made to achieve a judicious "balance" by those monitoring and evaluating the reform process.

Delivery of Training

Some questions have been raised about the overall strategy of expanding "formal" educational and training systems in concert with the growth of the modern industrialized sectors in developing nations (Herschbach 1989). The fact is that many of these nations rely primarily on the informal sector to maintain the economy, and therefore more people are employed in small businesses, craft-based workshops, and informal service sectors than in modern industries. The work units in these informal sectors are typically small and workers tend to fall into the categories of entrepreneurs, establishment workers, independent workers, and casual workers. While those in the first two groups are often educated in formal institutions, those in the other two are usually illiterate. In many cases, they are too poor to make use of any available educational opportunities or have no time or opportunity to do so. One way to resolve this problem is to provide informal education, or on-the-job education without formal training (Herschbach 1989).

The Latin American VET infrastructure appears to have addressed these issues by shifting training away from large enterprises toward medium, small, and micro-enterprises. The SENAI Centro Regional de Tecnología de Alimentos, for one, has made a point of serving enterprises of all sizes. Costa Rica's Instituto Nacional de Aprendizaje, for another, has focused on training for small enterprises since its creation in 1965. Early on, it recognized that the nature of industrial, commercial, and service establishments did not warrant "large-scale apprenticeship training, or training within industry on a massive scale" (Wilson 1991a). The scale of training activity in Costa Rica served to make its system one of the two sources of the Modules of Employable Skill (MES) promoted by the International Labour Organisation (ILO).

Another delivery concern of both institutional and on-the-job VET is the relatively slow adoption of distance delivering methods. Although some effort has been made to provide more than just correspondence instruction, for example, through the use of radio and television, such operations are still in their infancy and far from the innovative strategies developed in other regions, such as the open university, open tech, tele-conferencing, or computer-delivered instruction. Furthermore, with the exception of SENAI in Brazil and SENA in Colombia, the majority of distance delivery applications have not been developed by national training boards (Wilson 1993a). One interesting method of delivery in Latin America was the development of employment upgrading programs for offshore oil platform employees by PETROBRAS, the oil company in Brazil's private sector.

Attention must also be given to the delivery of VET in those nations that have developed their industrial and service sectors sufficiently to require trained manpower. Over the past two decades, the value of VET programs has continually been demonstrated: "particularly at the secondary and post-secondary levels, graduates of specialised, as opposed to academic, programmes have achieved far greater success in obtaining

employment." Moreover, "When the technologies taught in school match the requirements in industries and/or agriculture and rural development, then quality education and training have resulted. Another finding has been that in-service training of those already employed has been a great deal more effective than the pre-service training provided to those who may or may not become employed" (Wilson 1987). Nations that underinvest in vocational education may be later obliged to institute "crash" programs to revitalize their educational institutions, as well as to send thousands abroad for training.

Facilities, Equipment, Training Consumables, and Maintenance

No discussion of reform of VET would be complete without considering the facilities in which VET is delivered, the equipment provided, the provision of adequate supplies of training consumable materials and perhaps, most important, the routine and preventive maintenance of facilities and equipment. Unfortunately, few studies have dealt with these vital components of VET systems.

Brazil's highly successful SENAI is a striking example of the impact of high-quality physical facilities, equipment, and training materials on VET. The maintenance of SENAI facilities and equipment is also viewed as an important aspect of their success. This is far from the typical situation, however. Most developing countries have poor VET facilities, and their equipment is obsolete, and unserviceable. It is little wonder that they are having difficulty in delivering high-quality VET. This neglect, in many cases, has been going on for years, largely because of the deferral and underfunding of maintenance. In many LDCs such neglect involves:

expensive laboratory and workshop equipment was (a) never ordered, or (b) never cleared through Customs, or (c) never delivered, or (d) locked in storage cupboards at schools (because the Principals or Headmasters were 'responsible' for this equipment and could not replace it if damaged or stolen). Such conditions motivated this writer to support projects, such as the Bangladesh Educational Equipment Development Board, to manufacture, distribute and maintain laboratory equipment, which became a successful Asian Development Bank project. (Wilson, 1991b)

Analysts widely agree that the concepts of routine and preventive maintenance must be infused into the "culture" of the workplace and VET institutions. That is clearly impossible to do without adequate facilities, equipment, and funding. In particular, the stocking and timely provision of spare parts for both laboratory and workshop equipment is too often given low priority in the budgetary process.

Management of Reform

One of the basic problems in VET reform is that planners neglect to consider the role that management plays in the reform process. As a result, no attempt is made to formulate a management strategy to implement the reforms. To do so, it is essential to assess "the capacity of existing organizations to implement" the proposed reforms. Planners and policy-makers, in other words, should ask a host of questions about every aspect of

training conditions in their region before taking even the first step toward implementing their reforms:

Is there a national training authority? Are employers and workers represented in its governance? Is the agency adequately financed? Does it have the professional capacity needed to manage and support flexible policy strategies? Does it have the authority and resources to manage the training system through incentives, such as training funds? If a national training authority is not in place, how effective is coordination among public and private training organizations? Is there duplication of functions? Does this duplication lead to healthy competition, or wasted resources?

How effective are the various information systems that help training managers identify needs and opportunities? Are links between training and employment in place? How well do they function? Do training managers have access to labor market information and the ability to use it?

In larger countries what is the extent of decentralization of decision making to states, provinces or lower administrative units? Is responsibility at different levels matched by authority over resource allocation? Is the professional and managerial capacity of the provincial and local implementing units commensurate with responsibility and authority? (Middleton, Ziderman, and Adams 1993).

These diagnostic questions will guide policymakers through the complexities of initiating, planning, and implementing VET reforms. During this process, they will find that management concerns cover a broad spectrum of details on the way organizations operate. Following are some other general observations relevant to the management task:

- The more varied the reform tasks, the more difficult they are to analyze and the higher the level of innovation required.
- The scale of innovation is a function of the overall amount of change.
- Reforming one institution is easier than revamping several levels of an extensive training system at once.
- The choice of a management strategy depends on the degree of uncertainty in the project environment and the degree of innovation envisaged.
- Mechanistic and adaptive management strategies define opposite ends of a continuum of approaches, and in practice most organizations use elements of both, depending on the tasks to be accomplished.
- as uncertainty and innovation increase, management strategies must become more adaptive to enable institutions to respond to changing environments, to learn from experience as innovations are put in place, and to adjust operations as experience accumulates.

- Organizations that already operate in a largely adaptive manner are usually capable of effective and rapid change.
- Restricting reforms to pilot projects, or a few institutions, or limited geographic area, is the most common way of reducing the scope of innovations.
- A combination of organizational development and careful phasing of reforms offers the most practical management approach.

Conclusions

Because of the complexity of VET reform, it seems useful to itemize the reform measures considered to be of high priority for the Latin America and then to pose a series of questions that reformers need to ask in formulating their strategies.

1. Nature of reform:

- Overhaul the structure of the national VET system
- Completely revise the allocation of resources
- Eliminate defects systematically
- Initiate cumulative change of a VET system

2. Reasons for undertaking reform:

- Change and/or growth in the economy
- Development and/or adoption of new technologies
- Perceived irrelevance of existing VET and/or institutions
- Correction of abuses
- Poor efficiency
- Ineffectiveness
- Keep up with changes in goals and objectives
- Keep abreast of changes in skill requirements of enterprises
- Respond to need for new curricula and courses

3. Reforms should be based upon:

- Facts about the VET system
- Input from and consultation with practitioners
- Needs of the clientele
- Research-based evidence

4. Reforms can be achieved through:

- Innovative (stand-alone) projects
- Sectoral and/or policy changes

- Decentralization
- Integrated attention to all essential factors

5. Types of reform are:

- Additive
- External
- Regulatory
- Structural

6. Outcomes of reform efforts include:

- Better-trained human resources required by enterprises
- Stronger knowledge base necessary for VET
- Upward differentiation of technician/ technologist training to the post- secondary level
- Creation of exclusive technician/ technologist training centers
- Decentralization of VET systems
- Privatization of VET systems
- Growth of sectorally focused VET
- Changes in VET financing mechanisms
- Development of new methods for organizing and delivering VET
- Delivery of VET to medium, small, and micro-enterprises
- Provision of equitable access to VET for disadvantaged groups
- Merger of technological education and competency-based training
- Transformation of VET from training "standard" workers to "polyvalent" workers

7. Difficulties encountered during reform are due to:

- The political nature of education and VET
- Inappropriate timing of reforms
- Variations in the systems preparing reforms
- Changing VET "cultures" from didactic to training of knowledge workers
- Dislocation resulting from abrupt changes in policies
- Underfinanced reform or changes to financial provision

8. Lessons learned from reforms are:

- Consensus about the nature of reforms is difficult to obtain
- The reform process can take longer than planned/anticipated
- Attention must be paid to routine and preventive maintenance
- Decentralization implies coordination difficulties
- Training for narrow specializations results in rigidity in occupational structures
- Modular organization of curricula facilitates new delivery modes
- Female participation in VET increases female employment in enterprises
- The optimal balance between VET and academic education is unique to each nation
- Successful VET reforms take place in concert with modernization of enterprises

- VET provision must be offered to match demand from enterprises
- Shift from protectionist to competitive policies necessitates VET reform
- Addition of work experience and/or productive components enhances VET
- All aspects of VET are interconnected and reforms have multiplier effects
- Some reforms succeed because they reinforce existing practices
- Reform of strong VET institutions is more successful
- VET reforms often result in enhanced lifetime earnings of workers
- A regional approach to VET reform facilitates reform efforts
- Effective monitoring and evaluation capabilities improve the implementation of reform
- VET leads to better success in obtaining employment than "academic" education
- Nations that underinvested in VET had to implement "crash" programs later on

9. Reform failures are attributed to:

- Underfunding of reform initiatives
- Inability to see the need for reform
- Inability to conceptualize reform as an all-embracing process
- Improper diagnosis of problems
- Poor interpretation of reform documents
- Implementation difficulties
- Changes in the goals and/or objectives of reform
- Lack of logistical support
- Lack of monitoring and evaluation mechanisms
- Lack of support from stakeholders
- Lack of involvement of all stakeholders
- Weak management
- External finance policies, e.g., structural adjustment, alters VET provision
- Externally induced reforms rarely last long enough to ensure sustainability
- Reforms that are successful in one nation may not be successful in others
- Political interference
- Untimely evaluation of reform can result in its demise

10. Recommended Action to Strengthen VET

Precursor Actions

- Increase involvement of "stakeholders" in VET reform
- Improve the basic technological education "foundation" for VET
- Promote the participation of women in VET
- Diversify sources of VET funding through cost-recovery sales of services
- Focus VET reforms on unique needs of each nation
- Undertake VET reform in concert with change in client industries
- Broaden human resource (manpower) planning to include local labour market data

Scope of Reform

- Reform VET and the educational system at the same time
- Focus VET on economic sectors appropriate to regional jurisdictions
- Extend VET provision to medium, small and micro-enterprises
- Decentralize VET decisionmaking to regional/provincial/state jurisdictions
- Balance VET privatization initiatives with access and equity considerations
- Continue the regional approach to VET reform promoted by CINTERFOR and the ILO

Planning

- Enhance research capabilities to identify HRD needs
- Plan VET reforms on the basis of identified national/local needs
- Improve monitoring and evaluation mechanisms for implementation of reform
- Enhance routine and preventive maintenance capabilities
- Encourage employers to recruit female employees
- Promote articulation between VET and continuing education
- Add multimedia components to existing VET systems
- Improve distance delivery of VET, where appropriate

Process

- Adopt multiskilling, or cross-training to match technological change
- Add polyvalent functions to existing VET systems, where appropriate
- Transform VET from training "standard" workers to "polyvalent workers"
- Improve management of VET by emphasizing quality, rather than quantity
- Adopt competency-based methods of VET curriculum design
- Adopt the modular organization of VET curricula, where appropriate

Outcome

- Focus technician/technologist VET on training "knowledge workers"
- Implement the service center concept (e.g., CADERH)
- Adopt the polyvalent model (e.g., SENAI)

In the early stages of the reform process, those charged with the reform of VET must address the following questions:

- Should VET be a component of the formal educational system?
- Should training be general or specific?
- Should VET be pre-service or in-service?
- What should be the sources of finance for VET?
- What is the economic context of employment and skills demand?
- How extensive and effective are the various forms of training?
- Are current training policies and planning practices able to adjust training supply to a changing economic context?

A survey of literature on VET reform indicates that no clear-cut answers (or even "right" or "wrong" answers) can be given to some of these complex questions. What is clear is that each nation must determine what VET system is relevant to its own unique needs and circumstances. Furthermore, in view of the apparent movement toward a merger of VET and technological education in order to meet the challenges of the globalization of markets, VET should be part of the formal education system. The German "dual system," for example, has long provided for theoretical instruction in mathematics, science, and technology to be delivered in state-sponsored technical schools, while practical instruction is provided in industries by employers. In the Latin American context, however, the success of the SENAI CENATEC centers suggests that both the theoretical and practical components can be effectively delivered in specialized VET institutions.

Many analysts have characterized SENAI (and similar institutions elsewhere in Latin America) as nonformal educational institutions. The SENAI experience suggests that quality nonformal institutions can equal, and often outperform, formal educational institutions. Indeed, SENAI students consistently outperform students from Brazilian secondary schools on national examinations (Oliveira and Castro 1991). About the only "safe" conclusion is that quality VET institutions can be either formal or nonformal, and that the policy choice should be tailored to the needs of each nation.

As to whether training should be general or specific, and when it should take place, the general consensus is that quality pre-service training should begin with a firm (specific) foundation in science, mathematics, and technology (or technological education) and then proceed to general training. Trends in the technological modernization of industries suggest that specific technical knowledge tends to become obsolete at an increasingly rapid pace. Therefore, specific training tends to be more effectively delivered to experienced workers in the workplace.

This does not imply that VET institutions should not play a role in this in-service skill upgrading. SENAI and other institutions have years of experience in delivering such training and the newer polyvalent role played by SENAI includes the delivery of specific on-the-job training. Furthermore, the increasing importance of cross-training suggests that the desired "knowledge workers" can best be trained in several fields after having mastered the "basics" of mathematics, science, and technology. Therefore, it seems that training can be both general and specific for different groups at different stages of their lives. The modular organization of employable skills lends itself extremely well to this continuing education/training role.

The question about VET finance is equally complex. The industrial levy system used by SENAI since 1942 has been adopted by many national training systems in Latin America and elsewhere. Yet, as noted in this report, Brazil is currently discussing the future of the training levy. As a component of privatization, Chile decentralized VET finance either to local communities and authorities, or to the students themselves. This approach also appears viable and has in all likelihood contributed to the impressive Chilean economic growth, albeit at the expense of the social equity considerations central to the financing system it replaced. The range of international models includes the financing of most

training by industry in Japan, Germany, and increasingly in North America, to the state finance of training in Sweden, Singapore, and France. In many nations, VET finance is shared by the state, industry, and the students by means of various formulas. Here again, the answer must be that VET finance is a matter to be decided by each nation according to its unique needs and circumstances.

The foremost external impetus for VET reform worldwide appears to be the dual impact of the shift from the dominance of productive and resource-based economic sectors to some form of parity between these traditional engines of economic growth and the newer service and informatics sectors. Those formulating VET policy should bear in mind that the resource and productive sectors will always play an important economic role, but these traditional sectors are losing ground to the service and informatics sectors. Even so, quality VET should be aimed at producing knowledge workers for all sectors.

Briefly, here are some possible answers to the last three questions posed above:

- Establishing market-oriented planning capacity is a first objective of policy reforms.
- Traditional manpower requirement forecasts need to give way to a range of labor market analyses that produce information needed to guide private training decisions, identify impediments to competitive labor markets, improve the management of training systems, and determine the most appropriate roles for the government.
- Labor market signals and education and training qualifications are the key tools in planning.
- In preemployment training, anticipating the need for skills is a matter first of anticipating structural shifts in the economy and then forecasting the effect these shifts will have on employment growth in different subsectors and industries.
- Measuring the benefits of training consists primarily of gathering data on post-training employment and earnings by means of tracer studies, social security records, and household and labor force surveys.
- Unit cost data per student per year or per graduate for different kinds of training are the other essential element of cost-benefit analyses and include annual recurrent costs, the depreciated costs of facilities and equipment, and the opportunity costs to trainees of earnings forgone during training.
- Underutilization of training capacity is a principal cause of high unit costs and is measured by calculating drop-out and repetition rates, proportion of available workshop time actually used, among other factors.
- Improvements in productivity attributable to training can be measured directly or by examining the earnings differentials between employees with different levels of qualification.

- Other measures of training effectiveness include employment rates for graduates, trade test results, employer opinions, the time learners spend on tasks, availability of texts and training materials, teacher qualifications and experience, quality of workshop equipment, practice materials, and maintenance.
- Adjustment of training policies to changing economic contexts can be assessed by examining the degree to which training is justified by supply objectives, provision of adequate finance for training, the effectiveness of public policies designed to encourage training by private employers, and the nature and quality of systems for collecting labor market information and monitoring of training.

A final word of warning: those charged with the formulation of policy should guard against proceeding without first analyzing and diagnosing existing VET systems. It is imperative to consult stakeholders at all levels of the system. These are the individuals who must implement any reform, and if they are not favorably disposed toward it, then success is automatically in jeopardy. Since reforms often take considerably longer to implement than originally envisaged, it is indeed worthwhile to properly analyze and plan VET reforms. A subsequent step should be to pay considerable attention to the implementation and evaluation of those reforms. Policymakers should not hesitate to change focus, or tactics, if evaluations indicate difficulties, new problems, or changed conditions. Last, but not least, VET reforms should be tailored to the unique conditions found in each nation and not imported "holus-bolus" from elsewhere.

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