Technical Education: the chronicle of a turbulent marriage[1]

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Technical schools combine a high school degree, technical information and hands-on vocational experience. This essay narrates the turbulent cohabitation of the academic and the vocational curricula of technical schools. In the last section, the balance between different levels and modalities of technical education is also discussed.

In Brazil, as in many other parts of the world – to wit, Latin America, the Arab World and Sub-Saharan Africa – technical schools are an unstable solution. They are supposed to be a combination of academics and practical training and, in most cases, the balance between the parts is lost, becoming something else that is not very satisfactory. While some European countries have managed to have moderate success with this formula, it tends not to work in most developing countries.

The formula survived in Brazil for many decades but was abandoned in the mid nineties, creating some confusion. After the initial perplexities, a new system begins to take shape and show promising results. However, the new incumbents of the Ministry of Education show interest in tampering with the delicate balance obtained.

[1] Text prepared for presentation in the Seminar on Education in Brazil, organized by the Department of Educational Studies and the Centre for Brazilian Studies, University of Oxford, Hillary Term 2003. Published in Colin Brock and Simon Schwartzman, eds, *The Challenges of Education in Brazil*. Oxford Studies in Comparative Education. Oxford, UK: Triangle Journals, Ltd., p. 115-134.

The catch 22: the more you improve, the more dysfunctional it becomes

Around 1971 I was sitting in my IPEA [2] office when a visitor from the World Bank arrived. The man was very proud of the new Bank policies to invest in technical and comprehensive education in Brazil – as well as elsewhere in the world. As he explained, by combining an academic and a vocational curriculum, students would get, at the same time, a solid academic education and whatever it takes to prepare them for jobs.

As it happened, I had on my desk a number of tables from a survey of Ginasios Orientados para o Trabalho (GOTs), a network of junior high schools combining academics and vocational preparation. [3] The data showed the percentage of GOT students who wanted to take up the occupations offered by their schools. On average, only 2% of the students were interested in getting jobs related to the skills they were learning. Instead, almost all of them wanted to go to higher education. I showed him the tables and insisted that the same would happen with the World Bank schools. Needless to say, the World Bank officer was not persuaded by my tables. The Bank went on to invest heavily in technical and comprehensive high schools around the world.

In the late nineties, John Middleton and Arvil Van Adams commissioned a vast number of surveys to find out what was happening with technical and vocational schools all over the globe. The results, used in the policy paper of the World Bank [4], showed that comprehensive high schools were an unmitigated failure and technical schools were almost as disappointing. The Bank shifted gears and stopped investing in these models.

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[2] Instituto de Planejamento Econômico e Social, the policy and research branch of the Planning Ministry.

[3] Castro, Claudio de Moura, Milton Pereira de Assis, and Sandra Furtado de Oliveira. (1978). *Enseñanza técnica: Rendimientos y costos*. Montevideo, Uruguay: CINTERFOR.

4 The World Bank, (1991). *Vocational and technical education and training*. Washington, DC: The World Bank.

In the early seventies, when my research – mentioned above - showed that students were not interested in skills training, I asked a few of my graduate students to write term papers looking at what was happening in the federal technical schools of their home states. The numbers found anticipated what the World Bank found a decade later. Indeed, the schools were not producing the expected results, i.e. technicians who would work as technicians.

In a country with a very small enrollment in secondary education and a dismal quality in public schools, technical schools were offering a winning formula for students: free secondary education of high quality. Considering that the only other alternatives to quality education were the expensive private schools, it did not take long for students to realize that practically the only tuition-free schools offering a high quality academic education were the technical schools (most were federal, but a State such as São Paulo also had an extensive network of public technical schools). With the increasing demand for enrollment in the relatively few such schools (around one hundred in the federal system and another hundred in the São Paulo network), requests for admission expanded enormously and schools started to impose admission tests (known as "vestibulinhos). Candidate to vacancy ratios soared to 10:1 and more. Cramming programs to pass these tests also appeared.

Affluent students, particularly those from private primary schools, started to corner the market for technical schools. These institutions became, *de facto*, elite schools, preparing students for the most competitive entrance examinations for higher education. A survey conducted in the late eighties indicated that among the ten schools that produced the largest number of approved students to the most competitive São Paulo programs (e.g. medicine, law and engineering at the University of São Paulo) were coming from an industrial arts federal technical school.

Lavish resources were dispensed to make them better, including a substantial loan from the Interamerican Development Bank. However, the better these schools became, the less technicians they produced, because they were co-opted by the elites who were able to pass the "vestibulinho".

No matter how sophisticated the labs and workshops, the students were clearly higher education material and did not take very seriously the skills instruction. At best, they would take a technical job for a few years, to ease their personal finances, while attending elite universities.

This was the Catch 22. The better they became in everything, including their labs and vocational programs, the less their students took interest in the technical part of the program. This was because they also became equally good at academics. These were expensive schools, costing five to ten times more than the local public secondary schools.

To sum up, a set of close to one hundred federal schools were preparing technicians who hardly ever became technicians. They tended to come from upper class backgrounds and have nothing in mind but the examination for the best universities, be they in law or medicine. Hence, the schools lost the equity battle. The few students from a more modest origin who managed to enroll were quickly convinced that going to higher education was a better deal, having come so far up the education ladder in a country in which so few reached that level. Hence, industry was also on the losing end, since they were not getting the technical staff they needed.

Given the due differences, the situation was not too different from what was described by Philip Foster in his well known paper on the "The vocational school fallacy in development planning" [5] .Technical schools in Africa did not prepare for technical jobs. In fact, in a field visit to a technical school in the Ivory Coast, I was told that when the students started to face a tougher job market, the solution was to prepare them better to enter university.

The situation persisted for decades. In the middle eighties, the Minister of Education appointed a task force to discuss technical schools and I became

[5] Philip Foster, in *Readings in Economics of Education* (Paris:Unesco, 1971) pp. 614-630

member of this short-lived group. Most members were, one way or another, connected to the Ministry of Education. It is interesting to notice that this group was totally unconcerned with such a distortion *vis a vis* the original role of technical schools, namely, to prepare technical cadres for industry, services or agriculture. Instead, they reflected the general mood of the faculty of technical schools. They were proud of the academic excellence of their student body. Not becoming technicians was almost a mark of success. This was in line with what Ronald Dore called the "academic drift".[6]

At that time, I suggested that the schools be split into two separate tracks. One would offer the academic program, attracting the upper classes. The other would only offer the skills training. Not being interested in practical skills, the upper class students would not apply for the technical track, allowing those truly interested in skills to find vacancies. Perhaps the more modest students could not compete for the academic tracks in these schools, and would have to take their secondary education elsewhere. But at least, they would find vacancies in the technical tracks. It is instructive to notice that the members of the task force did not even take the time to understand my proposal. Their mindset was elsewhere.

There is nothing wrong with preparing engineers or medical doctors who have had to file, solder or hammer. Using one's hands is not a bad idea. However, in a country with over one hundred million inhabitants then, two hundred odd technical schools is a very scarce resource. These schools are much too expensive and scarce to impart a hobby or familiarize students with hand work. Industry needed skilled labor and had no other alternative solutions.

While Latin American education has a lot in common, both good and bad, this is an area where Brazil and their neighbors part company. Almost everywhere in the world, there is a close correlation between student's socio-economic status and the excellence of the schools they attend. It should be no surprise to state that the poor attend less expensive and worse schools. Technical schools in Latin America tend

[6] Ronald Dore

to be the poor cousins of the academic secondary. They offer lower quality education and cater to lower status students. As a result, there is much less interest in higher education. However, they have other problems. Their curricula are neither here nor there. They are not good enough at the academic level. They tend to be perfunctory and outdated at the technical level and the hands-on activities are not sufficient to prepare skilled workers. Jack-of-all-trades, master of none. By trying to offer too much, they end up offering a watered-down preparation on all three counts.

By contrast, Brazil invested very heavily in its relatively few technical schools. They are very good and very expensive. However by boosting the quality of the academic side, they became a magnet to the elites. Hence, the Catch 22: the better they became, the worse they performed their original task of preparing technical personnel.

World trends in technical education

As mentioned, technical schools were having the same troubles in many other countries. Granted, Europe has had technical schools for many decades and they tend to work reasonably well.

But the conditions are quite different. Firstly, Europe has a much higher proportion of the corresponding age cohorts in secondary education or some other alternative at the same level, making the diploma less scarce. Secondly, Europe has very high quality academic public schools. There are no serious incentives for someone to attend a technical school in order to have access to the best higher education programs. Thirdly, Europe has a clear segmentation of secondary-level technical schools. According to academic qualifications, students are tracked to programs that are stronger or weaker in academics and more or less geared to job preparation.

Even so, countries such as France, that have something similar to technical schools, still feel the weight of the academics bias in their technical programs. Contacts with enterprises are not always easy. Inertia in changing occupational profiles is endemic.

Therefore, a trend away from the conventional academic-technical schools can be discerned even in Europe. The French *baccalaureat* is divided into broad areas, such as commerce, biological or natural sciences, mathematics, humanities etc. But they should not be confused with technical schools, because they give only the "flavor"of occupations, along the corresponding lines, but are a far cry from job preparation. Argentina and Mexico seem to be going along this "soft" career education.

The comprehensive high school of the United States is an interesting case. In theory, it offers the best of all possible worlds. Academics, technology and shop, all under one roof. What could be better?

But in practice, social cleavages are all under the roof of the same high school – while hidden in Europe by school segmentation. Tracking is rampant inside the schools and each track is typically attended by each social stata. Working class students, as well as low-performing students go to shop classes. And both groups attend watered down mathematics and science courses. Being dumped into one of them can be seen as a punishment. As a result, they have low status and can be demeaning. To sum up, comprehensive schools, on the whole, perform poorly at job preparation.

The more or less spontaneous response to the poor job preparation done by high schools has been the highly successful community colleges. In other words, job preparation is moved to the post-secondary level. But this trend to push occupational training up to the post-secondary is not only American. It has become universal, with Licées Techniques and Institutes Universitaires Technologiques in France, the Fachhochschulen in Germany and the University Colleges in the United Kingdom. This trend has reached Latin America

where in Chile, Argentine and Venezuela, around one third of higher education enrollment is in post-secondary short courses.

Another major trend is to offer job preparation in specialized training centers, unrelated to academic schools and not offering an academic degree. The Brazilian SENAI was the pioneer Latin American institution to create vocational schools outside the academic system and was cloned by practically all countries of the region. The rationale of this system is quite robust. It offers job preparation after one leaves regular academic school, whenever it might happen. Typically, it enrolled youth with four years of schooling, in the forties, when SENAI was created. As Brazilian mean school achievement increases, SENAI now receives students with as much as complete secondary, in the most affluent states and in the more complex occupations (e.g. electronics). For the record, as much as SENAI (and SENAC, the corresponding institution for the service sector) perform quite well in their traditional skills training programs, they also operated technical schools where they met the same predicament of the federal network. In most cases, students became infatuated by the academic track of the programs and often went straight to higher education, largely frustrating the original intention of the course.

All in all, the standard formula of the technical school has not performed too well and is being progressively replaced by other alternatives. This is less the case in Europe where the highly segmented technical schools still resist. Of course, Germany never adopted this model, except for a few such schools in Bad Württemberg.

Finally, divorce!

In the mid nineties, after Paulo Renato de Souza became Minister of Education, the idea of a loan to beef up technical education was in the air. The Federal Technical Schools had lost their leading edge in technology and equipment and there was a chance to prepare a substantial loan, using FAT [7] money as counterpart funding. But the IDB was reticent about putting more money in an elitist institution that had failed to deliver a credible product.

[7] Fundo de Auxílio ao Trabalhador, a fund that accumulates a tax imposed on the payroll of workers.

At this time, I was an employee of the IDB and also advising the Minister on matters of education policies. To counter the reluctance of the IDB, the idea of splitting the academic and the technical segments of a technical program was exhumed. Indeed, this was an obvious way to avoid the problem. If students could take the academic track by itself or the technical track by itself, or both, the reasons for university-bound students to enroll in the technical track would disappear. Why would a high status student want to spend time in shops or labs, learning an occupation that was not desired? For such students, it would be a much better idea to spend more time preparing for the academic degree, increasing his chance of passing a competitive vestibular.

If that were the case, they would leave the technical track free for more modest students who could be interested in the occupations taught. These were the students unable to compete with the elites in the vestibulinho.

This was more than a hunch. In fact, the São Paulo SENAI had conducted a survey among students of three of its technical schools.[8] Two were regular technical schools, offering the standard fare of integrated technical and academic curricula. The third was called a Curso Técnico Especial, meaning that it was targeted to clienteles that already had a complete secondary degree. Therefore, they only took the technical courses, making the program much shorter (one year, instead of three).

As it turns out, this natural experiment created the evidence that was needed to increase the confidence in the plan. In fact, the Curso Técnico Especial, is a spontaneous version that anticipated the split technical program. Comparing the socio-economic status of the three schools, it became obvious that the two conventional programs had a clientele that was substantially different from the third, the Especial. The latter had students from a much more modest origin. In

[8] SENAI SP

other words, by removing the academic track, the door was opened for more modest students to enroll, as they did not have to compete with the others.

The IDB agreed with the policy but wanted to ensure that enrollment at the academic tracks inside federal schools would be contained, to avoid distorting even more their original role of preparing technicians. This created a considerable tension between MEC and the IDB. Nancy Birdsall was the Executive Vice President and had been previously involved in a research piece on Brazilian technical and secondary education. She was adamant to ensure that the loan would not do more of the same that already existed. At one point, the whole project almost fell through. But finally, a working solution was found.

Implementation and confrontation: Much easier said than done

For about a quarter of a Century, technical education was stuck in the Catch 22 predicament described above. The decisive factor to bring about change was the possibility of a 250 million dollar loan from the IDB. A loan can be a powerful weapon to break a deadlock.

Multilateral bank loans have what is called a conditionality. In brief words, the banks tell the countries that they are free not to take a loan. By the same token, the banks are entitled not to offer a loan, unless the country is willing to do this or that. Conditionalities are dreadful weapons. They can be used for good or for evil. They can be the catalyst of change or create horrendous crisis and confrontations in the borrowing countries. And very often, the consequences of stopping a loan because a conditionality was not satisfied are so dire that the banks pretend that they do not see its lack of enforcement. In other words, they can also be ineffective. But, of course, this is not the place to discuss or pass judgment on the styles of work of multilateral banks.

To make a very long discussion short, conditions imposed with a loan can be a good thing, if well conceived and all goes according to plans. Conditionalities, when well designed and negotiated, can be a blessing for a Minister who has to deal with recalcitrant actors and cannot afford to pay the political price of confronting them squarely. A "good" conditionality reflects the wishes of the Minister – and hopefully the needs of the country - but put the blame on the banks. The Minister can then meekly say: "Sorry, but unless we accepted their terms, we would not have this huge amount of money to spend".

PROEP was a very benign case of conditionalities being used to boost reform. Before becoming Minister of Education, Paulo Renato de Souza was the Director of Operations of the IDB, being fully familiar with all the trappings of development banking. Breaking the Catch 22 that preserved the elitism of technical schools was his goal, as much as that of the IDB staff involved in preparing the loan.

The author of this paper was, at the time, an officer of the IDB and was as involved in this loan as anybody else in the Bank. Therefore, the present paper has all the advantages and disadvantages of being written by an insider in the reform that took place.

Once the split between the technical and the academic tracks of the technical schools had been decided, the rest was a matter of sorting out the details and finding a legal form to do it. The recently approved LDB (Lei de Diretrizes e Bases da Educação), the broad legal framework for education policy, made matters much simpler than initially thought.

It was agreed, at the starting point, that students would take the technical track after completing secondary. But it was subsequently decided that they could also do so while taking the last two years of secondary. It was feared by the IDB that this last alternative could create some loopholes to preserve the old system. But on hindsight, the fears were exaggerated.

A more contentious matter was to decide what to do with the academic tracks to be offered inside the federal technical schools. Technical schools could respond to the new regulations by expanding them and shrinking the technical track, making them as removed from skills training as before. After much debate, it was agreed that enrollment in the academic track had to be reduced to half its present level. This was not a politically easy decision.

A major source of reaction when the new plans were first spelled out was an increase in the total work load of students who took both the academic and the technical tracks, compared with the previous load in the integrated programs. Critics chastened the Minister for imposing on the poorer students - who wanted to get a technicians degree - a heavier work load than before.

It is true that the work load increased. But the reason for the increase had absolutely nothing to do with the split imposed by the reform. It was the LDB that increased the work load of all secondary education, technical or otherwise. Had the LDB not been enforced, the work load of the split technical added to the work load of the academic would be exactly the same as before.

Once the broad outlines of the reform were agreed with the IDB, the Minister invited a number of leading principals of Federal Technical Schools to present the new plans. The present author was at this meeting and was able to notice that the reactions from the principals were mild and more sympathetic than otherwise.

The only gripe they expressed was the loss in contextualization of subjects in the academic track. Some of the best technical schools had managed to bring the technical and the academic subjects closer together, using examples and illustrating the drier and abstract theories of the academic world with concrete examples from the technical end.

However, soon the tide turned against the Ministry. The same principals, who were so docile at the beginning, probably got much flak from their teachers and teacher's unions, particularly from those leaning to the left. As a result, they began

to oppose the reform. Their arguments were less of substance than process. They claimed that they had not been consulted beforehand. This is only partly correct. It is a moot point, whether asking a representative group to participate in an open discussion on the proposed reform is a consultation or not. However, we all know that the alternative of calling in a broad consultation, with students, teachers and unions leads to stalemate, due to the long tradition of obstruction from the organized left.

The *leit motif* of the reform, namely, to make technical schools less elitist and more able to fulfill their mandate to supply technicians to industry, was never challenged straight on. Principals claimed, unconvincingly, that the schools were not so elitist and that not all graduates went to higher education. However, the data to show who their students were never materialized. In other words, decade after decade, technical schools never went into the troubles of finding out how elitist were their students and how few graduates became technicians.

Deep inside, repeating what was said before, they ultimately liked being an elitist institution, catering the ablest students who had the most success in the most exclusive universities and who mostly came from upper class families.

Ultimately, what convinced them not to go too far in their objections to the reform was the 250 million dollars they could tap on. A well-prepared request to the Ministry could bring to the school a handsome amount of money, allowing reforms, expansions, new labs and workshops.

It is interesting to ponder on the fact that the real losers in the battle to implement the reform never participated in the confrontations that ensued. If schools were to split the two tracks and the academic track had to cut to half its enrollment, the losers were clearly the elites who were getting a free ride on the best academic education offered by the public sector. Why did they not organize and obstruct the reform? Curiously, the opposition came from the left, which subscribes to an ideology where privilege is the enemy.

The hard core opposition to the reform came from a group of left-wing education researchers and professors. They ignored the elitist nature of the technical education being offered by almost all the technical schools. Why would the left choose to ignore the fact that a school designed to cater to modest youth trying to become technicians had become so elitist?

Their arguments focused on two issues. The first was the alleged imposition of a reform agenda by a multilateral bank. Acacia Kunstler, a well-known author in such matters, dedicated several chapters of her book on technical education to the evil influence of the World Bank on Brazilian technical education affairs. She discusses at length how the Bank dumped its cookie-cutter formulae on Brazil. Unfortunately for the credibility of her arguments, she got the name of the Bank wrong. The World Bank never considered lending money to technical education in Brazil. It was the Interamerican Development Bank that made all the negotiations and the loan. [9]

As previously mentioned, it is true that the IDB wanted to see the reform approved, as a pre-condition to make the loan. But the reform was designed by Brazilians, inside and outside the IDB. And it had roots in past attempts to move along equivalent lines. But, ultimately, the argument hinges on the moral and political justifications for the conditionalities that are part of multilateral bank loans. This involves value judgments. It cannot be proven right or wrong.

The second argument is far more abstract and goes back to this group's conception of education. At least a decade before, much attention was paid to something called "politecnia". Maybe the roots are in Proudhon, but the real father of "politecnia" was Gramsci, in the late twenties, while in an Italian jail.

"Politecnia" is a school conception in which the academic and the vocation, the study and the work are all combined in a seamless process. To those espousing the

[9] A. Kuenzer, Ensino Médio e Profissional (São Paulo: Cortez Editora 2001) pp 46-47

principles of this school of thought, splitting the academic and the technical tracks was seen as straight on rejection of "politecnia". Therefore, it was wrong.

There are many problems with the defense of "politecnia". First of all, it was conceived in the twenties, before the great technological revolutions took place. In addition, practically all the vocational and technical education systems of the world took shape after that and all made honest attempts to bring the world of work closer to the world of schools. But more importantly, "politecnia" is a utopia, since there are no schools anywhere in the world that adopted this model. Comparing any existing system with a utopia does not yield a fruitful discussion, because we are comparing something that bears the imperfections of the real world with the purity of something that only exists in imagination of authors.

If we want to look at the closest real life materialization of "politecnia", the American comprehensive high school comes to mind. Or the Russian schools, with vacations spent working in factories. But on both counts, the existing research does not show very flattering results. American high schools disappoint in their attempts to impart an occupation to its students and the experience of Russian students in factories is appalling. [10]

To the present author - who is far from neutral in this discussion – the opposition from the "politecnia" group makes no sense. The quest for intellectual integration of academics and technical subjects is real and important. However, it was neither achieved automatically by the previous system nor is it impeded by the reform that split the two. In fact, in some of the technical schools where the students take the academics and the technical tracks at the same time, administrators claim that they have achieved a good degree of integration.

[10] Claudio M. Castro, co-authored with Marina Feonova and Anna Litman. "Education and Production in the Russian Federation: What are the Lessons?" International Institute for Educational Planning, UNESCO. Paris. 1997.

Furthermore, good academic education is a combination of theory and its applications. Students should practice the application of theory as part of the learning process. Good education does not need a parallel goal of job preparation to be credible and useful. Using one's hands is a good way of learning about the world – which includes all sorts of theories. In fact, it has been said that theory comes through the hands. But this only requires simple laboratories and workshops to do practical projects. It is very different from job preparation.

Finally, business as usual and growth

The reform process started in 1995. Several years have elapsed since. This is a good time to take stock of what happened.

There are two main issues in front of us. One has to do with the numbers. What happened with enrollment figures? The second has to do with the clientele of the technical schools. Have they become less elitist?

Despite the remarkable improvements in school statistics that took place during the tenure of Paulo Renato de Souza, the statistics that could give us a picture of technical education are difficult to interpret. The first complication results from the fact that secondary-level teacher preparation was counted as technical education. So was the old bookkeeping programs, an obsolete track in traditional high schools. Worse, there was no census of technical and vocational education. The first one took place in the year 1999. But with the reform, the students from technical education migrated from the regular school census to the census of vocational and technical education. Bookkeeping courses disappeared – not a great loss. Teacher training programs also shrunk, for reasons unrelated to the reform. As a result, it became very hard to disentangle what was happening. Comparisons are very difficult because the "before" is in a databasis that is not comparable with that of the "after" situation. In the last months of the tenure of Paulo Renato de Souza, both INEP (the statistics and evaluation branch of the Ministry of Education) and the Cabinet of the Minister tried to sort out the figures. But the

results are less satisfactory than one would have expected, considering how much statistics have improved.

To make a long story short, it seems that the reform played havoc with enrollmen, right after it was implemented. Of course, it caused the integrated programs to be pared down, as prescribed in the law. It also provoked a crisis in private technical education, right after it was implemented. This was confirmed by the administration of one of the largest private technical schools in the country. In fact, this school had to quickly open four-year undergraduate programs in order to survive the crisis. In the public technical schools, the results are less clear. But on the whole, there seems to have been a sharp fall in enrollment, right after it was implemented.

Enrollment in technical high schools (old model)

Years	Technical High Schools	Teacher Training (secondary level)		Bookkeeping	
1996	2.503.644	851.551	34,0%	743.866	29,7%
1997	2.381.701	828.017	34,8%	647.533	27,2%
1998	1.896.521	742.105	39,1%	446.070	23,5%
1999	1.379.359	615.670	44,6%	246.938	17,9%
2000	907.479	519.095	57,2%	91.181	10,0%
2001	444.018	260.975	58,8%	29.445	6,6%
2002 *	202.000	109.000	53,9%	8.900	4,4%
Growth rate. 1996-2002	-92%	-87%		-99%	

Source: MEC/INEP: (2002) preliminary data

However, as the dust settled, growth resumed. Present numbers seem to show a very steep increase in enrollment. In other words, from a purely quantitative point of view, the reform has succeeded, even if belatedly.

Enrollment in technical education between 2000 and 2001 grew at 68% and 63% at federal and private institutions, respectively. Municipal and state schools did not grow at all. In fact, states' secretaries of education were never keen on technical

education and saw in the reform a good excuse to escape from it. The 2002 Census shows 560 thousand students in 2.8 thousand technical schools.

Technological and "seqüenciais" are also growing fast. Seqüenciais went from 421 to 660 programs, between 2000 and 2001 (See next sections for definitions of these other post-secondary programs). The table below shows the enrollment in technological programs, reaching 18 thousand students.

Enrollment in post-secondary education - BRAZIL –- 2001

Administrative status	Technician	Superior (1)		TOTAL	Share of enrollment (2)
		Tecnologist	"Seqüencial"		
Brasil	**462.258**	**63.046**	**18.242**	**543.546**	**17%**
Federal	56.579	6.618	450	63.647	12%
State	159.745	12.720	2.812	175.277	35%
Municipal	15.412	812	206	16.430	19%
Private	230.522	42.896	14.774	288.192	14%

Source: MEC/INEP/SEEC.

NOTE (1) Year 2000 Census of Higher Education

(2) Share of category divided into the total enrollment regular and short post-secondary education

On the elitism issue, federal technical schools were never keen on collecting such data. However, conversations with staff and principals of several such schools suggest that the students from the technical tracks have indeed become much less affluent.

By contrast to federal technical schools, the public system of technical schools from the state of São Paulo has always been much more forthcoming with such studies. It has recently released some very instructive statistics.

Family Income	1995	2002

0 a 5 times the Minimum Wage	32%	57%
11 a 20 MW	21%	8%
21 a 30 MW	5%	1%

The table above shows a very sharp decrease in the participation of students from the higher income brackets and an equally sharp increase in the share of low income students. If making the clientele of these schools more in line with the occupations taught was the goal of the reform, the table is an unmistakable proof of success. In other words, the reform hit a mortal blow on the elitist clientele of these schools.

The other face of the reform is the large number of schools that benefited from the PROEP loan. Indeed, up to 2002, 331 schools signed agreement to receive funds to be expanded, repaired or built. Initially, the federal schools were the first to take advantage of the funds. They are closer to the Brasilia administration and understand better what it takes to get the funds. Then, state schools started presenting their requests. The so-called "community schools" took much longer to understand what it was all about. These are non-government, non-profit institutions, scattered around the country. But once they found out how that they could bid for the PROEP funds, they took it on earnest and came forth very aggressively.

A new government is in place, already for six months. What can we say about its encounter with technical education, inside the walls of the Ministry?

It is very difficult to piece the situation together. The Minister has been silent on the subject. The person in charge of technical education has not said much, except to propose an extra year of secondary education, only in the public institutions, and devoted to vocational subjects. In other words, it has proposed exactly the formula that around the world has shown the most disappointing results. This proposal, however, does not seem to be going very far. If nothing else, this is

enormously expensive for the state systems of education that operate and fund secondary education and the federal government would not have the requisite funds to transfer to the states.

At the same time PROEP disbursements were interrupted, even though no administrative irregularities have been found. Millions of dollars stopped flowing to half-finished schools and laboratories. No good reasons were given to this freeze.

A few names associated with the "politecnia" movement have been consulting with the Ministry. It is being said that their goal is to reverse the main thrust of the reform, i.e. to integrate the technical and the academic tracks once again. Whether they will succeed is anybody's guess.

The elusive balance: the "staircase theory"

In very traditional systems of education, it is as if God had determined that occupations either require a complete secondary education or a higher-education program lasting at least four years. Nothing in between exists.

In all mature societies, the education systems respond to the obvious facts that the intrinsic difficulties of occupations widely differ and the time it takes to prepare a serious professional to discharge them can be less than four years. Therefore, the systems adjust by creating shorter courses. Countries usually come up with more than one alternative that lasts less the than the classical four years. Indeed, there are no good reasons to suppose that all in-between occupation take exactly two or three years.

In France, there are the Licées Techniques but there are also the Institutes Universitaires de Technologie, with different durations. In the United States, there are one-year technical courses and also the two-year associate degrees.

These are welcome complexities in responding to equally complex situations. However, the presence of several post-secondary alternatives brings the obvious difficulties of setting up to each of them the rules, requirements and privileges for the diplomas and certificates.

For lack of better words, I am calling this balancing act the "staircase theory". What this "theory" says is that we need stairs composed of different programs, each step taking a little longer than the previous, with no huge gaps in the middle. More complex occupations are taught in higher steps in the staircase, requiring longer courses of study.

But since education markets are seldom unregulated - even in the most unregulated country, the United States - there are rules and regulations, pertaining to each of the steps of the staircase. In most cases, these regulations set minimum number of credit hours, sometimes curricula and syllabi and the rights and privileges that go with each modality.

The balancing act has to do with how the regulations of each step compare with those of the others. If a step taking less years grants too many privileges, compared to that immediately higher, the incentives to enroll in the higher step are reduced. For instance, if the law were to allow the same privileges to two-year courses that are given to four-year degrees, the reasons to spend four years in school would be sharply reduced. If the lower step has too few benefits, in terms of what one can do with the diploma, it will languish and enrollments will dwindle, reducing the range of effective alternatives.

The reform that created the new generation technical schools – disentangled from secondary education – was implemented at the same time that two additional categories of post-secondary education took shape and started growing. Brazil has presently three categories of post-secondary courses, lasting less than the conventional four-year programs:

Technical Education. This is the category focused in this paper. It can last from one to two years (or even more), depending on the complexity of the occupation. Business degrees can be completed in one year, automation and robotics in two. The certificates are not officially considered as higher education. In addition to the loss in status, graduates cannot use the credits, if they move on to higher education.

Sequential education. This is a possibility opened by the LDB (Education Law) approved in 1995. Institutions accredited to offer four-year degrees can offer two-year courses in any subject for which they are accredited. They do not need to request permission to open such courses and there are no official curricula to be followed. It is a very flexible alternative. However, the law was too cryptic in defining such programs, leading to much discussion and disagreements. In a recent and controversial decision, the National Council of Education decided that this is not true higher education. Or perhaps we could say that it is higher education but not quite on par with other alternatives, since the graduates are not allowed to go on to post-graduate schools (be it the standard master or doctorates or what is in Brazil called "especialização", i.e. an abbreviated version of post-graduate programs).

Technological Education. This post-secondary alternative has existed for many years. But it has had a bumpy ride, from its early start in the sixties. The first course on Engenharia de Operações (operations engineering) was created emulating the American community colleges. In recent years, the effort by the Ministry of Education to regulate, develop curricula and streamline this modality has resulted in their explosive growth, from the late nineties. One of the legal provisions that boosted their growth was the higher education status, allowing graduates to move on to post-secondary programs of any variety. On the down side are the strict requirements to open such programs, like is the case with four-year programs sponsored by institutions that do not have the status of universities or Centros Universitários. To get permission, institutions have to submit complex projects to the Ministry of Education and the delays in processing them are one of

the most critical determinants of expansion of different levels of education and different status of institutions.

Therefore, the balancing act that the educational authorities have to manage involves these three modalities. Students can leave secondary school and go to the market, they can take the one-year technical courses, they can take the two-year "Sequenciais", they can take the two to three year Tecnológicos or they can enroll in regular four-year schools. The privileges and limitations of each level have to be managed, so that the staircase is preserved and one step does not kill the other that lies above or below.

On the equation of the students there are elements of status, transferability to higher levels, duration and labor markets. A diploma after one year is in itself attractive. But its status cannot be the same. The possibility of transfer is always desirable, but at what price? For older students, is investing four years to get a degree worthwhile? Sequenciais are more focused and specialized, a boost to those who have a clear market niche in mind. But they do not allow for enrolling in graduate schools and may end up having less status.

For those who operate the schools, the difficulties of each alternative also have to grow stepwise, lest one level kills the other. This is true not only for the modalities of education considered above but even more so for the types of institutions. The privileges of universities – that can open courses freely – and the unbelievable amount of red tape to shepherd through a request for a new program for those that do not have this status has been a source of profound distortions in the higher education scene. Private universities have grown at 356% between 1985 and 1998. In the same period, stand-alone programs hardly grew at all. Such rules may distort the stepwise pattern in any of the three technical modalities.

In the present Brazilian scene, expansion of public schools of any of these steps or varieties is severely constrained. There is the financial stalemate of Education budgets and the high costs per student of public education, bound by inflexible personnel rules, privileges and many other political restrictions. Therefore, the

growth is practically dominated by private schools (be they for profit or of the not-for-profit variety, the latter including many disguised for-profit operations).

To a very large extent, the growth of each modality will be determined by legislation that constrains or makes it easy to open schools or operate them. Therefore, the National Council of Education has been the stage of fierce – if somewhat disguised – battles to shape legislation pertaining to each.

Universities are free to create four-year programs and "Sequenciais", without asking permission to the government. The decision of the National Council of Education to consider that "Sequenciais" are not pure-blood higher education (no access to post-graduation courses) was a boost to the Tecnólogos, that are higher education. But the law requires a permission to open up a Tecnólogo from all institutions, including Universities. This has hurt the universities, because it lowered the market value of "Sequenciais", that can be opened by universities without previous permission.

University lobbies tried to force the National Council of Education to increase the minimum workload of Tecnólogos. This would increase the duration of the courses to three years, making a new and still unknown modality of education too close to the traditional four-year degrees. It would be a strong disincentive to its growth.

There is also a new proposal to lower the minimal duration of regular higher education programs to three years. Combined with the increased duration of technólogo, it would be fatal to the latter. But the latest twist is that the Council now wants to keep the tecnólogo shorter and also shorten to three years the regular bachelor's degree. With that, the tecnólogo may still prosper.

While the present paper is essentially about technical schools, now that technical schools are, *de facto*, post secondary institutions, their situation cannot be properly understood unless we consider the entire set of post-secondary institutions with which they compete. Any misbalance in the restrictions or privileges granted to each technological degree may hurt or kill them. This is more so, due to the

relatively fluid and unpredictable nature of legislation concerning such matters. The "staircase theory" suggests that the manipulation of incentives and legal restrictions to each modality of technical education is one of the most critical factors in determining their future. Unless there is a stepwise progression in difficulties, prizes and privileges, the balance between each modality may be messed up, resulting in the crippling of one step or another. And in a highly regulated school environment, labor markets are not necessarily the decisive factors in determining the balance between them.

The myth of the transfer function

In an ideal system, after a certain age, students should be able to continue their studies or stop anytime, having already received a sound preparation for jobs. Therefore, systems made up of modules are always on the wish list of school planners. In the American parlance, "transfers" to higher steps in the education staircase are desirable.

However, there are real and there are administrative barriers to this smooth and seamless progression. Taking engineering as an example, advanced degrees may require calculus, high-level physics and other complex and difficult subjects. If a shorter course is to be designed in such way as to allow for transfers to a higher level, the students of these courses must also take them. In the United States, the tendency is to offer undergraduate programs that do not require so many pre-requisites (theory is moved up to the master's level). In addition, the first two years are very open-ended, with many general studies subjects. Therefore, those with an associate degree may be able to move to bachelor programs in engineering – even if taking some additional course may be necessary.

But when we look at the engineering curricula of Latin American colleges, there are too many such theory requirements. A two or three-year course that wants its students to move up to a regular bachelor program must offer a curriculum that

ends up being almost a clone of the first two years of the long course. The price is obvious. There is no time to take the practical courses that prepare for the job market.

The first "operational engineering" courses were victims of this problem. They made a serious effort to allow students to transfer to regular four-year programs. But given the curriculum rigidities of four-year programs, in order to permit transfers, they had to severely sacrifice the job-oriented training. As a result, since the graduates were not prepared for real jobs, almost all of them migrated to regular engineering courses, defeating the purpose of a shorter program.

The problem today is no different from what has been described above. To allow for transfers, there are only two paths. Either the job preparation is curtailed or the curricula of the four-year courses need to be seriously modified. The first alternative will never lead anywhere. Why would anybody want to take a short course that does not prepare for jobs? The second alternative is possible but politically unfeasible in most cases. Four-year programs have higher status and their graduates monopolize the cadres of ministries of education. In Latin America, the only cases of transfers take place in private institutions where the owner of the four-year program is the same as the owner of the shorter program.

The situation with technical courses, *vis a vis*, technological degrees is no different. It is possible to make provision for the transfer. But thus far, this remains no more than a promise.

Therefore, the transfer function, the pride of American community colleges, remains a far-away dream. In most cases, it is far more productive to give up such hopes, for the time being, and focus on giving the best job preparation that is possible within the time constraints.

The rough ride of technical education

This paper has reviewed the trajectory of technical schools in Brazil. It is somewhat different from that of other countries but, in the end, equally plagued with chronic problems.

Planners, parents and equalitarians are all seduced by the all-in-one formula proposed by technical schools. A secondary diploma, together with technical culture and job preparation seem like a winning proposition. However, this formula is increasingly being perceived as a hopeless solution – except in a few advanced countries. The balance between the three ingredients is difficult if not impossible to achieve. Often, it is overambitious, trying to do too much and achieving too little.

In most developing countries, technical schools tend to be poorer than its regular academic counterpart and end up being weak in academics, obsolete in technology and insufficient as a preparation for skilled jobs.

Brazil is an exception, having expensive and tuition-free technical schools, offering high quality education. This has generated a Catch 22 type of situation in which the better the school becomes, the more it attracts elite students and, therefore, the less interest the graduates have in the technical jobs for which they are prepared. Instead, they go to the best university programs. Both equity and efficiency suffer.

With the political thrust offered by an IDB loan, a reform was undertaken to split technical education into two tracks. In other words, technical schools were to offer a stand-alone technical program for students who already had a secondary diploma or were attending another school where they would get it. The purely academic track could continue to exist and could continue to attract the elites. However, the elites would not want to enroll in the purely technical track, because they are not interested in jobs. Therefore, less affluent students could find vacancies.

The reform was initially resisted but was firmly implemented. At first, there was much confusion and enrollments went down. Progressively, as the dust settled, growth has resumed. Just as important, the social class of the technical track has gone down substantially, meaning that the new students have a social profile that is more in line with the status of the occupations offered. In other words, the reform has succeeded in increasing equity and in graduating youth interested in the jobs for which training is offered.

At the same time that these changes were taking place, two other post-secondary modalities were officially created and their legal status defined: Technology programs and "sequenciais". Since these three courses of studies and their diplomas are heavily regulated, the pacific co-existence of the three modalities, plus the traditional bachelor depends on the balance between the time it takes and the privileges granted to each course. In other words, the future of the new technical education is contingent on all the factors that regulate their operation, vis a vis the other modes.