Vocational education and the training of industrial labour in Brazil

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1. Introduction

The present article reviews some issues concerning the training of industrial workers in Brazil, though it is hoped that the findings will be of interest to a general readership and certainly to anyone concerned with vocational education. Both data and conclusions are based on a study of training in two Brazilian states carried out by the author and an associate.¹

For definitional purposes I shall call vocational education the postprimary courses offered by the National Industrial Apprenticeship Service (SENAI—Serviço Nacional de Aprendizagem Industrial) at their own schools or in workshop programmes within firms. By technical education I mean the high-school-level courses (Escolas Técnicas) which prepare students for positions of supervision and control and as junior engineers. By on-the-job training I refer to learning that takes place while performing tasks on the production lines of industry, whether under intensive or only occasional supervision by factory instructors. Manual occupations are those occupations which, in contrast with office positions, require physical manipulation of materials and some degree of physical effort. Skilled manual occupations are those for which training of at least several months is required for adequate performance.

The contemporary literature in this field, although highly controversial, suggests that investment in vocational education is often ineffective. It also suggests that students rarely take up the manual occupations for which they were trained; many find non-manual jobs more attractive, and those who do enter manual jobs when they have completed their vocational education sooner or later end up in occupations for which they were not trained. A good academic education followed by training on the job is claimed to be a much simpler and better approach.

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In the research upon which this brief article is based, my colleague and I were able to show that in the Brazilian case the above does not hold true. We found outstanding results for vocational education. Cost-benefit analysis yielded rates of return that were consistently high, always above 20 per cent and with modal values around 30 to 40 per cent. In addition, instead of generating a rigid occupational structure, as predicted by the literature, formally trained workers turned out to be more flexible, displaying a greater ability to change occupation and better adaptability to new tasks.

When the research project that materialised in the form of the study summarised here was originally proposed, the terms of reference contained comments that could hardly be called flattering to SENAI. At that time it was hypothesised that the costs would be excessively high and the training insignificantly better than that obtained on the job. The results of the research completely shattered these initial hypotheses. The SENAI schools are not necessarily more expensive than in-plant programmes. SENAI training, or training given in courses run under agreement with SENAI, has been exceptionally satisfactory in terms both of costs—when compared with similar programmes—and of the increased earnings of the trainees.

SENAI is seen *a posteriori* to be one of the most successful experiments in the history of Brazilian education, and it is noteworthy that several countries in Latin America have modelled their own training programmes on it. In what follows I shall attempt to describe the Brazilian experience with industrial training and explain why the results were so favourable.

2. The economic results of training

The investment in training the industrial labour force almost always showed excellent economic returns in both São Paulo and Rio de Janeiro. In spite of all the methodological and statistical limitations of cost-benefit analyses, the high rates of return suggest that investment in this area is very rewarding.

Tables 1 and 2 show the results of a cost-benefit analysis of investment in education in São Paulo and Rio de Janeiro respectively. The rates of return were computed for manual workers in the manufacturing sector with the most usual education and training profiles. Some had only academic or so-called "general" training. Others had taken vocational or technical courses in addition to the regular academic curricula.

Rio de Janeiro and São Paulo have basically the same education system. However, since the samples were drawn from different sources, the level of disaggregation is not identical. In Rio it was possible to identify incomplete courses and also graduates from the modern junior high schools (Ginásios Orientados para o Trabalho), which had been introduced only a short while before.

Level and type of education	Rate of return %	
1. Junior high school after primary school	12	
2. High school after junior high school	23	
3. Technical high school after junior high school	13	
Draughtsmanship Electricity	30	
Electronics Mechanics	0 31	
Metallurgy	9 9	
4. SENAI after primary school (4 to 6 years)	24	
Draughtsmanship Electricity	9 37	
Electronics	18	
Mechanics	33	
Metallurgy 5 SENAL after junior high school	24	
Mechanics	26	
Group 91 ² Group 92 ³	8 29	
6. SENAI after high school	23	
Group 91 ²	20	
Group 92 ³	43	

 Table 1.
 Rates of return by type of vocational training and level of academic schooling, São Paulo, 19701

¹Shows income differentials between a group that took the course mentioned as its last form of education or training before employment and a group with all but this course. Thus item 5 compares the incomes, for the same age groups, of SENAI graduates who attended junior high school prior to entering SENAI and of junior high school graduates with no SENAI instruction. ² This group is an aggregate of numerically less important courses of study; it includes production control, time and motion techniques, timing operations, time analysis and instrument reading. ³ This group is an aggregate of numerically less important courses of study; it includes product research and organisation, production programming, use of computers and project design.

For the purpose of estimation, benefits were defined as the earnings differential between workers with a particular level of training and those who had only attained a lower level (for details see tables 1 and 2). In accordance with usual practice, time series of earnings were simulated by means of cross-sections of earnings as a function of work experience.

Costs include imputed rent on capital and forgone income. Several cost alternatives were estimated. Although each represents a reasonable measurement of social costs, considerable variation results from different assumptions about forgone income.

Level and type of education ²	Cost estimate ³	Firms					
		Cruzeiro	Rede	Standard ⁴	Ishika- wajima4	GE	
1. P _c / P _i	E ₁	17	<0	5	9	5	
	E_2	•		6	10	5	
2. J _i /P _c	E			10	10	11	
	E ₂	•		13	17	17	
3. J_c/P_c	\mathbf{E}_{1}	12	10	<0	12	9	
	E ₂	15	13	0	15	11	
	E ₃	21	19	10	22	15	
4. J_c/J_i	E	21	13	< 0	14	4	
	• E ₂	51	20	17	29	8	
5. M_{i+c}/P_{c}	E			13		19	
	E_2			18		29	
	E ₃		•	15		22	
	E ₄	•	•	24	•	43	
6. M_c/P_c	E	•	13		18		
	E ₂	•	21	•	26		
	E_3	•	15	•	21	•	
	E ₄	•	33	•	38	•	
7. M _i /P _c	Ei	•			<0		
	E ₂	•	•	•	<0	•	
8. M _c /M _i	E		•		67		
	E_2	•	•	•	173	•	
9. T_{i+c}/J_c	E ₁		<0		113	18	
	E ₂	•	< 0		219	33	
	E ₃	•	•	•	199	30	
10. T _c /J _c	E	27		37			
	E ₂	53		65			
	\mathbf{E}_3	48		60	•	•	
11. T _c /T _i	E ₁	34		30			
	E ₂	57	•	50	•	•	
12. SENAI/P _c	E	16	8		7	23	
	E_2	28	13	•	19	43	
	E ₃	34	14	•	24	53	
	E ₄	52	19		39	81	
	E ₅	64 7.(29	•	32	95	
	E ₆	/6	44	•	П	106	

Table 2. Rates of return in five Rio de Janeiro firms, 1972-731 %

Table 2 (continued)

Level and type of education ²	Cost estimate ³	Firms					
		Cruzeiro	Rede	Standard ⁴	Ishika- wajima⁴	GE	
13. In-plant courses ⁵ versus—							
$P_c + J_i$		195				337	
P_{i+c}			300				
Pc				18	522		
\mathbf{J}_{i}		•			534		
J_{i+c}	•	•	<0	37		• .	

¹Shows income differentials between workers with the first level of education and those with only the second level mentioned in each case; thus, complete primary ss. incomplete primary, incomplete junior high school vs. complete primary, etc. ²Course codes are as follows: P = primary school; J = junior high school; M = modern junior high school; T = technical high school; subscripts c and i = complete and incomplete. ³E₁ = higher cost estimate; E₂ = lower cost estimate; E₃ to E₆ = alternative cost estimates. ⁴The coefficients for T₁ and T_c (Ishikawajima) and P₁ and J_c (Standard) are significant only at the 10 per cent level, and the corresponding rates of return are shown in italic type in the table. For the remaining regressions the coefficients are significant at the 5 per cent level. ⁵In-plant courses of less than 400 hours' duration; they may be administered by SENAI, based on SENAI methods or entirely independent, depending on the subject and firm.

The wide fluctuations in the observed rates of return result partly from sample disparities and partly from the fact that the rates are too sensitive—in their higher ranges—to differences in the initial assumptions regarding forgone income, the age of entry to employment, etc.

Since the rates of return compare costs with income differentials, we are estimating how much one dollar will produce when invested in different levels of education. Hence, all the rates are comparable; in fact, they are logically comparable with rates of return for factories or irrigation works, although it would certainly be hazardous to draw any conclusions from the relative returns to such heterogeneous investments.

The economic advantages of the SENAI model of structured and formalised vocational education over academic education plus on-the-job training is clearly illustrated by comparing their respective rates of return to investment.

It is also evident that the academic and vocational courses are complementary in the sense that both, separately or in combination, raise the level of individual output. Nevertheless, a person who has only SENAI (industrial vocational) training in addition to the complete four years of primary school (items 4 in table 1 and 12 in table 2) usually achieves higher earning levels than a person who has completed the lower secondary cycle but has not taken any vocational course (items 1 in table 1 and 3 in table 2), although the latter have at least four years of additional schooling.²

An important question that could not be adequately dealt with is the relative advantages of courses for young trainees and courses for adult

workers already in employment who are looking for a more methodical and thorough training. The psychology of learning would suggest that adults are less trainable than young people; in addition, during the years preceding their training the adult workers' productivity will be lower than if they had undergone training in their youth. On the other hand, we know through SENAI itself that, for various reasons, 23 per cent of young trainees end up in an occupation not even remotely connected with the subject-matter of the course they have followed.

It must be stressed that we are at all times discussing alternative ways of training manpower for *industry* and not the whole range of career alternatives with which a student from a particular social group would be faced. Otherwise, it would have been necessary to consider the options available outside the manufacturing sector.

Because our sample was composed only of industrial firms, it does not provide an insight into the occupational distribution of graduates of all types of education and training systems. Nevertheless, we were able to establish that, within the industrial sector, there is a fairly high consistency (80 per cent) between training and occupation. And the more training the worker has, the more likely it is that, when he changes occupation, he will transfer to a related field in which the knowledge he has previously acquired can be turned to advantage.

The industrial technical high schools, although showing good rates of return in Rio de Janeiro (items 9, 10 and 11 in table 2), yield disappointing results in São Paulo (item 3 in table 1), where their rates of return are among the lowest in the study. This may be largely due to two factors: the rapid growth in the number of graduates and the relatively low demand for technicians by firms.

To sum up, a careful micro-economic analysis of the training of industrial workers revealed outstanding results for vocational education, as compared with academic education plus on-the-job training.

Before leaving the subject of the survey, a word must be said about the gathering and processing of the data on which it was based. Naturally, conclusions drawn from information of unknown reliability should be viewed with considerable scepticism. However, the firms studied here allowed our field workers great freedom of action and collaborated in the checking and critical evaluation of the results. In many cases we personally interviewed staff members and engineers from the administration and production sides. With few exceptions, we have great confidence in the data presented. In particular, the data on wages, usually of doubtful reliability, are rigorously correct, since they were cross-checked by supervisors or personnel officers.

Nevertheless, one must be cautious in extrapolating these results. Rio de Janeiro and São Paulo are, by Brazilian standards, highly industrialised and fast growing states. A comparable analysis of SENAI experience in less industrial states would probably not lead to identical results. In addition, we are sceptical of attempts to explain the observed growth rates by means of a micro-economic analysis of training.³

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3. Schools, students and environment

An economic analysis of training, no matter how carefully performed, can only give a partial measure of the relevant issues. The students, the school and the environment have to be observed also from other points of view.

The achievement of training objectives can be hampered by structural rigidities in the labour market and by prejudice on the part of the students. A course of study—whether academic or vocational—is conceived and conducted with certain specific assumptions about the functions its graduates will be expected to perform. However, the students or applicants may have expectations about the course that do not coincide with the objectives envisaged by the school.

Our research turned up many problems of this nature. The technical high schools offer a self-contained course that is expensive and of good quality, and help their graduates to find suitable employment (at least in Rio de Janeiro) that usually has fairly high initial earnings. However, many of the students regard this course as a preparation for entry into the university and one which, as a bonus, offers employment from which university studies can be financed. Between one-fourth and half of these students enter college. For those who take employment high starting salaries soon lead to stagnation, so that the technicians become restive and dissatisfied with their jobs. The firms, although they are aware of this, aggravate the problem by denying them positions of responsibility and promotion prospects.

In addition, however, to its function of imparting knowledge, a school also gives its students a system of values and attitudes reflecting the behaviour, expectations and social position of the majority of students, teachers and, ultimately, employers. Secondary schools, at least 80 per cent of whose pupils are middle class, exhibit a totally prejudiced group attitude towards technical and manual occupations, even highly skilled ones. As a result, middle-class children come to develop a disdain for these occupations, totally thwarting all efforts to "vocationalise" middle-level education, and the few children of workers who reach that level at all adopt the values of their middle-class peers and reject their fathers' occupations.⁴

The graduates of modern junior high schools who go into manual occupations earn well. But they represent only a very small proportion of all manual workers (1.5 per cent). Besides, whatever theoretical interest this result might possess, from a policy point of view it is irrelevant. As a result of the 1970 Education Act, vocational training has been transferred to the

high school level, so that the "modern" system which produced these graduates is no longer in existence.

It would be a mistake, however, to lump all manual occupations together. Our research suggested that there is a substantial barrier between skilled and unskilled occupations, in terms not only of wages but also of access. In the firms we studied in Rio de Janeiro only about 10 per cent of the skilled labour force began their working lives as unskilled manual workers; the other 90 per cent started out in jobs with built-in prospects of advancement or promotion.

This suggests that the first job is of crucial importance. To start out right appears to be essential to the worker. What determines this first job? Fate? Chance? Knowledge? The patience to wait for the right opportunity? Our research showed beyond doubt that, apart from these factors, which also play a role, vocational courses have an immense influence on the trainees' subsequent careers. But this leads us to another question: what determines the amount or the type of vocational training the worker will receive? His social position will have much to do with this, as will the information available to him about what courses to take and at what points in his life. A condition for acceptance in a SENAI course is the completion of at least four years of education. Only about 20 per cent of those who enter primary school ever reach this level, and only about half of these are capable of meeting the other entrance requirements. Since the middle and upper classes are not interested in these courses, the sons of foremen and skilled manual workers are over-represented in the student bodies.⁵

If we classify the sample of manual workers according to the occupational status of their fathers, we find that only 17 per cent of the latter are in non-manual occupations. In other words, manual workers tend to be sons of manual workers. Although class barriers are usually thought to restrict upward mobility, in this case the opposite is true. Prejudice against manual occupations keeps the lower-middle-class groups from taking highly skilled manual jobs, which are better paid and offer greater stability but have been traditionally filled by the working class. The fact that the rates of return to training for non-manual or semi-manual positions such as draughtsman, chemist and quality controller are lower than those for skilled manual positions such as machinist, tool-maker and electrician (see table 1) suggests that it is in part the barrier of middle-class prejudice against manual occupations that helps sustain the scarcity of skilled manpower.

Starting from the premise that confronting an adolescent with the need to make an occupational choice at too early an age may be undesirable, the Brazilian academic education system (under the Education Act of 1970) postpones vocational training until the higher level of secondary schooling, a level that is reached by only about 10 per cent of students. As a result very few students are ever offered any vocational training, and it may well be that this absence of vocational training at lower levels is a more serious problem than a premature choice of career.

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There is thus a pronounced discrepancy between what the academic school system offers and what the student needs. The aim of offering vocational and technical education within the academic cycle is frustrated by the fact that students have no interest in occupations that offer status levels lower than those they can reasonably aspire to, given the schooling level they have reached. Also, attempts to improve the quality of instruction provided by the technical high schools, coupled with the aspirations of the student body for which they cater, have resulted in creating schools that are becoming preparatory courses for university entrance.

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By contrast, SENAI aims at a clientele of sons of workers and foremen, discourages middle-class applicants, offers programmes that give no academic credits and creates an environment in which sophisticated manual skills are highly regarded.

4. What can we learn from SENAI?

The above arguments point to the fact that SENAI is a distinctly superior programme for training industrial workers. In what follows I shall attempt to describe some of its salient features.

Because of the techniques of programmed instruction and individualised teaching that it uses in some of its branches, SENAI has great potential for expansion. It minimises dependence on the human aspects of teaching, which are more erratic and difficult to co-ordinate in very large organisations. Moreover, our research indicates that the quality of SENAI candidates could be maintained even if enrolment were many times the present figure. Although there would inevitably be a drop in the present high rates of return as the supply of graduates increased, it is unlikely that the market would quickly be saturated.

Nevertheless, quite apart from prescribing some optimum rate of expansion for SENAI, there are more profound lessons to be learned. In the first place SENAI offers the most eloquent example of the possibilities for intelligent adaptation of education to the true potential of working-class children. In Brazil examples of innovative and modern academic education are limited to private schools such as those inspired by Montessori and Piaget, which are accessible only to the upper strata of society. Secondly, the experience of SENAI demonstrates how much better it is to teach a few concepts thoroughly than to cover too broad an area rapidly and superficially. The SENAI programmes, whether in the classroom or the workshop, drastically restrict the material presented to the students, who as a result can really absorb what they are taught.

It is significant that SENAI has been able to maintain its standards over the years. The system has expanded without its quality suffering. The qualifications of its teachers are improving, its administration is alert and ever-present, and its pedagogical methods are being constantly upgraded.

This is more than can be said of most Brazilian educational institutions. Generally speaking, the supply of education responds to pressures for enrolment and since the demand for places is not matched by a demand for quality, except in schools catering for the élite, standards are being sacrificed. As a result, there has been a significant and alarming fall in the quality of instruction in academic education.

The same is not true of SENAI. Demands for expansion in SENAI enrolment do not come from the working class itself but from the firms that use SENAI-trained manpower. And indeed, being supported and indirectly administered by an employers' organisation,⁶ SENAI has close ties with and is very responsive to the manufacturing firms that hire its graduates. Clearly, these firms will be as interested in quality as in quantity.

It has often been assumed that the good results obtained by SENAI can be attributed to cognitive factors and the manipulative skills acquired during the courses. The content of the courses and the way in which they are usually conducted do in fact lend plausibility to this hypothesis. Nevertheless, we cannot rule out the possibility that the results achieved are due, at least in part, to non-cognitive factors and, to a lesser degree, to the effect of selection. The self-discipline, organisation and will-power required to complete a course successfully have a great deal to do with subsequent on-the-job performance. However, what we are concerned with here is not the significance of successful course completion but rather the possible differences between SENAI and academic courses as regards these noncognitive aspects.

SENAI offers self-contained courses, conducted by a businesssponsored institution operating with a built-in feedback mechanism from the manufacturing sector. It places its graduates in appropriate jobs and follows up on their performance in firms for a period of one year. If jobs are scarce for the graduates of a given course, enrolment can be reduced; SENAI routines can be changed when field personnel report any shortcomings. This means that the course is sharply focused on the true training needs of firms. And, no doubt, this higher degree of coherence is true also for non-cognitive areas.

SENAI courses—both in schools and in factories—have developed over the years a distinctive methodology based on a progressively more difficult series of practical exercises. For instance, in a course for lathe operators the first exercise may be turning a bolt and in each subsequent exercise new operations are introduced in such a way that when the last has been completed the student will have mastered all the major techniques of the occupation. Trainees do not learn *about* lathes or their uses; they simply work with them in so-called "methodical series". The training environment is highly structured. Minute attention is paid to every detail, ranging from the well-starched overalls to the reinforcement of values and attitudes that are functional in the everyday operation of a factory. There is no overt disciplinary control such as is found in most high schools, but the smooth monitoring of students' time and the factory-like atmosphere create an environment that is at the same time relaxed and busy. From the first day they come to school, students are explicitly told what are the rules of the game and what is expected of them. It is not that SENAI has invented new pedagogical formulae but rather that whatever it does it does well and that at all times it stresses excellence.

We have observed that, compared with the academic system, SENAI emphasises values, attitudes and aspirations more consistent with the jobs the trainees are likely to fill. Thus greater emphasis is placed on responsibility, punctuality and organisation. At the lower levels of Brazilian society, dealings with persons invested with authority are often tense and difficult. SENAI's system gives the trainee a better initiation into on-thejob, objective contacts with authority than does the academic school. Similarly, by means of the very thorough execution of tasks in the "methodical series", SENAI develops in its trainees a taste for the occupation being learned, as well as a sense of dignity and professional pride. The group dynamics necessary for the development of these values and convictions would be difficult to reproduce in an academic programme. Nor is the workplace in industry an entirely suitable substitute for this initiation.

The typical SENAI graduate usually goes to work in a large, modern firm, where wages and salaries are above the average level. But there appear also to be other, subjective reasons for his choice. The SENAI trainee develops a taste for technical perfection rather than for improvisation or creativity. His training leads him to expect total logistic support, assured of which he can devote himself wholly to producing work that is as nearly perfect as possible. The school inculcates in him a concept of order and fastidiousness, of methodical working in logical sequences. It is in this sense that the SENAI graduate is especially suited to work in large enterprises where the above conditions are more likely to be met. Moreover, his first job is almost always set up by SENAI itself, which for obvious reasons has better contacts with enterprises that can absorb a large number of its graduates.

One of the most surprising findings of our study was that, at the level of manual worker training, the SENAI-type vocational training courses, with their highly specialised teaching methods, produce workers capable of performing functions quite far removed from the ones for which they were trained. They do not attempt to teach a large variety of operations or skills—quite the contrary. Courses are very specific to particular occupations: milling operators do not learn about lathes, and vice versa. Yet, when faced with the need to perform different occupations, SENAI graduates were observed to fetch pay rates that are at least no worse than other workers in the same occupation. What is more curious, they show a greater tendency to change occupations than persons who have followed the primary or lower secondary—or even upper secondary—cycles and have learned their trades on the job. This fact challenges the myth that specialisation at this level heightens the inflexibility of the labour force. The occupational changes made by SENAI graduates, which cause certain people so much concern, are in fact an indication of flexibility and adaptability, not of ineffectiveness of the programme in the face of the frictions and conflicts of the labour market.

We can do no more than speculate as to the reasons for this greater adaptability, compared with workers who have only an academic-and, supposedly "general"-training. Industrial workers tend to come from the lower classes, and Brazilian schools still have a strong middle-class bias: they impose overambitious curricula lacking practical focus and employing modes of expression not mastered by working-class children. Occupational flexibility ultimately rests on the understanding of general principles. Ideally a sound academic education would give its students the best possible grasp of general principles. But in Brazil, as elsewhere, these principles are often taught in a vague and perfunctory manner and are incomprehensible to lower-class children. By contrast, the SENAI-type courses offer, as an alternative, a minutely detailed sequence of operations. The scientific and symbolic language barrier is broken down by the use of methods in which language plays a minor role, being used mainly for factual and concrete descriptions of processes that are simultaneously taking place in front of the student. By handling tools and materials the students come little by little to absorb the general principles intuitively. They may acquire a very poor substitute for twentieth century science and technology, but they acquire a knowledge that is far more useful and adaptable than the half-thoughts learned by rote in an academic school.

5. Conclusion

At a time when the current of opinion in the specialised literature is running strongly against technical and vocational education, the present article throws doubt on most of the commonly held views on the matter. By examining the situation in the two most important industrial centres of Brazil we found that vocational education is a sound investment, that its graduates tend to stick to the occupations for which they were trained and that, whenever they do change, their specialised training is a help rather than a hindrance to them in learning a new job. Ultimately what seem to matter are the good habits and general principles they have acquired; but it is the specialised nature of their training that leads them to the attainment of these desirable goals.

Notes

¹C. de M. Castro and A. de Mello e Souza: *Maõ-de-obra industrial no Brasil: mobilidade, treinamento e produtividade* (Rio de Janeiro, Instituto de Planejamento Econômico e Social (IPEA), 1974). It must be stressed that our conclusions are based on two samples with rather special characteristics. We were dealing exclusively with production personnel in the industrial sector; neither administrative nor managerial staff were included in the analysis. In Rio de Janeiro our sample was taken from firms which, although operating in different sectors (shipyards, electrical engineering, aircraft maintenance, etc.), are all large; this may of course limit the applicability of our conclusions to the smaller firm. In contrast with the Rio sample, where all manual workers of the firms were interviewed, the São Paulo sample, although representative of manufacturing industry in that state, included only middle-level technicians and those skilled usorkers who had some supervisory duties, thus excluding a substantial segment of the skilled labour force. Both samples consisted largely of "upper echelon" manual occupations, i.e. in mechanical and electrical engineering, electronics, etc. By the nature of the industries covered, some skills—for example those used in the construction industry—were omitted or under-represented.

 $^{2}M_{c}/P_{c}$ obtains surprisingly high rates of return, indeed higher than SENAI/P_c in several cases. However, it is difficult to draw conclusions from this result since the number of M_c graduates entering industrial jobs is very small.

³ The theory of human capital postulates that the productivity levels achieved by a firm are a function of the education of its labour force. This rigid cause-effect relation is not something that can be observed at the level of the individual firm. Examination of our Rio de Janeiro sample suggests that educational requirements may in some cases be merely a device for screening candidates for top-paying jobs. For example, for many of the occupations considered, the requirements in terms of academic education were clearly excessive. As these are firms that operate at a considerable profit, they can afford to pay better. On the other hand, recent legislation which requires the firm to bear the cost of a complete primary education for such of its workers as have not had one leads firms to hire staff who have already been through primary school. I suggest that there is a circular relationship between the productivity of a firm and the educational level of its labour force. The high efficiency of the firm allows it to invest in a better educated labour force, and this in turn has beneficial effects on productivity. In particular, I believe that the most important effects of education are indirect. A more educated person is easier to administer within a large organisation; he may have a higher motivation to work and his values are more likely to be in line with those of the firm. Moreover, he is likely to be better able to carry responsibility and make decisions, thereby lightening the load of his superiors and enabling them to devote themselves to tasks more directly related to raising productivity.

⁴ In one rather unusual situation we were able to observe lower-middle-class minorities aspiring, at the end of the primary course, to skilled manual occupations and vocational training courses. This was only because they attended schools in working-class districts, where the dominating values were those of the working class.

⁵ It is worth noting that there are practically no women workers in skilled jobs. They are, however, quite numerous on the assembly lines in light component industries.

⁶ SENAI is formally a branch of the National Confederation of Industry.