

World Bank Reprint Series: Number 363

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published by the University of Chicago Press.

# Curriculum Diversification in Colombia and Tanzania: An Evaluation

GEORGE PSACHAROPOULOS

Diversifying the secondary school curriculum to include prevocational subjects has been an educational policy that has flourished over the last decade in many Third World countries. The oft-cited objective of diversification is to provide a wider set of future career options relative to the traditional academic curriculum and a better match between the skills learned in school and those needed in the labor market.

In spite of numerous arguments put forth in support of or opposition to diversified education in the Third World, little empirical evidence exists to confirm or reject hypotheses in favor of this type of school.<sup>1</sup> The purpose of this study is to compare any advantages that might have accrued to diversified school students and graduates with more conventional types of formal training. Potential advantages stemming from diversification could be measured in three ways: first, wider access to secondary schooling by less privileged socioeconomic groups of the population (equity); second, higher cognitive attainment measured by test scores in both prevocational and academic subjects (internal efficiency); and third, better labor market outcomes, such as better employment opportunities or higher returns to investments in acquiring a combination of academic and prevocational skills as opposed to merely one or the other (external efficiency).

Countries selected for the empirical investigation of diversification should meet at least two criteria that would allow a proper evaluation: programs should have been in place long enough and be well implemented, and diversification should have been introduced on a scale large enough to permit appropriate sampling. Colombia has been chosen as a case country in Latin America because it extensively implemented public di-

This paper is based on a more comprehensive World Bank research project on Diversified Secondary Curricula (DiSCuS, RPO 672-45), in collaboration with the Colombia Ministry of Education, the Instituto SER de Investigación (Eduardo Velez and Carlos Rojas), the Tanzania Ministry of Education and the Institute of Education, and the University of Dar es Salaam (Issa Omari). William Loxley was the main consultant to the project and Ana-Maria Arriagada served as research assistant. Philip Foster, Keith Hinchliffe, and Antonio Zabalza provided various input to the project. Robin Horn was very helpful in revising the first draft. The views expressed here are those of the researchers and should not be attributed to the World Bank or the governments of the two countries.

<sup>1</sup> For a review of the related literature and a more extended analysis of the issues treated here, see George Psacharopoulos and William Loxley, *Diversified Secondary Education and Development: Evidence from Colombia and Tanzania* (Baltimore: Johns Hopkins University Press, 1985), in press; and K. Lillis and D. Hogan, "Dilemmas of Diversification: Problems Associated with Vocational Education in Developing Countries," *Comparative Education* 19, no. 1 (1983): 89-107.

*Comparative Education Review*, vol. 29, no. 4.

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0010-4086/85/2904-0004\$01.00

versified education alongside purely vocational and academic secondary schools. Tanzania has been selected as a case country in East Africa because diversification there is a well-established policy based on self-reliance and has spread throughout the educational system.

#### **Colombia and Tanzania: Alternate Routes to Diversification**

Because of basic differences in their cultural, political, and economic environments, Colombia and Tanzania provide two different proving grounds for evaluating curriculum diversification. Colombia has a *multi-track* diversified system. The diversified secondary schools, called INEM (Institutos Nacionales de Educacion Media), combine academic with pre-vocational subject tracks under one roof in a 6-year program. During the first 2 years, students are exposed to prevocational subjects in order to acquaint them with knowledge and career options in the various trades. The second 2 years are devoted to a vocational orientation such as agriculture or commerce along with some academic study, but the emphasis is clearly on the vocational course work. During the last 2-year cycle, further specialization takes place. For example, students enrolled in the general industrial training program in the preceeding cycle might now focus on metal work, construction, or perhaps electrical mechanics, or they may concentrate in an academic option. In addition to the diversified education system, there remains the traditional academic course of study in private and public secondary schools, as well as purely vocational schools at the same level.

Tanzania has a *unitrack* diversified system, which is better understood when placed in the context of the country's economic organization that stresses public ownership and control of most major enterprises. The educational system is largely geared to providing the trained manpower needed if this sector is to run efficiently. But the main impetus for diversification stems from a strong sense of commitment to the ideals of work education similar to that found in socialist countries. Because of Tanzania's philosophy of self-reliance, students are required to gain experience in practical subjects in addition to academic pursuits by "majoring" in a vocational subject of their choice while in secondary school.

#### **Methodology**

In spite of the intuitive reasoning that specialized knowledge would be beneficial for an expanding modern economy, there exists no definitive evidence in support of this assumption. The central research question is whether the outcomes of diversified education vary substantially from those of conventional academic and purely vocational secondary schooling. Two clusters of outcomes have been identified as the main "dependent

variables" in this study: (1) what is learned in school and (2) what is later accomplished in postsecondary economic or further education activities.

The external outcomes of diversification could be tested in the framework of their stated rationale, that is, that such curricular reform leads to: less private demand for postsecondary schooling; a closer relationship between school bias and specialization of postschool training; a higher propensity for labor force participation at the end of secondary schooling; employment in the field of prevocational specialization; shorter periods of unemployment (job search) following secondary school graduation; higher graduate earnings; and higher social returns to investment in education.

Given the time span between the socioeducational inputs and outputs, a longitudinal tracer study was chosen.<sup>2</sup> I have defined three testing points in time for assessing the possible effects of diversified curricula: (a) effects observable while the student is *still in school*; (b) effects observable about *1 year after graduation*, when the graduate might be in his or her first employment or further education; and (c) a fuller assessment *after the graduate has been out of school for some years*.

The starting point in each country case was the school or schools in a given district where diversified curricula have existed for a number of years, along with other nondiversified schools. Random sampling was used to obtain representative national coverage of high school students in proportion to their numbers enrolled in particular curricular programs. A survey administered to high school seniors just prior to graduation was used to collect baseline information. A follow-up survey was administered to the same cohort 1 to 3 years after graduation in order to assess the initial postschool outcomes. Of course, in order to assess the performance of diversified schools (the target group) on a set of agreed criteria, information was collected on a number of students who did not attend such schools (the control group). Thus, the testing of hypotheses reduces to the statistical significance of differences between target and control group mean performance on a set of indicators, standardized for a set of non-school-related factors. In Colombia, the baseline sample consisted of 8,051 students, of which 4,800 belonged to the control group—that is, those in traditional vocational schools pursuing specialties that correspond to INEM specialties or in standard academic secondary schools. The Tanzanian sample consisted of 4,181 students, of which 1,025 belonged by default to the control group—that is, those schools that have not yet been biased and thus offering a traditional academic curriculum.

Three sets of instruments have been used in each country to collect the necessary information for hypothesis testing: (a) an individual student

<sup>2</sup> George Psacharopoulos and Keith Hinchliffe, "Tracer Study Guidelines," mimeographed (Washington, D.C.: World Bank, Education Department, 1983).

questionnaire, administered to those still in the last year of target and control secondary schools; (b) a school questionnaire, filled in by the headmaster of the schools included in the survey; and (c) a graduate follow-up questionnaire administered to those who left school 1 year before (and also 3 years before, in the case of Colombia).<sup>3</sup> Thus, the information for each individual student included parental characteristics such as education, occupation, and income level; personal characteristics such as age, sex, and verbal and mathematical ability;<sup>4</sup> cognitive achievement scores on commerce, agriculture, and technical subjects, as well as academic subject matter;<sup>5</sup> noncognitive outcomes based on tests of psychological modernity; and further training and employment indicators (e.g., for those who during the follow-up were in training or further education, the type of institution and field of study were recorded). For those in employment, the sector of economic activity, occupation, earnings, and hours of work were recorded, as well as how long they waited before getting a job. For those who were looking for work, information was raised on their reservation wage and sources of finance.

#### *Who Attends Diversified Schools?*

Table 1 shows that in Colombia the INEM schools, irrespective of subject, recruit more from the lower-income families. Thus, as intended, diversification has successfully drawn more secondary students from lower socioeconomic backgrounds. Presumably, some of these students might not have attended high school if INEMs had not been introduced. But, of course, such students might have enrolled in any type of secondary school built in their area.

Regarding Tanzania, table 2 shows significant differences in background characteristics of students attending agricultural and commercial subjects. Although it is at the entrance to secondary schools where social selectivity mainly occurs, there is virtually no difference between the socioeconomic origins of those who attend diversified school as a whole and control schools.

#### *Cognitive Achievement*

Because raw achievement score differences do not take into account out-of-school influences such as sex, age, ability, and social origins—which might differentially affect achievement independent of school placement—regression analysis was employed to control for those out-of-school influ-

<sup>3</sup> For the actual questionnaires used, see George Psacharopoulos and William Loxley, "Diversified Secondary Curriculum Study (DiSCuS)—Survey Instruments," mimeographed (Washington, D.C.: World Bank, Education Department, February 1984).

<sup>4</sup> General ability scores from selected items from the ICFES tests (National Examination Board) in Colombia were intended to tap general aptitude rather than achievement on a specific subject. In Tanzania, both verbal and quantitative tests of general ability constructed by the local research team were administered to students in the sample during the base-year data collection.

<sup>5</sup> Examination items can be found in Psacharopoulos and Loxley, "DiSCuS—Survey Instruments."

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TABLE 1  
FAMILY CHARACTERISTICS OF STUDENTS BY SCHOOL TYPE AND CURRICULUM SUBJECT:  
COLOMBIA, 1981 COHORT

Subject	Family Characteristic	INEM	Control
Academic:	Family income (pesos/month)	24,602	37,564
	Father's education (years)	6.9	7.8
Commercial:	Family income	22,859	31,080
	Father's education	5.6	6.6
Industrial:	Family income	21,367	25,517
	Father's education	5.6	6.3
Agricultural:	Family income	17,230	19,342
	Father's education	5.4	4.7
Social services:	Family income	19,595	29,556
	Father's education	5.5	7.4
Overall:	Family income	22,220	30,282
	Father's education	5.9	6.8

ences that might account for higher scores before students were assigned to various schools or curriculum programs. Table 3 gives group test score means in academic achievement and the test score mean in each vocational specialization for all students taking that specialization in the Colombian sample. (Raw scores have been standardized to a mean of 50 and a standard deviation of 10.) Thus, in the academic subsample, INEM students earned 3 points more on average than control students on the academic achievement test, after adjusting for differences in family background, ability, and school quality. Industrial students in INEM schools performed substantially better than control students on the industrial achievement test (16 points higher) and also on the academic achievement test (8 points higher). This implies that industrial learning was not acquired at the sacrifice of academic learning. This is true of commercial and social science students as well, though the advantage of the INEM program in the field of specialization

TABLE 2  
FATHERS' CHARACTERISTICS OF SECONDARY SCHOOL STUDENTS BY  
CURRICULUM BIAS: TANZANIA, 1981 COHORT

Curriculum Bias	Income (Shillings)	Education (Years)
Agricultural	6,656	5.7
Technical	7,088	5.2
Commercial	7,834	6.6
Academic (control)	7,181	5.9

TABLE 3  
COGNITIVE ACHIEVEMENT BY SCHOOL TYPE AND SUBJECT:  
COLOMBIA, 1981 COHORT

Subject/School Type	Achievement Score	
	Academic	Own Subject
Academic:		
INEM	53	53
Control	50	50
Agriculture:		
INEM	49	62
Control	48	58
Commercial:		
INEM	49	61
Control	49	56
Social services:		
INEM	48	57
Control	48	53
Industrial:		
INEM	55	62
Control	47	46
Overall:		
INEM	51	59
Control	48	53

NOTE.—Achievement scores are adjusted for out-of-school characteristics.

is less marked. There were no significant differences between the mean scores of INEM and non-INEM agricultural students.

Table 4 presents similarly adjusted test score means for Tanzania. Here again, for each vocational test, the group trained in the subject of that test scored highest. But in contrast to the Colombian case, the score differences are modest, and there are trade-offs between vocational

TABLE 4  
ACHIEVEMENT SCORES BY CURRICULUM BIAS: TANZANIA, 1981 COHORT

Curriculum Bias	Vocational Score			Academic Score		
	Agricultural	Technical	Commerce	Math	English	
Agricultural	52	...	...	52	50	] 49
Technical	...	53	...	55	48	
Commercial	...	...	55	49	49	
Academic	51	49	50	51	53	

NOTE.—Means are for public school students only, and adjustments have been made to remove the effects of ability and out-of-school characteristics on achievement.

achievement (gain) and academic achievement (loss), especially in the English academic subtest.

*Comparing Costs with Outcomes*

The cost of schooling can be looked at from three viewpoints—society, government, and the individual (or household). The specific cost components that may be relevant to these actors are (a) forgone output or earnings; (b) capital costs of buildings, furniture, and equipment; and (c) direct recurrent costs. Since annualized capital costs are typically small and the opportunity cost of study can be assumed to be nearly equal for all students in the sample, we focus here on the last and major cost component.<sup>6</sup>

Table 5 reports the cost structure in Colombia, showing that INEM academic and commercial tracks are around 20 percent and 14 percent, respectively, more expensive than the control counterparts. But INEM agriculture and industry tracks are significantly less expensive than the control counterparts (28 percent and 25 percent), and the same is true for the social services specialty but to a lesser extent (11 percent). Table 6 combines the information on differential achievement and costs between INEM and control schools by reporting the INEM advantage on the basis of cost per unit. Industrial and social service INEMs are especially cost-effective in raising achievement in their own subject relative to the controls (negative coefficients), whereas academic and commercial INEMs raise achievement at a higher cost, relative to the controls.

Table 7 shows that costs are 14 percent higher in the “biased” schools than in those emphasizing academic subjects in Tanzania. Regarding the government-financed part of the recurrent cost, biased schools are on average 34 percent more costly. Table 8 gives the unit cost of raising achievement in the various vocational tracks relative to a purely academic

TABLE 5  
ANNUAL DIRECT UNIT COST BY SCHOOL TYPE AND SUBJECT:  
COLOMBIA, 1981 (Pesos)

Subject	INEM	Control
Academic	25,700	22,200
Agricultural	26,200	33,700
Commercial	25,200	23,200
Social services	25,000	27,800
Industrial	25,300	31,900
Overall	25,480	27,760

NOTE.—Cost refers to public schools only and includes school-related expenses by students.

<sup>6</sup> The data sources and assumptions lying behind the cost calculations are described in Keith Hinchliffe, “Cost Structures of Secondary Schooling in Tanzania and Colombia,” mimeographed (Washington, D.C.: World Bank, Education Department, 1983).



TABLE 6  
ACHIEVEMENT SCORE GAIN ASSOCIATED WITH INEM PROGRAMS:  
COLOMBIA, 1981 COHORT

Subsample/Test	Achievement Gain	Cost of Raising Achievement 1 Point (Pesos)
Academic:		
Academic	3.28	1,067
Commercial:		
Commercial	5.10	392
Academic	.43	4,651
Industrial:		
Industrial	15.71	-420
Academic	8.01	-824
Social services:		
Social services	4.47	-626

NOTE.—Background, ability, and school factors controlled for. All reported gains statistically significant at the 5% level or better. The agricultural subsample and social services academic achievement gains were not statistically significant.

curriculum, showing that the agricultural biased schools are the least cost-effective.

#### *Graduate Destinations*

Table 9 gives the main activity destinations by school type and curriculum program in Colombia. Thus, 1 year later, roughly one-third of the graduates were in school; one-third were working full-time; and, aside from 11 percent studying and working part-time simultaneously, about one-quarter of the sample was neither studying nor working. There is virtually no difference in the proportions of academic and prevocational students from either type of school who continue studying. Neither curriculum diversification nor the introduction of INEMs has led to a reduction in the desire of secondary students to continue with some type of formal education. Thus, prevocational studies appear to be used in the same way

TABLE 7  
ANNUAL UNIT COST BY CURRICULUM BIAS:  
TANZANIA, 1981

Curriculum Bias	Annual Unit Cost (Shillings)
Agricultural	3,449
Technical	3,263
Commercial	3,160
Academic	2,888

NOTE.—Cost refers to public schools only.

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TABLE 8  
ACHIEVEMENT SCORE GAIN ASSOCIATED WITH DIVERSIFIED SCHOOLS COMPARED  
WITH ACADEMIC CONTROL GROUP: TANZANIA, 1981 COHORT

School Bias/Test	Achievement Gain	Cost of Raising Achievement 1 Point (Shillings)
Technical:		
Technical	5.26	71
English	-4.05	...
Commercial:		
Commercial	5.43	50
English	-2.27	...
Agricultural:		
Agricultural	1.61	348
English	-2.24	...
Academic:		
Commercial	-2.74	0
Technical	-4.09	0
English	-2.24	0

NOTE.—Background, ability, and school factors controlled for. All achievement score differences statistically significant at the 5% level or better.

as academic studies, namely, to gain qualifications for further academic study.

Do those coming from vocational curricula experience less unemployment before getting a job? The data for Colombia do not substantiate this hypothesis. If anything, they show the reverse, as is indicated in table

TABLE 9  
1982 DESTINATION BY SCHOOL TYPE AND SUBJECT: COLOMBIA, 1981 COHORT (%)

School Type/Subject, 1981	Postschool Activity, 1982			
	Study	Work	Study/Work	Other
INEM:				
Academic	34	30	9	27
Agricultural	29	27	15	29
Commercial	39	29	10	22
Social services	43	26	9	23
Industrial	36	31	8	25
Average	37	29	10	24
Control:				
Academic	38	29	13	20
Agricultural	34	36	11	19
Commercial	36	32	9	23
Social services	46	26	12	16
Industrial	34	32	11	23
Pedagogy	41	29	10	20
Average	37	30	11	22
Overall average	37	30	11	22

TABLE 10  
PERIOD OF UNEMPLOYMENT BEFORE FIRST JOB BY SCHOOL TYPE  
AND TRACK: COLOMBIA, 1981 COHORT (Weeks)

Track	School Type	
	INEM	Control
Academic	21.2	21.6
Vocational	25.6	26.4

NOTE.—Between-subject differences are significant at the .01 level.

10; that is, those who have followed vocational courses in either INEM or control schools have significantly longer periods of unemployment. Of those seeking jobs, 85 percent claim to be still financially dependent on their parents or relatives, with no difference between INEM and non-INEM affiliation. On average, job seekers have been looking unsuccessfully for work during the past 22 weeks and would be willing to work for 12,000 pesos per month, a reservation wage that is much higher than the wage rates of those already employed.

Table 11 gives the mean earnings of INEM and control graduates working full-time. Earnings differences are very modest. But academic graduates earn more, relative to the rest. With the exception of INEM academic graduates, actual earnings are clearly less than what graduates were hoping to earn before entering the labor market.

The range of occupations entered by graduates is very wide and has been narrowed down into groupings. Comparing outcomes by INEM/control dichotomies produces no obvious pattern, apart from teaching being a much less likely occupation for control graduates. In summary, although proportions of INEM and control graduates looking for work are much the same, and although both groups expect to earn much the same once a job is found, few differences can be discerned regarding the kind of employment sought by individuals from the two groups.

In Tanzania, the major post-form IV avenues available to graduates

TABLE 11  
MONTHLY EARNINGS BY SCHOOL TYPE AND SUBJECT: COLOMBIA, 1981 COHORT (Pesos)

Curriculum Subject	1982 Earnings		
	INEM	Control	Sample
Academic	10,639	10,070	10,207
Agricultural	9,520	9,596	9,556
Commercial	9,664	9,322	9,493
Social services	9,556	9,577	9,568
Industrial	9,408	10,291	9,902
Overall	9,854	9,980	9,887

are as follows: entry into form V; placement in teacher training or other public sector training; private sector salaried employment or self-employment; looking for a job or further training or being voluntarily inactive. Table 12 shows no major differences in the ways that employment, further education, and training are distributed by curriculum bias. But technical students are more likely to be employed and less likely to be seeking schooling, work, or training. Similarly to the case of Colombia, evidence from Tanzania does not support the view that the incorporation of pre-vocational studies into secondary school has decreased the demand for more schooling. If one aggregates the form V and training categories, one is still struck by the similarities among biases in terms of post-secondary school activities. Consequently, it is possible to infer that, with the possible exception of technical students, all other ex-form IV students stand nearly the same chances of going into employment.

According to one of the main purposes of diversification, it would be expected that graduates of agricultural, technical, and commercial biases would experience a shorter period of unemployment than those from academic schools. The data, however, do not support this, as table 13 shows. One year after graduation, 13 percent of academic students were still looking for either work or training, whereas the percentages for technical, commercial, and agricultural students were 8, 16, and 16, respectively. Among those looking for work, 70 percent are supported by families and 30 percent by odd jobs. Academic graduates did not believe that they had waited any longer for some activity than other students. Those graduates in either form V or training courses again showed no differences by bias in the period that they expected to have to wait to acquire employment once they entered the labor force.

With respect to the nature of wage employment, there were no significant differences by bias in the type of work gained or in the level of earnings. Nor were there differences in the time taken to acquire employment. Table 14 presents expected and actual earnings for respondents in the 1982 follow-up by form IV curriculum bias. It is interesting to

TABLE 12  
1982 ACTIVITY OF FORM IV GRADUATES: TANZANIA, 1981 COHORT (%)

1982 Activity	1981 Form IV Bias				
	Agricultural	Technical	Commercial	Academic	Overall
	25.3				
Form V	45.1	33.3	34.2	27.5	29.5
Training	13.7	39.4	35.9	45.0	41.6
Working	15.8	17.4	14.2	14.1	14.4
Looking		9.8	15.7	13.4	14.5
Total	100.0	100.0	100.0	100.0	100.0

TABLE 13  
UNEMPLOYMENT RATES IN 1982 AND EXPECTED PERIODS OF JOB SEARCH: TANZANIA, 1981 COHORT

	Agricultural	Technical	Commercial	Academic
Unemployment rate (%)	16	8	16	13
Expected time to find work (weeks):				
Those looking	11	9	9	10
Those in form V	34	38	36	38
Those in training	35	36	32	31

note that those still looking for work put the level of "minimum acceptable earnings" at a much higher level of Sh 957, ranging from Sh 859 for academic students to Sh 1,051 for commercial students.

One-half of those who did obtain wage employment found public sector clerical jobs. In general, it is not possible to observe any correspondence between bias and job type. For instance, commerce students are no more likely to be working in clerical jobs than are academic- or agriculture-bias students. Thus, graduates from the academic, agricultural, and commercial streams show no differences in their pattern of employment. Technical stream graduates, however, obtain employment more in line with their specialization.

#### The Colombian Class of 1978 Three Years Later

Given the long, inherent gestation period associated with longitudinal studies, it was felt that the project could yield some early indications on the labor market destination and on performance of secondary school graduates by introducing a pseudopanel component to it. After the selection of the sample of schools and students for the 1981 cohort, addresses were obtained from the same school of the graduates of the 1978 class. A target sample of 2,000 such graduates was randomly selected from the school records for the administration of a special questionnaire. This questionnaire raised retrospective information on the student's further education and occupational record between 1978 and the fall of 1981, when the interviews took place. The questionnaires were completed by personal interview at the house of each selected graduate. This data set was used to test the same hypotheses related to diversification as with the 1981 cohort, except of course those related to achievement because it was not feasible to administer cognitive tests to the 1978 cohort.<sup>7</sup>

It was found that INEMs draw students from the lower socioeconomic groups. This finding is similar to the one obtained using data from the

<sup>7</sup> For a more comprehensive analysis of the 1978 cohort, see George Psacharopoulos and Antonio Zabalza, *The Destination and Early Career Performance of Secondary School Graduates in Colombia: Findings from the 1978 Cohort*, Staff Working Paper no. 653 (Washington, D.C.: World Bank, 1984).

TABLE 14  
 EXPECTED MONTHLY EARNINGS AT THREE POINTS IN TIME AND 1982 ACTUAL EARNINGS BY SECTOR OF EMPLOYMENT:  
 TANZANIA, 1981 COHORT (Sh/Month)

	Expected Earnings			Actual Earnings			
	Without Form IV	With Form IV	With Post-Form IV Studies	Public Sector	Private Sector	Self-Employed	All Sectors
Form IV Bias	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Agricultural	755	830	1,325	772	776	1,676	1,100
Technical	773	844	1,247	702	580	1,560	892
Commercial	754	852	1,356	697	820	1,252	932
Academic	792	883	1,252	746	787	1,532	1,065
Average	766	852	1,307	716	777	1,504	1,013

5/19

1981 cohort. Graduation from an INEM and an academic subject are strongly associated with the propensity to study after secondary school. Also, those who studied agriculture in INEMs had a much higher chance of continuing their studies than entering the labor market immediately after secondary school. Those coming from INEM schools were less likely to participate in the labor force or hold a job 3 years after graduation. Standardization for other factors influencing the employment probability accentuated the INEM disadvantage in producing employable graduates.

Of the entire cohort, 18 percent was looking for a job in 1981. However, most of those looking for a job either already held a job or were studying. Excluding such cases, the overall unemployment rate among the cohort in 1981 was 6 percent, with a negligible overall difference between INEM and control schools. But the unemployment rate was especially pronounced among control agricultural graduates (17.3 percent). Control industrial graduates were the least likely to be searching for a job in 1981 (1.9 percent).

The 1978 graduates spent 14 weeks on average to get their first job. Those coming from INEM schools had an advantage of 1 week over the control group in getting a job. However, school type and subject were statistically insignificant in explaining job search duration. In contrast, job seekers had a reservation wage much higher than their classmates who were already employed.

*Testing the Causal Links between School Type, Cognitive Skills, and Earnings*

A path model was fitted to those working full-time 1 year after graduation in Colombia. Father's education and verbal aptitude were treated as prior factors to school type (INEM vs. control), academic achievement, and earnings 1 year after graduation from secondary school. Figure 1 gives estimates of the model using academic achievement as an intermediate variable. The model is fitted to all graduates with earnings in 1982, since all were exposed to the academic subject. No one factor was shown to have a significant direct effect on earnings, including achievement. The school-type-to-earnings link reveals no advantage of INEM over control schools in this context. This simply repeats our earlier finding that INEM versus control earnings differences are slight. When industrial achievement is substituted for academic achievement, achievement marginally causes higher earnings (i.e., a standardized path coefficient of .078, which is statistically significant at the 10 percent level). Substituting other test scores in commercial, social services, and agricultural subjects shows no effects.

We also examined the links between father's education, student ability (a composite of verbal and nonverbal scores), school type (i.e., diversified vs. control), subject achievement score, and earnings 1 year after graduation from form IV in Tanzania. Figure 2 presents the results of the path

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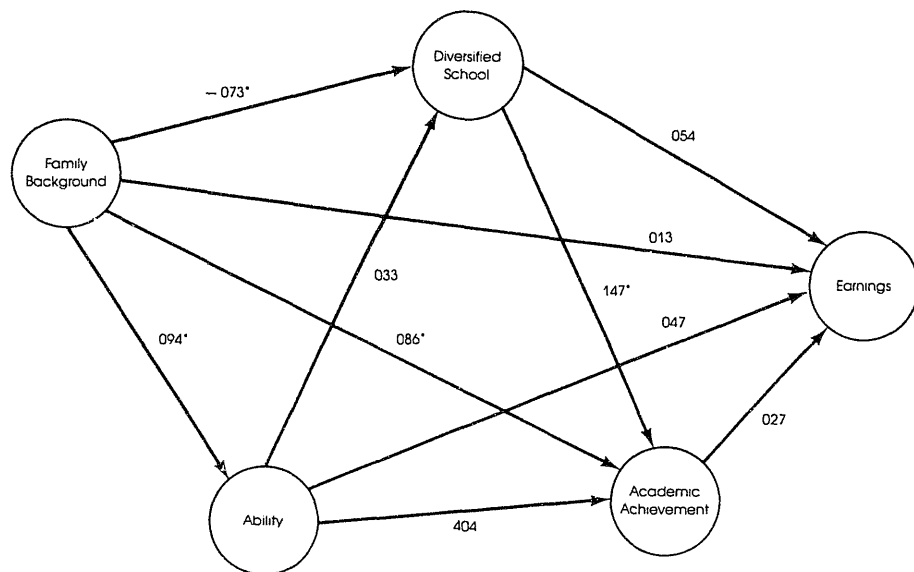


FIG. 1.—Path model estimation (Colombia);  $R^2 = .007$ ,  $N = 510$ , \* = statistically significant path at .10 level.

model using the agricultural score as the intermediate achievement variable. The achievement score was not found to have a significant effect on earnings; neither did school type. When other tests were substituted into the achievement variable in place of the agricultural score, neither technical, commerce, mathematics, nor English achievement played any significant

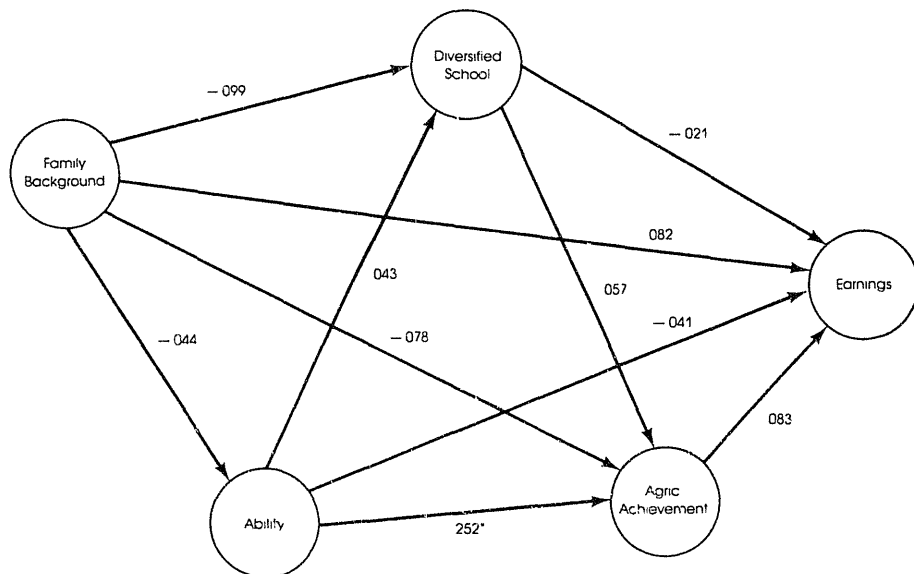


FIG. 2.—Path model estimation (Tanzania);  $R^2 = .015$ ,  $N = 302$ , \* = statistically significant path.



TABLE 15  
 APPROXIMATE SOCIAL RATES OF RETURN TO INVESTMENT IN SECONDARY  
 EDUCATION BY SUBJECT AND SCHOOL TYPE: COLOMBIA, 1978 COHORT (%)

Subject	INEM		Control	
Agricultural	9.1	8.8	7.2	8.3
Commercial	8.4		9.3	
Social services	7.2		7.2	
Industrial	9.2		9.9	
Academic	7.7		9.3	

NOTE.—Based on earnings adjusted for ability and socioeconomic factors.

role in influencing earnings. Thus the agricultural, technical, or commercial biases have no effect on earnings different from the academic.

*The Returns to Investment in Diversified Curricula*

Regression-adjusted 1981 earnings differentials were used to estimate rates of return to investment in various curricula. The fact that in the case of Colombia we are dealing with a 3-year-old cohort allows us to approximate a more valid "flat equivalent" earnings differential at age 22 and hence use the "shortcut" rate-of-return method.<sup>8</sup> Abstracting from the particular vocational specialization, INEM schools appear to have slightly higher returns (see table 15). But the academic subject in control schools appears to be associated with an even higher rate of return. Given the nature of the earnings and cost data and the simplifying assumptions of the shortcut formula, the differences in the rates of return between INEM and control schools cannot be regarded as significant. Although some tracks appear to have higher profitability than others, the differences are not wide enough to conclude that the introduction of prevocational tracks results in secondary schooling being more economically efficient.

The data set for Tanzania is not appropriate for a social rate-of-return calculation. This is true for at least three reasons: (a) only a very small fraction of the 1981 cohort was in employment in 1982; (b) most of those who are employed work in the noncompetitive sector of the economy, hence their earnings do not necessarily reflect the marginal product of labor; and (c) the relative earnings refer too early in the career of the graduate to approximate the flat lifetime equivalent earnings differential assumed by the shortcut method. Subject to the qualifications above, regression-adjusted earnings were used to calculate indicative social rates of return to investment in the four curriculum biases—if nothing else, in order to summarize the cost and benefit differentials associated with them.

<sup>8</sup> See George Psacharopoulos, "Returns to Education: An Updated International Comparison," *Comparative Education* 17, no. 3 (1981): 321–41.

Table 16 presents the estimated "rates of return," which in fact highlight the interplay of costs and benefits differences among the four curricula. Thus the academic (control) bias exhibits the highest rate of return (6.3 percent) and the technical bias, the least (1.7 percent). Of course, the usefulness of this calculation lies more in the relative comparison among biases than in the absolute level of the returns.

### Discussion

This study has been concerned with whether the introduction of diversified curricula into secondary schools has resulted in any differences between those groups of students who enrolled in diversified schools offering prevocational subjects and those who concentrated solely on academic programs on a number of "outcomes" such as equity, higher cognitive achievement, or better labor market performance.

It is always difficult, if not dangerous, to derive firm policy implications on the basis of the results of a single study in two countries using young cohorts of graduates. Ideally, one might have to repeat this study in several other countries and also wait several years (decades) until the now-young cohorts of graduates reach their full earning capacity. On the other hand, decisions are made daily on how to shape a secondary educational system and on what types of curriculum to provide. It would be of little use to tell the policymaker to wait longer, especially when many policy decisions today are based on intuition rather than on facts.

Although limited in the number of countries and years of graduate follow-up, this study has added a few factual pieces of information on the evaluation of diversified secondary school curricula. Below is a series of considerations that the policymaker could confidently take into account when designing a secondary school system in developing countries.

a) *Diversified curricula are difficult to implement.* Development of the new instructional material, the provision of teachers with new qualifications, and the supply of associated laboratories and hardware can cause logistical

TABLE 16  
INDICATIVE SOCIAL RATES OF RETURN TO  
INVESTMENT IN SECONDARY EDUCATION:  
TANZANIA, 1981 COHORT (%)

Curriculum Bias	Rate of Return	
Agricultural	5.4	} 3.4
Technical	1.7	
Commercial	3.2	
Academic (control)	6.3	

NOTE.—Returns based on mean earnings adjusted for ability and other socioeconomic factors.

problems and cause the reform to fail in the beginning. Unless a country has the necessary infrastructure to implement thoroughly a diversified curriculum, the reform may not reach the full system (as in the case of Tanzania). To put it differently, curriculum diversification does not mean only the supply of new buildings; it must be accompanied by a series of software components that may well prove to be a bottleneck in the implementation of the reform.

b) *Curriculum diversification is expensive*, in the sense that the unit cost of keeping a student in a diversified school is often higher than that for a conventional (academic) school. The main reason for the higher unit cost of a diversified school is the specialized equipment used. Therefore, the policymaker should weigh this cost against potential extra benefits that such schools confer to the recipients of the new kind of education or to society at large. Of course, such benefits can be monetary or non-monetary.

c) *This study provides no evidence that monetary benefits are greater than those of conventional schools*. All forms of secondary education increase the productivity of the worker, but diversified schools have not yet proven themselves better in this respect than conventional schools.

d) *Unsupported by this study's findings are some of the main policy rationales put forward to institute such schools*, such as "to improve the fit between the school and the world of work" or "to stop the one-way street from school to the university." Graduates from both types of schools spend roughly the same amount of time finding employment, and in some cases graduates of diversified schools are more prone to continue their studies at the university.

e) *Neither has the prevocational argument of "preparation for further study" been borne out by the data*. Specifically, those who have studied a particular course in secondary school (e.g., agriculture or technical trades) often study a completely different subject later at the university (e.g., liberal arts).

Of course, on the basis of such results one should not halt the further development of diversified curricula: each case should be considered on its own merit and the expectations for their effects should be more realistic.<sup>9</sup> But perhaps there is one clear situation where diversified schools should *not* be offered as part of a country's development effort. This is when the country's secondary school system is very selective and only, say, 20 percent or less of the eligible population age group attends secondary education. In this case, the expansion of any type of secondary schooling will be legitimately seen by students and their families as opening the door to

<sup>9</sup> Our conclusions are consistent with "Foster's thesis"; see P. Foster, "The Vocational School Fallacy in Development Planning," in *Education and Economic Development*, ed. C. A. Anderson and Mary J. Bowman (Chicago: Aldine, 1965).

upward mobility, including university entrance or a start in a nonmanual occupation (such as teaching). But such expansion could have been achieved by less costly means and also would not predicate the outcome of the reform.

The paradox we seem to be left with is that the lower the overall level of a country's development, the weaker the case for introducing a diversified curriculum. The more developed the country, the more it may be able to afford diversification. This conclusion is exactly the opposite of what now happens in practice—that is, the poorer the country, the greater the pressure to make the secondary school curriculum “more relevant to the world of work.”