

SUGGESTIONS FOR TREATMENT OF HUMAN CAPITAL
IN NATIONAL ACCOUNTS—WITH ILLUSTRATIONS
FROM INDIAN DATA*

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After giving a brief discussion of the biases that exist in the conventional estimation procedures followed in the construction of national accounts, this paper argues for restructuring of national accounts so as to treat human capital formation as investment rather than consumption and suggests that a beginning should be made in respect of schooling. The argument is based on the notion that "investment" or "capital" is that which yields future income streams and also on the rather obvious point that treating as consumption large outlays that really constitute investment distorts analyses of resource allocation, growth and income distribution, and obscures intersectoral relations. It is pointed out that the proposed restructuring of national accounts is more relevant and important for developing countries, many of which are embarked on investment planning. Another major point emphasized is that the input of students' time should be properly measured and included in the estimates of capital formation by schooling.

To illustrate what these proposals imply, revision has been attempted of the estimates of (a) educational outlay (or activity in the education sector), (b) gross capital formation, and (c) gross national product, pertaining to the national accounts of a major developing country, namely India, for the years 1960–61 through 1965–66. The modified estimates, though first approximations and covering only a part of the human capital formation and having a systematically downward bias, nevertheless indicate an upward revision of the estimate of activity in the education sector by about 200 to 300 percent, of gross capital formation by about 50 percent and of the gross national product by 4 to 7 percent. These magnitudes show the substantial order of distortion involved in the conventional procedures.

In this paper we point out some major deficiencies in conventional national accounts and suggest how these shortcomings could be removed in one very important sphere: treatment of the formation of human capital through schooling. The two basic points made by us in regard to the accounting for education are: (a) inputs going into the formation of human capital by schooling should be treated as investment and *not* as consumption, and (b) these inputs should be accurately measured and, in particular, the inputs of students' time should be properly evaluated and included in the estimates.

At the back of this analysis lie the broad problems that arise in distinguishing between consumption and investment in the accounts and in dealing with shifts of activities between subsistence (or household) and market sectors. It is argued that these problems are at least as important for the less as for the more developed economies. Handling of these problems should be a high priority concern in any plan to revise the accounts or to extend the information that they provide. India is used as an illustrative case, both for laying out the logic of the estimation procedures and for indicating the orders of magnitude involved when we introduce human capital accounting. The estimates made here have a significant

*We are deeply indebted to Prof. Mary Jean Bowman for inspiration, guidance and valuable comments, and to Prof. C. A. Anderson for major improvements over an earlier version. We are also grateful to Prof. Theodore W. Schultz for a helpful discussion of some of the issues. The responsibility for the deficiencies of the paper is, however, entirely ours.

downward bias, and we use only one of the many aspects of human capital. Nevertheless, the empirical results reveal a very substantial effect upon the estimates of total national product and, especially, on the balance between consumption and investment in the national product.

Our recommendations follow essentially the line of argument presented in John Kendrick's paper in this issue of the *Review* and in some of his earlier writings [1], but there are certain important differences. Conceptually, while we start from a "human capital" orientation, we distinguish sharply between *ex post* national income accounting and the quite different question of causation and of decision criteria. There are no "rates of return" in our paper at any level, macro or micro. Empirically, we are dealing with a different nation than did Kendrick, and we treat a more narrowly delimited aspect of the formation of human resources. Using a more limited treatment has some pragmatic advantages when one is dealing with data for the developing countries, even setting aside some of the more subtle conceptual issues.

The paper is divided into three main sections. First, we discuss some of the important, pervasive biases in national income accounting. Second, we present the logical argument and the general methodology for incorporation of schooling into the accounts of capital formation, and we deal with some of the main controversies relating to this procedure. Third, we illustrate these points in application to India.

1. CONVENTIONAL BIASES IN NATIONAL ACCOUNTS

It is fair to say that most of the existing systems of national accounting owe their origin to the impact of Keynesian economics and to the related notion that aggregate demand has a pivotal role in macroeconomic phenomena. Hence, due to their historical antecedents, the various concepts and measures used for compiling national accounts have placed exaggerated emphasis on final products in the market sector and on formation of physical capital. This contextual situation has changed greatly over the last three or four decades. Aside from advances in economic theory and analysis, the uses to which national accounts are or can be put have multiplied phenomenally. While initially the accounts served primarily as broad indicators of aggregate output, now they are used extensively for analyses of resource allocation, productivity, growth, and income distribution. The demands on the accounts as a tool for national economic planning have grown rapidly, calling for appropriate adjustments in the framework and in the underlying concepts of national accounting. However, the response of the national accounting systems to these demands has been slow and inadequate. It is no doubt true that some adjustments in accounting procedures would entail costly new arrangements for collection of data, but even where such costs would be minor and where some reorientation in thinking has occurred, there has been little change in actual practice. There has been tension between conventional thinking (whatever the particular conventional mode) and newer perspectives. Such tensions are manifested in controversies relating to treatment of "productive versus non-productive" sectors, to coverage of household and subsistence production and other similar issues. More recently questions have been raised in

regard to the nature and usage of the terms “capital” and “investment” and it has been suggested that these concepts should be broadened in various ways to include accumulation of productive human resources not only in the form of schooling and on-the-job training but also investment in health and costs of migration.

Inadequate measurement of production in non-monetized activities is also a basic weakness in most existing systems of national accounting. Most of the less-developed countries adopted the prevailing structures of national accounting rather uncritically, and a major difficulty arises from the presence in these nations of a very large subsistence sector. If that sphere of activities is undervalued (or ignored), the estimates of GNP are biased downward as compared to times or places in which subsistence activities are relatively of a smaller order. Accounts for the industrially advanced countries give rise to some similar difficulties, especially in comparisons over time during which there is substantial movement of activities out of the home as women come to spend increasing proportions of their time in the labor market. However, in developing countries significant dynamic structural changes are occurring, and sizeable distortions are introduced in the estimates of the rate of growth of the national product as proportions between non-exchange and exchange activities undergo shifts. Evidently, one criterion for judging the adequacy of any measure of national product must be the degree to which it remains invariant with respect to mere shifts such as transfer of productive activities from non-monetized to monetized domains. Needless to say, existing systems of national accounting are not well designed to meet that test. It is prudent to undertake more research in this area so that the present anomalies may be corrected. In addition to and related to what has just been said, there is a distortion in the estimates of factor inputs for production of goods and services that draw from both market and non-market sources. This deficiency is exemplified clearly by the omission of the cost of students’ time from estimates of activity in the education sector and by noninclusion of post-school investments by individuals in formation of human capital in themselves.

There is a discrepancy in classification of outputs between consumption and investment. This is really a discrepancy between what is desired and what is actually done in practice, and is a major weakness in most systems of accounts. According to the accepted concept, national product includes both capital formation and consumption of goods and services. Following the argument laid out by Irving Fisher about half a century ago, which has been elaborated in modern theory, capital may be defined as any “product” that generates future income. Present guidelines from the United Nations on the concept of investment are to the same effect. Nevertheless, most existing systems of national accounting treat as consumption very large elements that actually are investment: they generate future streams of income. The treatment of human capital formed by schooling is a prime example of this error.

2. THE LOGIC OF EDUCATIONAL ACCOUNTING

Since T. W. Schultz published his seminal articles in 1959–60 [2], economists have realized increasingly that most of the resources going into education

constitute investment: these generate future streams of earnings and yield also streams of future consumption benefits (psychic income). For most people the immediate consumption enjoyments that are contemporaneous with their education are a relatively minor part of what schooling does for them. This investment viewpoint regarding education is the starting point for our proposals.

Once it is accepted that education is a form of capital formation, it follows that the terms “investment” and “capital” must be interpreted more broadly than is conventional among experts on national accounting; “investment” and “capital” should include not only the conventional measures pertaining to physical capital but also formation of human capital by education, by investments for health, and so on. The implications of this conceptual change are very important. It means that human capital enters as an important input into the production process. Also, a large part of what presently is being looked upon as consumption is more correctly viewed as saving and investment.

These points are not merely matters of definition. The proposed viewpoint has analytical significance, with important implications for analyses of resource allocation, of growth, and of income distribution—and hence for policy making. Human capital, like physical capital, is an important and distinct factor of production; omitting it from the capital account is bound to give a distorted picture of what is happening in the economy. The omission leads to serious understatement of savings and investments, to disregard of how the most important sort of capital is distributed among the members of a society, to inadequate and biased interpretations of the factors in growth and development, and to widespread distortions in assessments of inter-sectoral relationships.

These consequences are especially serious for the developing countries because many of them are embarked upon investment planning on an extensive scale. National accounts and the indices of aggregate consumption, savings, investment, and capital formation can provide direction to policy by revealing the state of economic performance and the interrelationships among economic variables. Treating educational activities as consumption, therefore, is not a minor error; nor is it a quibble over semantics. It is an error of major practical import. The error becomes the more important as we realize that rates of growth of physical and of human capital are quite different, as are the resulting changes over time in the mix among inputs. All these considerations point to the urgent need to restructure national accounts suitably so as to include specifications of capital formation by education.

Prompt introduction of improved accounting for human capital is important not only for immediate applications but also as the basis for future developments in the construction and use of national accounts. One hears many objections about the costs of collecting data but also complaints about non-availability of data. There seems to prevail a circularity in the situation. Conventional practices are accepted without adequate consideration of the costs of obtaining and maintaining appropriate data. This has a cumulative impact and at every stage rectification of the existing deficiencies tends to appear much more formidable than is really the case. The economics of human resources and of human investment is not a fad. This new outlook has come to stay; more properly, it has come back to remain for a while after a long period during which attention was misleadingly preoccupied

almost solely with investments in physical capital. Data relating to formation and utilization of human resources are needed not only for national accounting but for many other important scientific and policy applications as well.

Let us grant that “capital” is the potentiality for producing a future stream of output, whether that capital is embodied in a human being, in a machine, or, more elusively, in an organization. With this starting point, a number of questions still arise with respect to how human capital is to be measured. One basic problem is to decide what proportion (or which) of the resources used in schooling should be treated as investment. Should a deduction be made because it is enjoyable to go to college (immediate consumption)? Some would say that the main purpose or effect of this investment is to enhance the future stream of enjoyments rather than of productivity (or earnings). How do we deal with the effects of education upon productivity in the home? These questions, which have implications for the “cost” vs. “yield” basis for valuing physical capital also, are discussed by Professor Bowman in this issue of the *Review*. So far as males are concerned, it should suffice here to point out that even when all costs of schooling are counted, monetary rates of return to schooling are usually reasonable [3]—disregarding unmeasured returns in current consumption or future psychic enjoyment. There is thus a strong basis for estimating investment in human capital at the full cost of schooling for males, whatever the non-monetary returns to education may be.

We have not, however, disposed of the question of the extent to which costs of schooling women should be counted as investment. In most countries, definitely including India, most educated women do not move into the hired labor force or they participate only part-time or for limited intervals of their lives. Measurements of GNP do not capture the returns on their education that accrue through more efficient production in the home, including their services as supplementary teachers of their children. Treating costs of schooling of women as investment, therefore, raises the problem not of overestimation of human capital formation, but of the failure to count some of the future production to which that human capital gives rise. Given existing accounting practices and data, there is at present no easy way out of this difficulty, but one may hope that more attention will be given to including household production in the accounts. Such estimates ideally would take into account differentials in efficiency in the household economy arising from education differences among housewives. An opposite approach toward reconciling income and capital accounts would be to make downward adjustments in the estimates of human capital formation by education by counting only a fraction of such investments according to the rate of labor force participation by women. We have preferred to *include* in the estimates presented in section III the entire investment in the education of girls in India.

We are here joining those who argue the importance of human capital accounting within a broad conceptual framework for dealing with investment and capital formation. But this is *not* to argue for a merging of the accounts for human and physical capital. Any such merger that blurs the distinction among the various components of investment and capital formation would clearly be dysfunctional: we should be throwing away the chief advantages to be gained from incorporation of investments in human beings within the national accounts and we would even forego the information about physical capital that we previously had. There is

heterogeneity within the category of human capital and within the category of non-human capital and there are common elements in all capital, human or non-human. There are critical differences between investments in people and investments in other forms. One salient contrast lies in the relative importance of renting and sale of the two types of capital and of their services. There is a contrast also in the processes for forming human and other sorts of capital. In particular, there is a limited possibility of substitution of other factors for the individual's time and motivation in formation of human resources.

One main point of this paper is the insistence that students' time is an important input into the process of human capital formation by education and that input should be measured properly and included in the estimates of investment. In its simplest form, the argument is that time of students is a substantial, and indeed an essential, input of resources into the learning process. Despite the omission of the value of students' time from national accounts in present practice, the logic and the practical importance of viewing student time as a factor in producing embodied knowledge and skills is so obvious that only an habituation to the traditions of commercial accounting could obscure it. There has been another source of confusion, however: a confusion between cost and the measurement of factor inputs. The point that we wish to make here is not confined to accounting for human resources, but it is well brought out in this instance. It is clear that the measure of input of students' time derives from a measure of what the students could produce if they were working rather than attending school. In most other cases, the market provides us with a monetary measure of the inputs; for example the measure of inputs of bricklayers is provided by the wages which they are paid. Even in that case, properly speaking, national accounting at "factor prices" is not cost accounting from a societal point of view, it is accounting in terms of what the factors receive; what they receive equals costs to the society only under equilibrium conditions (tacitly assumed in most national income accounting); under such conditions wages in a given employment closely approximate the maximum marginal product of the individual in alternative employment. In respect of schooling, even such a monetary measure is not available, since students usually are not hired to learn,¹ and we must find some other way to put a value on the inputs of their time into the formation of human capital. This is how students' foregone earnings come into national income accounting. As Bowman has emphasized [4], the logic of measurement of student input for analysis of how human capital is formed is quite different from the logic of assessing costs. Several issues surrounding these topics need clarification.

(a) First of all, a sharp distinction must be made between national accounting as essentially an *ex post* summing up of what has happened and the comparison of costs with returns in the context of decision making. This paper deals with the former and not the latter; we are not analyzing how opportunity costs enter into decisions about schooling nor how costs related to such decisions should be conceptualized and measured. We are working strictly within the framework of

¹There are exceptions under some systems of stipends for students: It is proposed in some quarters that "university student" be declared a category or occupation within the public sector and that students be salaried. Apart from many arguments pro and con in the sphere of equity, such an arrangement would have serious implications for allocative processes in any economy.

national accounts in which one has to evaluate the inputs into production of a particular good or service—in this case formation of human capital through schooling. No formation of such capital can materialize without input of time from the individual whose human capital is being enlarged. Hence value of students' time forms an important component of human capital formation.

(b) Speaking broadly, valuing formation of human capital could be done either by computing the discounted "present value" of additional streams of income that are generated by the schooling capital or by "cost" assessment on the basis of the direct or implicit "factor price." The purpose is to value "what is put in," not "what is foregone" although the latter may be as good an estimate as the former. All measurements "at factor cost" are really pragmatic compromises in national accounting, whether the factor be teachers, students or bricklayers.

(c) The above points illuminate the question discussed by Bowman a decade ago [5] as to whether in measuring inputs of student time any adjustment should be made for the level of unemployment. The answer is that no such adjustment should be made, just as we do not reduce estimates of the value of housing construction because during depression the bricklayers might have otherwise been idle. Our interest lies in value of the time used to form educational capital, and we wish to measure that by means of an indicator of how much has gone into the accumulation of human capital. We are not asking about the student's decision nor about how far the unemployment situation might affect his choice. Neither, in presentation of national accounts, are we asking what the accounts would have been if people and business firms had done things other than what we observe them to have done.

It must be emphasized that the input of students' time into education is not at all the same thing as the formation of "tangible human capital" by "child rearing" in Kendrick's accounts. Confusion could arise depending upon how one interprets Kendrick's treatment of two questions (1) implications of the shift in the age for entry to work from 14 to 16 for estimates of the cost of rearing children, and (2) the "opportunity costs" of the time that students put into schooling. If it were legitimate to treat costs of child rearing as investments in tangible human capital (rather than as consumption), the value of students' time put into schooling would still be an additional element in the total of human capital formation, specific to what Kendrick designates as "intangible human capital," regardless of the effects of child labor laws on job options for school-age youth.

A word also about Kendrick's proposal to include the resources going into "tangible human capital" (i.e., the rearing of children) as investment in the national accounts. This proposal is more debatable. The building of bodies does indeed entail formation of capital in that the older children and the adults have embodied in them a potential for turning out a stream of future products and services—provided, of course, that these human beings are "maintained." First among the difficulties of including such estimates in the accounts, as Bowman rightly observes, is that "Training man's mind aside, the costs of forming human capital are primarily those involved in building his physical condition. But many of the outlays that have this effect are also consumer priorities of the first order, and with minor exceptions any assessment of rates of return on such outlays viewed as

investments in producer capital is meaningless unless the men are slaves.”² Going on from this point, why should we count what children eat (and enjoy eating) as investment while counting what adults eat as consumption? If we accept this logic, we must take some part of consumption out of the net national product to allow for maintenance of adults. How much should this be? Are we to adjust this figure to take account of the upward movement in perceived “poverty lines” accompanying increases in *per capita* national income? There is a further problem: an increase just in numbers of people (which would be reflected in estimates of aggregate formation of tangible human capital) may diminish income *per capita*, whereas such effects are unlikely when the increase in human capital is a quality improvement (as embodied capabilities and skills) or when there is an augmentation of non-human capital. Are we to count net returns to increase of population as positive no matter how dire the poverty, so long as the added individuals produce in a lifetime more than enough to keep themselves alive and to cover costs of rearing children who die before they reach a productive age? Despite the fact that tangible human capital fits well enough within the concept of capital as a source of future income, there are objections to this viewpoint. (1) Formation of tangible human capital is inextricably entangled with consumption. (2) Subtracting maintenance of children but not of adults from the category of consumer goods and services implies that children are not quite “people.” (3) To introduce adjustments for maintenance raises further issues, including the interdependence of degrees of poverty or affluence and what is “required” for maintenance. And (4) there is cogent reason to challenge inclusion in capital accounts of an item, the accumulation of which may have more negative than positive implications for societal wellbeing.

It may be noticed that a good part of the logic presented in this paper would apply over a broad spectrum of kinds and processes of human capital formation and accumulation. However, the suggestions for new procedures that are presented here and illustrated for India are quite modest in scope. Our suggestions are limited to schooling mainly for the pragmatic reason that inclusion of human capital formation by education in the national accounts is a comparatively manageable first step in bringing the human factor into its proper place in economic accounting. Presumably in many societies schooling would generate the largest part of intangible resources of human capital, although in many countries on-the-job training and learning may be no less important [6]. (Post-school learning and investments in it are discussed by Bowman elsewhere in this issue.)

3. ILLUSTRATIVE APPLICATION: TREATMENT OF EDUCATION AS FORMATION OF HUMAN CAPITAL IN INDIA'S NATIONAL INCOME ACCOUNTS

We have attempted to estimate the size of the impact of our proposals on the estimates of total national product, of capital formation, and of the level of activity in the education sector. The data relate to India for the years 1960–61 through 1965–66. Two explanatory comments are in order before the actual results are presented.

²See reference [4].

- (a) It is not our intention to strive for high precision in estimates. The aim is mainly to show that our proposal would lead to very substantial changes in the estimates. The order of magnitude of the resulting changes reflects broadly the extent of distortion in the existing estimates.
- (b) We have deliberately introduced a downward bias in our estimates in order to preclude any possibility that our calculations exaggerate the impact of our suggestions for a proper inclusion of figures for “the human factor” in national accounts. We have in most instances taken the lower bounds of possible values. It would miss the point of this exercise to say that our calculations are not “realistic” or that they err in some particular respect. We hope no major errors have been made.³

Subject to the foregoing, we have calculated/revised the following items: (a) Value of students’ time (table 1); (b) Educational outlay inclusive of the value of students’ time (table 2); (c) Gross domestic capital formation inclusive of the human capital formed by education as per (b) (table 3); (d) GNP on the basis of the revised estimate of outlay in the education sector (table 4). The main features of these calculations are summarized below.

(1) *Estimation of outlay in the education sector.* From a comparison of data given in *Education in India* [7] and in the estimates of national income [8] we conclude that figures for the *education sector* in the accounts for national income are based on salaries of teachers and of research and other staff only. Some other school items (such as books or equipment) presumably are included in accounts of other sectors such as manufacture and trade. Broadly speaking, the existing figures for the education sector do not include the following although (iv) and (v) presumably appear under other sectors:

- (i) value of students’ time;
- (ii) actual or imputed rental of school buildings and structures;
- (iii) cost of school supervision and administration;
- (iv) other general costs (such as equipment, library costs, contingencies); and
- (v) value of books and stationery used by students.

These items have been estimated by us on the following basis:

- (i) *Value of students’ time:* Ideally, one would use the market wage rate of persons of comparable age and schooling; but since such data are elusive one must use other measures.

“Primary” level (grades 1-5). One can say that the time of even young children has value and this may be more true in case of developing nations. However, to keep the estimates low, we put the value of the time of primary level pupils at “nil.” Some knowledgeable persons have challenged this assumption, arguing that the value of these pupils’ time was certainly positive and perhaps significant. Conceding the point, we nevertheless choose to keep a low estimate.

“Middle” level (grades 6-8). We have used a rough approximation to median daily wage of child labor in agriculture during the relevant year.

³Incidentally, we have also taken account of certain items that are unrelated to our proposals but which seem to have been overlooked in the existing computations: instances are items (ii) and (iii) in (1) below.

In our view this is an underestimate of the value of the time of these students. However, as explained, we choose downwardly biased estimates.

“*Secondary*” level (grades 9–11). We have put the value of students’ time in this category at *one-half* of the average annual earning of factory workers. The proportion one-half was chosen because of the likely age composition of these workers and partly also to keep the estimates low. *Post-secondary level (grades 12 and higher)*. Since teaching absorbs a substantial proportion of secondary school leavers, we have taken the average annual salary of teachers in middle schools as an approximate measure of the value of the time of post-secondary students.

Some idea of the composition of these teaching cadres is evidenced by their distribution among educational levels (for 1960–61) which was as follows: not completed secondary school—47 percent: completed secondary school with a diploma but had not completed college—48 percent: with a college degree—5 percent. Despite the heterogeneous ages of teachers, this distribution of their schooling suggests that our inferred estimate of foregone earnings of post-secondary students is an underestimate.

The above rates, along with year-end enrolments for different levels, permit an estimate of the total value of the input of student time as per table 1.

To repeat, the above is *not* an attempt to estimate accurately the opportunity cost of students’ time but only to estimate the broad order of the magnitudes. These figures must not be used to compute rates of return to various levels of education or for other similar purposes; they are designed solely to provide rough estimates of inputs into education for accounting purposes.

- (ii) *Rental of buildings*: Lacking other satisfactory measures, we have taken ten percent of total institutional costs as a reasonable approximation to this item. The figure is arbitrary but plausible, and it accords roughly with the results of using some other formulae.
- (iii) Cost of supervision, etc. is included in the figures given in *Education in India* Vol. II and we have adopted these.
- (iv) *Non-salary expenditures in schools*: These costs of equipment, contingencies, etc. are included in the total institutional costs (as given at S. No. 1 in table 2). The total institutional costs have been taken from *Education in India*, Vol. II.
- (v) *Value of books and stationery purchased by students*: This item is based on the results of a study conducted for the Education Commission⁴ 1964–66. We have taken the lowest bounds of the estimates for different grades or levels of schooling and have further assumed the figures to remain unchanged over the period we are dealing with. For that reason and also because there is a public subsidy on textbooks, this figure is a substantial underestimate.

⁴Reported by Mark Blaug et. al. (See reference 3).

TABLE 1
ESTIMATES OF THE VALUE OF STUDENTS' TIME

		1960– 61	1961– 62	1962– 63	1963– 64	1964– 65	1965– 66
(1) <i>Middle school level</i> (Grades VI–VIII)							
(a) Enrollment	000's	7,480	8,189	9,007	9,921	10,241	10,532
(b) Rate (annual)	Rupees	225	300	300	300	300	375
(c) Value	Million Rupees	1,683	2,457	2,702	2,976	3,072	3,950
(2) <i>Secondary level</i> (including vocational schools, etc.)							
(a) Enrollment	000's	4,086	4,692	5,234	5,603	6,136	7,193
(b) Rate (annual)	Rupees	770	805	830	873	978	1,056
(c) Value	Million Rupees	3,146	3,777	4,344	4,896	6,001	7,596
(3) <i>Post Secondary</i> (Collegiate level)							
(a) Enrollment	000's	1,090	1,181	1,299	1,426	1,875	2,095
(b) Rate (annual)	Rupees	1,057	1,087	1,123	1,184	1,301	1,424
(c) Value	Million Rupees	1,152	1,284	1,459	1,688	2,439	2,983
(4) <i>Total Value</i>	Million Rupees	5,981	7,518	8,505	9,560	11,512	14,529

Sources: (1) For enrollment: Various issues of *Education in India, Vol. II*, Ministry of Education, Government of India, New Delhi.

(2) For rate, (1) (b): Various issues of *Agricultural Situation in India*, Directorate of Economics and Statistics, Government of India, New Delhi.

(3) For (2) (b): *Statistical Abstracts: 1970*, Central Statistical Organization, Government of India, New Delhi.

(4) For (3) (b): *Selected Educational and Related Statistics at a Glance*, Planning Commission, Government of India, New Delhi, 1969.

Revised estimates of outlay on education in India calculated on the above mentioned methodology are given in table 2.

Summing up, these systematically modest estimates nevertheless give figures for total educational outlays that are three to four times those appearing under the education sector in the national accounts. Percentage increments range from 226 for 1960–61 to 285 for 1965–66.

(2) *Gross Capital Formation*. Since at present no “expenditure” on education is included in capital formation, we have reworked the figures for this rubric simply by adding to the existing estimates the totals arrived at in table 2 for each year. As table 3 shows, the figure for total capital formation is raised by almost 50 percent.

(3) *Gross National Product*. As already stated, in the existing GNP estimates the figures for income generated in the education sector seem to consist primarily of salaries of teachers and other staff. Figures for books and equipment presumably appear under other sectors. Imputed rental on school buildings does not

TABLE 2
REVISED ESTIMATES OF OUTLAY ON EDUCATION IN INDIA 1960-61 TO 1965-66 (CURRENT PRICES)

S. No.	Item	Unit	1960-	1961-	1962-	1963-	1964-	1965-
			61	62	63	64	65	66
1	2	3	4	5	6	7	8	9
1.	Total institutional costs	Million Rupees	2,574	2,933	3,321	3,701	4,218	4,938
2.	Rental of school buildings and structures	„	257	293	332	370	422	494
3.	Direction and inspection	„	70	79	87	107	134	149
4.	Hostel expenditure (excluding boarding)	„	43	55	56	52	52	57
5.	Value of books and stationery	„	239	266	292	316	354	410
6.	Value of students' time	„	5,981	7,518	8,505	9,560	11,512	14,529
7.	Total Outlay on Education S. No. 1 + 2 + 3 + 4 + 5 + 6	„	9,164	11,144	12,593	14,106	16,692	20,577
8.	Existing estimate of educational outlay included in GNP (1 + 5)	„	2,813	3,199	3,613	4,017	4,572	5,348
9.	Percentage increment in existing estimates of educational outlay $\{(7 - 8)/8\} \times 100$	Per-centage	226	248	249	251	265	285

Notes: (1) Figures mentioned against S. Nos. 1, 3, 4 are taken from the relevant issues of *Education of India*. The basis for the figures against S. Nos. 2 and 5 is explained in the text. We have excluded pre-primary and adult schooling for estimating cost of books. For post-secondary students we have taken an amount of Rs. 100 per student per year.

(2) The figures relating to "institutional costs" given against S. No. 1 include (a) salaries of teaching and research staff and of other non-teaching employees and; (b) other costs incurred in the institutions, e.g. school equipment, contingencies, laboratory and library maintenance costs, etc. Presumably a part of (b) is included in the national income under sectors like "Manufacture and Trade." To the extent (b) is not fully covered in the existing estimates, our figures for G.N.P. in table 4 are an underestimate.

TABLE 3
REVISED ESTIMATES OF CAPITAL FORMATION IN INDIA 1960-61 TO 1965-66

S. No.	Item	Current Prices		Million Rupees			
		1960-61	1961-62	1962-63	1963-64	1964-65	1965-66
1.	Existing estimate of gross (fixed) capital formation	20,210	22,110	25,740	30,690	34,020	40,250
2.	Total outlay on education (item 7 of Table 1)	9,164	11,144	12,593	14,106	16,692	20,577
3.	Re-estimated gross capital formation (1 + 2)	29,374	33,254	38,333	44,796	50,712	60,827
4.	Percentage increment in existing estimate of gross capital formation $\{(3 - 1)/1\} \times 100$	45.3	50.4	48.9	46.0	49.1	51.1

Note: The figures against S. No. 1 are taken from Account 5 of *Estimates of National Product: 1960-61 to 1969-70* (Central Statistical Organization: Government of India, May 1971).

appear to be included anywhere. Therefore, our estimate of GNP is arrived at by adding to the existing estimates the totals given in table 2 minus institutional costs and value of books. The result is an upward adjustment of estimated GNP by 4.5 percent in 1960-61 rising to 6.9 in 1965-66.

TABLE 4
REVISED ESTIMATES OF GROSS NATIONAL PRODUCT IN INDIA 1960-61 TO 1965-66

S. No.	Item	Million Rupees					
		1960-61	1961-62	1962-63	1963-64	1964-65	1965-66
1.	Existing estimate of gross national product	140,290	148,600	158,030	180,880	211,760	218,390
2.	Item 8 of Table 2	2,813	3,199	3,613	4,017	4,572	5,343
3.	(1) - (2)	137,477	145,401	154,417	176,863	207,183	213,042
4.	Total outlay on education (Item 7 of Table 1)	9,164	11,144	12,593	14,106	16,692	20,577
5.	Re-estimated gross national product (3 + 4)	146,641	156,545	167,010	190,969	223,880	233,619
6.	Percent increment in existing estimate of GNP $\left\{ \frac{(5-1)}{1} \right\} \times 100$	4.5	5.3	5.7	5.6	5.7	6.9

Note: The existing estimates of gross national product are taken from the "Estimates of National Product": 1960-61 to 1969-70.

We believe that the revised computations or estimates that we have worked out have yielded quite impressive results. Obviously one outcome of our exercise is increased realization of the need to plan for collecting additional data. A priority effort would be to obtain data for workers by educational level and by age; these data should be appropriately classified by rural-urban residence, by sex, and by major economic sectors. Particular attention should be given to gathering data for young people in such detail as to permit proper estimation of both direct and opportunity costs along with estimates of earnings. Such data are useful in many ways quite aside from the improvement of national accounts.

Our evaluations of the effects of recomputations in national accounts are related to *gross* magnitudes. The impact on the corresponding *net* estimates could be assessed by developing a suitable formula for depreciation of human capital [9]. It should be superfluous to add that the difficulties in deriving a suitable depreciation formula are no greater with respect to human than physical capital. The former task may actually be the easier. The chief contrast is that human capital may also appreciate in value in rather normal situations.⁵

4. CONCLUDING REMARKS

For the sake of conceptual accuracy and conformity to generally accepted economic theory as well as for the practical purpose of investment planning and analysis of resource allocation, growth, productivity and income distribution, it is desirable that, in the context of national income accounts, the terms "investment"

⁵See M. J. Bowman in this issue.

and “capital” be more broadly conceived so as to include accumulation of productive human resources. A beginning in this direction should be made by treating inputs going into education as investment rather than consumption. For estimating outlays in the education sector, it is necessary to evaluate and include the input of students’ time into schooling. The proposals made by us have relevance to most countries but may be especially pertinent for developing countries that have embarked on investment planning on an extensive scale and where data on aggregate consumption, savings and investment play an important role in guiding planning policies. The illustrative calculations made with Indian data show how substantial are the modifications which our suggestions imply and, therefore, how serious is the distortion in the existing estimates. It is true that even in the more developed countries thinking in the direction indicated by us is at a rather early stage, but there is no reason why the developing countries should not take a lead on this issue.

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