

# **DIRECTIONS IN SECONDARY EDUCATION: A STATISTICAL EVALUATION**

**Fred Emery  
1986**

*The original report consisted of six parts as follows:*

## ***Part I, The Setting***

- *Demographic trends and the student population*
- *The labour market for young people*
- *Reconsideration of labour market demands*
- *Emerging demands on secondary education*

## ***Part II, The Parameters***

- *The system characteristics of extended educational systems*
- *The implications*

*The first three sections consisted largely of statistics current at the time. These are significantly out of date and to reproduce them here would add little to our understanding of the essential features of the education in its full societal context.*

*I have chosen instead to reproduce the fourth section on emerging demands as many of the trends Fred saw emerging at that time are still playing out, illustrating once again how percipient he was at working out just how the future was going to roll out from the data in a handful of graphs.*

*The second part of the report is reproduced in full as it is the most powerful and enduring section. It consists of a reanalysis of a massive US study by Coleman that shows that it is the family not the school that exerts the most powerful and continuing influence on a person's development through life.*

*This reanalysis was done years before we had the Gonski report (2011) which found exactly the same result. This confirms yet once again as if we needed it after Fred's work that:*

- *the family, its socioeconomic status (SES) with associated features such as the number of books in a home and expectations is the major determinant, either positive or negative, of a child's future, and therefore,*
- *that in the case of a below par background, school funding must be directed to neutralize the effects of this handicap on development, and thus 'needs based funding' as Gonski spelt out.*

*Both Coleman's original study and subsequently Fred's reanalysis were monumental pieces of work and their further confirmation by Gonski establishes this research as a significant and timeless landmark, ME.*

## **DIRECTIONS IN SECONDARY EDUCATION: A STATISTICAL EVALUATION**

### **Emerging demands on secondary education**

Since Federation, the Commonwealth has evolved through two forms of economy and, since the early seventies, has been rapidly evolving into a third form.

Until World War II Australia was an agricultural economy, with significant mineral exports. Manufacturing was at an under-developed stage: milling, tanning, canning and small scale production of clothing, textiles, footwear, bicycles and the like for the small domestic markets. Commerce, trading and administration were also small scale local activities. The requirements for senior high school qualifications were low. Banks, the trading firms and the civil services were satisfied with junior high school qualifications. The demands for senior high school qualifications e.g. for university entrance and professional careers were readily met by private colleges and a handful of special state schools.

Mellor, the official historian of "The Role of Science and Industry" in Australia during World War II put it thus:

- Stated in the most general terms, the technical challenge that Australia had to meet in the war of 1939-45 was for mass production, on a nation-wide scale, of materials and articles of a higher degree of complexity and accuracy than had before been attempted in Australia" (p1).

The challenge was met and Australia emerged as an industrial nation able to mass produce machine tools, road vehicles, aircraft, refrigerators. The educational system had not prepared us for challenge. In 1938 our intake to technical training was around 100,000; just about half the rate for that age group that were going into technical training in the UK. In 1942 we were able to graduate only 105 engineers and 46 physicists.

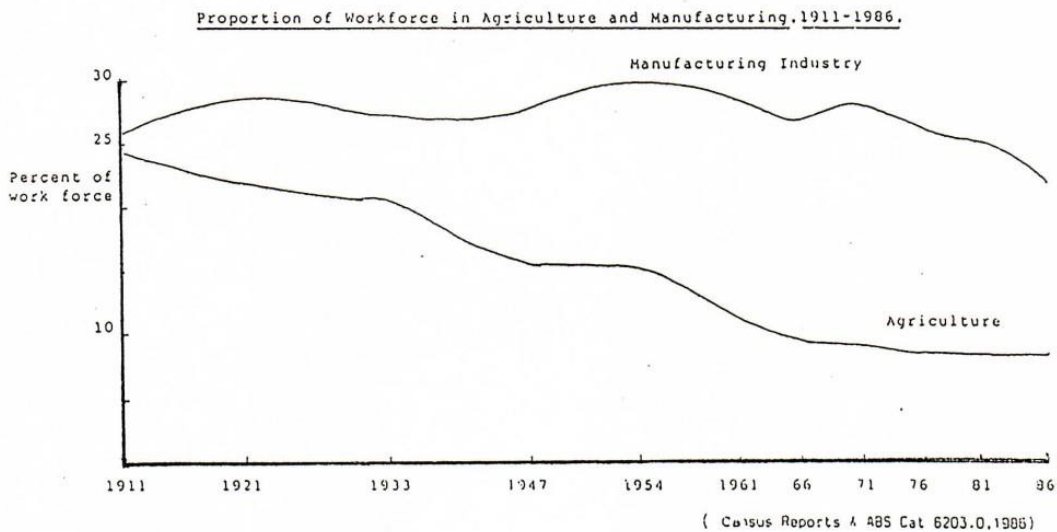
Graphs 22 and 23 trace the path of this change.

Secondary and tertiary education expanded rapidly to meet requirements for skilled and educated personnel that nations like Canada, Sweden, Japan and the USA had met twenty or more years before.

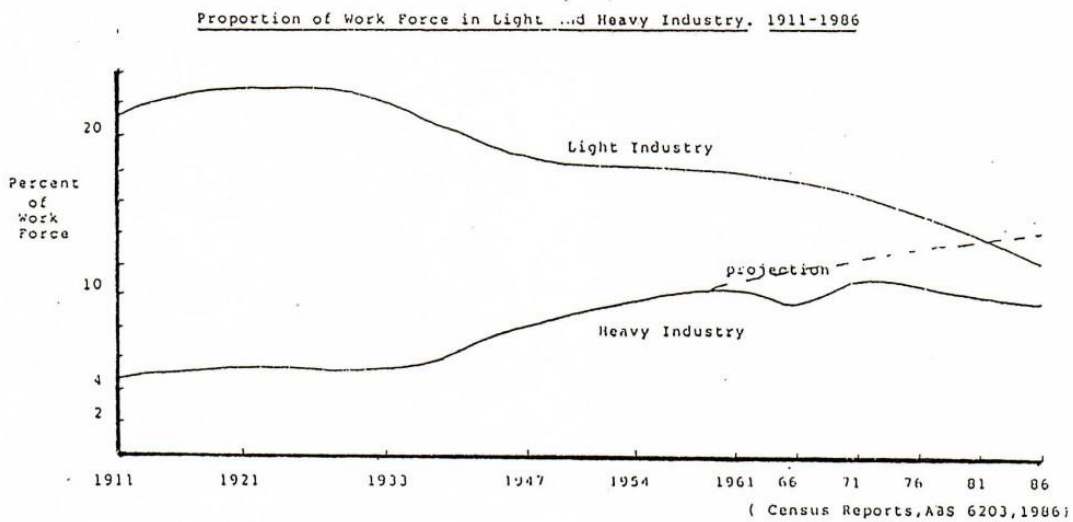
As graph 23 shows, our base in heavy industry started to falter in the early sixties, possibly because of the measures taken to protect our light industries.

In the early seventies the Australia economy started to enter the third form of economy, the so-called 'information economy' or, more generally speaking the post-industrial economy (Graphs 24 and 25).

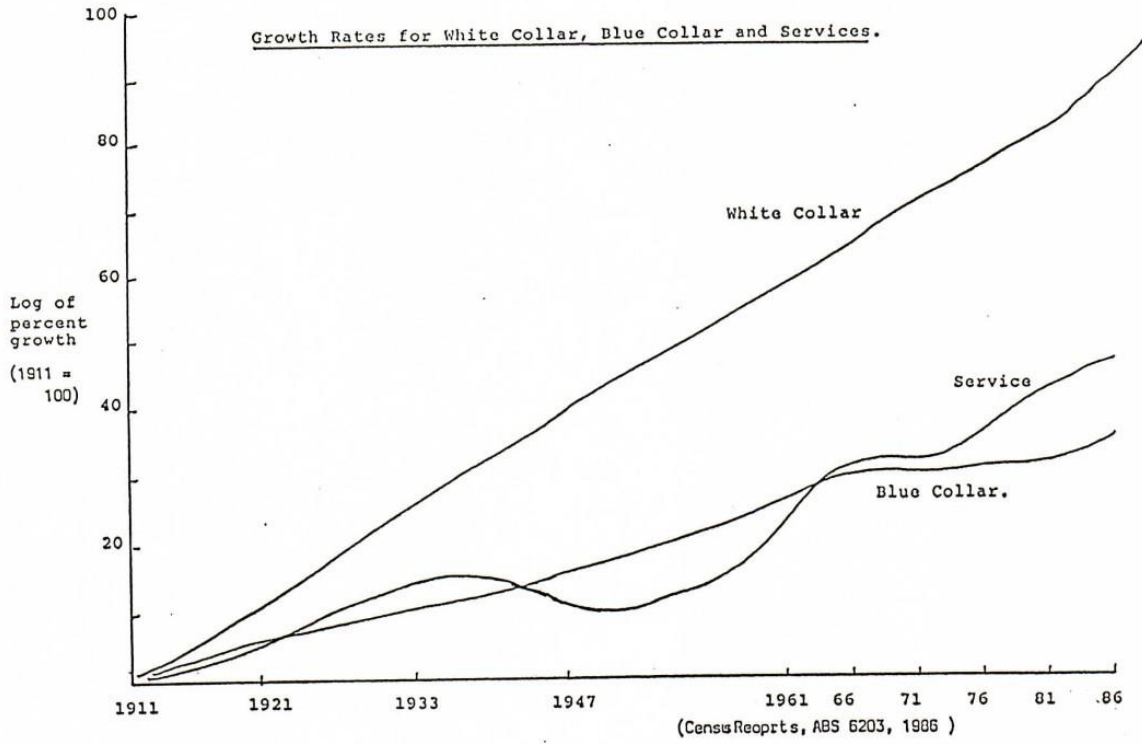
GRAPH 22



GRAPH 23

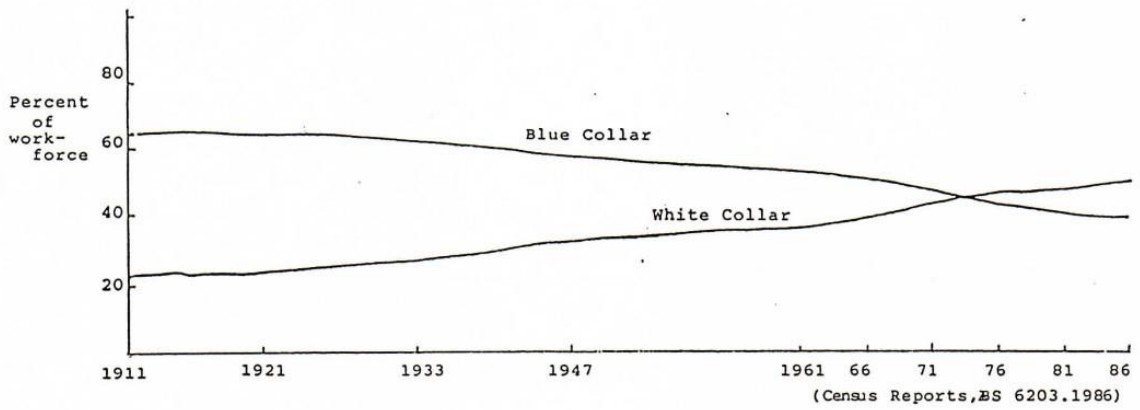


GRAPH 24



GRAPH 25.

WORK FORCE COMPOSITION.



\*Note. Service workers excluded.

Massive efforts have been made in Australia in the post-war years to catch up with the educational requirements of an industrialized economy. Without time to pause for a breath, it is now necessary to cope with meeting the educational requirements of the post-industrial society. At first glance this adjustment seem to be not at all difficult. The following table gives a first picture of the change in labour force requirements to meet those of the post-industrial economy. Since 1983 unskilled labour in electronics has been much reduced.

<i>Percent</i>	<i>Computers</i>	<i>Electronic capital goods</i>	<i>All engineering</i>	<i>Cars</i>
<i>White collar</i>	60	57	30	21
<i>Foreman &amp; skilled</i>	17	27	29	27
<i>Semi-skilled etc</i>	23	16	41	52

The changes that have taken place in Australian secondary education fit well with the requirements of this picture of the emerging post-industrial economy. By the same token, secondary education is no longer meeting the requirements of the tariff protected industries locked into the era of stunted growth in the industrialization process.

It has become apparent that the earlier conceptions of the post-industrial economy are quite inadequate. Throughout the early growth of the 'information sector' the emphasis, from telegraph to main-frame computer, has been on the *transmission* of information. This development in information technology readily found a place in the existing process of industrialization. Extrapolations from these developments in the sixties to a post-industrial economy were academic and unreal. The fact is that productivity in the western industrialized economies declined seriously during the seventies.

Since the mergence in 1976 of the microprocessor the post-industrial economy has taken concrete shape. Very quickly the microprocessor, associated sensor devices and optical fibres have invaded and started to displace all areas previously served by electro-mechanical or analogue devices. The real information revolution that we face is in *control* information: the ability to transform information into human decisions that control human or machine operations. In productive systems that have absorbed the first information revolution, the electronic transmission of information, it is essential that control is exercised as close to the 'interface' and as quickly responsive to changing conditions, as possible.

Public recognition of this distinction has been very recent (Wright, 1986, reviewing Beniger, Rubin & Huber, also 1986). However, in the sixties the science-based process industries, oil, refining and heavy chemical, had already made the distinction. It was in the nature of their

production processes that people could not be inside the cookers, distillation units, catalytic crackers, evaporators: these processes had to be operated from one remove and hence these processes industries led the way in instrumentation, automation and industrial computerization. The lessons those industries drew from their experiences are best spelt out by Hill (1972). The implications are now of general relevance as, with the advent of the microprocessor, the relatively low-capital intensive areas of manufacturing, banking, administration and retailing are facing the same levels of automation.

It is to be expected that in the near future we will see not only the displacement of routine labour, blue, white and service, but also of the crafts and professions. In both the crafts and the professions a good deal of their relevance lies in their possession of 'expert knowledge' that translates and massages information but does not transform into decisions ('on the one hand..but then on the other hand'). Diagnostic programs are increasingly programmed into machinery and there is a major thrust into 'expert knowledge' programs to be run on computers. The future growth areas, in a shrinking labour market, would appear to be in those occupations that need control information at arrive at decisions of a non-routine nature i.e. operatives of the kind that have emerged over the past twenty years in the process industries, and sales persons and administrators.

The following four graphs give some indication of how the Australia society is currently placed to cope with this future.

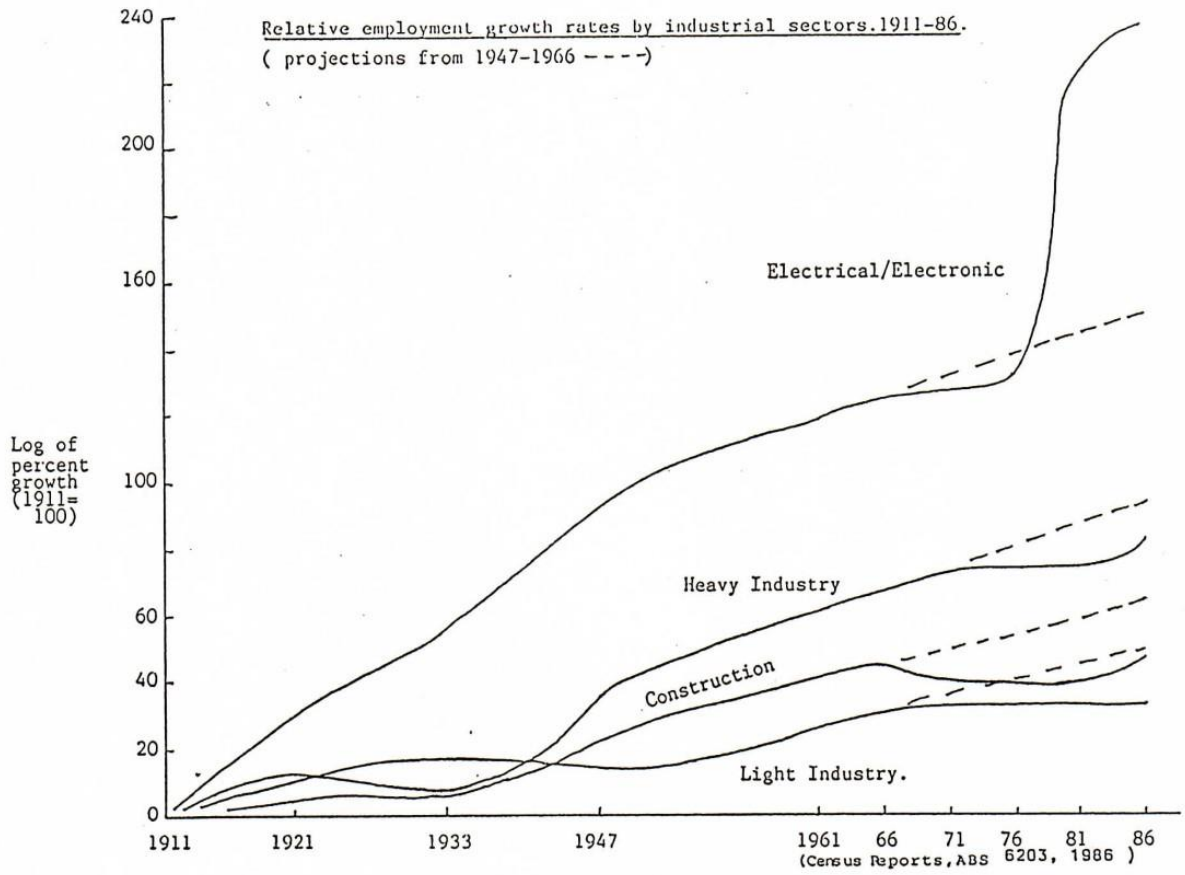
Graph 26 indicates a remarkably rapid thrust into the technological basis of the post-industrial society: a thrust that has, no doubt, received a great deal of support from the Federal public service's heavy investment in computerization, word-processors and the like.

Graph 27 indicates that the growth in craft skills has already adapted to the future: perhaps too fast for many small tariff protected manufacturers.

Graph 28 suggests that there will be a problem with over-supply of the most highly specialized professionals, doctors, lawyers, architects etc.

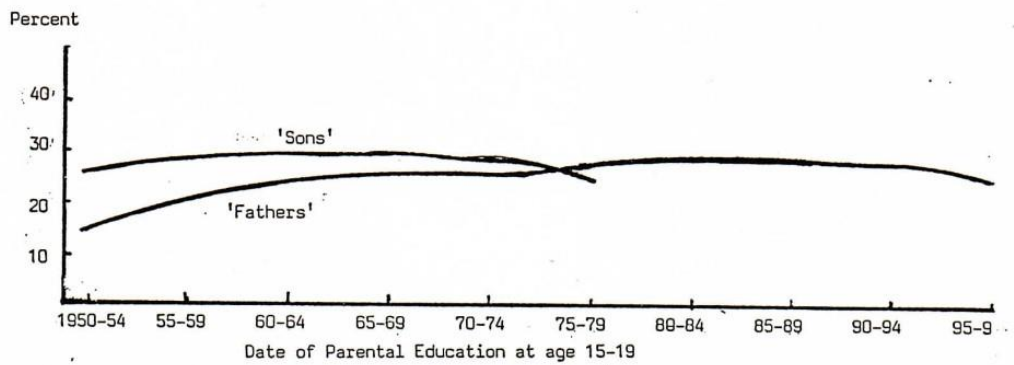
Graph 29 suggests that, maybe, the tide is turning (particularly if we bear in mind that so many of the professionals are now MBAs).

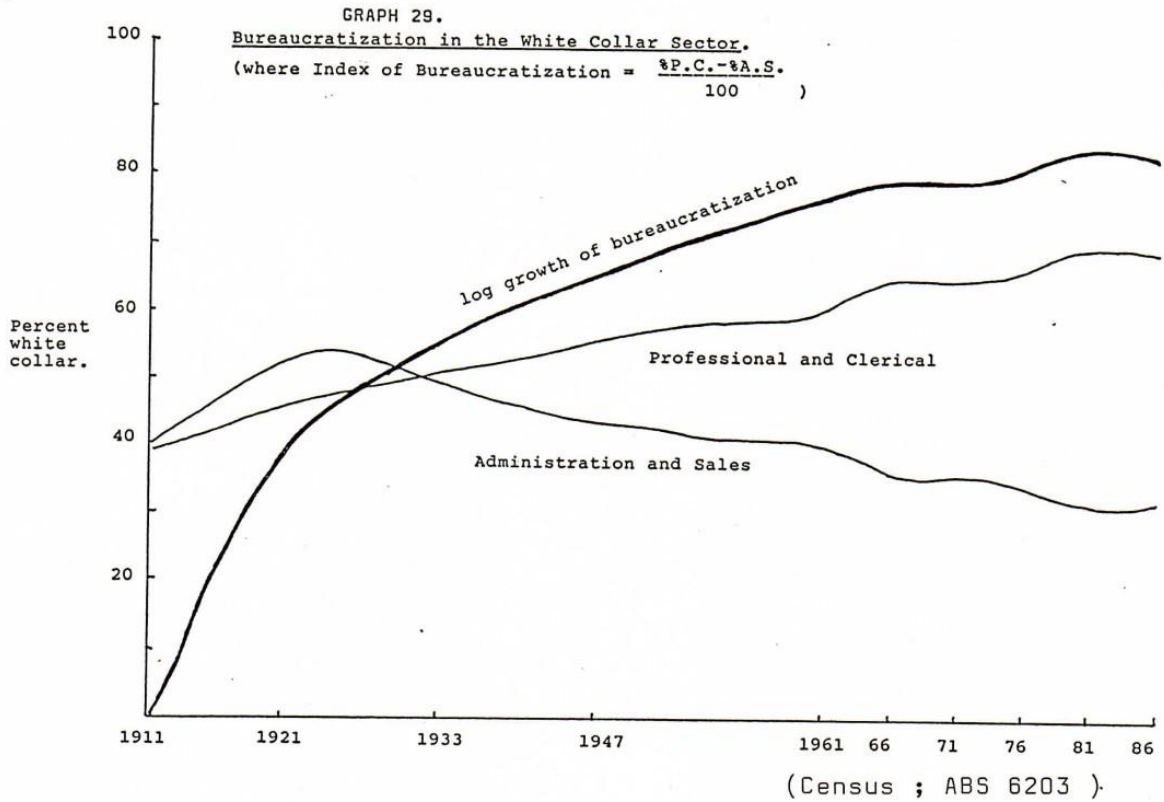
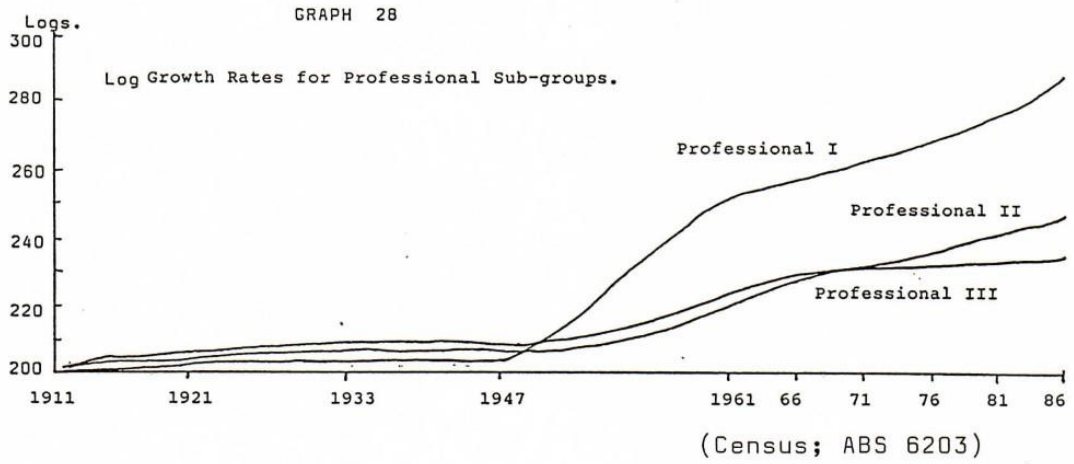
GRAPH 26



Graph 27

Trade and Sub-degree Diplomas. (All males)  
(percent of labour force. Census 1981.T 50)







## THE SYSTEM CHARACTERISTICS OF EXTENDED EDUCATIONAL SYSTEMS.

*This report has been simplified in places to make it more accessible to the everyday reader by for example, removing detailed descriptions of the American tests used for various indices and some statistical detail such as number of items in a scale. These changes do not alter the meaning of the results in any way. Needless to say, the Coleman study was monumental to a degree which would be almost inconceivable today, the correlation matrix published at the end will give you a taste of this, ME*

The statistics examined in the preceding chapters show that the characteristics of the Australian educational system and their inter-relationships are remarkably persistent. They have persisted during long periods of overall growth. The evidence suggests that it is a highly integrated system and one that is to a considerable degree self-perpetuating.

To plan for interventions in a social process as massive as this would seem to require some knowledge of how that system works. Some knowledge of governing system principles and of what, at any given period, are the 'leading parts'. By leading parts we simply mean those parts currently giving direction to the changes in the system. Planned modification of the leading parts, if possible, offers multiplier effects not to be gained from modifying the lagging parts.

Typically, however, our attempts at educational planning have proceeded from the simplistic assumption that the educational system is just an aggregate of interacting components: "...there is no simple prescription of the ingredients necessary to achieve high quality education: many factors interact - students and their backgrounds; staff and their skills; schools and their structure and ethos; curricula; and societal expectations" (Karmel, 1986, 14.4).

On this assumption a change in any part is as likely to produce effects as a change in any other parts. It then becomes a matter of intervening where it is most convenient to do so, cheapest to do so, or where there are some bright ideas about what could be changed. The temptation for a committee charged with educational planning is to come down with a hundred and one proposals for change over a wide front and avoid the spelling out of hierarchies of priorities (except, of course, when it comes to setting up new summit bodies who will be charged with setting operational priorities).

Whilst all of the factors listed in the above quote are *necessary* conditions for the educational process it is incorrect to assume that they are all *sufficient* conditions, such that if they are changed certain effects must follow. This sort of explanation ignores the fact that many of these parts may simply act to support, constrain or direct change rather than cause it or impel it along.

The assumption that a national educational system can be viewed as 'an aggregate of interacting parts' was proven false by James S. Coleman et al in the study reported in *Equality of Educational Opportunity* in 1966.

That is an unusually strong claim to make of a single social scientific study but then this was not one of the usual kind of studies.

However, when, in a national educational planning exercise it was suggested that serious credence be given to the Coleman findings the notion was rebutted on the grounds that 'the Coleman study was based on U.S. data gathered in the mid-sixties and could not be accepted as a guide to Australia in the mid-eighties'. When reminded that the Bardsley study in Australia, admittedly a much more modest study, confirmed the Coleman findings the response was that, 'that was in the mid-seventies'.

In what follows I will attempt to demonstrate that the Coleman findings have much greater generality than implied in that rejection.

First I will restate Coleman's findings and try to put them in the context of the unusual scientific endeavour that led to them; second, I will report on my own re-analysis of a major part of his data; third, I will present the re-analysis of the major studies since 1966, American and British, that have confirmed Coleman's findings; last, I will present the reanalysis of two major Australian studies, 1976 and 1982, that also confirm those findings. There is here no review of major studies contradicting Coleman's findings because no such studies have been found in the literature.

### **The Findings of the Coleman Study**

The Coleman study did not follow the usual pattern of arising from scientific/academic curiosity and being limited in scope by the generosity of some Foundation. It was dictated by law, Section 402 of the Civil Rights Act of the U.S. Congress 1964. The U.S. Congress were disturbed by the lack of progress following the Supreme Court desegregation decision of 1954 and concerned with Section 402 of the Civil Rights Act of the vigour of the black civil rights movement, particularly in the South. The law demanded that the survey should identify where there was, "in public educational institutions, at all levels" a "lack of availability of equal educational opportunities for individuals by reason of race, color, religion, or national origin". The clear intent was that the results of the study would guide the allocation of Federal funds toward rectifying inequalities.

The legislators also, quite clearly, assumed that inequalities could be rectified by changes in school composition and by pumping funds into facilities, re-design of curricula, and texts, and teacher development programs.

As Coleman points out, it followed from their reading of the intent of the legislators that, "This analysis has concentrated on the educational opportunities offered by schools in terms of their student body composition, facilities, curriculums and teachers" (p22). This bias is important enough to keep in mind in view of what follows.

The survey carried out by Coleman, and his multitude of collaborators, was not in any way stunted for want of funds and hence was on a scale that has not been seen before or since. At the high school level alone (which is what we are concerned with) some 689 randomly selected schools returned completed survey forms and tests for their pupils, their teachers, and their principals and superintendents. Some 356,860 pupils completed the forms and tests, and the design enabled their responses to be compared directly with those of their actual

peers, teachers and school facilities. (Coleman did not have to resort to comparing averages across levels.)

Coleman was able to use this vast body of data for census-type cross tabulations. However, for statistical evaluation of the causal interconnections in the schooling/educational system Coleman was limited by

- a) the then available computer capabilities: the IBM 360 could, at most, handle a matrix of correlations for 60 variables for a few thousand cases, and
- b) the statistical tools available for detecting possible causal relations.

Coleman handled the computer limitations by a) drawing random samples from the master sample of 356,860 high school students to yield the following sub-samples for each of the grades 6,9 and 12:-

1. White, North <sup>1</sup> : 1000 from each of the 4 regions	=	4,000
2. White, South: 1000 from each of the 4 regions	=	4,000
3. Black, North: 1000 from each of the 4 regions	=	4,000
4. Black, South: 1000 from each of the 4 regions	=	4,000
5. Oriental Americans	=	1,000
6. Indian Americans	=	1,000
7. Mexican Americans	=	1,000
8. Puerto Ricans	=	1,000

b) subsets of the 103 variables measured in the study were analysed to determine the 60 most important variables. The inter-correlations of these variables were then calculated for each grade in each of the eight social groups listed above (a total of 60,000 high school students).

The second limitation, the statistical tools, was equally unavoidable: The need to adapt Sewell Wright's statistical method of causal path analysis to social science data was already recognized (Emery and Oeser, 1958) but the means of doing so had not yet emerged. On the very weighty advice of John Tukey of Princeton, Coleman settled for regression analysis. His only practical alternative was that of three-way tabular analysis so brilliantly pioneered by Paul Lazarsfeld and his group at the Columbia University's Bureau of Applied Social Research (but Coleman had so many variables that that may well have been considered impractical in the two year time span allowed by Congress.)

This much is background, although I think it necessary background if one is to follow the Coleman story.

The findings of the Coleman study negated the assumptions on which it was designed.

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<sup>1</sup> 'North' included California, Alaska and Hawaii. 'South' included the South West i.e. Texas, Arizona, New Mexico and Oklahoma.

As indicated above, the study was designed on commonly shared assumptions that the learning of pupils was critically dependent on the provision of good school facilities (libraries, labs, workshops etc), low pupil-teacher ratios, well-designed curricula and texts, provision of stimulating extra-curricula activities, well trained and well paid teachers, and such like. The influence of the socio-economic status of the parents on pupil achievement was accepted as a proven fact. However, that influence was largely ascribed to superior genetic inheritance or to the ability of well-to-do parents to get their children into the best schools.

Contrary to those assumptions the Coleman study found, and in the best scientific tradition duly reported, that the emphasis in their design failed to anticipate the overwhelming influence of non-school factors on student motivation and achievement. They failed to anticipate,

"..the variability between individual pupils within the same school: *this variability is roughly four times as large as the variability between schools*" (p23, my emphasis).

In a lesser study the design assumptions would probably have precluded measurement of variables relevant to such an unexpected finding. With the scale of resources at his disposal Coleman had covered all eventualities. As a result he was able to explore at length the sources and nature of the variability, leading to the conclusion that:

"Taking all these results together, *one implication stands out above all*: that school brings little influence to bear on a child's achievement that is independent of his background and general social context; and that this very lack of an independent effect means that the inequalities imposed on children by their home, neighbourhood, and peer environment are carried along to become the inequalities with which they confront adult life at the end of school. For equality of educational opportunity through the schools must imply a strong effect of schools that is independent of the child's immediate social environment, and *that strong independent effect is not present in American schools*" (p325, my emphasis).

This conclusion was a bitter blow for those who believed that government policies on school funding could be a major tool for creating equality of educational opportunity. There is no reason to believe that "schools have a strong independent effect" *in any modern industrial society*, where the educational norm has gone past the provision of some primary education. The conclusion was not lightly arrived at:

"This implication stems from the following results taken together:

1. The great importance of family background for achievement;
2. The fact that the relation of family background to achievement does not diminish over the years of school;
3. The relatively small amount of school-to-school variation that is not accounted for by differences in family background, indicating the small independent variations in school facilities, curriculum, and staff on achievement;
4. The small amount of variance in achievement explicitly accounted for by variations in facilities and curriculum;
5. Given the fact that no school factors account for as much variation in achievement, teachers' characteristics account for more than any other - taken together with the results from section 2.3, which shows that teachers tend to be socially and racially similar to the students they teach;

6. The fact that the social composition of the student body is more highly related to achievement, independently of the student's own social background, than is any school factor;
7. The fact that attitudes such as a sense of control of the environment, or a belief in the responsiveness of the environment, are extremely highly related to achievement, but appear to be little influenced by variations in school characteristics "(p325).

Despite the crudeness of the statistical tool available to him (regression analysis - see Coleman pp 325-330 for a frank discussion of this), Coleman made two further discoveries that deepen our knowledge of the educational process. He detected that:

- a) parental education, a literate home and parental desires for their children's further education have a more direct influence than family wealth (Coleman, p324).
- b) some minority groups have been so deprived of education in the past that the schools are a much more important influence on their learning:

"Thus, 20 percent of the achievement of Negroes in the South is associated with the particular school they go to, whereas only 10 percent of the achievement of whites in the South is. Except for Oriental Americans, this general result is found in all minorities ...if a white pupil from a home that is strongly and effectively supportive of education is put in a school where most pupils do not come from such homes, his achievement will be little different than if he were in a school composed of others like himself. But if a minority student from a home without much educational strength is put with schoolmates with strong educational backgrounds, his achievement is likely to increase (ibid, p22).

These last two discoveries were not strongly followed up. They were glimpses of new land rather than landings. We will return to them in our re-analysis.

The major finding of the Coleman study was not that expected by the Congress; nor does it appear to have been what he expected when he supervised the design of the study. It was a finding that stressed the relative impotence of politicians to bring about short-term results in the upgrading of an educated community, one that had gone past simply providing elementary education to the mass of its citizens. (The study in no way reflected on the efficacy of legislative action in enabling the realization of pent-up demands for higher education, e.g. the undoubted success of the post-war provision of higher educational opportunities for ex-service people). It was also a finding that challenged all those, teachers' unions included, who had a vested interest in having more resources allocated to education.

Quite understandably the report was heavily attacked. The most serious attacks were directed at:

- a) the weaknesses of the method of regression analysis and
- b) the one-shot, cross-sectional nature of the study.

Some held that only longitudinal studies of the same students over time could reveal truly causal relations. The method of regression analysis can distort complicated patterns of interdependence but, as in this case, can demonstrate the basic structure of relations when relatively simple. After much heated debate, a collection of papers edited by Patrick Moynihan and Frederick Mosteller (a mathematical statistician of similar renown to Tukey, Coleman's statistical advisor) confirmed the correctness of Coleman's analysis. However, the damage appears to have been done. Not wishing to accept the implications of the findings, and unwilling to follow the debate they walked away from the issue. As noted above, the concerned parties, educationalists and politicians alike, still like to think that it never

happened or in any case is now out-dated and can tell us nothing important about the educational systems and processes of today.

This situation needs to be redressed.

Soon after the Coleman report appeared some of the problems of causal path analysis were solved and the application of these new, and less obtuse, statistical techniques fully confirmed his findings and his major educated guesses.

Furthermore, there has been a dawning realisation that Coleman's design was very sophisticated: it was no single-shot, cross sectional survey of one society. It was a comparative study of eight major and very different social groups with their own ethnic, historical and geographical identities. The many samples that Coleman selected on a probabilistic basis from these social groups were quite independent of each other. This design enables us to generalize over a range of societies that practically extends from 'Third World' conditions to those of WASP America.

In what follows I have reanalyzed Coleman's correlational data for grade 12 in all of the eight ethnic and social groups. For this analysis I have followed the graph-theoretical method of causal path analysis outlined in Emery and Phillips (Appendix A in *Living at Work*, AGPS, Canberra, 1976). Even with large numbers of variables this method yields a unique and non-subjective graph (or set of graphs) representing the statistically significant interrelations between the variables, and it takes account of *all* such interrelations. This analysis does not identify causal paths. The paths it identifies limit the interpretations that can be placed on the data, in that any causal interpretation must correspond with these paths or be involved with contradictions in the supporting data. Given the graph(s), causal relations may be inferred from evidence other than that given by the original matrix of correlations. (There is an alternative method of 'causal path analysis' based on an extension of regression analysis. I have not used this as it is heavily dependent on subjective assumptions when the number of variables gets to 5 or above).

To keep the manual task of reanalysis within manageable size a subset of 21 variables<sup>2</sup> was selected from Coleman's final sixty. Care was taken to ensure that some strong variables were selected from each of the sub-sets concerning educational outcomes, student characteristics etc. Thus 'G.I. Total' was selected from the outcome variables because it was more closely related with both mathematical and verbal performance than any other variable.

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<sup>2</sup> a) a description of the variables used and the tables of intercorrelations taken from Coleman's original tables are appended to this report. b) in interpreting the path graphs presented in this report it should be borne in mind that the correlation index that is quoted, Pearson's r, is significant at the .01 level of probability when it is .08 or above for a sample of 1,000, .07 or above for n=1,500, .05 and above for n=3,000. I do not think that any correlation below .10 has been here reported except to make the point that particular relationship might be suspect.)

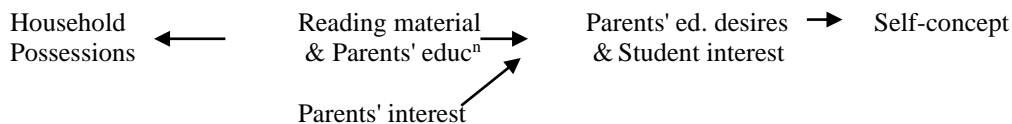
**Findings from further analysis of Coleman's data: The determinants of educational outcomes.**

The study data consists of three clusters or sets of variables, those of 'family', 'school', and 'outcome' plus two variables that linked the schools cluster to the outcomes cluster.

The *family cluster* consisted of:

- Reading material in the home: (which included dictionary, encyclopedia, daily newspaper, numbers of magazines regularly got at home, number of books at home.)
- Parental education: (which was a combined score for father and mother ranging from some grade school to graduate school.)
- Parental desires for child's education: (combined score again for father and mother.)
- Student interest in school and reading: (includes variables such as number of books read over the summer, feelings about leaving school, desire to achieve at school, measure of staying away from school.)
- Student self-concept (as scholar): (includes perceptions of self as 'bright' compared to other students, learning ability, and teacher as hindrance through speed.)
- Homework: (average time per school day spent studying outside of school.)
- Parents' interest: (time spent with parents talking about school work & reading to children before started school.)
- Household possessions (poverty index): (TV, telephone, record player, refrigerator, automobile, vacuum cleaner.)

These variables generally clustered together in the way shown in Figure .



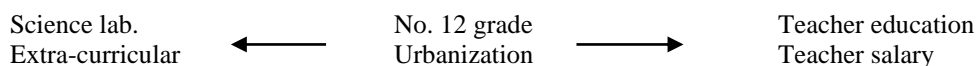
**Figure 1: Causal Path for the Family Cluster**

Figure shows that the reading materials in a home and parents' education lead to parents desires for education for their children and the student's own degree of interest in education. These then lead to the student's concept of self as a scholar. Reading materials in the home and parents' education also lead to the number of household possessions.

The *school cluster* consisted of:

- Science Lab Facilities - special questionnaire to principals and superintendents: (from a special questionnaire to principals and superintendents.)
- Extra curricular activities: (a special questionnaire as above.)
- Number of 12th Grade students.
- Urbanism of background: (A combination of urbanism of pupil and of mother at about same age.)
- Teacher, degree received.
- Teacher, salary.

These variables clustered together as shown in Figure



**Figure 2: Causal Path for the School Cluster**

The *outcome cluster*<sup>3</sup> consisted of:

A non verbal score:

A verbal score:

Reading Comprehension:

Math Achievement:

General Information:

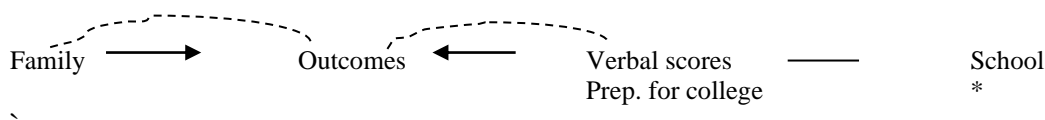
In addition, there were two items that bridged the family and school clusters. It appears that for good educational outcomes it is not enough for a school to have a lot of 12th grade students, good facilities, an extra curricular program and high quality teachers. The critical elements appear to be the educational qualities and educational aspirations of one's twelfth grade peers. These bridging items are:

- Verbal average score. (This means a body of peers each scoring high on the verbal test - that test is the most highly correlated item with all of the outcome items), and
- Proportion preparing for college. (The high correlation of this item with the previous item indicates that this is a measure of realistic aspirations.)

These then formed the set of items that were analyzed over the eight individual sets of data.

### **Overview: The determinants of educational outcomes.**

The overview, therefore, consists of those clusters and their interrelations. The graph of the causal path showing these interrelations can be read just like a road map. It shows what leads to what.



**Figure 3: The Causal Path of Determinants of Educational Outcomes**

\* The dotted lines indicate secondary relationships.

The overview graph (Figure 3) shows that both the school and the family contribute to educational outcome. The influence of the school acts particularly through the scores on the bridging items of average verbal ability and preparing for college. The graph took exactly the same form for each of the groups in the study. Family has by far the most significant effects on outcomes.

This graph devised from a different method of analysis, and the fact that it held for all eight separate groups, is further reinforcement of Coleman's finding above that "school brings little influence to bear on a child's achievement that is independent of his background and general social context".

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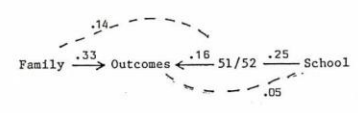
<sup>3</sup> The items in the outcome cluster are all scores of the individual pupil on tests selected from a battery of tests widely used and standardized in the USA (SCAT - school and college ability tests). This was the tightest, most highly intercorrelated cluster in Coleman's original set of variables. We chose the general information (GI) score as the most representative item for this cluster.



Findings from further analysis of Coleman's data: the determinants of educational outcomes. As can be seen from the following path-graphs the clusters, 'Family', 'School' and 'outcomes', and their inter-relations are nearly identical across all social groups. The weightings change systematically.

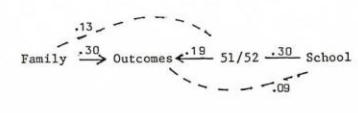
White North (n = 4,000)

	Fa.	School	Outcomes	51/52
Fa.	(27)			
School	06	(13)		
Outcomes	33	05	(58)	
51/52	14	25	16	(.40)



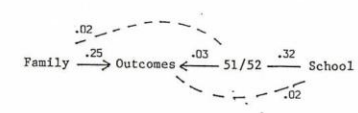
White South (n = 4,000)

	Fa.	School	Outcomes	51/52
Fa.	(25)			
School	06	(15)		
Outcomes	30	09	(59)	
51/52	13	30	19	(.30)



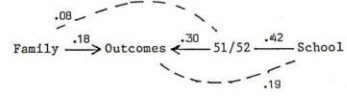
Oriental Americans (n = 1,000)

	Fa.	School	Outcomes	51/52
Fa.	(25)			
School	02	(22)		
Outcomes	25	02	(63)	
51/52	03	32	03	(.50)



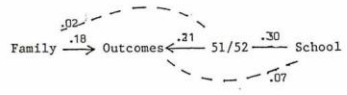
Black South (n = 4,000)

	Fa.	School	Outcomes	51/52
Fa.	(20)			
School	08	(39)		
Outcomes	18	19	(50)	
51/52	08	42	30	(65)



Black North (n = 4,000)

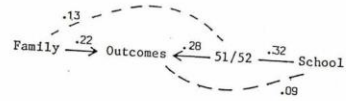
	Fa.	School	Outcomes	51/52
Fa.	(20)			
School	02	(17)		
Outcomes	18	07	(55)	
51/52	02	30	21	(34)



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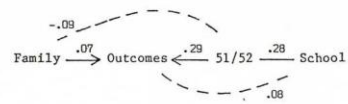
American Indians (n = 1,000)

	Fa.	School	Outcomes	51/52
Fa.	(27)			
School	10	(22)		
Outcomes	22	9	(57)	
51/52	13	32	28	(54)



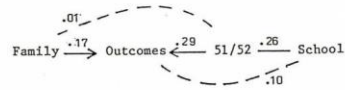
Puerto Rican Americans (n = 1,000)

	Fa.	School	Outcomes	51/52
Fa.	(24)			
School	02	(17)		
Outcomes	07	08	(58)	
51/52	-09	28	29	(45)



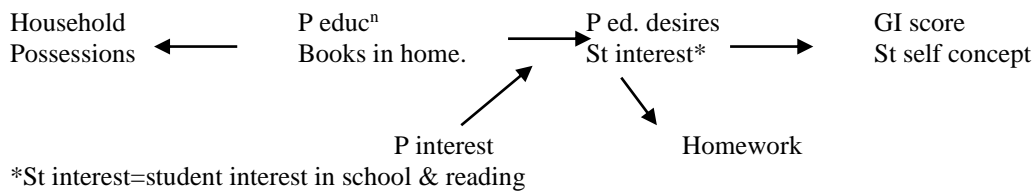
Mexican Americans (n = 1,000)

	Fa.	School	Outcomes	51/52
Fa.	(20)			
School	02	(20)		
Outcomes	17	10	(57)	
51/52	01	26	29	(44)

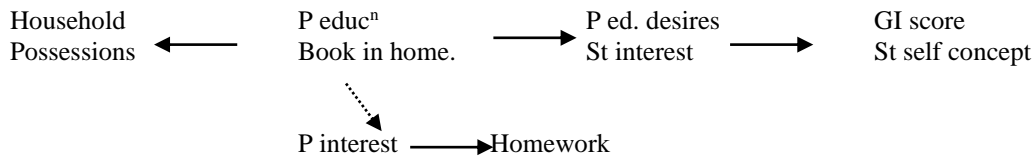


## Findings from the Reanalysis of the Family Cluster with General Information

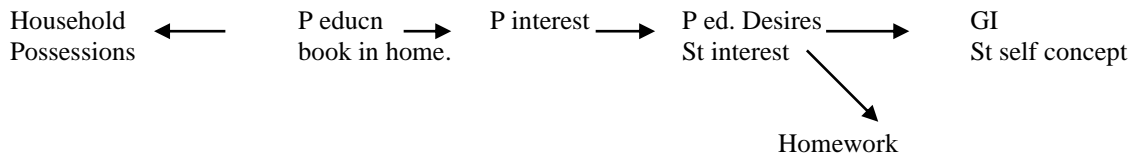
*White North (n=4000)*



*White South (n=4000)*



*Black North (n=4000)*



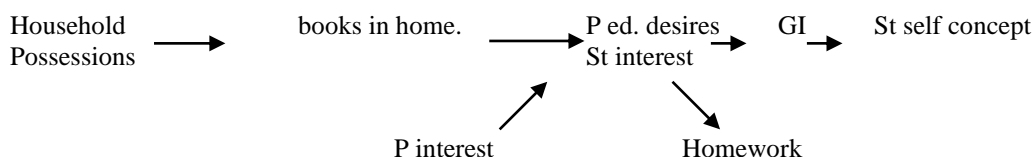
**Figure 4: Causal Paths of the Family Cluster for Whites and Black North**

The white north pattern can be taken as most likely to be typical of developed societies where some secondary education is taken as the minimal acceptable standard for entering adulthood. In this pattern 'parental interest' makes a contribution independently of parental education. The reason might be that some parents who themselves lack education can see the opportunities for post-compulsory education that their developed societies offer and the occupational opportunities for the better educated.

The economic boom in the South (and South-West) of the USA was in its early years when the Coleman study was done. This could explain why 'parental interest' was not a significant independent influence: the opportunities were not seen to be there.

The Black North pattern is essentially like that of the White South. With most of them living in city ghetto areas the schooling system and labor markets offered little to encourage any parental interest that did not arise from their own education.

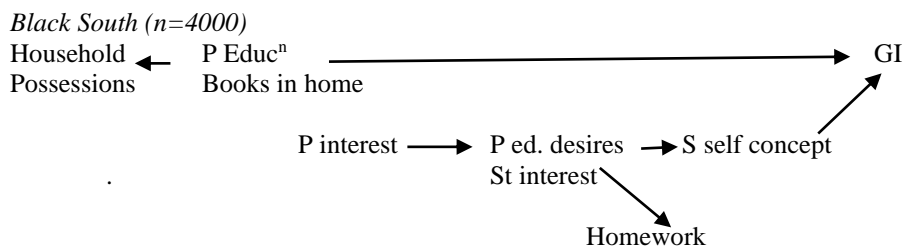
*Asian Americans (Coleman called them Oriental Americans, n=1000)*



**Figure 5: Causal Path of the Family Cluster for Asian Americans**

The pattern for the Asian American (Figure ) is quite unique amongst all of the eight social groups that Coleman compares (and he frequently notes this). The unique features are twofold;

- the Asian Americans (basically Japanese farmers in California and Chinese small business people throughout the central areas of the cities) appear to be strongly disposed toward more education for their children, regardless of the education they have received. Having a good family income appear to be the only critical determinant,
- in this case, and only in this case does the student's self concept, of himself or herself as a scholar, emerge as clearly dependent on their school performance (i.e. the G.I. score).

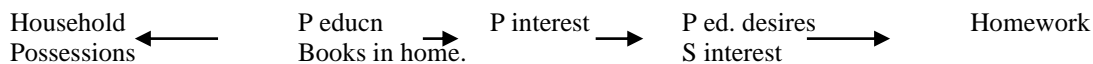


**Figure 6: Causal Path of the Family Cluster for Black South**

The pattern for the Southern Blacks (Figure 6) is indicative of a rapid transition from a backward educational system, aimed at 'none or some primary education' to an educational system aimed at all having some secondary education. Past parental education still affects final GI score of their children but the dominant role is played by 'parental interest' and the translation of that parental interest into parental educational plans and students interest in school and reading. This would appear to presuppose, as appears here, a considerable pool of untapped student talent.

Of all the patterns coming from this section of Coleman's data this seems to be the most time-specific. A different pattern would almost certainly have appeared if the survey had been done ten years earlier or today, when the children of those twelfth graders would be deciding their educational futures.

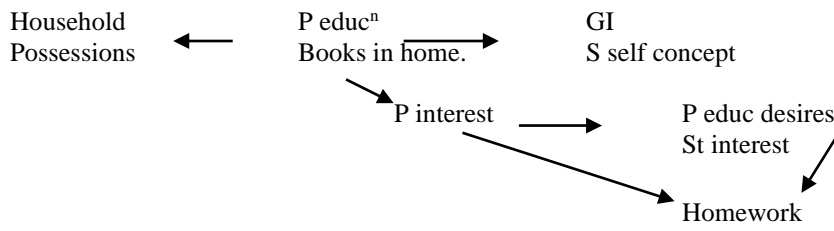
*Native Americans (Coleman called them American Indians, n=1000)*



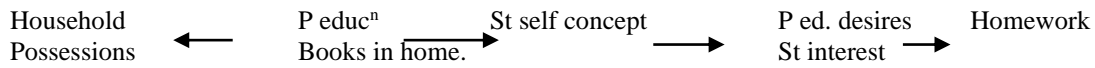
**Figure 7: Causal Path of the Family Cluster for Native Americans**

The Native American pattern shows a high dependency on continued pressure from parents who had themselves had more than average education. A clear response from their children is not observed till after parental interest is concretized into parental plans; and even then the only consistent outcome is in their children trying harder (homework). It does not show up in GI scores.

*Mexican Americans (n=1000)*



*Puerto Rican Americans (n=1000)*



**Figure 8: Causal Paths of the Family Cluster for Hispanic Americans**

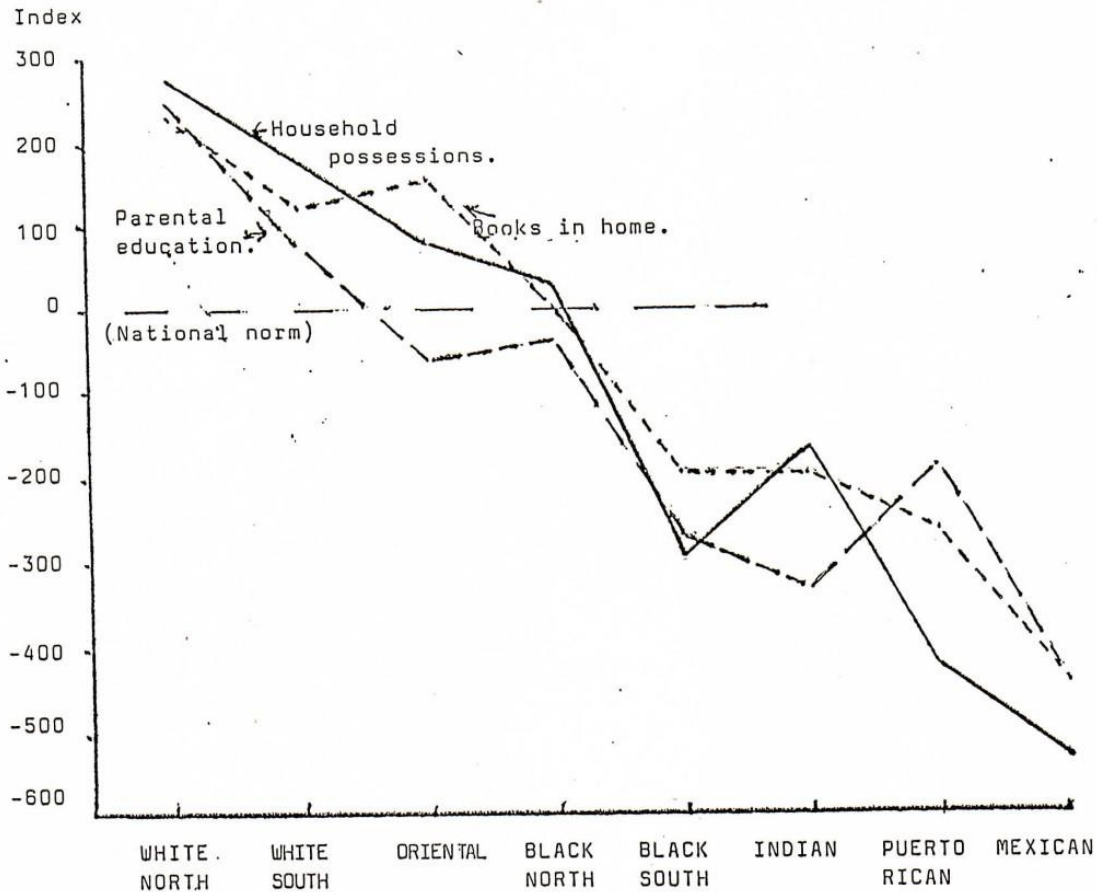
Those of Hispanic origin show two different patterns.

The Mexican Americans are rural South but with a large minority from cities such as Detroit, San Diego or Los Angeles. Their pattern is essentially the same as that from the Northern blacks and Southern whites; except even more depends on the parents having 'made it' in terms of education and escaping.

With the Puerto Rican Americans the critical link appears to be the student's concept of himself as doing well at school. Presumably this self concept fairly realistically reflects the student's talents but as with the Indian Americans it culminates in trying harder. There is no evidence in Coleman's data that these efforts in their social context, produce educational outcomes (eg. GI score).

The comparison of these eight groups clearly show which family influences can produce educational outcomes in terms of student interest, self motivated reading, attention to homework and educational performance. The comparisons also show that some social environments inhibit these possibilities.

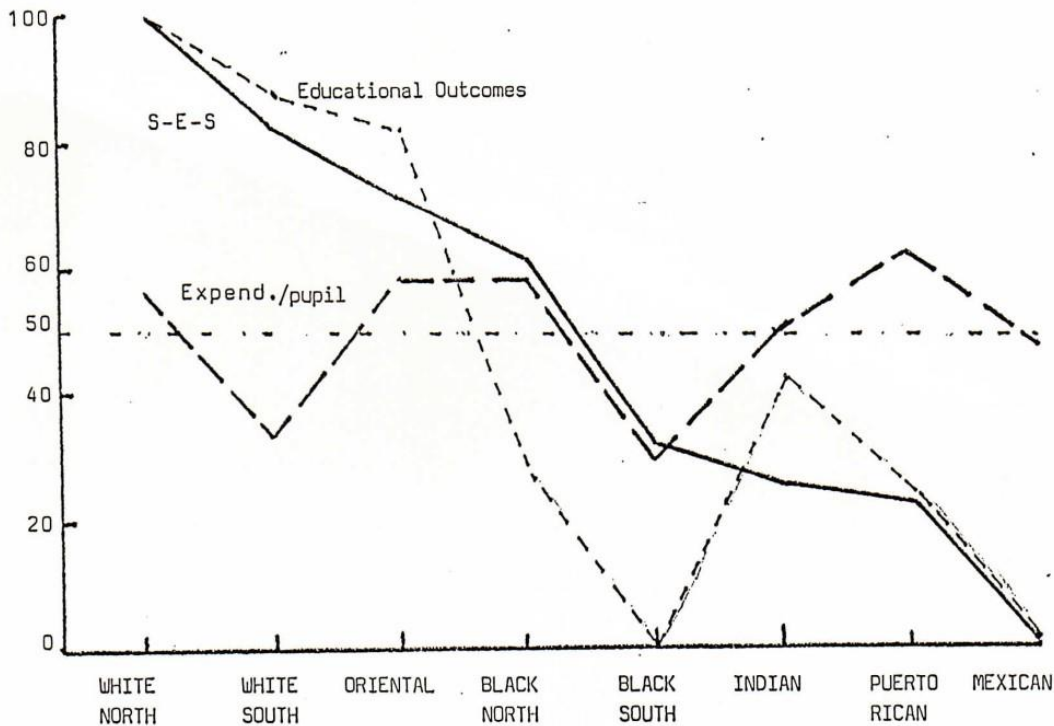
An indication of how the social environment acts to limit family influence is given by the following graph.



GRAPH 29. RELATIVE SOCIO-ECONOMIC STATUS.

This graph does not contradict the basic pattern which we found in all of the eight social groups. It does show that when the driving forces are low (particularly low levels of parent education and reading materials in the home) then their contribution to educational outcomes is low.

The following graph brings into consideration the relative levels of public expenditure on pupil instruction.



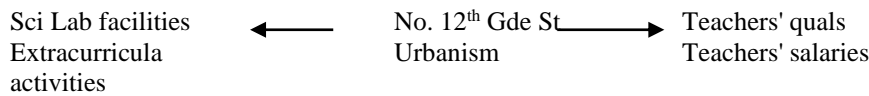
GRAPH 30 . RELATIVE SOCIO-ECONOMIC STATUS, SCHOOL EXPENDITURE PER PUPIL, OUTCOMES.

- ( a. The index of socio-economic status is a combined measure of household possessions, parental education and reading materials in the home. The index ranges from 0 to 100.
- b. Expenditure is only for recurrent costs for instruction. It does not measure capital expenditures. Overall average expenditure = 50.
- c. The index of educational outcomes is a combined measure of the five scores. The range is 0 to 100. )

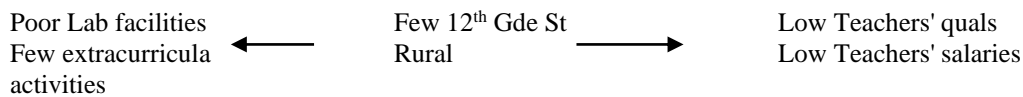


## The Causal Paths for the School Cluster

In all groups, but the southern whites, the same causal path pattern is to be found:



As mathematical graphs obey a symmetry law, the mirror image defines the other extreme:



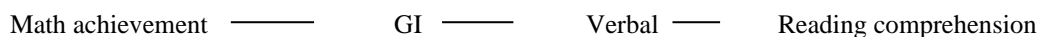
The pattern appear to be that the higher density of population in the urban areas permits high schools to attract large numbers of 12th grade students hence attract the public funds necessary for better teachers, better facilities and extra curricula activities.

For the southern whites, who were more rural than any group apart from the Native Americans, the factors of urbanism and numbers of 12th grade students plays a lesser, although still significant role. It is possible that the relative prosperity of the local region is a more important determinant but the Coleman data do not cover this possibility.

Such influence as this cluster has on educational outcomes appears to derive from extraneous socioeconomic factors e.g. urbanism. There is no reason to believe that improving school facilities or teachers would have an independent effect.

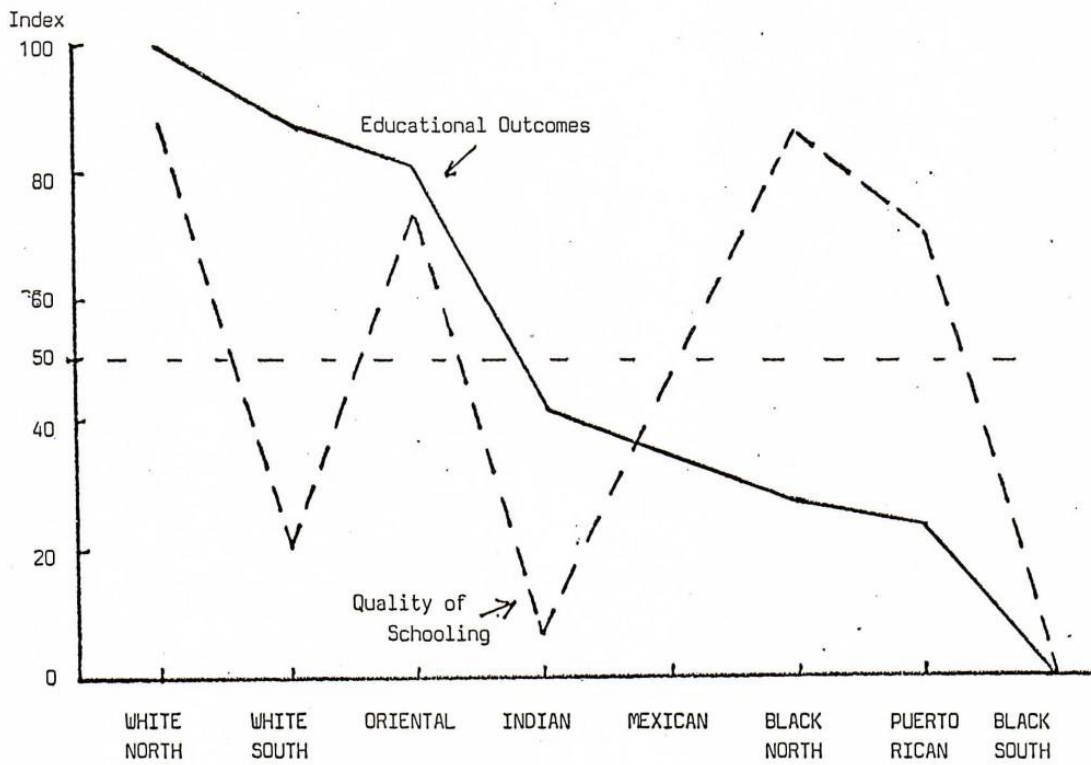
## The Inter-relatedness of Items in the Outcome Cluster

This is a matter of some importance as it is possible that the various aptitudes and knowledge levels hang together differently for the different social groups. If that were the case then special care would have to be taken. As it happens the following pattern of interrelationships is found in every social group.



The 'non verbal' scale is the only one that dances around: for all blacks, Mexicans and Southern whites, it is most closely associated with the verbal scale, for northern whites and Puerto Ricans with maths achievement and for Asians and Native Americans with reading comprehension. We appear to be quite justified in using a combined index of 'educational outcomes as in the graphs above.

If we graph the interrelation of quality of schooling with educational outcomes we arrive at the same conclusion as Coleman arrived at, at the much more exacting level of individual correspondences.



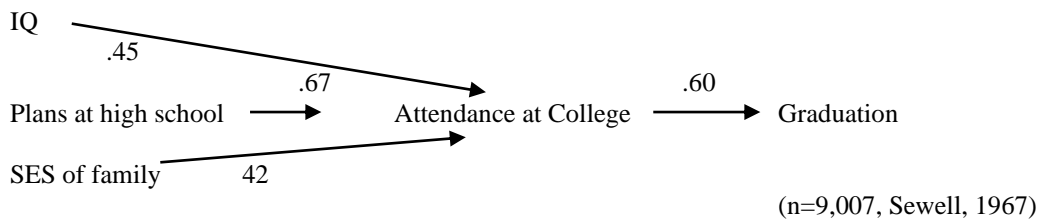
GRAPH 31. EDUCATIONAL OUTCOMES & QUALITY OF SCHOOLING.

( The index of Quality of Schooling is a combined index of all items in the School Cluster, excluding urbanism. The index ranges from 0 to 100).

It is obvious from this graph that there are vast gaps between legislative provision of 'quality education' and 'educational outcomes'.

## FURTHER STUDIES RELEVANT TO THE COLEMAN FINDINGS.

Since the Coleman Report appeared there has been a continuing flow of major studies covering the same ground. Where those studies have published the table of intercorrelations between their variables I have reanalyzed them for comparison with the Coleman findings. The first set of studies to be reported is the Sewell longitudinal study of the Wisconsin sample (Sewell, 1967). This study was underway long before Coleman's started. In 1957 all high school seniors in the state in public private and parochial schools were surveyed with respect to their educational plans, social background and aptitudes. In 1964 a random sample of 9,007 was followed up to see how far their educational plans had been realized. The results were compared with their earlier interview responses. The following path graph sums up Sewell's findings:



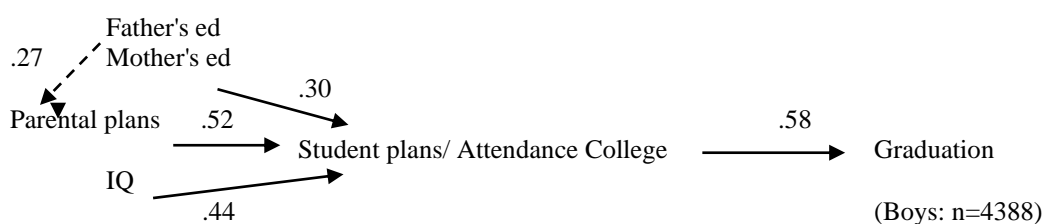
**Figure 9: Causal Path of Wisconsin Longitudinal Data**

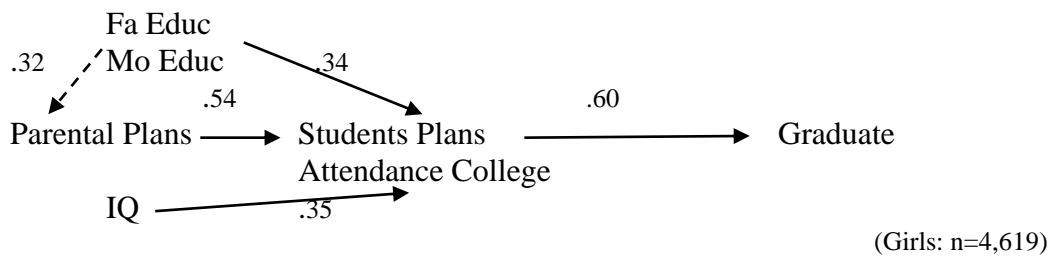
Figure shows that the Wisconsin data confirms Coleman's finding about the effect of the family socioeconomic status (SES). In Figure , SES also makes a contribution to the making of plans at high school. This Wisconsin sample is comparable with Coleman's White Northern twelfth graders. Settled by Scandinavians and Germans, only 3.6 percent of the high school students were African Americans in 1965. Unfortunately, the broad measure of socioeconomic status used by Sewell prevents closer comparison.

However, the longitudinal nature of Sewell's study makes two contributions:

- it shows the reality of the educational aspirations and plans of 12th graders, at least at this level of affluence with eight-six percent retention of 16-17 year olds, and
- it confirms Coleman's finding that "...the relation of family background to achievement does not diminish over the years of school" (Coleman, p.325). Up till then the prevailing view had been that family background influence declined once a student had overcome the hurdles to college.

In 1968 Sewell published a further analysis of the data in which he separated out the education of the parents and the students perception of the encouragement they received from their parents. The analysis was carried out separately for 4388 boys and 4619 girls. This analysis could have shown that Coleman had overlooked a significant gender difference. However, the causal paths were identical for boys and girls:

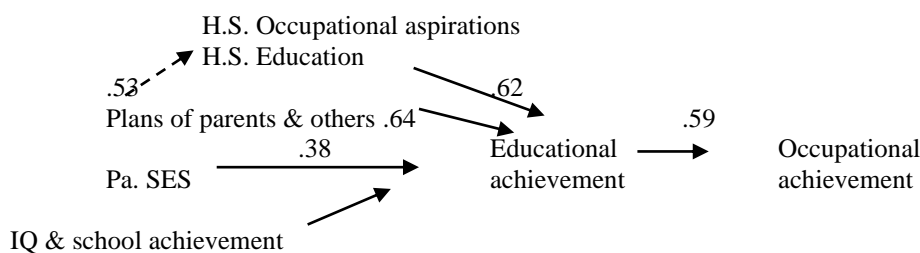




**Figure 10: Causal Paths for Influence of Parents' Education on Boy's and Girl's Performance**

Not only were the paths the same for boys and girls but the actual level of correlation between parental plans and 'students plans/ college attendance' was nearly identical. Figure shows that the education of mother and father was influential in student's plans and their achievement. It also made a contribution to the parental plans themselves. In other words, the higher the parents' educational achievement, the more important the plans in the subsequent achievement.

In 1970 Sewell reported a further stage in the analysis of the boys in this sample. This time he used one of the newly developed techniques of causal path analysis and concentrated on the effect of the rural -urban dimension on northern white 12th graders. This was a level of detail that Coleman could not have hoped to deal with in the time allowed for production of his report. As the following path graphs show the determinants of the educational process are practically unvarying, from large city (Milwaukee, population 1,100,000, Madison, 250,000), medium city (25,000 to 100,000), small city or town (2,500 to 25,000), village (under 2,500) and farm.



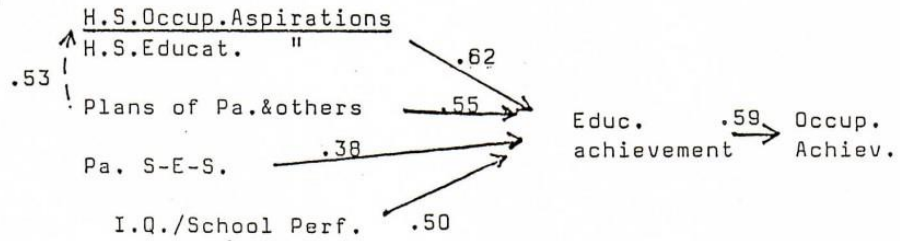
**Figure 11: Causal Path for Educational and Occupational Achievements**

Once again Sewell has used a combined measure of socioeconomic status that conceals the role of parental education. However, the data show that the "Coleman effect' operates with remarkable consistency at all levels from city to farm, for a well-to-do white society such as Wisconsin with a population of 4 million plus in 1960.

The only variation is in the role played by parental socioeconomic status at the village or hamlet level. The population of the villages tends to be dominated by farm laborers and small scale farm contractors. This might explain the more direct dependence of parental ambitions for their children's education on parental socioeconomic status.

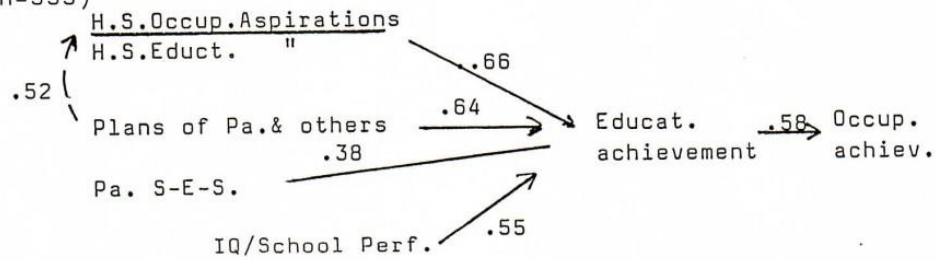
Large city :

(n=686)



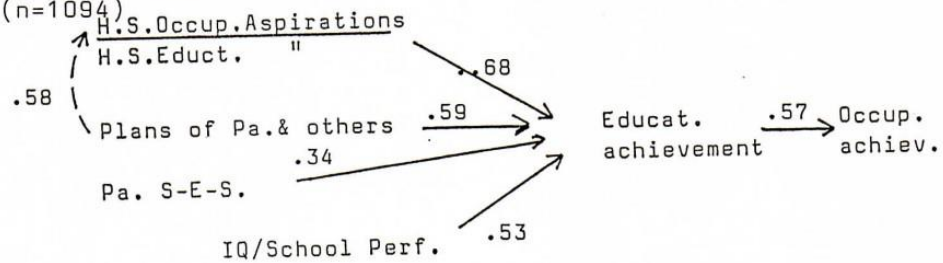
Middle sized city:

(n=935)



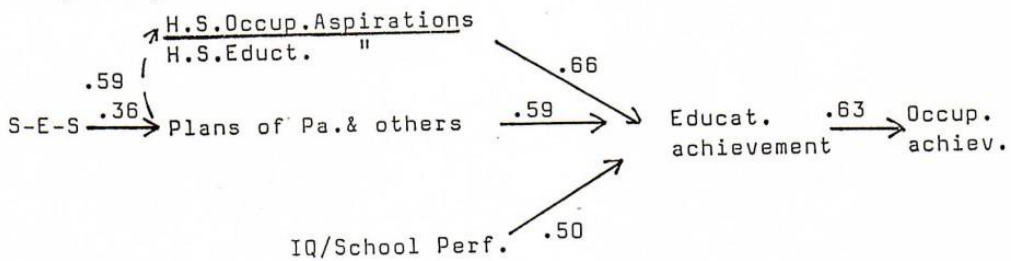
Small city (town):

(n=1094)



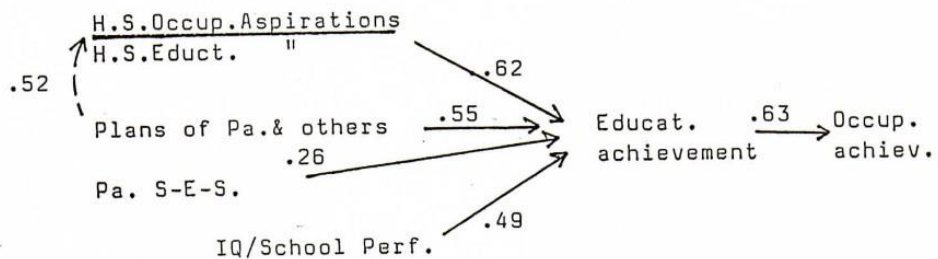
Village :

(n=816)



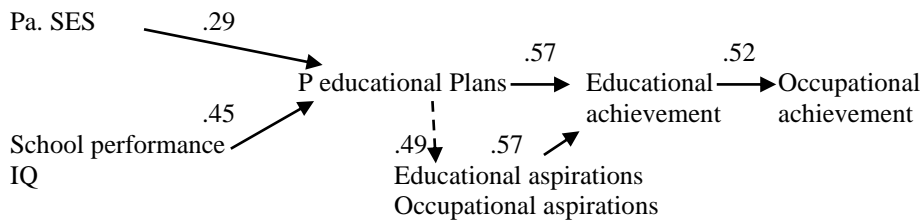
Farm :

(n=857)



Sewell was originally a rural sociologist concerned with the measurement of socioeconomic status differences amongst farmers. It is not surprising that when he reported on the next step in the analysis of his data, in 1976, he focussed on the farm-reared males in the 1957 sample. Its relevance is that he tries to elaborate on the role of more of the socio-psychological influences. The result, however, is much the same as before:

(n-929)



**Figure 12: Causal Path for Achievements of Farmer's Sons**

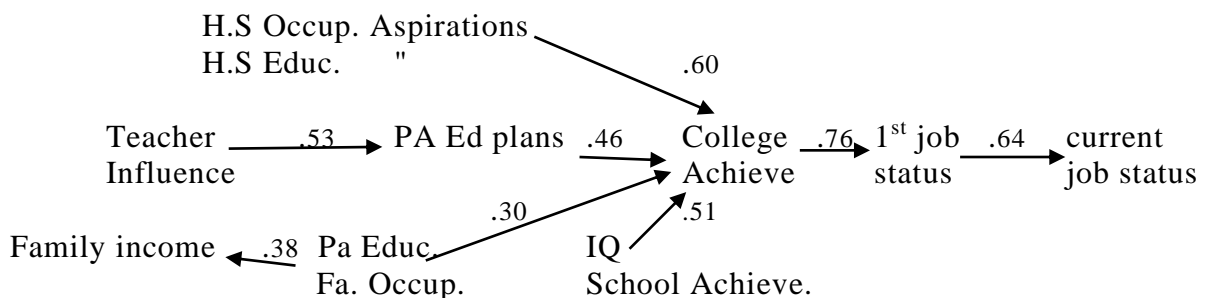
Only by referring back to Sewell's 1968 study can we get an indication of the role of parental education, as apart from their wealth or income. Restricted by his method of causal path analysis he had to be content with a gross overall measure of socioeconomic status. (It might also be noted that Sewell persistently refuses to make any reference to the Coleman study. His reference point is to the 'in-house' studies by Duncan, Hauser et als).

The last reported study by Sewell was in 1980 (with Hauser, also of the University of Wisconsin). This reported on an 18-year follow-up of the original 1957 Wisconsin sample. This time their confidence with causal path analysis and the relative cheapness of computer time led them to tackle models for 18 variables.

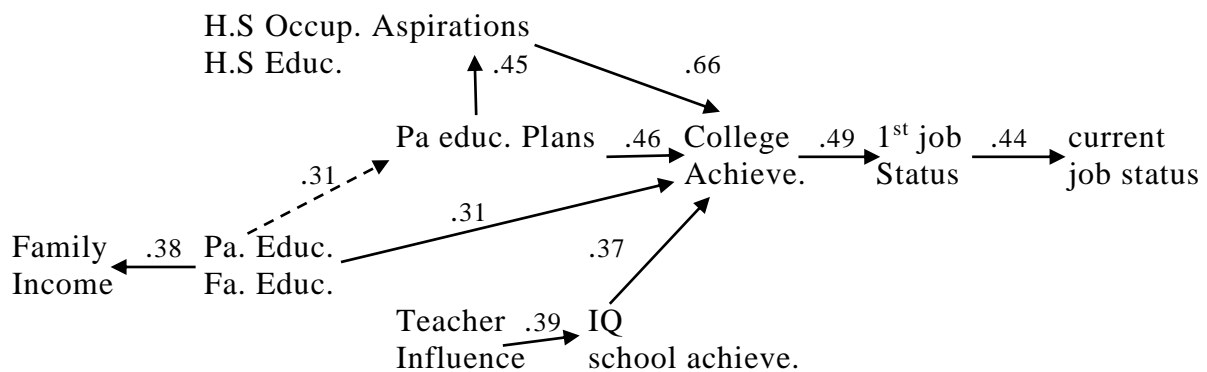
The pattern that emerges is now quite familiar, except that we have the evidence of later occupational career.

Wisconsin Sample, 18 year follow up:

a) Males, n=3,411



b) Females, n=2,620



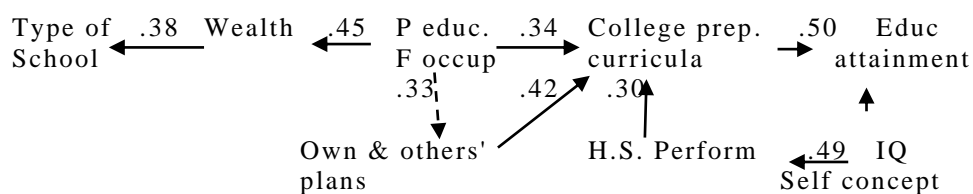
**Figure 13: Causal Paths for Occupational Achievements for Males and Females**

Once again, the graphs showed that parents' education and occupation, the two critical dimensions of socioeconomic status were the key to high school educational achievement and aspirations and then onto achievement at college and then onto their first and current job status.

This study also found pronounced gender differences. This data makes it very clear that gender differences in educational and occupational achievements, for this particular affluent northern US white population, did not arise from the existence of different kinds of educational processes: the processes are identical. The differences occur within the same process. Thus males can expect teacher support if there is evidence of parental ambitions; girls cannot expect this support until they demonstrate their ability in school performance or IQ testing. School performance, college achievement and first job status do not give a girl anywhere near the advantage that they give to boys.

**The Alexander studies.**

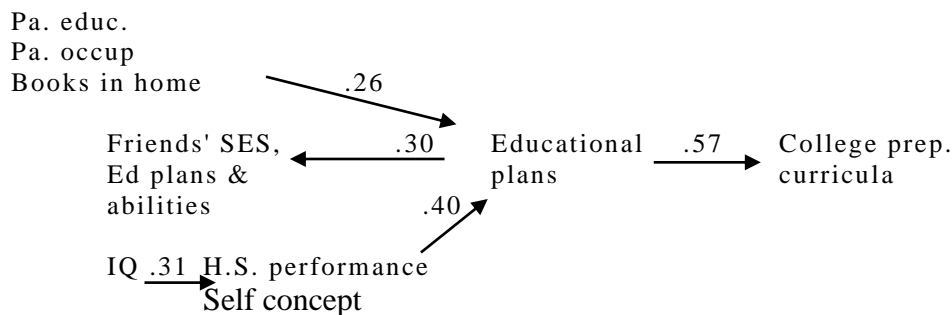
Karl Alexander was from the same university as James Coleman, the Johns Hopkins, but his intent was clearly to recapture some of the ground for traditional educational policies. "Recognizing that such influences (school influences) are likely to be modest does not, however, mean that they must also be uninteresting or unimportant" (1975, p402). Alexander's 1975 report was based on a follow-up of a 1955 national survey of second-year high school students. A fifty percent return was achieved, 1130 females and 947 males. The path graph of his data is as follows:



**Figure 14: Causal Path for Educational Achievement (1975 Follow Up Study)**

Alexander measured type of school on average ability level and the socio-economic status of the parents. These were highly correlated but, as Coleman had found they do not contribute to educational attainment. Type of school simply reflected parental wealth. That students who plan to go to college elect to do the college preparation curricula is an unsurprising fact and tells us nothing about why they want to go to college.

Alexander returned to the problem of identifying the admittedly modest school influences in his 1976 report. This was based on a 1964-5 survey of twelfth grade students in 18 public coeducational high schools around the nation (n = 1,731 males and 1968 females). There were more measures available in this study but, as can be seen in the following path graph, the results are essentially the same.



**Figure 15: Causal Path for school influences on College**

The strong correlation between own plans and friends plans, SES and academic aptitude is here interpreted as simply due to the fact that students tend to select their friends from amongst their class-mates, and other students will tend to be in, or not in, classes following the college preparation curricula for the same reasons that they are.

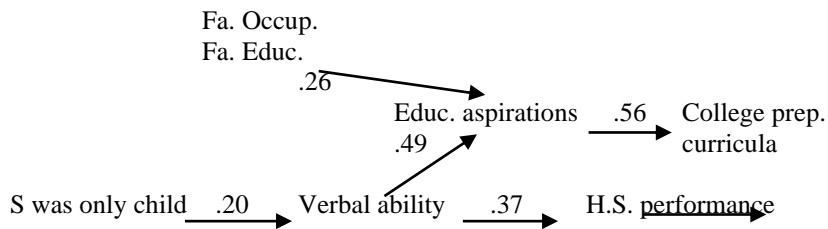
Alexander was concerned in his studies to counter a study by Heyns that purported to show that Coleman had overlooked the very important role that schools played in student achievement by their selection, on academic grounds, of students for the college preparation classes. This study will be considered next.

Heyns, 1974, starts from the contention that Coleman had under-estimated the role of schools by dealing only with the between-school variances. Her study was designed to high light the role of counseling, encouragement and selection on academic criteria to college preparation streams. The sample of 31,278 ninth and twelfth grade students was selected from Coleman's non-Southern sample. Her conclusion was that "The contention that class bias operates independently of differential achievement cannot be supported by the present research"(p1449).

This conclusion was based on a 'causal path model' that involved the popular form of regression analysis and as usual, involves making subjective judgements about the most probable arrangements and the tests just those.

If instead we use the objective, non-arbitrary graph-theoretical approach (as used in the above re-analyses) we get the following path (Figure 16):

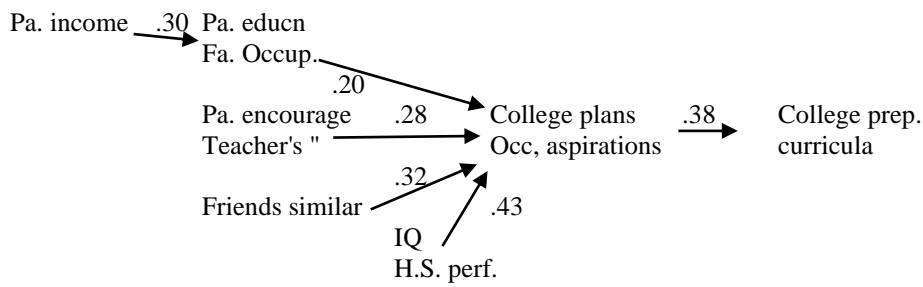




**Figure 16: Causal Path for Educational Achievement from Heyns 1974**

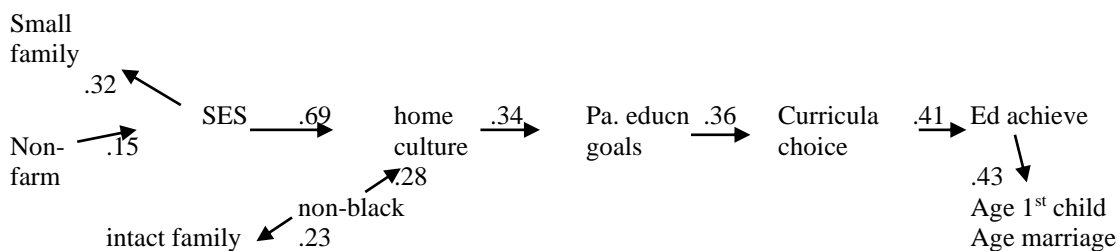
These data confirm, not contradict, Coleman's finding.

The debate about the effects of school context led to the study by Alwin and Otto (1977). Their sample was 4,303 twelfth grade students from Washington State i.e. Northern white. Reanalysis of their matrix of correlations yields the following path:



**Figure 17: Causal Path for Educational Achievement for Alwin and Otto 1977**

An effort to relate the educational process to early family formations was made by Moore and Hofferth (1980). Their sample of 2,538 young women came from the US Dept of Labor's National Longitudinal Survey of the Labor Market Experiences of Young Women. The data came from interviews in 1968 and each subsequent year to 1975. Their matrix of correlations yields the following path:

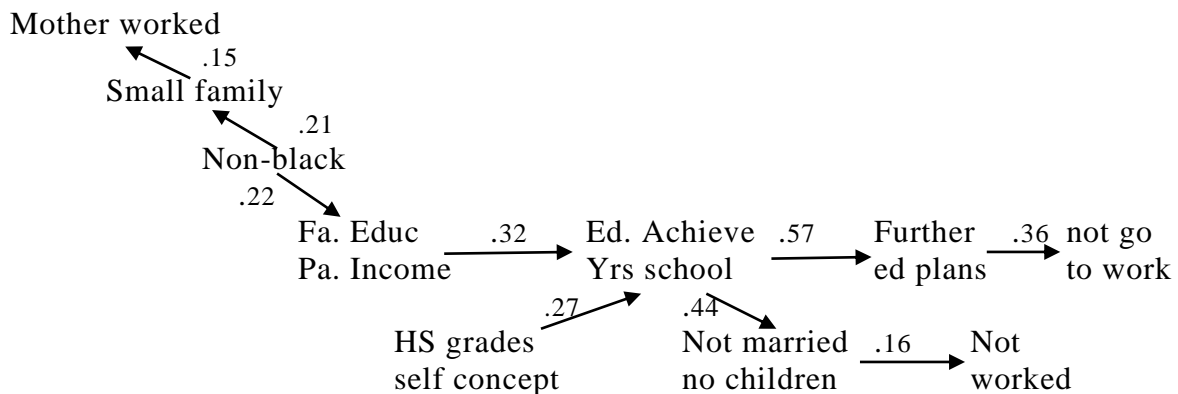


**Figure 18: Causal Path for early Family Formation, Moore & Hofferth 1980**

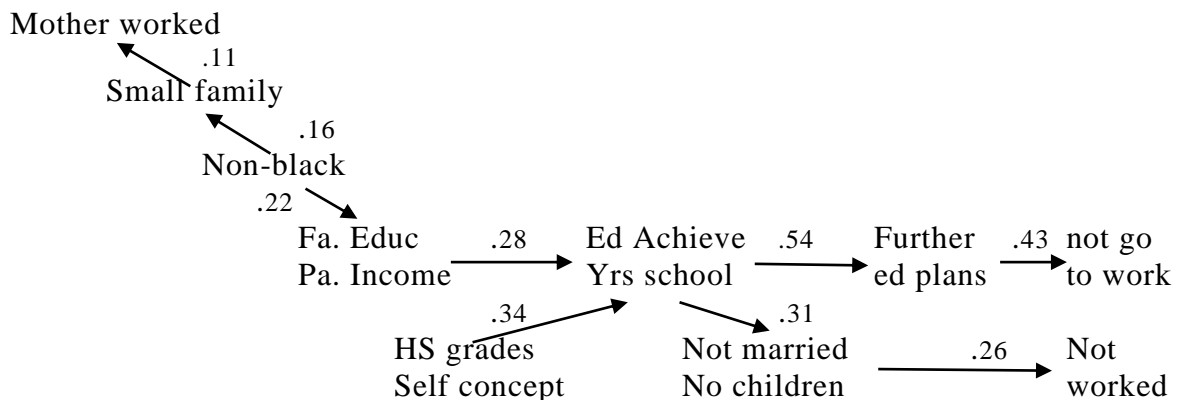
The data also show that parental socioeconomic status and home culture have powerful direct influences on the educational achievement of this national sample of young women. This is Coleman's pattern.

In 1972 the National Center for Education Statistics launched a National Longitudinal Study of the High School Class of 1972. The report by Richards and Gottfredson (1983) uses the data for 1972, 1973 and 1975. Full information was available for 2,944 males and 3,325 females. The authors were interested in education, entry to work and early family formation so they presented separate matrices of correlations for the genders. The causal path graphs for these are as follows:

*Females, n=3.325*



*Males, n=2,944*



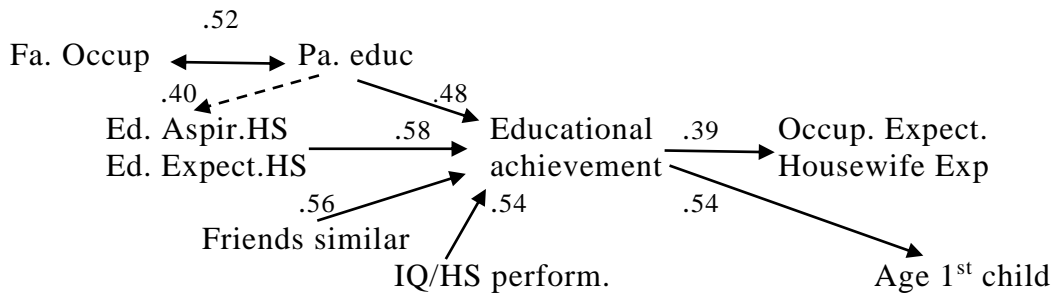
**Figure 19: Causal Paths for early Family Formation, Richards & Gottfredson 1983**

Richards and Gottfredson found that the causal paths for males and females were identical, with the only exception the fact that prolonged schooling is more of a deterrent to marriage for young women than it is for men.

Once again the Coleman effect was demonstrated in a longitudinal study.

A fifteen-year follow-up of 3,433 women is the basis of Marini's study (1984). They were originally interviewed whilst in high school in 1957 and followed-up in 1973-4. The primary concern was with how the timing of entry into parenthood affects educational attainment. Reanalysis of Marini's data again confirmed Coleman's

findings and additionally showed the very strong effect of higher educational achievement on the timing of family formation. The higher the achievement, the more family formation was delayed.

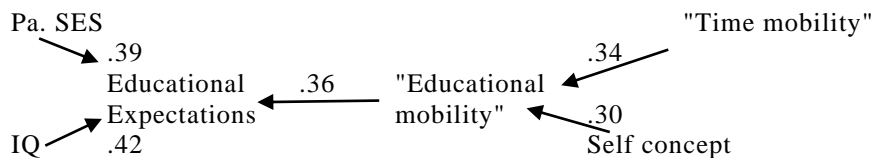


**Figure 20: Causal Path for early Family Formation, Marini, 1984**

The last of the US studies to be considered is that of Rehberg, Schafer and Sinclair (1970). A reanalysis of this is included, not because it confirms Coleman's findings but, because it spells out in some empirical detail what is involved in the concept of "educational aspiration" for a sample of 1,455 northern and mainly white high school twelfth male students (from public and parochial schools in the southern tier region of New York State - a region that stretches across to the Great Lakes).

The Coleman study left open the possibility that education was valued simply as an instrument for career advancement, although the central role of "reading material in the home" placed a big question mark on this interpretation.

The reanalysis yielded the path shown in Figure.



**Figure 21: Causal Path for Educational Aspirations 1970**

The key is in the strongly correlated cluster that the authors' rather misleadingly label "Educational mobility". The five items in this cluster are:

- The more education a person has, the better able is he to really enjoy and appreciate life (Agree).
- In business and industry, a person without a college education can get ahead just as rapidly as a person with a college education (Disagree).
- Education tends to make a person more unhappy than happy (Disagree).
- A college education is worth the time and effort it requires. (Agree).
- Education helps a person use his leisure time to better advantage (Agree).

Some of these items suggest an intrinsic valuation of education not just an instrumental evaluation. This would further suggest that a child growing up in an

educated household in the presence of books and other reading material is more likely to value education as an end in itself and be favorably disposed toward the purposes of schools and colleges.

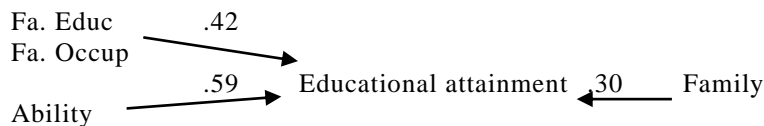
### Comparable U.K. Studies.

Comparable U.K. studies are few in number and poverty stricken. Typically they draw on surveys designed for other purposes and have available to them only the simplest measures usually found in socioeconomic studies. However, we must make do with what little there is.

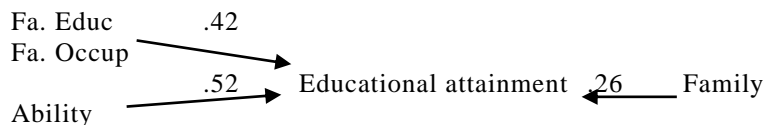
Kerckhoff (1974) has made the major effort to align the evidence about educational attainment in the U.K. compared with the U.S.A. Using the Blau and Duncan study (1967), Duncan (1968) and Sewell (see above) as his U.S. baseline he was able to find only two comparable large UK studies: Douglas's (1968) study, derived from the British Longitudinal Study of babies born in March 1946, and Crowther's study based on the National Service Survey of 1956-58.

Reanalysis of the data yields the following patterns. They are very simple patterns because those studies did not probe very far.

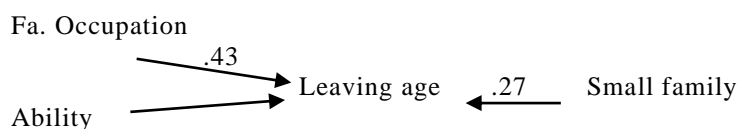
*Duncan (1968)*



*Douglas, 1968, (n=1,872)*



*Crowther UK, (n=7,991)*



**Figure 22: Causal Paths for Comparable UK Studies**

We saw above that Sewell's Wisconsin sample yielded the same pattern. For good measure Kerckhoff included data from a relatively small Indiana sample he had studied (n=396). That yielded the same pattern and almost identical correlational indices. He concluded that, despite the marked differences between the American and British school systems they "differ little in the process of educational attainment. The degree of continuity of social level from father to son is almost identical in the two countries, and the relative importance of social origin and ability in affecting educational attainment is the same" (p797).

Since Kerckhoff's review two more such large sample, but shallow, studies have appeared, Psacharopoulos (1977) and Halsey et al (1980). These do not change the picture and add little. However, Halsey related the attainments of age cohorts with changes in the schooling system, e.g. the phasing out of the public grammar schools, and arrived at a profound conclusion that does indeed seem to follow from the Coleman findings:

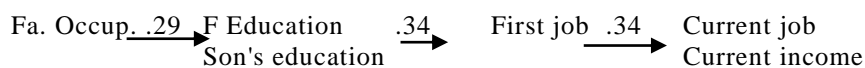
- "...the continuing class-related drop-out between the statutory leaving age and entry to higher education calls obviously for incentives through maintenance grants to 16-18 year-olds. Even so, the further expansion of post-secondary education cannot expect to escape the logic of logistic curves which have shown us in this book how *the long-run path to equality passes in the shorter run through terrain of initially increasing inequality*" (p.215, my italics).

### Related Australian Studies

The educational process has attracted and continues to attract a great deal of research (Anderson and Blakers, 1984). Only a few of these studies confront the issues that Coleman raised, on an adequate scale.

Broom and Jones (1976) provide data from 1775 students comparable to that examined in the previous section. Their concern was also at the 'broad-brush' level of social stratification and social mobility. Their data yield the path shown in Figure .

$n=1,775$

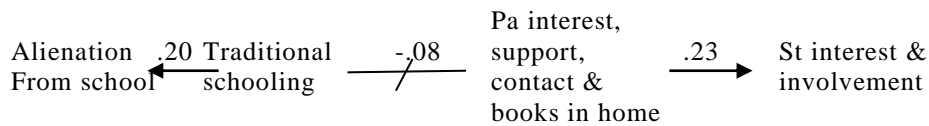


**Figure 23: Causal Path for Broom & Jones, Aus, 1975**

Their analysis of age cohorts, like the similar analysis made by Psacharopoulos of the age cohorts in his British sample, show that over certain periods the father's occupation, and presumably his influence on entry to that occupation, has a greater influence than school achievement. However, the link between father's education and son's education has not varied.

The study which most closely approximates the depth of the Coleman study is that done by Bardsley. It was not of course on any comparable scale but the sample was very well designed. His sample of 374 was built up from approximately 30 students chosen at random from those born in May-June, 1960, from each of four large metropolitan, co-educational schools in each of the three states, Victoria, S.A. and Tasmania. In each set of four one was classed by Education Dept officers as traditional, one as conventional, one as innovative and one as open.

His data separate out the school and family clusters in a very striking fashion, as can be seen from the re-analysis of his data (his Table 7.6).



**Figure 24: Causal Path for Bardsley's (Aus) Confirmation of Coleman Effect**

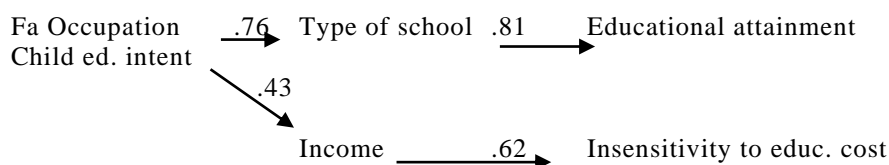
This is the 'Coleman effect' - it is the home, not the school which is the primary determinant of student interest and involvement in learning. The schools, in Bardsley's sample, go their own way and their effect is to either increase the students sense of alienation or to minimize that feeling. (Bardsley's scale C defines this as a sense of social powerlessness). The scales that define "student interest and involvement" give us a very good insight into the range of relevant aspects of which the home atmosphere is the primary determinant. These scales measure adjustment to school, liking for school, extra-curricula involvement, interest in subject matter, fitting in at school and confidence as a scholar, i.e. 'self-concept'.

I think any educationalist would grant that when the students are high on these qualities, teaching has a much better chance of bringing the best out of a child.

As a last point from Bardsley's study we may note that the one feature of school organization that had highest influence on alienation was the extent to which the rate of teaching (and expected learning) was adjusted to individual differences.

The only Australian study that is near the Coleman study in scale and comprehensiveness is that done by the Australian Bureau of Statistics in 1982. Its purpose was "to determine the reasons why persons decide to stay on or leave school before completing secondary education and the socioeconomic variables that may influence the choice made" (p.1). To this end interviews were conducted with persons aged 14 to 20 years who were at school in August 1982, or had only left in the preceding twelve months. Persons who had left before August 1981 were not interviewed. The interviewees were selected by a multi-stage area sampling of about 18,000 private dwellings and the non-private dwellings in the sampled areas. The sample covered about one-third of one per cent of the population (approx. 50,000).

An analysis of the cross tabulations presented in the ABS report yielded the path shown in Figure .



**Figure 25: Causal Path for Educational Attainment, ABS, 1982\***

\*The levels of correlation in this diagram should not be compared with those in preceding diagrams as they are rank order correlations. The ABS did not publish a matrix of intercorrelations between variables. It was necessary to construct indices from the cross tabulations and establish rank order correlations.

In other published reports (ABS, 1984) we find the usual strong correlation between father's education and father's occupation, and between parental education and their plans for their children's education. These are safe assumptions. The effect of parental plans is very clear (tables 10, 11 of the Report). If parents have made it clear that they want their child to complete Year 12, then in about *nine cases out of ten* the child will aim to complete Year 12. If parents show no interest in the educational achievement of their child then *two out of three* of their children will drop out. If the parents have made it clear that they are happy to settle for less than completion of Year 12 (which means in effect that they accept a blue-collar future for their child) then only *one in twenty* of their children will set a higher goal for themselves.

From all of the studies we have reviewed we would have to expect that both parental expectations and the student's intentions reflect a reasonably realistic perception of the student's educational performance over the earlier years.

The only other Australian study in this class is the longitudinal study on two large samples, by the Australian Council of Educational Research (Williams, 1985). This has not been reported in a fashion that permits direct comparison with the other studies but in a sophisticated fashion, they analysed what would remain as a source of inequities if we could offset:

- a. The inequities in educational achievement of vertical inequities, i.e. those arising from wealth, rurality, ethnicity, gender, type of school,
- b. If, in addition, we could offset the effects of individual ability, what inequities would continue to exist. (Equity H – horizontal equity).

The following tables summarize Williams' report of this statistical exercise:

<b>Table 8. Statistical summary of Williams 85/5. Completion of year 12.</b>							
% of possible variance accounted for							
	<i>Occupation</i>	<i>Wealth</i>	<i>Ethnicity</i>	<i>School</i>	<i>Rurality</i>	<i>Sex</i>	<i>Achievement</i>
<i>Observed</i>	29	22	-01	24	00	04	61
<i>Equity V</i>	20	06	02	19	01	03	50
<i>Equity H</i>	11	01	-01	11	00	25	25

<b>Table 9. Statistical summary of Williams 85/2. Participation in higher education.</b>							
% of possible variance accounted for							
	<i>Occupation</i>	<i>Wealth</i>	<i>Ethnicity</i>	<i>School</i>	<i>Rurality</i>	<i>Sex</i>	<i>Achievement</i>
<i>Observed</i>	22	04	05	08		11	38
<i>Equity V</i>	21	00	07	04		09	38
<i>Equity H</i>	16	-03	03	03		08	10

It will be noted that despite all efforts to cancel out sources of social and intellectual inequity that, as Coleman would have predicted from his data, the effect of family and ability remain.

Halsey, after his study of the British scene, glumly concludes that "...there may be increasing equality of *schooling* as the service class reach their saturation level, while the working class continue to increase their consumption of school education" (p. 218).

## Implications

Educational policy makers necessarily look at secondary schooling as part of the supply side of labor market demand; approximately one quarter of a million 15 to 19 year olds leave school for the market place each year. Beyond these are the students being prepared for tertiary and professional education. The evidence we have reviewed makes it clear that this supply side is primarily driven by the level of educational qualifications of the students' parents.

Hence policy making for raising the educational level of a modern society, that is a society that has educational challenges beyond that of simply raising the literacy rate, should address the problems of how this drive is converted into:

- parental aspirations for their children's education, concern for the educational progress and achievements of their children and to providing a home atmosphere that encourages reading and study.
- realization of those aspirations through the provision of appropriate educational facilities; facilities that support, constrain and direct the education of their children.

The main practical problem is to gauge the magnitude of the driving force that is coming down the 'generational pipeline', and to determine how best to facilitate the education of this increasingly sophisticated demand. In a time of rapid technological change forecasting from the demand side of the labor market is hazardous, as both the Kirby and Karmel Inquiries pointed out. Employers have a range of viable organizational choices to match the quality of the supply of potential employees. Parents do not appear to be so flexible. The evidence is that they want more education for their children than they had, for reasons that pertain to the life careers of their children, not any short-term fluctuation in the labor market.

For a large population this parental demand is a highly predictable, recursive process. Most parents get their post-compulsory education, if any, between 15-19 years of age, marry at 20-24, have their children at 25-29 and, when they are 40-44, their children are at an age to choose for voluntary secondary education. This is a positive feedback loop with a twenty-year cycle (perhaps moving to a 22-3 year cycle).

The growth in educational qualifications of the population from one census to another gives a broad picture of how this demand is growing.

There is another way to get a more dynamic picture of the growth. The parents of many of the recent 15-19 year old generation are still alive and, in the 1981 census data, we have a record of their educational attainment that can be compared with the educational attainment of the generation that includes their children. Thus we can discover that females who received their post compulsory education in 1960-5 attained an indexed level of education of 0.13; the parents of this group, aged 55-59 at the time of the 1981 census, had an indexed level of education of 0.06.

More important, the parents of some future generations of 15-19 year olds have already received their education. If the trends for generational reproduction do not change then we have a means of predicting future demands. There is nothing to suggest that the trends of parental reproduction are changing.



An increasing level of demand for higher education has already been built up in Australia. Projecting for those sons that have already gained their education we can forecast steeply increasing demand. On Coleman's findings we can expect most of those demands to be pursued, even if they lead to an over-supply in the labor market.

This picture compares sharply with that presented earlier in graph 27 which showed 'the breed' of trade and sub-degree diplomas to be a dying race.

A similar analysis of census data for the USA and Canada shows identical growth curves with the same multiplier effect if children getting more education than their parents. They also show, rather dramatically, the educational effects of Australia's late emergence as a modern industrial society with a highly developed tertiary sector. Thus it was only in 1975 that Australia reached the point on the educational growth curve (in terms of proportion graduating from university) that the USA had reached in 1950.

There is a clear gender difference in favor of males but, as the following graph shows, the gap is closing. It will be noted for the 1981 population the level of educational population was not peaking out until the late twenties.

There is one further important implication from the findings reviewed in this study. Given that the parental role is so critical we still have the fact that nearly thirty percent of the parents in the ABS 1982 survey did not know, did not care or could not make up their mind about whether their children went on into post-compulsory secondary education. It is difficult to statistically evaluate this problem for want of published data. Given that the professional labor market analysts have become so confused about market trends, with respect to what kinds of occupations are emerging, what shrinking, it is perhaps not surprising that parents feel the same way. However, it does suggest that some parents, not just their children, might be counseled about the value of completing secondary education.

The most hopeful kind of direct intervention in the 'educational reproductive process' would seem to be that which is directed to parents through adult and continuing education.

In a society where labor market requirements are changing slowly and the general educational levels are low, adult education usually means just catching up with missed schooling, or professional refresher courses. However, in a society exposed to rapid changes in cultural and intellectual perspectives a much wider range of the adult population are concerned with learning. People begin to realize that what they thought they knew is under challenge or even irrelevant. In order to make their world meaningful they find they need to continue their education. How far this need is being blunted by the instant 'knowledge' offered by television is hard to judge. However, if parents can be involved in continuing education then we would expect their children to see schooling as education, and not just a grind to get certification.

There is an apparent contradiction here. I have suggested that *a direct approach to motivating students is not a hopeful endeavor but that a direct approach to motivating their parents is*. In fact, in both cases it is accepted that the major contribution of the educationalist is to facilitate and support, not motivate. It is just that with adults legal

coercion is ruled out and adult educators have had to find ways of letting adults structure their learning experiences. Their children are locked into a schooling process that has evolved to deal with captive groups.

This brings me to my final point, which is essentially a 'closing of the circle'. This study arose from a government policy to encourage adolescents to complete high school. Various means, including monetary incentives and changes in school practices and curricula, have been considered. Some solid evidence has emerged that questions whether there is much point in encouraging adolescents to remain at school when they would otherwise choose to drop (as we saw earlier such decisions usually have parental support or acquiescence).

The same new round of debates about concentrating on the 3R's and increasing high school retention rates has been going on in the USA as in Australia. In the US case they have once again been able to conduct research on the grand scale. The first results from this study, the High School and Beyond Study, gives us cause to question accepted wisdom. This study surveyed 30,000 second-year high school students in over 1,000 high schools around the USA during April 1980. In 1982 a follow-up study was carried out to compare the educational progress of those who stayed to complete high school with that of those who had dropped out.

The same data can be put another way. We can compare the relative educational performance of the two groups in 1980, when they were all in high school and their relative performance in 1982 when most had graduated and some had dropped out.

Whichever way one looks at the differences we are confronted with a statistically non-significant difference.

This is not the result we have been led to expect from those who have lauded the value of completing high school, even if one was not after the certificate that would permit continuing on to tertiary education.

The lack of a difference is more striking when one considers that those who stayed to graduate almost certainly did so in better schools, with more peers interested in higher education and were obviously more highly motivated to go along with the schooling process. Ignoring this, but correcting for such highly correlated variables as ethnic and class backgrounds, the authors of the report conclude that:

"Schooling thus appears to benefit youngsters who persist academically by about a tenth of a standard deviation, on average" (p.417)

It is the custom to regard only a deviation of a full standard deviation as evidence of difference that makes a difference. It is peculiar to regard an observed difference of only one-tenth of a standard deviation as other than a chance variation.

There is in fact no evidence that those who dropped out of high school suffered any detrimental effects to their overall learning compared with those that stayed on: And this is overall learning as measured by academically oriented tests, and the stayers were in higher quality schools. It would appear that the outside world (even 'the street', given the very high unemployment rate for these drop-outs) provides

opportunities for learning that enable backward students to learn as fast as the brighter students who spend the same time in the better schools. The encouraging feature of this finding is that that lessens the difficulty of arranging reentry for such drop-outs, as and when they perceive a need for further education.

On the other side, it is remotely possible that the 'brighter students' might not be as well adapted to learn outside school or that the pressures on them to gain early entry into higher and professional education justify them in effect marking-time for the last couple of years of high school.

These comments do not take into account the extra-curricula activities of these years that figure so prominently in the Coleman-type findings on the quality of schools, not mind you, the motivation to be educated.

### **An Overview**

At most points in this statistical analysis it has been necessary to consider what would be relevant evidence in the light of the liberal, meritocratic view that has dominated educational policy making for most of this century. By this label I mean no more than the view that:

- schools meet market demands for varying levels of skill, knowledge and talent by (i) sorting out and labeling students with respect to their ability and achievement, and (ii) imposing curricula appropriate to each sub-group of students and their expected role in the labor market, and
- the longer the schooling process the less the influence of the family over the sorting process and the selection of curricula (and hence on eventual placement in the labor market).

The evidence we have reviewed clearly shows that except in backward conditions (e.g. Native American in poverty-stricken rural conditions and Puerto Ricans in city ghettos) the outcomes of schooling are more strongly determined by family influence than by the schools. Further, the influence of the family does *not* decline with increasing years of schooling: family influence extends beyond tertiary education and even beyond the first job.

The history of modern mass education is not a history of parent-school conflict, and hence it would seem that schooling systems tend to meet parental demand, not immediate labor market demands.

In looking for some relations between schooling and the labor market we were forced to look back over the last seventy-five years of census reports. There can be no doubt but that there is some relation between the growth in education and the emergence of science-based industry and massive social regulatory organizations, private and public. However, it is also clear that the gearing between education and changes in the occupational structure is very slack indeed; probably because employers find it far more practical to cope with emerging occupational requirements by on-the-job training or specific, job-related training in technical, commercial colleges and the like.

The major changes in education seem to correspond to the technological and organizational revolutions that Schumpeter and Chandler associated with Kondratieff's 'long waves' of about fifty years. In that sort of time-scale parental life experiences and institutional changes in the labor market may play a more important role in shaping education than do the educationalists, or short term labor market requirements.

A similar long term perspective probably needs to be taken with respect to the increasing involvement of girls and women in post-compulsory education and the long term growth in female participation in the workforce.

The rapid increase in divorce rates and the reduction in the birth-rate have probably much more to do with this phenomena than technological changes or short term labor market demands. The former changes indicate cultural changes in the female role; the latter only indicate possibilities. Parents and daughters have probably rationally interpreted these broad cultural changes as reasons for a girl to learn in order to be able to earn her own living.

It so happens that the next decade will, most probably, see the recovery to economic growth in the next fifty-year cycle: a recovery based on new technologies and widespread institutional change. At periods like this education, technology and the labor market are close in time. It is the point where they are most likely to find fruitful mutual adaptations, before education goes its own sweet way for another thirty to forty years."<sup>4</sup>

*Fred published all of the group correlation matrices in an appendix. I have reproduced one below as an illustration. If anybody is interested in using any other of them, let me know, ME*

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<sup>4</sup> I realize that the views expressed here run counter to the judgements expressed by the O.E.C.D expert teams that have explored the reasons for Australia's low economic growth rate. They have pinpointed the low rate of participation in post-compulsory education as a primary cause. This has been accepted as a given fact in recent inquiries into the Australian educational system. In point of fact an analysis of economic growth rates for the twelve OECD countries most like Australia shows no significant correlation. There is a relation, no doubt, but it is not to be found in per capita GDP, or even five-year lagged GDP growth rates. It is most likely to be found in the long span of time where parents influence their children, and have a partial influence on their grand children.



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COLEMAN, GRADE 12

White North (n = 4,000)

	3	9	11	13	15	19	-21	22	24	31	39	40	41	44	45	46	47	51	52	55	59
3	-	09	07	03	10	11	+03	06	11	01	42	15	19	36	26	20	25	20	21	28	04
9	-	18	18	-33	48	52	-08	20	31	-08	11	50	05	07	08	02	01	13	40	03	06
11	-	-	-	53	-05	-08	-05	05	15	05	19	-17	06	09	04	04	04	20	15	06	02
13	-	-	-	-	-07	01	0	-08	03	09	09	-23	-01	05	03	03	0	09	-06	05	02
15	-	-	-	-	-	64	-02	12	34	-04	15	38	08	07	06	04	02	25	47	07	03
19	-	-	-	-	-	-	-02	10	25	-08	16	45	0	10	03	+02	-02	13	34	06	12
-21	-	-	-	-	-	-	-	+40	+12	+04	+04	+04	0	+01	0	0	-06	+12	+01	+02	-12
22	-	-	-	-	-	-	-	-	50	06	06	16	03	-01	01	0	-01	08	04	03	-05
24	-	-	-	-	-	-	-	-	-	06	18	28	04	02	03	0	0	24	26	07	-02
31	-	-	-	-	-	-	-	-	-	-	04	-08	0	02	-03	-02	02	30	08	02	-10
39	-	-	-	-	-	-	-	-	22	15	38	20	21	38	20	21	21	28	29	28	05
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44	-	-	-	-	-	-	-	-	-	-	34	36	44	15	18	41	10	10	10	10	10
45	-	-	-	-	-	-	-	-	-	-	-	15	31	06	11	14	03	03	05	05	05
46	-	-	-	-	-	-	-	-	-	-	-	-	37	04	06	41	04	04	04	04	04
47	-	-	-	-	-	-	-	-	-	-	-	-	-	04	06	33	05	05	05	05	05
51	-	-	-	-	-	-	-	-	-	-	-	-	-	68	22	0	0	0	0	0	0
52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

