ABSTRACT
              Three stages of linear causal model building
procedures (conceptual, main theory, and auxiliary theory) were used
to examine the cultural and personality resources of individuals and
their school-related skills as determinants of achievement in mother
tongue literature. A path analytic approach was used to test a
popular model of literature achievement among a subsample of Swedish
14-year-olds. A pooling procedure was used for controlling the
influence of sex and the amount of effort expended on school work.
Analysis showed that both the cultural resources of the student's
home and his verbal ability, as mediated by his level of reading
comprehension, account for most of the explained variance in the
model. Some conventional beliefs regarding achievement in literature
were not supported by the analysis. Thus, variables such as reading
speed, the hours spent reading for pleasure, and literary attitudes
had negligible effects and were omitted from the final revised form
of the model. The final form was composed of policy variables
potentially manipulatable by within-school teaching strategies.
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Achievement in Mother Tongue Literature

Some Strategies of Causal Analysis

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ACHIEVEMENT IN MOTHER TONGUE LITERATURE:
SOME STRATEGIES OF CAUSAL ANALYSIS

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

This paper focuses on the cultural and person-
ality resources of individuals and their school related
skills as determinants of achievement in mother tongue
literature.   A path analytic approach is used to *se
a popular model of literature achievement which is
applied to a subsample of Swedish 14-year olds selected
from the data bank archive of the International Assoc-
iation for the Evaluation of Educational Achievement,
University of Stockholm.   Because the sex of the stud-
ent and the amount of effort expended on school work
accounts for variance in levels of performance over-
and-above the causally interrelated system factors, it
is necessary to control for the possibility of their
confounding influence.   Accordingly, a "pooling"
procedure is used for adjusting the correlation matrix
inorder to account for the bias in the regression
model which is attributable to these factors.   The
analysis shows that both the cultural resources of the
student's home, and his verbal ability, as mediated
by his level of reading comprehension account for most
of the "explained" variance in the model.   Some con-
ventional beliefs regarding achievement in literature
were not supported by the analysis.   Thus, variables
such as reading speed, the hours spent reading for
pleasure, and literary attitudes, were shown to have
negligible effects and were omitted from the final
revised form of the model.   Some limitations of the
analytical model are referred to, implying the need
for additional respecification of the functional form
of the model; hence, further research.   The final
form of the simple four variable model, which accounts
for almost half the variance, is composed of policy
variables potentially manipulable by within-school
teaching strategies.   There is some discussion of the
educational implications of the findings.

1. INTRODUCTION: CAUSAL MODELS

In the 1920's, sociologist William Ogburn and geneticist Sewall Wright were junior faculty members at the University of Chicago. Though it is claimed that they occasonally played handball together, one can only conclude that handball and scholarship were not a good mix becau 't was not until the middle 1960's that the work of these men was brought together by Blalock (1964), Boudon (1965), and Duncan (1966).

Ogburn was best known for his theory of social change, and especially for his concept of "cultural lag", but he was brought to the Department of Sociology at Chicago for his methodological expertise. It was there that he became the first sociologist to apply the, then, very new statistical techniques of partial correlation and multiple regression to the testing of social theories. Simultaneously, in a series of brilliant papers, the geneticist Sewall Wright was developing the method of what he called "path coeff-icients" -- the mathematical basis of the causal lin-ear model. The method was an extension of the general regression model procedure being used by Ogburn.

In the interim, Wright and others have made extensions to what is referred to today as "path analysis", and there have been scores of applications both in the biomedical and behavioral sciences.[1] Now that path analysis is an analytical tool available to most researchers in economics, sociology, and allied disciplines, there has been a path analysis explosion. The consequences have been referred to as a "paradigm shift".[2]

Whether or not current developments in social
science methodology constitute contributions to a
paradigm shift, there seems little doubt that to the
extent that the linear causal model can capture the
parameters of those human behaviors which are socially
patterned and purposive (that is, rule-following), it
is likely to remain a potent tool in the armoury of
the social scientist.   Readers of the educational
literature in school achievement will be already fam-
iliar with the preliminary findings of the IEA spon-
sored research through a number of publications.[3]
Comber and Keeves (1973:267-285) present the results
of a path analytic examination of the causal relat-
ionships between the variables accounting for achieve-
ment in science for Japanese 14-year olds.   An earl-
ier version of path analysis was conducted by Peaker
(1967) in which he demonstrated, independently of
parallel studies in other countries, the powerful
effects of family background factors or early learn-
ing conditions on scholastic achievement.   Though it
is too early to assess the practical consequences of
the Comber and Keeves (1973) analysis, since replica-
tions have to be made in each of the countries partic-
ipating in the science survey, there is little doubt
that Peaker's (1967) findings had a powerful impact
on the structuring of English education.   The Plow-
den Commissioners recommended the establishment of
educational pricrity areas in England which has since
been acted on.   The policy represents the largest
effort made in England in the area of compensatory
education for those children in disadvantaged social-
izing environments.   Keeves (1972) also uses the
path model procedure in his effort to disentangle
school, classroom, and home background effects on
school achievement.

It is reasonable to conclude that the causal
linear model is one that will become increasingly
used by curriculum theorists and educational research-
ers investigating problems associated with teaching --
that is, in the development of a theory of teaching.
Thus, it is reasonable to predict that these studies
will cumulatively contribute to a more sociologically
based theory as the relevance of non-school factors
in models of teacher effectiveness becomes increasingly
apparent.   Thirdly, the kind of research made possible
by these models is likely to result in changes in
current emphases in educational practice;   probably
not so much because they will suggest radical innovat-
ions in teaching or learning strategies, but because
they will assist the educator in clearing his attic
of a backlog of outworn traditions, myths, and practices
that have little relevance for those outcomes of school-
ing considered desirable and valuable.   In this way,
perhaps, they will assist in freeing the teacher from
the constraints of obsolescence.

One purpose of this study is to procede through
the various stages of path analysis by illustrating
its application to a problem area familiar to school
administrators and mother tongue teachers.   The cri-
terion measure of interest is literature achievement.
The major purpose of the study, however, is to exam-
ine the cultural and personality resources of indiv-
iduals and their school related skills as determinants
of achievement in mother tongue literature.

2. THEORY DEVELOPMENT

(i) The Conceptual Model

IEA models of school achievement are support-
ative of the view that regards schools as desirable
interpersonal settings for transforming student person-
alities (inputs) such that approved levels of under-
standing in the major cognitive modes are achieved,
as well as levels of commitment to societal values
that will enable the individual to function in a rel-
atively autonomous manner within a national culture.
The schools, then, are socializing agencies which
extend and complement the functions of the family and
other socializing institutions such as the media,
youth groups, and the church.   As such, they have
important resource modification or conversion respon-
sibilities.[4]

One such resource conversion responsibility,
seemingly international in scope, is the initiation of
the student into the cognitive form which might be
properly labelled "the aesthetics of literature", but
which is commonly known as literature.   As a conse-
quence of effective involvement in, and exposure to,
the literature curriculum, the student will become
increasingly familiar with the characteristics of the
major literary forms such as poetry, drama, the novel,
and biography;   will develop an awareness of his national
literary heritage;   an appreciation of the skill of the
literary craftsman;   and, ideally, an abiding interest
in literature as a form of thought which is of intrin-
sic interest.

The resource conversion properties of schools
even though equalized across classrooms, and within
classrooms across pupils, are likely to result in unequal

success.   This is because student attributes (inputs)
vary, which accounts in turn for the differential
responses to the within school and within class inter-
personal environments which constitute the resource
conversion and transformation settings.   Since int-
erest in this paper focuses on explaining variability
in school achievement in literature, what is minimally
required is the identification of the major determinants
of this variability and, if possible, their relative
contributions to variance.

The model described thus far has three compo-
nents -- the personality attributes of students, usu-
ally referred to as student background factors, and
which are dependent on early learning conditions;
school resources, or the within school interpersonal
settings where the student resources are transformed
or converted;   and the achievement outcome in literat-
ure.   The relationships between these components
are illustrated in Figure 1.

Figure 1 about here

The relationships depicted in figure 1 incorp-
orate three fundamental assumptions.   First, it is
assumed that the student background component is exog-
enous;   that is, not determined by other variables
in the model.   This predetermined component may be
regarded as "given" in the sense that it represents
the starting point of the system of relationships on
which all other components are dependent.   The exog-
enous component is "given" also in that it requires
no further explanation.   There are several exogenous
variables in some models which, of course, are likely

to be interrelated, but this is not a problem for the
system under consideration. The remaining variables
in the model are the endogenous variables because they
are inside the system, and completely determined by
a linear combination of variables within the system,
which are either logically prior exogenous variables
or other endogenous variables.

Secondly, it is assumed that, if the variation
of an endogenous variable is not completely determined
by prior system components, then a residual variable --
some outside factor, or set of unspecified variables,
which is assumed not to be correlated with the set of
prior variables in the model -- accounts for this
unexplained variance. In Figure 1 the student back-
ground component represents the exogenous factors
(the givens); the school resource component and ach-
ievement in literature represent the endogenous com-
ponents. Because they are endogenous there is the
possibility that they are affected by outside factors;
hence, the residuals (X_r and X_s) for school resources
and school achievement respectively. The outcome
variable is literature achievement. Prior variables
in the system are the independent variables.[5]

Thirdly, it is assumed that the relationships
are recursive in that the causal flow of the model is
in one direction. In this conceptual model there
are no feedback loops from endogenous to exogenous
variables, or between exogenous variables with diff-
erent orders of causal priority. A recursive model,
then, eliminates the possibility of reciprocal link-
ages between variables.

(ii) Effect Parameters and Contrasts

In the model represented by Figure 1 which has
a single exogenous component and only three components
in all, a total of four possible effects can be spec-
ified. It is the contrasts between these effects that
provide the framework within which proposition-like
statements may be formulated. Once a model has been
operationalized, hypotheses way be generated by deduction
from the propositions.

The effect parameters are as follows. 1. The
linear zero-order relationship of the student background
component (or composite) on achievement in literature,
which may be referred to as the total effects, which
can be expressed in the three variable case as the
effects of student background both through its impact
on school resources, and through its direct impact
independently of school resources. Note that the
effects between any independent and dependent variable
(r_{ij}) in the three variable case can be expressed as
the sum of the direct effect of j on i (p_{ij}) plus j's
indirect effects on i transmitted via j's direct assoc-
iation with other independent variables in the model.
That is, total effect equals direct effect, plus indir-
ect effect.[6]

2. The linear zero-order relationship between
the school resource component and achievement in lit-
erature (r_{ij}) which constitutes the total direct effect
of the school, including that effect attributable to
the direct effect of j on i and that effect of j on i
attributable to the component of j implementing student
background. The same proviso in footnote six applies
to this effect parameter also.

3. The direct effect of school resources as
distributed independently of, or over and above, the
force of student background.

4. The direct effect of student background apart from the force of the student background component operating via the schools.

These effect parameters can be expressed in terms of explained variance or RSQUARE (R^2). Thus, effect 1 = R_1^2; effect 2 = R_2^2; effect 3 = $R_{12}^2 - R_1^2$; and effect 4 = $R_{12}^2 - R_2^2$; where, R_1^2 = the explained variance of the first component (X_1) or student background; R_2^2 = the explained variance of the second component (X_2) or school resources; R_{12}^2 = the explained variance of the first and second model components together (i.e., $X_1 + X_2$).

Once the effects have been specified it becomes possible to compare six two-way effects; namely, 1 x 2, 1 x 3, 1 x 4, 2 x 3, 2 x 4, and 3 x 4. (a) Comparison of effects 1 and 2 is between the total effect of variations in student background with the total direct effects of the school. In each effect the joint or overlapping variance between components one and two remain unpartitioned. (b) Effects 1 and 3 are between the total effects of student background variations and the partial effects of school variations. That is, the school resource effects are those after the joint variance shared with student background has been removed. The purpose of such a comparison might be to compare the total effects of student attributes on achievement with those other societal variations which operate through the schools but independent of the student background; that is, the "unique" effects of schooling. (c) Contrasting 1 and 4 effects might be for the purpose of estimating the proportion of the student background effect that takes place through the selection of the school attended by the student, and proportion that takes place directly as

a function of the student's qualities alone. That
is, contrasting R_1^2 with $R_{12}^2 - R_2^2$. (d) If one
wished to examine the proportion of the school's impact
that was distributed independently of differences in
student background effects attributable to the personal
qualities of the student one would compare effect 2 with
effect 3. Effect 2 is the total direct effect of
school resources while effect 3 is the effect of school
resources after removal of student effects. (e) The
comparison of effects 2 and 4 is between the direct
effect of the school resources with the direct effect
of student qualities independent of school. It would
be important to note in this comparison that effect 4
is not the total effect of student background because
student background factors help to determine the school
resource component. (f) A comparison between effects
3 and 4 would reveal the unique effects of the school
resource component acting independently of the student
background, with the unique effects of student back-
ground operating independently of school resources.

(iii) Model Building Guidelines

In terms of the conceptual model, the general
problem may be defined in two ways. First the hy-
pothesis may be tested that a student's personal res-
ources -- that is, the effects of the internalized
prior learning experiences -- have more powerful direct
effects on achievement in literature than their indir-
ect effects via school resources, or more recent
learning experiences, acting as mediating factors.
Alternatively, an estimate may be made as to the ex-
tent to which the effects of of the personal attrib-
utes of students on literature are mediated by the

allocation of school resources. In more practical
terms the following question may be posed: How much
effect does schooling have on achievement in literat-
ure over and above those effects which can be attrib-
uted to student background factors and other non-school
effects?

Drawing on the experiences and strategies adopt-
ed by others in this tradition a number of guidelines
may be specified. Though four rules or caveats are
presented they are not intended to constitute an ex-
haustive set; others have no doubt been overlooked.[7]
First, conceptual models such as the one formulated
above are used to guide variable selection. Thus,
variables which fall outside its parameters, even
though they may contribute in a substantive sense to
the reduction of residual effects (e.g., X_g) will be
excluded from the model. It is a common "drag net"
technique to introduce variables in fully specified
models on the grounds that predictive power may be
enhaced. For example, in the Figure 1 model a major
concern is with the student effects as mediated by
school resources and, therefore, the extent to which
other social institutions affect literature lies out-
side the conceptual framework. It would be an error
of judgment to add such variables as access or use of
community cultural resources such as theatres, drama
groups, and libraries. Similarly, a variable such as
amount of TV viewing, and/or TV viewing preferences
might boost the explained variance, but it would still
constitute a specification error since unnecessary
variables would have been introduced into the model,
thereby nullifying the parsimony and elegance of the
causal model.

A second rule relates to simplicity. Model complexity is a multiplicative function of the number of variables. If the experience of other researchers is useful as a valid guide, then, other things being equal, the fewer the variables, the fewer the technical problems and the easier the scientific processes of model revision. One reason for this is that in models containing a small number of variables -- say, as a general rule of thumb, fewer than seven -- unreasonable results can be more easily detected by inspection; that is, both the path coefficients and the raw coefficients can be tested against researcher experience at first hand. In these "simple" models, then, the researcher is more likely to feel more confident in his control over the analysis and in the decisions leading to revision of the model.

Thus, the trend has been toward the formulation in the first instance of "basic" models, followed by model elaboration in the form of extensions to the basic model. Perhaps the best ongoing example is the work of Duncan, Featherman, and Duncan (1968) which consists largely of extensions to the Blau-Duncan (1967) model. More recently, the work of Williams (1973a, 1973b) may be seen as an extension and elaboration of Eckland's (1971) basic model of cultural deprivation.

Thirdly, it is advisable to consider those variables which are conceptually well defined. One of the problems inhering in school effects models todate has been the inclusion of a large number of explanatory variables which correlate with one another. Technically, this is known as the collinearity problem, and accounts for the possible over-estimation of background effects and the consequent underestimation of

the effects of conditions operating in the schools
themselves (Coleman, 1973; Wiley, 1973). Though
the examination of the total, direct, indirect, and
other effects made possible by the path analysis
approach overcomes this to a degree, the inclusion of
variables which lack conceptual clarity makes the
relatively unambiguous effects of individual variables
difficult to detect. For example, the variable
"presence of a dictionary in the home" is a reflection
of the presence of other underlying variables such as
the educational level of the parents, the parents'
encouragement of the child's school-related activities,
the presence of other books in the home, and even the
vocabulary level of the parents. In other words, the
variable "presence of a dictionary" is a surrogate
for many things. It may   even be a partial def-
inition of the social status of the child's home which
adds to the interpretive problem; and especially if
these underlying variables are included in the analy-
sis.

A fourth caveat concerns the hierarchical level
of the model. A number of expert data analysts have
drawn attention to the methodological and interpretive
problems of school effects models stemming from the
inclusion of variables at two or more hierarchical
levels (Hauser, 1970, 1971; Hannan, 1971; Hannan and
Burstein, 1973). The unqualified position taken here
is that it is essential to specify in causal models
the unit level of analysis, and especially when a
data set is used which is defined at several levels;
for example, where the data consists of variables
measured at the level of the pupil, classroom (teacher),
or school. School effects data typically contain

variables at two or three of these levels, such as home
background variables at the level of the pupil, and hours
in the school day, pupil-teacher ratio and so on, at the
level of the school.

The problem is not difficult to understand. Suppose
that in a three variable explanatory model the two predictors
(independent variables) were correlated with one another.
If the effect of the first is examined, ignoring the second,
then both its effect and also a spurious effect attributable
to its correlation with the second variable will be erroneously
considered. This is the classical multicollinearity problem
and failure to adjust variables in order to eliminate or
reduce one possibility of spuriousness leads to severe inter-
pretive difficulties -- especially in models containing
variables defined at different hierarchical levels. Recently,
analysts such as Wiley (1973) have suggested adjustment tech-
niques for coping with this problem, while at the same time
formulating complex multi-level explanatory models. The pre-
liminary evidence (Wiley and Harnischfeger, 1974) shows that
the functional form of models in which variables at one hier-
archical level or category are adjusted for those in another
are logically more correctly specified than the more tradi-
tional multi-level models, where both individual and contextual
effects are examined asymmetrically.

Equations 6, 7 and 10, above (sections 5 (i) 2, and 6),
are suggestive of some possibilities in this complex area
concerning specification errors related to the functional
form of auxiliary models. In general, it will be essential
for analysts wishing to formulate multi-level models -- espe-
cially contextual effects models -- to consider the adjustment
procedures currently being formulated by Wiley and others in
order to avoid serious specification errors. In the mean-
time, the prudent position might be one in which, in the
absence of adjustments to the variables through the use of

linear covariance controls, or "pooling" through
within-group mean adjustment, individual level models
are defined only at the level of the individual, and
school level models defined solely at the school level
whether the model components are "natural" school level
variables or aggregated measures.

Given that the analyst has taker these rules
into consideration in the variable selection stage,
there is a further second-order principle which de-
serves some attention. In applied research concerned
with practical issues, other things being equal, the
analyst might wish to give preference to those vari-
ables which are policy manipulable. Thus, with ref-
erence to the conceptual model in Figure 1 it would
be desirable to select those variables for inclusion
in the model which are manipulable to some extent by
classroom teachers.

In summary, four guidelines have been present-
ed for governing the variable specification phase
of model building. (1) The analyst is advised to
restrict variable inclusion to those model components
directly relevant to the conceptual model. (2) Test
the basic model first before considering elaborate
extensions, and minimise technical complications by
including as few variables as absolutely necessary

for the purpose in hand. (3) Consider those variables
which are conceptually well defined in that they are
not surrogates for a number of underlying properties;
and which, if possible, are relatively orthogonal to
other variables in the system model. (4) Specify
the hierarchical level of the model and ensure, for
example, that criterion measures defined at an indiv-
idual level are regressed on predictors at the same
unit level and so on.

(iv) Main Theory

A fully specified conceptual model -- the main
theory -- is described below. The unit of analysis
is the individual pupil; thus, the model is of the
micro variety. The relationships between the var-
iables are fully identified; that is, all possible
paths between variables are included, and diagrammed
in Figure 2. Hereinafter Figure 2 will be referred
to as Model I.

Figure 2 about here

In Model I it is assumed that verbal ability
(X_1) and the literacy level of the home (X_2) are both
exogenous. The two-headed curved arrow linking the
two variables denotes that no assumptions have been
made about the causal priorities between them. The
remaining four variables in the system are endogenous.
The postulated causal relationships between them are
represented by unidirectional arrows from the explan-
atory or determining variable to each variable depen-
dent on it. Residual variables are represented by
unidirectional arrows coming from outside the system.
Subscripts are attached to the residual symbols to
indicate that they are the unmeasured terms.

In the operational stage the quantities entered beside the arrows are the path coefficients or standardized beta weights. At the conceptual level only the symbolic form (p_{ij}) of the path coefficient whose impact or effect within the system is under consideration is presented. Relationships between exogenous variables are represented by their zero-order associations or correlation coefficients.

An analysis identifying the relative size of each path -- the sizes of the causal flows labelled p_{ij} in Figure 2 -- would require four regression equations:

> (a) reading speed as dependent variable, the literacy level of the home and verbal ability as independent;

> (b) reading comprehension as dependent, with reading speed, literacy level of the home, and verbal ability as independent;

> (c) attitude toward literature as dependent, with reading comprehension, reading speed, literacy level of the home and verbal ability as independent; and finally,

> (d) achievement in literature as dependent and all five others as independent.

In terms of standardized path coefficients, the system of equations (a) through (d) which fully identify Model I are as follows:

$$X_3 = p_{32}X_2 + p_{31}X_1 + p_{3n}X_n \tag{1}$$

$$X_4 = p_{43}X_3 + p_{42}X_2 + p_{41}X_1 + p_{4q}X_q \tag{2}$$

$$X_5 = p_{54}X_4 + p_{53}X_3 + p_{52}X_2 + p_{51}X_1 + p_{5r}X_r \tag{3}$$

$$X_6 = p_{65}X_5 + p_{64}X_4 + p_{63}X_3 + p_{62}X_2 + p_{61}X_1 + p_{6s}X_s \tag{4}$$

It can be inferred from equation 1 that reading rate is a function both of the literacy level of the pupil's home and his verbal ability.   On a *priori* grounds it could be assumed that the literacy level of the home environment -- the interpersonal milieu within which the pupil's speech patterns and language skills were developed -- determined in part the verbal ability of the pupil, but the assumption is not necessary in terms of the subsequent analysis, and would only complicate the model to be presented, since it gives rise to the thorny "heredity-environment" issue, without contributing to the issues of more specific concern. Therefore, the variables X_1 and X_2 are presented in Model 1 as exogenous and merely intercorrelated.

It can also be inferred from Model 1, equation 2, that reading comprehension is dependent on the exogenous variables X_1 and X_2, and reading rate (X_3). Recent IEA research has demonstrated quite conclusively that some school outcomes -- such as reading ability -- are more home dependent than others such as achievement in science (Coleman, 1973).   Popular beliefs, and to a lesser extent pedagogical beliefs, would seem to support the p_{43} relationship.   Thus, widespread attention for several years has been given to speed reading under the assumption that inorder to improve reading ability all one has to do is to speed it up. It is as if the act of burying one myth has promoted the uncritical acceptance of its antithesis.

Not too many years ago it was commonplace for methodology teachers in language arts at teacher training institutions to draw attention to the research which undermined the myth that fast readers were the most inaccurate readers, or its obverse, that slow readers got the most out of what they read (e.g., Tinker, 1939).

Perhaps not too unnaturally this gave rise to the alt-
ernative explanation that if reading rate could be
speeded up, then comprehension would improve. More
recently, the importance of conditioning factors in the
rate-comprehension controversy has been recognized,
as researchers have shown that rate interacts with
IQ, age, purpose, and reading material (e.g., Blommers
and Lindquist, 1944; Shores and Husbands, 1950;
McDonald, 1960). Despite such demonstrations of the
complexity of the P_{43} relationship, the popular belief
is still that rate and comprehension are associated;
and furthermore, that comprehension is dependent on
rate. If this is the case, and reading is a home dep-
endent skill, then it is plausible to enquire as to
the extent of the dependency of reading rate on back-
ground factors. This is the purpose of equation 2.[8]

The background factor selected for main theory
formulation is labelled "literacy level of the home".
The variable probably represents a number of underly-
ing behaviours, such as the vocabulary of the parents,
their speech patterns, and language usage. To some
extent the variable can be expected to overlap the
educational levels of the parents and other structural
characteristics of the home such as social class.
There is some evidence that variable X_2 may be a power-
ful proxy. In a recent study, the writer showed that
the socioeconomic status of hearing impaired children
who had acquired their verbal skills in the controlled
setting of a school for the deaf had no effects on their
school achievements -- even for such a home dependent
subject as English language achievement (Bulcock, 1972).
The suggestion here is that in the presence of controls
for the literacy level of the home, the effects of
status structures such as father's occupation and income
as determinants of scholastic performance are consid-
erably reduced.

The exogenous variable "verbal ability" (X_1)
has a longer and more controversial history in educa-
tional research than "literacy level". Its major
role has been that of the component always present in
the construct labelled IQ. The conventional view,
supported here, is that verbal ability covaries with
such commonly recognized individual differences as
comprehension, understanding, and learning. Thus,
the nature of verbal ability is such that an individ-
ual average on one of these behaviours is likely to be
average on all, or the person below average on one is
probably below average on all, and so on. It is to
be anticipated that the two exogenous variables will
be correlated to a moderate extent, in that the lit-
eracy level of the home represents an opportunity struct-
ure in the absence of which expression of verbal abil-
ity may be retarded and vice versa. The relationship
may be a nonmonotonic one attributable to the presence
of floor and ceiling effects, but this is not a poss-
ibility which can be examined by Model 1.

The path model is extended in equation 3 to
include the student's attitude toward literature.
Based largely on the conventional wisdom it is hypoth-
esized that literary attitudes are a function of both
family background and school related factors. There
is some empirical support for the hypothesized relation-
ships, though they may be more complex than portrayed
in Model 1. Thus, though lower class children tend to
hold less favorable attitudes towards schooling than
those from higher status backgrounds (Neale & Proshek, 1967;
Glick, 1970), the differences may be offset by the fact
that lower class students may be more influenced by the
teachers in the school (Yee, 1966, 1968). Whether

the relationship holds up with the variables proposed
in this analysis, which are conceptually more precisely
defined than are such gross global indicators as social
class, is open to test. The proposition is held that
if the literacy level of the home is high; if the pup-
il's verbal ability is also high; that attitudes toward
mother tongue literature will be positive. Similarly,
if the pupil's reading rate and reading comprehension
level are high, then it is expected that they will
support positive literary attitudes, and vice versa.

The relationship between attitudes and the crit-
erion measure, achievement in literature, is more ambig-
uous. The ambiguity is captured by this statement
from a recent review of the literature dealing with
the relationship between students' attitudes and
achievement.

> The relationship between favorable scholastic
> attitudes and level of academic achievement
> is functional rather than causal -- that is,
> academic successes help to promote satisfaction
> with school, which in turn increases the possib-
> ility of future successes (Khan and Weiss, 1973).

In other words, the authors postulate a recip-
rocal relationship between attitudes and achievements --
one in which there is a feedback loop between achieve-
ment and attitudes.[9] If so, then the question of
causality must be resolved largely on a priori grounds
rather than on the empirical evidence from cross-sect-
ional data. Perhaps the important point to note is
that regardless of the direction of the relationship --
that is, whether it is captured by a recursive or a
reciprocal model -- there would in either case be a
degree of association between the variables. Empir-
ical findings, however, do not always support this
theoretical association (Tenenbaum, 1944; Jackson and

Lahaderne, 1967; and Lahaderne, 1968). Nevertheless, the popular conception is that other things being equal favorable attitudes toward school and school subjects will covary with related achievement outcomes; and this is supported by most recent research findings (Holtzman and Brown, 1968; Khan, 1969; Khan and Roberts, 1970; Williams, 1970). Since the linkages between background factors, school factors, and school related attitudes on achievement in literature have not been examined previously within the framework of a causal model, there would seem to be additional justification for examining attitudes as determinants of achievement in case they act as a powerful mediating phenomenon for prior factors, which may act via attitudes (that is, indirectly, as well as directly). Equation 4 is a test of this hypothesis.

Equation 4 also test the effects of such school related skills as "reading comprehension" (X_4) and reading rate (X_3) on achievement in literature. In this way some general comparison between the exogenous variables (home and personality resources) and the endogenous variables (school related skills and attitudes) is possible.

3.   DEVELOPMENT OF THE AUXILIARY THEORY

Discussion to this point has been in terms of
a conceptual model, or what Blalock (1968: 25) refers
to as "main theory"; that is, theory linking common
language concepts not necessarily directly measurable.
In order to test the theory, the data analyst must con-
struct an auxiliary theory which is specific to the re-
search design, the population studied, and the measuring
instruments used. This step involves the quantification
of the model consisting of the measured counterparts
to the components in the conceptual model. Model iso-
morphism is the major problem at this stage; the most
important outcome of which is the generation of a set
of testable hypotheses. If the hypotheses are true
then both main and auxiliary theories may be true,
though this finding will not preclude the possibility that other
conceptual models or other auxiliary theories or both
may also constitute alternative tests of the hypotheses.
If the hypotheses are false, either the main theory or
auxiliary theory or both must be modified or rejected.
Normally one cannot deduce from a failure to find support
for the hypotheses whether the main theory or the auxiliary
theory is at fault, which accounts for the element of
intuitive inventiveness involved in the research process.

In this section basic information about the sample
and subsample selection, the operationalization of vari-
ables, and the specification of the effect parameters is
presented. The purpose is threefold: (i) to describe
the data base and the operationalized measures in order
that the reader can estimate the degree of fit between
main and auxiliary theory for himself; (ii) to identify
the hypotheses; and (iii) to present information

about the approach used for estimating model parameters.

(i)   The Sample

        Data for testing Model I was generously provided
by the Institute for the Study of International Problems
in Education, University of Stockholm.   The sample
consisted of a five percent random subsample of the
IEA stage two Swedish data for Population II subjects.
IEA stage two data on science, reading comprehension,
and literature achievement was gathered on the same sam-
ple at three age levels in ten countries in 1970.
Population II consisted of fourteen-year olds, largely
at the grade 8 level.   The total number of cases in the
subsample was 119.   This was considered a random sample
of a suitable size to provide substantively and statist-
ically significant results without running into unnecess-
arily high computer costs.

        The data was gathered by a series of questionnaire
instruments administered over a period of several days
(usually three) in the sample schools to the subsamples
of randomly selected children.   The school was the
primary sampling unit (Peaker, 1967b). Approximately
25 pupils in each school out of approximately one hun-
dred and ten schools sampled in each country responded
 to the test questionnaires.   Other questionnaires were
completed by students providing information on their
social backgrounds, interests, and attitudes.   Class-
room teachers and school principals also completed quest-
ionnaires.   In total, over 1200 items of information
was available for each student in the population II
sample.

        The questionnaires were of the omnibus variety
in that they we. designed to provide information about
a number of problems and issues of a practical and theo-
retical nature related to educational achievement.

More detailed descriptions of the samples, the instrumentation, and the findings of the stage two surveys can be found in Purves (1973), Thorndike (1973), and Comber and Keeves (1973), as can reliability data for the test and subtest scores. Valuable information about the organization of IEA, the developmental phases of the test and questionnaire instruments, the hypotheses tested by the series of studies, and the analytical designs, is to be found in the two volume Bloom Report (1969). A technical volume describing the sampling design and the statistical model used in the analytical phase is in press (Peaker, nd.).

(ii) Operationalization of Variables

Verbal Ability (X_1) The structure of verbal ability is hierarchical in that abilities at one level are causes of covariation in lower-order abilities, which in turn explain covariance in performance on a number of specifically observed behaviors (Hebb, 1949; Cattell, 1963). The factor model with reference to Wechsler scales of mental ability has been described by Williams (1973a). A component of these models which always emerges is the verbal comprehension factor which is the variable of interest in Model I. The word knowledge test data gathered in the IEA stage two survey effectively captures this dimension of ability which accounts for its use as the measure of verbal ability. In his review of the status of word knowledge in IEA research R. L. Thorndike (1973: 36) concludes that for within-country analyses "it appears that the test should be a reasonably satisfactory measure of verbal ability."

The item format for the word knowledge test consisted of word pairs. The words of each pair had to be judged as approximately either synonyms or antonyms.

It was believed that such a format would be easier to translate into different languages than other alternatives such as the multiple-choice format.[10]   Pools of items were assembled by the International Reading Committee from the national committees in each country.   These were classified into ten difficulty levels by a team of expert judges at Teachers College, Columbia University. The major problem was that the order of difficulty in English might (and did) change as a consequence of translation.   An attempt to resolve this was made by circulating the list of 300 word pairs to each national committee, with the request that each be asked to indicate which pairs would be impossible or difficult to translate into a pair of corresponding difficulty in the language of the country.

Following this, all word pairs were dropped in which more than one country indicated translation difficulties, and the remainder used for pretesting purposes. The steps for scaling items for difficulty are described in detail by Thorndike (1973: 30-36).   Unfortunately there were great variations for the test from country to country, but the discrimination within a country was good;   hence, legitimizing its use for the purpose described.   The coefficient of reliability for the word knowledge test for Sweden population II was 0.672.

Literacy Level of the Home (X_2) There are at least three noteworthy differences between the variable "literacy level of the home" and that described above as the verbal dimension of mental ability.   First, verbal ability is an unmeasured construct.   The unmeasured variable can best be seen as the cause of its underlying measured indicators;   that is, the structure of factor models such as mental ability or value orientations such as conservatism is hierarchical, in which a

single general ability or attitude is seen as a cause
of the covariation among more specific abilities or
attitudes which in turn might account for covariation
among performances on a number of tests.

Figure 5 about here

In Figure 5a the unmeasured variable Y is the
cause of covariation in two underlying unmeasured dimen-
sions, W_1 and W_2, each of which is the cause in turn
of a relatively pure set of underlying measured items.
In the case of the construct mental ability, our int-
erest is centered on only one of its underlying dimen-
sions; namely, verbal ability.   In terms of Figure
5a interest lies not in the second order construct Y
but in one of its first order dimensions; namely, that
representing the verbal component of this construct.
It is believed that an individual's word knowledge score
is a function of his verbal ability and, hence, the
score itself represents an accurate and valid measure of
the construct.

The variable literacy level of the home is not
a factor model like verbal ability.   Rather, it is
best conceived as a productive model variable in that
the underlying indices or measured variables give rise
to or "produce" the unmeasured construct.   See Figure
5b above.   Thus, literacy level of the home can be con-
ceived as an unmeasured variable which is the product
of several indicators such as the language fluency of
the parents, the degree of commitment to the use of
"pure" forms of language usage, the interest of family
members in a variety of literary forms, and so on.
Such information is difficult to obtain, however, by
questionnaire methods and even if an effort was made
to gather it in this way it would minimally require

questionnaire feedback from several family members which
in itself is a large undertaking. Not surprisingly,
therefore, the IEA questionnaire committee settled for
approximate indicators of the construct such as: use
of dictionary in the home, number of books in the home,
the number of magazines received in the home each month,
and whether the family receives a daily newspaper.

Each one of these items may be conceived as a
surrogate or proxy for a number of qualities and inter-
ests held by a family member (or members) related to a
family environment dimension of some presumed importance
called literacy level of the home, which is used as one
indicator for predicting or determining a child's achieve-
ment level in a mode of understanding called the aesthetics
of literature. It is condeded that these variables are
surrogates or proxies, and possibly for this reason not
to be taken too literally. For example, if it were
found that the variable "presence of a dictionary in the
home" was strongly associated with achievement in liter-
ature, then if the association was literally true by
adding a dictionary to every home without one, one would
expect to bring about an increase in literary achieve-
ment. That this would not occur is obvious because the
other properties of the home for which the presence of a
dictionary is merely a proxy would still be absent.

The second difference, then, between literacy level
and verbal ability is that the measured indicators of
literacy level are only proxies which fail to reflect the
precision and care taken in the construction of the verbal
ability variable. It is partly for this reason and partly
for pragmatic research considerations that it was thought that
the number of books in the home would represent the best

single proxy for the literacy level of the home constr-
uct. The third distinction, then, is that whereas
verbal ability is an unmeasured variable based on an
individual's score on forty test items, the variable
number of books in the home as a proxy for the literacy
level of the home is based on a single questionnaire
item.[11]

Reading Rate (X_3) The variable "reading rate"
was included as one of the achievement measures by the
International Reading Comprehension Committee responsible
for the preparation of the reading tests for the stage
two surveys. The format considered to be the most
appropriate for meeting the speed test conditions involved
a series of short paragraphs, each followed by a question
and three words, one of which had to be underlined as
the answer to the question.[12] In this way it was thought
(a) that a natural reading situation could be retained,
(b) that there would be some guarantee that the material
had been read and understood, and (c) that the score
would reflect maximum rate of comprehension.

Thorndike (1973: 28-29) draws attention to tech-
nical problems involved in the construction of reading
speed tests and concludes that no fully satisfactory
technique has been developed. Nevertheless, in the
development of the final test form every effort was
made to eliminate ambiguity and difficulty through anal-
ysis of pretest results from each country. On the
basis of these try outs, a time limit of four minutes
was set for a passage consisting of a single continuous
story containing forty items. Answers were marked
directly on the test booklet, on the basis of which
two scores were obtained: (a) the number of the last
item attempted without regard to correctness, and (b)
an error score based on the first nine items of the test.
For the purposes of this study only the first of these
scores was used.

<u>Reading Comprehension</u> (X_4) The reading compre-
hension variable was also constructed under the direction
of Robert L. Thorndike of Columbia University. The
test was of the conventional type -- a reading passage
followed by multiple choice questions on the passage
designed to cover a wide range of reading skills, such
as identifying factual details and the main idea; in-
ferring beyond the literal content; recognizing the
author's point of view and purpose; and demonstrating
an understanding of the author's writing techniques.
Both the population II tests were 45 minutes in length,
and included a total of eight passages with 52 test
items. The items covered a wide spread of difficulty;
thus, discriminating satisfactorily between good and
poor readers.[13] The Kuder-Richardson formula 20
(Kuder and Richardson, 1937) estimate of reliability for
Swedish 14-year olds was 0.865; high enough to permit
useful studies of individual and group correlates of the
score. For further details regarding the development of
this instrument see Peaker (in press), and Thorndike
(1973, chapter 2). It will be noted that reading comp-
rehension is a factor model type of variable with two
hierarchical levels (compare Figure 5a).

<u>Attitude Toward Literature</u> (X_5) Two questionnaire
items were given equal consideration as representative
of the student's attitude toward literature. One was
a subjective psychological attitude variable called
"liking for literature".[14] The other was a more object-
ive behavioral-type measure called "hours of reading
for pleasure".[15] The behavioral measure is to be pref-
erred for two reasons: (a) its greater objectivity,
and (b) its stronger association with the other variables
in the model.

Literature Achievement (X_6)   The literature achievement measure used was the one devised and pretested by the International Literature Committee chaired by Alan C. Purves.   The development of the instrument and its psychometric properties take up two chapters in the monograph Literature Education in Ten Countries (Purves, 1973: chapters 2 and 4).   The scores on the tests wei corrected for guessing and the test reliability (K-R 20) for Sweden was 0.81.   The test format was of the usual multiple choice variety, since students had to have common literary passages for analysis and interpretation.   The reason for this was that a common literature curriculum exists neither within nor between most countries.[16]   Like verbal ability and reading comprehension, the dependent variable literature achievement is a hierarchical factor model.

Sex   Sex was used as control variable since in Sweden girls consistently outscore boys in achievement in Literature.[17]

Hours of Homework per Week   Since it was thought that the amount of effort a student put into his school work might affect achievement in literature, the variable hours of homework per week was also used as a control variable.[18]

(iii)   Specification of Effects

The specification problem in the development of linear, recursive models is one of ordering the variables in terms of causal priority so that the structural equations can be formulated.   This matter was dealt with at some length above in the "main theory" section of the paper.[19]   The operationalization of the model does not affect the chain of causation rationale.   It was noted, however, that in the case of the relationship between rate and comprehension,

and attitudes and achievement, alternative theoret-
ical formulations existed; and in both instances
the matter of the functional form of the relationship
was an open question.   On both issues the "popular"
or conventional wisdom explanations were the one's
set up for testing and presented in Model I.

Rather than repeating what is already captured
mathematically in Eqs. 1 - 4 above,[20] the hypotheses
built into the system of equations will be formulated
verbally.   The hypotheses are not an exhaustive set,
but it is hoped that they reflect the causal laws
governing the system of relationships among the var-
iables.

(i)   Cultural and Personality Resources Hypotheses

1.   Achievement in mother tongue literature,
reading comprehension, and reading rate,
varies with the cultural level of the pupil's
home as measured by the number of books in
the home.

2.   Attitudes toward mother tongue literature
vary with the cultural level of the pupil's
home.

3.   Achievement in literature, reading, and
reading rate, varies positively with the verbal
ability of the pupil.

4.   There will be a modest association between
the cultural level of the pupil's home as
measured by the surrogate variable number of
books in the home, and the pupil's verbal
ability.

5.   More favorable attitudes toward mother
tongue literature as represented by the proxy
hours of reading for pleasure per week, will

be held by pupils with the higher levels of verbal ability.

(ii) School Related Skills Hypotheses

6. Achievement in literature will be positively correlated with such school related skills as reading comprehension and reading rate.

7. Attitudes toward literature will be adversely affected by low achievement levels in reading comprehension and reading rate.

(iii) Control Variable Hypotheses

8. Girls will outscore boys of the same age on achievements in literature, reading, and reading rate.

9. Girls will tend to have more positive attitudes toward literature than boys.

10. Achievement in literature, reading comprehension, and reading rate will consist of nonmonotonic functions (possibly logarithmic in form) of the amount of effort expended on school related subjects, as measured by the number of hours the pupil spends on homework per week.

Discussion of Model I relationships has so far precluded discussion of the control variables, sex and effort. Since three control variable hypotheses are presented above some explanation is in order. First, sex. The fact that the sex differences are related to differential school achievements is well documented both in recent IEA reports and other sources.[21] The research literature is, however, long on description and short on explanation. Because the theory of sex differences is relatively underdeveloped no attempt is made here to go beyond the empirical level. The fact is that in Sweden, population II, the correlation between sex (scored 1 for boys, 2 for girls)

and achievement in literature is 0.21. The mean
cross national correlation was a little over 0.20
(Purves,1973: 160). Thus, in the system of variables
constituting Model I it was thought advisable to
consider the introduction of statistical controls
to avoid the possibility of the confounding influ-
ence of sex.

Similarly, it was thought that the amount of
effort expended on school work as represented by the
variable hours per week spent on homework might also
confound the system of relationships. There was some
evidence in IEA studies that the homework variable
had some impact on achievement. This was referred
to in the science volume where the authors note:

> . . . Hours of homework per week is a sound
> indicator of standards of industry and effort
> by students at school. ... (Comber and Keeves,
> 1973: 263)

Unfortunately, the effects of the homework variable
on achievement in literature have not been published.
In Sweden the correlation for population II is -0.12
suggestive of a nonlinear relationship.[22] In other
words, 14-year olds who study at home do so because
they are weak students in school. The hypothesized
relationships are presented in Figure 6. Thus, low

Figure 6 about here

achievers in literature may be found among those
who do a great deal of homework as well as among those
who do little or none. The reason,then,that this
variable failed to account independently for achieve-
ment in literature -- and hence why it was not ref-
erred to in the Purves monograph -- may be attribut-
able to the fact that it is nonlinear and not estim-
ateable by the IEA linear model. Since the homework
factor might be a source of bias, it is taken into
consideration in constructing Model II which is form-
ulated in the findings section below.[23]

4. FINDINGS

The findings are presented under three headings.
Model I findings are examined first, and are used to
revise the model further.   Analysis of the revised model
is followed by the presentation of the third and final
model which is the basis for the subsequent interpretation
of the model and its implications for educational
practice.

(i) Model I Findings

The zero-order relationships between Model I
variables -- including two measures of attitudes -- are
presented in Table 1.   Though these are interesting in
their own right as summary measures, one cannot gauge
the relative contribution of the several factors until a
regression analysis has been conducted.   For several
reasons it was thought that the most parsimonious proc-
edure would be a multivariate regression analysis using
both reading comprehension and achievement in literature
outcomes as dependent variables.   These were regressed
on six predictors.   The results of this analysis are
presented as Table 2.

Table 1 about here

From a multivariate procedure such as MULTIVARIANCE
(Finn, 1972) one can obtain both multivariate and univar-
iate F-ratios, which indicate the statistical significance
of relationships between either (i) predictors and both
outcomes taken simultaneously, or (ii) between predictors
and outcomes taken one at a time.   Secondly, one obtains
the relative effects of the predictors from the standard-
ized betas;   and the overall predictive power of the
model from the multiple R and/or R^2 coefficients.   Since
it is hypothesized that both criterion measures are caus-
ally dependent on the predictors, these two advantages

of the multivariate regression procedure are particularly
important.

Attention is drawn first to the mean sex differences
which can be extrapolated from the mean differences
presented as marginals in Table 1.   For the most part
they are in the predicted direction.   The single ex-
ception is the similarity between both boys and girls in
verbal ability scores -- though the boys are a fraction
ahead of the girls the difference is trivial.   Girls
outscore boys in reading and perform markedly better
in literature.   These results are consistent with
overall IEA findings.[24]   Secondly, attention is drawn
to the strength of the pattern of relationships between
verbal ability, the cultural level of the home, read-
ing, and literature.   With the exception of a moder-
ately high correlation between the attitude measures,
the relationships among the other predictors, and betw-
een predictors and the dependent variables are either
low to moderate or negligible.

Table 2 about here

It is not surprising, then, to note from Table
2 that reading speed, hours of homework, and the two
attitude variables make little signi.icant contribution
to variance in either reading comprehension or achieve-
ment in literature.   In the case of reading speed,
when controls were placed on books in the home and verb-
al ability, its effect on reading effectively disapp-
eared, despite the zero-order relationship of 0.18.
Thus, the decision was made to drop this variable from
the model.   Further discussion of this variable is
deferred until the interpretation section.

The attitude variables and the hours of homework
variable deserve separate consideration.   Note that
despite the trivial effects of homework on both reading
and literature, that the beta coefficient is negative.

This lends support to the earlier contention (see hypothesis 10) that its effect may be nonlinear. The decision was made, therefore, to control for the effects of homework is a proxy for "effort" prior to conducting the causal analysis at the Model II stage. Attitudes 1 and 2 were entered simultaneously into the regression, making it more difficult to judge which of the two is the more effective. A standardized beta of 0.141 for attitude 1 (reading for pleasure) compared to 0.055 for attitude 2 (liking for literature) on literature achievement made the first one preferable. Since attitude 1 is a behavioral measure and, therefore, preferred on these grounds also, this variable was used in the subsequent analysis of Model II.

(ii)   Model II Findings

The difference between Model I and Model II is twofold. First, in Model II the reading speed variable has been omitted from the system. Secondly, the causal relationships are not examined until after the correlation matrix has been adjusted for differences in the subgroup means between both sex and effort factors. Effort was measured by the five point variable -- hours of homework per week. It will be noted from Table 3 that even ignoring the fact that factor levels 4 and 5 of the effort variable for both boys and girls have low cell N's, the distributions are nonmonotonic.

Table 3 about here

It will be noted from Table 4 that controlling for cognitive effort tends to strengthen the relationships among system variables while reducing the size of the R^2 coefficient, or predictive value of the structural equations. Thus, in Table 4 the addition of effort as a control factor hardly affects the combined predictive effects (R^2 value) of verbal ability and

literacy level of the home on reading ability, but it
does affect their relative effects.   Verbal effects
are reduced somewhat while concomitantly the relative
effect of the home environment factor is increased.

Table 4 about here

The findings for the predictability of reading
for pleasure (ATTIT 1) from background and reading
ability factors are interesting but negative.   Only
the relative effects of reading ability as a predictor
of reading for pleasure when controlling for the con-
founding influence of sex and effort was significant at
the 0.05 level.   The explanatory power of the equation
is low in that only five per cent of the variance in
reading for pleasure is being accounted for, which
raises the interesting question of which factors do
account for the amount of time children spend reading
for pleasure.   In view of the relationship (r=.30)
between ATTIT 1 and ATTIT 2, by adding liking for lit-
erature to the equation it might have been possible
to boost predictability by an additional 9 per cent.
But even this leaves 86 per cent of the variance unacc-
ounted for.   In Figure 7 the relationships in Table 4
are presented diagrammatically.   The size of the res-
idual for the ATTIT 2 equation can be noted at a glance
from the figure.   Clearly, in a linear model of this
form the attitude variable makes no substantive contrib-
ution to explaining absolute levels of achievement
in literature.   For this reason the decision was taken
to drop this variable in Model III analysis, though the
matter raised is brought up again in the interpretation
section of the paper.

Figure 7 about here

Verbal ability is a more powerful predictor of
reading comprehension than achievement in literature

according to Model II findings. In fact, the direct
effects of verbal ability on literature is not signif-
icant, suggesting that the path might be deleted in a
reduced form model. From Model II findings it is also
noteworthy that the addition of effort as a design fact-
or decreases the relative effect of reading comprehen-
sion on literature achievement.

(iii) Model III Findings

The sole difference between Model II and Model III
is that Model III does not include an attitude var-
iable. In accounting for absolute differences in ach-
ievement levels a measure of an individual's attitude
is not an explanatory factor unless it is related to
the attitudes of others in the same social context.
In other words, attitudes may be situation-specific.
Since the information necessary to convert an unad-
justed attitude measure into a relational measure --
for example, for inputting the measure of an individ-
ual's attitude after it has been adjusted for contex-
tual considerations -- was not available as part of the
data set the variable was dropped. It will be recog-
nized that in this form the model is misspecified,
since a theoretically important variable has been
omitted from the system.

Despite this shortcoming, the four variable
model has powerful predictive qualities as is shown
in Table 5. Two variables account for almost 40
per cent of the variance in reading performance, while
three explanatory variables explain 45 per cent of the
variance in literature achievement. Some indication

Table 5 about here

of the magnitude of the effects of verbal ability
(word knowledge) on reading performance (p_{31} in Figure

8) can be obtained from the path coefficient. This coefficient, $p_{31}=0.548$ is the best estimate of the net degree of change in the dependent variable (RDGCOMP) which would result from a change of one standard deviation unit in the independent variable (VERBAL). For this sample, a one standard deviation increase in verbal ability would produce a massive 54.8 per cent standard deviation increase in reading comprehension net of the simultaneous effect of the literacy level of the home (LITHOME).

There is an interpretive difficulty involved, however, in using standardized regression coefficients. The difficulty stems from the fact that standardized beta coefficients are sensitive to the standard deviation of the independent variable. Wiley (1973) expresses the difficulty as follows:

> As the variance of an independent variable decreases, the standardized regression coefficient also decreases even though the unstandardized regression coefficient (structural relation) remains unchanged.

There is some advantage, then, in describing the relationship in terms of the dependent variable metric; that is, in terms of the raw (unstandardized) beta coefficients. For this reason these are presented in Table 5 along with their standard errors. In this way, it is not only possible to interpret the raw betas; it is also possible to calculate a rough estimate of the significance of a path coefficient. If the standard error (S) of the unstandardized beta coefficient (B) is much smaller than B, the sign of the coefficient may be interpreted confidently. Further, if S is more than twice as small as B, then the path coefficient is most likely statistically significant.

<u>Figure 8 about here</u>

For the p_{31} relationship in Model III diagrammed in Figure 8, an increase of one point in verbal ability increases the reading comprehension score by 0.63 points. Similarly, an increase of one in the raw metric (number of books in the home) of the LITHOME variable, increases the reading comprehension score by 3.44 points.

In some ways of much greater interest is the finding that verbal ability affects achievement in literature less in a direct manner than indirectly via reading comprehension as a mediating variable. The direct effects $(p_{41}=0.090)$ are not significant at the .05 level, whereas the total indirect effect (TIE) of X_1 on X_4 $= r_{41} - p_{41} = 0.34$, which is considerable.

The variable LITHOME which is a proxy for the general cultural level of the pupil's home operates both directly and indirectly on literature performance. Thus, net of other variables in the system, an increase in the raw metric of the LITHOME variable accounts for an increase in the pupil's test performance in literature of two points. And by the same token, an increase of one point in the score in reading comprehension is accompanied by an increase in achievement in literature of 0.40 points.

5. DISCUSSION

(i) Theoretical Implications

1. <u>Reading rate</u>. The results of the multiv-
ariate regression analysis presented in Table 2 show
convincingly that reading rate has no tangible effect
on either reading comprehension or literature. Sim-
ilarly, the zero-order relationship between reading rate
and literacy level of the home was trivial. In short,
there was little support for the popular belief that
comprehension is dependent on rate. Neither was there
support for the notion that rate is a function of verbal
ability. One possible explanation of this has been
posited above; namely, that the relationship between
rate and comprehension is a complex one, mediated by
a number of conditioning variables which interact with
rate as a concomitant variable.[26] Another reason why
rate had no relationship to comprehension for the pop-
ulation tested may have been because the test for rate
had a different purpose, and consisted of a different
type of reading material than the test for reading
comprehension.

Thus, the reading comprehension test may have
had its own reading rate built into it, which was ana-
lytically distinct but not empirically separable from
the test measure itself; and this component of the
reading test (being of a different logical order in
terms of purpose and material than the reading rate
test) was neither congruent with, nor covaried with, the
rate test. If this were the case, then it would follow
that a valid rate measure for any comprehension test
must be based on a passage (or passages) being read
for the same purpose and composed of the same kind of
reading material. But since a comprehension test
includes rate as one of its inextricable components
(the word "test", by definition, presupposes some time
limit) it seems fatuous to include it in models where

interest centers primarily on reading comprehension.

    2.   <u>Attitude toward Literature</u>.   The finding
that neither attitudes toward literature, nor the time
spent reading for pleasure, accounted for variability
in literature achievement was disappointing.   In the
case of attitudes toward literature the explanation
may be attributable to the kind of model misspecifica-
tion due to the use of an incorrect functional form.
This complex matter is taken up below.   The explanation
for the failure of the variable hours spent reading
for pleasure is probably simpler.   Two overlapping
explanations are suggested.

    First, literature is unlike some other school
subjects such as mathematics and science, which make
little or no sense unless the student is already on the
inside of their content and logical form.   In the case
of literature, a relatively naive student can read a
literary work because it is in the common language and
find something of interest, even though literary understanding
may be at a low level.   But unless the student is assist-
ed in the development of his critical powers; and
unless he has his attention consciously drawn to the
durable qualities in a literary work, his appreciation
may remain relatively undeveloped despite considerable
time spent reading literature.   Secondly, it depends
what the pupil reads.   No matter what potential the
pupil has, reading for pleasure is unlikely to have
positive effects unless that reading is of literary
merit.   Just as the child who interacts almost exclu-
sively with age-peers with parallel vocabulary levels
to his own is unlikely to extend his vocabulary or
significantly improve his language usage, so the pupil
who reads exclusively "low-level" literature, or one
kind of literature only, is unlikely to significantly
develop his literary tastes or his critical capacity.

    The absence of impact of the variable ATTIT 1,

hours of reading for pleasure, may be attributed to the
failure to incorporate a component such as type of
reading in the variable itself. The remaining aspect --
opportunity to learn about the principles governing
the aesthetics of literature -- may or may not be var-
iable in that in Sweden age peers of both sexes are
taught by State certificated teachers, are exposed for
about the same length of time each year to the formal
literature curriculum, and taught in non-grouped class-
rooms. Thus, opportunity to learn may be a constant
fact . Variance attributable to differential rates
of school attendance, classroom disruptions due to
disorderly pupil conduct, and non-purposeful classroom
activities, was not measured by IEA surveys, and, there-
fore, could not be considered.

The failure of the functional form of the model
to capture variability in literature attributable to
attitudes toward literature, may be twofold. First,
a model of absolute achievement in literature for 14-year
old Swedish pupils may be inadequate because the attit-
ude formation context is not the entire country but, rather,
the school; and within the school, classrooms. If
attitudes toward literature are context-specific, as
is suspected, then it is unlikely that the linear model
containing "natural" or unadjusted attitude and achieve-
ment outcome variables would capture attitudinal effects.
Such a model is described below in Eq. 5. In the
most general case the value of the vector for the jth
pupil in the ith school is denoted by $\underline{X}_{ij}$. The unad-
justed effects of individual characteristics (denoted
by $\underline{B}$) on the outcome (denoted by Y_{ij}) is captured by
the equation:

$$Y_{ij} = A_0 + \underline{B}'\underline{X}_{ij} + E_{ij} \qquad (5)$$

where: Y_{ij} = the outcome measure; e g., achievement
in literature

A_0 = the regression constant

$\underline{X}_{ij}$ = the predictor variables, X_1, X_2, ..., X_n
in the model; and

E_{ij} = the residual or disturbance term.

A reason for the failure of Eq. 5 may be due to
the fact that attitudes are governed by the school
and classroom context.   For example, a pupil of high
ability in literature in a high ability school or class
may have only a modest ordinal performance relative to
the members of his reference group in the school.
Similarly, a pupil with a modest absolute level of
performance may have a relatively high ordinal perform-
ance, if he attends a relatively low achieving school.
Such a phenomenon may account for a high performing
pupil (in an absolute sense) having a low liking for
literature, and a modestly performing pupil (absolutely)
having a high liking for literature, if performance
reciprocally interacts with   attitudes (as in Fig-
ure 4).   What is posited here is the notion of a
psychological disposition (ATTIT 2) which has socio-
genic properties, such that the disposition which is
reflected in an indicator at a particular time may
have arisen in part as a consequence of the very activ-
ity it tends to instigate.   On the same logical point
see Duncan and Featherman (1972: 130-134).

For the attitudes of such pupils to have effects
on literature outcomes, both the attitude variable and
its associated outcome measure of achievement have to
be adjusted inorder that the pupil's definition of the
situation can be considered.   Such an adjustment is
demonstrated by Eq. 6 in which an attempt has been made
to compensate for the biased estimate of the standard-
ized beta (β_z) in the attitude case.   'n this model
the attitude variable is labelled Z and the emphasis

is not on the absolute level of individual pupil achievement but on relative achievement. The purpose of the model is to account for the difference in performance betwe n the individual pupil and his peers.

$$Y_{ij} - \overline{Y}_{i.} = A_0 + \underline{B}'\underline{X}_{ij} + B_z(Z_{ij} - \overline{Z}_{i.}) + E_{ij} \quad (6)$$

where: $\overline{Y}_{i.}$ is the mean of the Y_{ij} for the $\underline{i}$th school; and

$\overline{Z}_{i.}$ is the mean of the attitude (Z_{ij}) for the $\underline{i}$th school.

If it is wished to adjust for all sources of school-related variation, the simplest model is one in which all individual-level variables are adjusted for the possibility of school bias as in Eq. 7.

$$Y_{ij} - \overline{Y}_{i.} = A_0 + \underline{B}'(\underline{X}_i - \overline{\underline{X}}_{i.}) + E_{ij} \quad (7)$$

The models represented by Eqs. 6 and 7 were not tested, though the nationally representative school samples available in the IEA data bank archive would accommodate such tests.

3. <u>Resource Conversion Considerations.</u> It was shown that both sex and effort were confounding factors; and demonstrated that the procedure of pooling the within-groups measures (design factors) was a viable way of coping with the problem. An unanticipated finding stemming from the use of this technique was that the adjustment for effort resulted in a strengthening of the environment variables. Thus in the presence of the control for effort the relative effects (standardized betas) of verbal ability on reading comprehension declined and that for the literacy level of the home increased. Similarly, Table 4 shows

that in the presence of adjustment for effort, the
strength of the reading comprehension variable on li-
erature achievement declines.   This is interpreted
in terms of effort compensating for inherent abilities
and skills.   In other words, empirical support for the
principle of compensatory education, since up to certain
unknown thresholds the efforts made by pupils will
assist in the marshalling of resource assets (enhancing
environmental factors) to compensate for resource def-
icits (personal abilities and skills) inorder to trans-
form or convert the personality attributes into resource
assets.

4.   Effects of Verbal Ability.   It was shown
(e.g., Model III) that the effect of verbal ability
(word knowledge) on reading performance was substan-
tial.   The magnitude of the path coefficient (p_{31})
in Figure 8 is simply an estimate of the net degree of
change in the dependent variable (RDGCOMP) which would
result from a change of one standard deviation unit in
the independent variable (VERBAL).   For this example
a one standard deviation increase in verbal ability
would produce a 54.8 per cent standard deviation incr-
ease in reading comprehension net of the simultaneous
effect of the literacy level of the home (LITHOME).
Surprisingly, VERBAL had only a slight (nonsignificant)
effect on LITACH which implies that its effect on lit-
erature was an indirect ore mediated by reading compreh-
ension.   The practical implications of this firding
are taken up below.

5.   Effects of LITHOME.   The weakest concept-
ual variable in the model was undoubtedly LITHOME, the
literacy level of the pupil's home, as measured by the
number of books in the home.   The number of books,
however, says nothing about their type, whether they
are for display or use, the extent to which family

members critically discuss the merits of selected vol-
umes, whether the collection includes children's books,
and so on. Thus, the variable appears to be a weak
proxy for a set of qualities of the home environment,
and attitudes of family members related to learning,
reading, and scholarship. As such the presence of a
home library is indicative of the literary tradition
of the pupil's household and, in particular, of the ext-
ent to which school related activities of a verbal kind
are replicable in the home; and, hence, the degree of
congruence between the home and the school.

Further, the variable, books in the home, as
measured, probably underestimates the influence of the
home's literacy level as a determinant of achievement
in both reading and literature. The proportion of the
responses to the five categories of this variable by
the entire Swedish population II sample was as follows:

Q. "About how many books are there in your
home?" (Do not count newspapers or mag-
azines). Choose one.

Response Categories	Percent Response Swedish 14-year olds
A. None	0.9
B. 1 - 10 books	2.0
C. 11 - 25 books	7.0
D. 26 - 50 books	18.3
E. 51 or more books	71.8

The distribution indicates clearly that the
response categories do not differentiate well between
the size of home libraries in Sweden. Neither do the
categories differentiate the size of home libraries in
developing nations as Thorndike (1973) points out,

though in these instances the skewness is the reverse
of that for Sweden. For this reason, the overall corr-
elation of 0.27 for the entire data set, or 0.26 for
the subsample used in this study, between size of home
library and reading comprehension should be regarded
as remarkably high. In any case, the effects of the
LITHOME variable on both reading and literature are
probably underestimated.

This conclusion underscores the relative crudity
of survey-type questionnaire data for getting at the
fine-grain effects of interpersonal environments and
social processes on school outcomes of policy inter-
est. Thus, in large-scale omnibus studies of the sur-
vey variety in which data is gathered for examining a
variety of theoretical issues and practical questions,
the effects of process factors or social environments
may be masked because of the varying strengths and dir-
ection of the environments studied. Nevertheless,
such research does permit systematic comparison of
schooling processes despite the kind of measurement
problems referred to above (cf. Bidwell, 1972: 5-6).
Neither should the fact be overlooked that in the early
stages of any kind of research work, methodological
issues are inevitably going to take a dominant role
in the discussion of substantive questions (cf. Cole-
man, 1973: 2ff.). Thus, the question is not one of
either "macro-survey" research of comparative social
systems, or "micro-ethnographic" studies of single
cases (whether the school, the school class, or the class-
room) but rather insistance upon the complementarity
and necessity of both types of research endeavour. As
survey models become more refined, the complementarity
referred to will become increasingly obvious.

(ii) Practical Implications

1. Preliminaries. Four preliminary matters
will be taken up prior to a presentation of some pract-
ical implications of the research. There are several
pitfalls not easily avoided in making practical infer-
ences on the basis of empirical enquiries such as this.
First, one has to cross disciplinary boundaries which
are logically distinct in kind -- from the descriptive
procedures of the social sciences, to the prescriptive
domain of the practical activity of education, or in the
limiting case, ethics.[27] Secondly, in making practic-
al judgments about any activity there are usually equally,
or more important inferences that can be made about
the issues in question, to be drawn from other disciplin-
ary areas. In the case of education, in addition to
sociological and psychological considerations there
are minimally the economic, historical, philosophical,
and ethical. But in the case of the education of
minority group or ethnic group children, the cultural
anthropologist may play an important role in the decis-
ion-making process; and in the case of curriculum
matters the logical considerations stemming from the
nature of the type of inquiry or discipline itself
must necessarily play a decisive role. For these reas-
ons the practical inferences to be drawn from, say,
sociological-type inquiry may be one-sided. It is
important, then, to balance these inferences against
those from other sources. And, of course, logical
considerations must necessarily supercede the psychol-
ogical in such discourse. Perhaps in this way the
bane of the social scientist -- the naturalistic fall-
acy -- can be avoided.

A second comment concerns the earlier claim
that research of this kind is less likely to suggest
radical changes in school practices, than to provide
the educator with evidence for discarding or deemphas-
izing practices which have little or no impact on the

desired outcomes of schooling. This prediction is borne out by this study, since the practical implications tend to refer to practices which in Sweden, as elsewhere, are currently in force. In other words, the study provides support for the current efforts of mother tongue literature teachers, and suggests which efforts may be the most effective.

Thirdly, the reader will have noted that the Model III variables are potentially policy manipulable by teachers at the classroom level. This is in marked contrast to the findings of many studies where key variables include background factors such as parents' education, the prestige of the father's occupation, IQ, and type of school which may account for powerful effects on scholastic performance, but which are well outside the sphere of teacher, or even school, influence. The variables in this study in contrast are all more or less policy manipulable by school authorities. Thus, the teacher can control the amount and type of home-work; can select literature which is appealing to boys on the one hand and girls on the other; can influence the pupil's word knowledge and reading comprehension performances through classroom activities; and can act as advisor on book purchases, and therefore influence the pupil's ownership of books in his home library.

This suggests, fourthly, that ubiquitous social Darwinist dogmas which continue to constrain school practices are false doctrines; that teachers can exert powerful morally desirable influences over the scholastic performance of pupils; and that, therefore, mother tongue teachers can and must individually and collectively assume responsibility for the intellectual performances of pupils from all social groups no matter how different their attributes. The presentation of the following practical implications of the research

is predicated on the assumption that teachers have with-
in their control the means for initiating the student
into the main modes of understanding characteristic
of the cultural tradition of their society -- including
the society of scholars -- and that this control is
no less possible for mother tongue literature teachers
than for more school-specific subjects.

2. The Sex and Effort Factors. One type of
specification error occurs when subgroups of respondents
within the data set have different means on one or
more variables which are correlated with achievement
outcomes, and when these differences are ignored or unused
for making necessary adjustments to the structural
equations.   In the case of the present data set there
was sufficient evidence from earlier IEA analyses that
sex differences affected achievement in outcomes on
verbal performances, and that the amount of effort as
reflected in the amount of school work performed at
home also accounted for variation in school related
achievements, that these two potentially confounding
factors could be taken into consideration and controlled
for by making appropriate statistical adjustments to
the data prior to the regression analysis.   The point
can be illustrated by reference to a hypothetical ex-
ample.

Suppose that: (1) prior performance on some school
related achievement outcome; (2) differences between
the performances of boys and girls; (3) differences
between those who practiced their school related activ-
ities at home, and those who did not practice at home;
and (4) the differences between those pupils whose teach-
ers held themselves responsible for how well their
students performed and those teachers who held themselves
less responsible, were the only factors that affected
the final achievement of pupils.   In this model the

correct mathematical equation would be:

Final achievement (Y) = prior performance (U) + sex (V) + prac-
   tice at home (W) + teacher responsibility (X)   (8)

In this instance, a model (Eq. 9) with, say, practice
at home (W) missing, would be misspecified -- that is,
would be an oversimplification of "reality" -- because
it would produce a biased estimate of teacher responsib-
ility unless practice at home were perfectly correlated
with sex and prior performance.

Final achievement (Y) = prior performance (U) + sex (V) +
        teacher responsibility (X)   (9)

This second model is misspecified because the estimated
effect of teacher responsibility (X) would equal the
actual effect of teacher responsibility plus part of the
effect of practice at home (W).   In other words, Eq.9
would give teacher responsibility credit for part of
the effect due to practice at home.   The error consists
of the bias introduced as a consequence of the failure
to specify practice at home in the second equation.
One way of handling such bias is by a linear control
on (W) within the general regression model prior to
examining the impact of the remaining effect parameters
(U, V, and X).   Another way is by adjusting the error
correlation matrix for within group mean differences
on the (W) factor through the use of a pooling procedure
described by Finn (1974), and available in the muti-
variance statistical package used in the data analysis
stage of this study (Finn, 1972).
        The latter procedure was used in the study to
remove bias introduced by both sex and effort (practice

at home). On the basis of the findings (Tables 3 and 4), it can be confidently asserted that both variables made a difference. The obvious implication for practice of the finding related to sex differences is that both 14-year old boys and girls might benefit in terms of literary understanding from exposure to different content curriculums. Such curricular differences would be based upon the different literary interests of the sex groups.

The principles of literary criticism -- that is, the procedural principles invoked in making judgments related to the aesthetic appreciation of literary forms - are analytically distinct from the content of the form. Thus, it is logically possible to initiate the pupil into the procedures of literary criticism and appreciation via an almost infinite number of meritorious works in a variety of forms -- for example, poetry, stage drama, cine-drama, the literary essay, literary criticism, the short story, the novel, and the modern folk song. Furthermore, there is no logically necessary starting point or conclusion, since "education" is hardly characterized by the sheer distance travelled but by the manner and style of the journey. This is because an education sheds light on many other things including previously darkened surfaces, thus making the journey more interesting and worthwhile.

There may be, however, psychological constraints, if not logical ones on the content of the literature curriculum. The Piagetian orders of conceptual complexity will necessarily dictate an epistemological order of understanding, in which the pupil's cognitive maturity or level of thinking will ineluctably narrow the range of possibilities. Such constraints will be as fundamental in their importance for common language pursuits, such as literary understanding, as is the

case with more school-specific subjects such as science
and mathematics. It is probably pedagogically sound
to claim, then, that the procedural principles themselves
are independent of any particular literary form.
That is, there is nothing sacrosanct in terms of under-
standing the aesthetics of literature, or getting on
the inside of the procedures of literary criticism,
about lyric poetry, or the Victorian novel, or Shakes-
pearean drama, or mother tongue literature sanctified
by tradition. Gaps in content are of less significance
than gaps in understanding of the logic of the mode of
inquiry in question.

If 14-year old boys prefer modern adventure
stories, epic poetry, and "popular" scientific essays
to romantic novels,Shakespearean sonnets, and literary
essays, there is no inherent reason why the competent
teacher cannot structure a curriculum which initiates
the pupil into the mode of literary understanding which
is based upon these preferences. This might be an
extreme example since in practice both pupils and teach-
ers are likely to make compromises -- especially when
the teacher has gained pupil trust. On the other
hand, the teacher in some situations may have to break
down a longstanding tradition of disregard and disin-
erest in literature, or apathy and indifference toward
learning how to read. In such cases it may be necess-
ary to begin teaching aesthetic understanding by appeal-
ing to nonverbal expressions in the popular culture
of interest to students. Consider, for example, the
teaching of the aesthetics of basketball, or the aes-
thetics of the folk song (modern ballads), in which
the forms -- "movement" and music -- are different,
but the procedural principles of aesthetic appreciation
essentially undistorted. In short, there is no nec-
essary compromise over the manner -- that is, underst-
anding the form -- only over the matter, which need not
be the same for pupils of different cultural backgrounds,
different interests, or different sex.

By the same token, just as effective literary
instruction toward the goal of understanding literature
is independent of content, so it is independent of any
fixed starting point, though perhaps having started, say,
with the TV cowboy movie, it may be vital to one's pur-
pose to carry on systematically to compare TV and cinema
versions; to compare TV drama and Stage drama; modern
drama and the modern novel, and so on. There would
appear to be no inherent reason why the principles of
literary appreciation conveyed by such content should
differ from those taught via more traditional works.

While it is relatively easy to recommend the
consideration of different literary curricula for boys
and girls based upon sex differences, it is less simple
to translate into practical terms the findings related to
effort; that is, the amount of homework. Two con-
clusions were drawn from Table 3. First, homework
does make a difference. Second, the relationship of
time spent to productivity (achievement in both reading
and literature) was curvilinear, such that those pupils
who spent a lot of time did no better than those who
spent little or no time.

Though one might correctly infer that the reason
for this relationship is that the length of homework
is proportional to its need, there are still unresolved
questions such as: What is the optimum homework time
per pupil? How valuable is persistence and perseverence?
What characteristics of the home environment facilitate
the replication of school environments in the home?

It is believed that children benefit scholastic-
ally from doing moderate amounts of homework per week
in all subjects; where moderate may be interpreted
at the 14-year old level to mean from one half hour
to an hour per day. Further, that children who do
little or no homework are likely penalizing themselves

in terms of their future performances, while those who
do a great deal are unlikely to receive proportial
payoffs.

Though recommendations regarding homework are
largely contingent upon further research it can be con-
fidently asserted that the current evidence supports
the desirability of pupils being able to practice school
related activities at home. Thus, there is some supp-
ort for the provision of a home opportunity structure
which replicates to some extent those activities charact-
eristic of the classroom. In the absence of a degree
of congruence between home and school environments, in
the writer's opinion it is up to the teachers to coll-
ectively take the initiative. The time parameters of
the school are manipulable and so is the curriculum con-
tent. Both can be modified without jeopardizing the
principles of educational practice. With regard to
homework three inferences are drawn:

(1) homework practice might replicate in the
home educational activities performed in school;
(2) only activities which are realistically
replicable in the homes of the pupils might be
given;
(3) homework activities should be moderately
demanding in terms of both time and effort.

The recommendations are based on the premise
that if school environments are not replicable in the
pupils' homes the onus is upon the school to change.

3. The LITHOME Factor. The measurement problems
and limitations of the LITHOME variable were discussed
above.[28]   What it is important to note for the purposes
of making practical inferences is that LITHOME or the
concept, literacy level of the home, is a proxy for
family background structures. How well a pupil performs
in literature at a particular grade level depends on

several proximate factors, but overridingly on the pup-
il's performance prior to entering the grade. In the
words of Gilbert Peaker: "What one can do today dep-
ends on what one did yesterday. But equally, what
one could do yesterday depends on what one did the day
before." In accounting for present performance in
literary understanding, the analyst wants to know as
accurately as possible what proportion of the variation
in present performance is attributable to recent learning
conditions and experiences, and what proportion is
attributable to early conditions and experiences.

This is an unsolvable problem with cross-section-
al data because the estimates for the earlier influences
have necessarily to be best estimates -- some would say,
best guesses. Since nearly all research in this problem
area has been conditioned by the Coleman studies of
equality of educational opportunity in the United States,
and by the Peaker studies of the Plowden children in
the United Kingdom, it is not surprising that most an-
alysts have followed their lead by using a set of fam-
ily background variables as the best proxies or surro-
gates for these early learning experiences. The con-
ventional wisdom is supportative of the view that ear-
ly learning experiences are likely to be more powerful
influences in accounting for current performances than
the more recent ones, which is precisely what Coleman
and Peaker found in their studies. Unfortunately,
there has been a steady refusal on the part of some
researchers to recognize the gap between the language
of theory and the language of research, with the result
that the proxies used to account for earlier learning
experiences have been interpreted rather literally to
mean that the home is a more powerful influence on schol-
astic performance than the school. In recent empir-
ical studies both analysts have expressed their dis-
agreement with such views (Coleman, 1973; Peaker, n.d.).

This misunderstanding has been compounded by the invidious comparisons that have been made between the effects of recent learning conditions attributable to within school factors and proximate teacher behaviours on the one hand, and the much greater effects that are attributable to the earlier learning conditions for which background factors and personality characteristics are proxies on the other. Thus, questions such as' do teachers make a difference? or, how effective is schooling? have been posed in recent years suggesting that teacher effects and school effects are less powerful influences than popular myth structures would have us believe.

The conclusion this author draws from these studies is that the schools are quite uniform in their impact; so much so that despite the manipulation of within school, or within class environments, the relative position of pupils viz-a-viz one another on measures of scholastic performance at the end of some period of instruction is likely to be roughly the same as it was at the beginning. Hence, the likelihood that despite an overall mean gain in performance for all pupils during the period in question, an individual's rank in relation to his peers at the time of final testing is likely to be practically the same as what it was at the beginning. However, there is no "time-one" in cross-sectional studies, only the background proxies for prior learning conditions and experiences; hence, the "high" correlations between present performance and background variables.

These insights provide the interpretive key to the LITHOME variable. The number of books in the home does not _really_ matter. For example, one could provide some children with the resources of the British Museum, or the New York Public Library, and it would

make little difference in their achievement in mother
tongue literature unless these resources were accompanied
by the changes in attitudes and abilities associated
with the presence of home libraries.   This is largely,
but not entirely, because the number of books in the
home is an indicator of the kind of earlier learning
conditions experienced by the pupil.   It is an indi-
cator in the same way that the number of church candles
purchased by Catholic families in Paris at the turn of
the last century was used by LeBon, the French sociolo-
gist, as an indicator of religious devotion; or, in the
same way that the proportion of males in the agricultural
work force has been used as an index of modernization.

        Since the number of books in the home as an in-
dex of early learning influences has an impact on both
reading and literature achievements, it is desirable
for mother tongue teachers to continue, and even renew,
their current efforts in encouraging children to utilize
public libraries, school libraries, classroom libraries
and the like. Though for elementary school children it
is especially desirable to discontinue practices which
discourage children from borrowing books and utilizing
library facilities, such as fines for overdue books,
inconvenient library hours, and drab, cheerless library
rooms; it is sometimes difficult to reconcile these with
the equally desirable requirements for pupil decorum and
the necessity for respecting the reading rights of other
pupils. Perhaps the most positive approach for younger
pupils in the first division of the school grading system
(grades Kindergarten through three) is to provide more
families with access to community resources for stimulating
the complex environments that characterize those homes
with high achieving children. The dimensions of these
cognitive, conative and affective home environments were
almost unknown a few years ago, but recent work by such

social learning theorists as Williams (1974) is proving
particularly helpful in this regard.

In the earliest grades the term library may be a
misnomer. In order to provide the complex stimuli de-
sirable for the development of cognitive abilities a new
institutional setting may be desirable where the equivalent
of a "library" or book corner might include toys, games,
and puzzles. In the division two and later grades
libraries might become distribution centers for cheap,
attractive, children s pocket books on the assumption
that ownership makes a difference in the meanings that
books have for children. Teachers might consider con-
certed action favoring the elimination of sales and/or
purchase taxes on books and other children's educational
materials. Teacher groups might also consider the possi-
bility of supporting laws for the removal of excise duties
on books where such duties are imposed. There are several
countries where book ownership is so expensive as to be
almost a prohibitive luxory for the lower or middle income
family.

All efforts designed to place more of these educa-
tional resources in the children's homes, thereby repli-
cating the school's learning environment more faithfully
in the home, seem one way of ensuring that educational
attainment level of the entire society is raised. Further
suggestions for action in these matters are contained in
the recent UNESCO publication, Books for All (n.d.).

These suggestions for increasing the congruence
of home and school environments are not particularly
supportative of the home interventionist philosophy,
whereby the school authorities interact on a more or
less sustained basis with parents.   Rather, the suggest-
ions are designed to promote opportunities for the pupil
to take greater responsibility for his own learning;
to sensitize children to the expectations and demands
of adults;   to provide encouragement and support supple-
mentary to that given by the home.   In this way the
school authorities are supportative of, not intervention-
ist in, the family institution.   The chief justification
of this approach is that a purpose of schooling is to
provide authority structures which will enable the child
to become independent of authority -- so that the intell-
ectual gap between student and teacher is progressively
bridged.   Such a purpose demands that pupils become
progressively less dependent on teachers.

    4.   <u>VERBAL and RDGCOMP Variables</u>.   Several
practical considerations stem   from the findings
that verbal ability and reading comprehension have
extremely powerful effects on achievement in literature.
Though it is obvious that inorder to understand liter-
ature one has to be able to read -- and read well -- it
is still valuable to obtain accurate estimates of the
extent and power of the dependence for different age
groups.   It is held that the basic model of literature
achievement as described in this study has to be exten-
ded, and some suggestions for model respecification
have been made.   It is also held that the research has
to be replicated on a larger scale by the various nat-
ional centers inorder to validate the findings cross-
nationally.   Nevertheless, it is confidently believed

that the basic model as presented is conceptually correct;
and that therefore the practical implications have to
be faced by curriculum theorists.

Consider the following.

1. Because a high degree of association is noted
between two or more variables does not necessarily
imply that the manipulation of one will have effects
on the others. Perhaps the most important requirement
as far as future research is concerned is the experim-
ental testing of the efficacy of the development of
word knowledge and reading comprehension skills to be
able to evaluate more accurately their effects on lit-
erature achievement.

2. If it is desirable to change prevailing
practices inorder to achieve some desirable outcome,
some estimate of the degree of societal effort required
to implement   the change is minimally necessary.
This is because the extent to which change is possible
is determined by the costs in effort involved.   The
changes necessary to reemphasize word knowledge skills
and reading comprehension at the 14-year old age level
are probably minimal.   The manpower required to initiate
change -- mother tongue teachers --constitute a highly
educated and dedicated corps of teachers capable of
developing and implementing a range of appropriate
teaching strategies.

3. The direct effect of verbal ability on read-
ing comprehension and its indirect effect via reading
on literature suggests an increased emphasis on word
building skills in the secondary school as well as at
more elementary levels.   Approaches would vary at diff-
erent grade and ability levels, but the present evidence
points to considerable payoffs in literature understand-
ing for systemmatic perseverence in the promotion of
verbal abilities

4. Consider at the senior grade levels the introduction of courses in common language (linguistic) analysis inorder to provide more senior students prior to school graduation with some sensitivity to the problems of conceptual analysis.

5. Consider at the lower secondary school levels the introduction of regular instruction designed to strengthen the vocabularies of students. In this regard, and bearing in mind the interests and attitudes of pupils, consider the introduction of word games and word puzzles, along with opportunities for students to exercise verbal skills in settings less artificial than the classroom; for example, the deserted stage, the empty pulpit, the TV or radio studio, the debating chamber, and the like.

6. The role model for the mother tongue teacher -- for many, the university scholar -- need not be the most appropriate model for the literature teacher who has a less specialized role to perform. Literature teachers have to be teachers of reading skills also, though at the senior school grades may be lacking suitable preparation. Thus,despite the tendency for university-type curricula to filter down into the school grades there may be still advantages as far as gains in literature are concerned in teaching such skills as: the paraphrase, the précis, the abstract, and the report.

7. Consider the value of providing the resources in teacher training institutions for the training of teachers of developmental reading at the secondary school level.

8. Consider the teaching of media skills which demand the active verbal participation of pupils; for example, script writing for the TV drama and the documentary movie, radio announcing, class newspaper production and the like.

6. CONCLUSIONS

1. The use of linear causal model building procedures is likely to become more common in curriculum research. Three stages in the model building process were illustrated in this research: (1) A conceptual stage at a high level of abstraction in which the major effect parameters are described, and the most important contrasts between effects delineated. At this stage some fundamental model building principles were presented which may be used to guide model development. (2) The main theory building stage is concerned with the more detailed presentation of the fully specified conceptual model. The network of causal relationships is described and the causal flow justified by reference to the theoretical literature. (3) In the auxiliary theory stage the fully specified conceptual model is operationalized and the research hypotheses generated from the main theory propositions. It is at this stage that the data is described in detail.

The development of causal models and the formulation of causal model building principles and strategies is of more recent origin in North America and Western Europe than in the Soviet Union and Eastern Europe though some exceptions to this generalization may exist(e.g., Ogburn's early work in multiple regression mo' ls). In these latter countries the formulation of predictive and/or explanatory models of social behavior -- especially economic behavior -- was stimulated by the writings of Lenin and his emphasis on economic planning implemented by the first series of plans in the 1920's. The research, indispensible to the preparation of a scientific base for economic planning, became known later as social-economic prognostication. Especially in the English-speaking countries, the equivalent research would be largely of the prediction model

variety.   In the Soviet Union as in the United States,
economic prognostication or economic growth modeling
is more advanced methodologically than in other socio-
economic disciplines, and the application of such res-
earch in the economic planning sphere more common than
in such areas as health systems, public education and
aspects of urbanization (Bestuzhev-Lada, 1969: 302).

Though the purpose of the present research has
been explanatory, not predictive, the logic of the anal-
ysis is essentially the same as that of the social-
economic prognostication models used in the USSR.
There are probably two major differences between the
otherwise quite compatible research procedures.   Though
in both systems the taxonomy or initial conceptual
framework is nonempirical (in our case the resource
input framework), consisting of untestable ideologies,
the ideologies are divergent in fundamental ways.
Thus, macro-models may be more likely to play more
prominent roles in Soviet-style predictive systems,
and micro-models in American-style models.   Secondly,
computer software packages seem to be more accessible
to US researchers in the social sciences other than
economics, than to their Russian counterparts.   Perhaps,
surprisingly, the problems currently under examination
tend to be very similar.

2.   Only hypotheses 4, 8, and 9 (out of ten)
remained unscathed as a result of the analysis.   This
is because the reading rate and literature attitude
variables played some role in all the remaining hypothesized
relationships.   The reasons for the lack of support
for the popular misconceptions about reading rate and
reading comprehension were presented above (section
5, i, 1).   Clearly, rates vary according to the read-
ing purpose and the type of material;   and unless these

components are considered, an arbitrary measure of reading speed as used in Model I is probably meaningless. Thus, speed is an integral subcomponent of comprehension and fluency.

The decision to remove the variable from the causal system was justified on these grounds. In this way it was shown that the new myth that speed improves comprehension is as unacceptable as the old one that slow, careful readers were the best readers. Both myths may or may not be correct, of course, depending upon the reading purpose, type of material, and possibly other factors. Teachers encouraging careful, close reading of a passage, or fast reading, ought to be cognizant of the fact that the rate to be attained depends minimally on these two conditions.

There is a simple solution as far as theory modification is concerned. Since reading rate is already built into the reading comprehension variable, all reference to it in the specification of effects (4, iii) should be dropped. Model I was, therefore, misspecified because the variable reading speed had mistakenly been included in the model.

The modifications to the theoretical model in terms of specifying the form of the effect parameters in so far as attitudes to literature are concerned is largely dependent on future research. On the basis of current findings, it is believed that the model is missecified because an absolute measure of attitude to literature ignores the possibility that attitudes may be characteristically situation-specific. The extent to which this hypothesized possibility is correct is unknown at the moment, but the models represented by Eqs. 6 and 7 (both testable with data already in the IEA data archive) are respecifications of the functional form of the model to counter the possible error.

2. In addition to further research which incorporates the functional forms represented by Eqs. 6 and 7, there are additional possibilities. One of these involves adding further variables to the data set. Consider, for example, a variable such as "level of thinking" in the Piagetian sense, which might be incorporated prior to attitude, but following reading comprehension in Model II. Work presently underway in the Institute for the Study of International Problems in Education, University of Stockholm, by Kurt Bergling, has resulted in the Guttman scale construction of such a measure from variables in the IEA data set. Then the model would help determine the relative effects of environmental factors on mental development as well as the dependence of scholastic performances of various kinds at different age levels on the stage of thinking achieved.

A second research possibility is the one mentioned earlier (section 5, i, 2, and footnote 9) regarding the existence of reciprocal effects between attitudes and scholastic performance. Yet a third possibility is the formulation of a model which would examine the relative dependence of more than one achievement criteria on the cultural and personality resources of individuals; for example, one in which the relative effects of, say, Model II predictors in Eq. 6 form were compared for two achievement outcomes -- one school-specific, say, science achievement; one less so, say, achievement in literature -- as in Eq. 10.

$$\underline{Y}_{ij} - \overline{Y}_{i.} = A_o + \underline{B}'\underline{X}_{ij} + B_z(Z_{ij} - \overline{Z}_{i.}) + E_{ij} \qquad (10)$$

Eq. 10 would identify the degree of school specificity of science in relation to literature.

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Footnotes

1.   In sociology, the monograph by Blalock (1964),
and the papers by Boudon (1965) and Duncan (1966)
which soon followed, set the stage.   Important con-
tributions have subsequently been made by Blalock's
colleagues and students formerly at the University of
North Carolina, and by Duncan's students formerly
at the University of Michigan.   Research in applied
sociology from several centers soon followed.   The
pioneering work by Sewell and his colleagues at the
University of Wisconsin is noteworthy.   More recently
the Jencks team at Harvard University have demonstrated
the analytical power of causal modelling approaches
in a series of monographs and papers.   But these
are only two among a score of possible examples, and
are mentioned because their applications have been
in the educational sphere.

     Since the publication of the theoretical papers
referred to, several collections of papers in causal
modelling have appeared.   Those by Blalock and Blalock
(1968), Borgatta and Bohrnstedt (1969), Blalock (1971),
Goldberger and Duncan (1973) are of major importance.
The collections deal with the numerous extensions,
refinements, and modifications to the basic technique
as well as with some of the important issues, theoret-
ical and substantive, that have inevitably arisen.
The pace of these developments has been so rapid that
there is as yet no general text available for the stu-
dent.   It is noteworthy in this writer's opinion
that despite the pace of the numerous developments,
the quality of the basic research work being done is
with but few exceptions uniformly high.   Kerlinger
and Pedhazur (1973) present an uncomplicated introduct-
ion to path analysis within the context of the general

Footnotes cont'd.

regression model, and this work is recommended until
researchers slow down inorder to evaluate and synthe-
size more specialized work in the field.

2.   The notion cf a paradigm-shift is Kuhnian, and
refers to that complex of metaphysics, action theory,
and msthodology which forms the coherent background
to the science of a particular time period, and which
is usually given concrete expression in archetypal
scientific work; for example Einstein's"general theory
of relativity", or (perhaps) Hull's "principles of
behavior". A paradigm-shift, then, is explicable in
terms of a transition from one paradigm "the Old",
to another, "the New". Since the advent of New Para-
digms is inevitably accompanied by debate concerning
their legitimacy (Kuhn 1967: 47-49), one may tend to
infer too much from the current debate between conflict-
ing schools of thought in, say, sociology.

        Nevertheless, there is some evidence that the
kind of critical debate Kuhn refers to exists in con-
temporaneous social science (for example, Winch, 1958;
Gouldner, 1970). Gouldner's view, to take a single
example is worked out (paradoxically) in the polemics
of a so-called "activist" sociology. Rather quixo-
tically he urges the trolls of the quantitative ("new")
methodology to return to sociological matters in the
manner of individual scholarship.

        If historians of science subsequently verify
the innovative trends in model building in the social
sciences, which are currently conditioning scientific
thought, as components of a paradigm shift, then there
would seem to be a case for comparing the pioneering
work of the British statistician R.A.Fisher -- inventor
of the covariance model -- viz-a-viz the social and

Footnotes cont'd.

biomedical sciences with that of fellow-countryman
Isaac Newton viz-a-viz the physical sciences and eng-
ineering.

3.   The International Association for the Evaluation
of Educational Achievement (IEA) is an autonomous,
non-profit, non-governmental research organization.
Its central staff, who coordinate IEA-related research
activities at the national centers located in partic-
ipating countries, are located at the University of
Stockholm.   Its research activities span almost a
decade and have covered the core curricular areas of
most national educational systems;   namely, mathematics,
science, reading comprehension, literature, civic
education, English as a foreign language, and French
as a foreign language.   From eight to nineteen coun-
tries -- twenty-one in all -- participated in each
subject by testing at one or more of three age levels:
10-year olds (Population I), 14-year olds (PopulationII),
and those students in the last year of secondary school
(Population IV).   Major monographs include: Husén,
vols. 1 and 2 (1967);   Comber and Keeves (1973);
Purves (1973);   Thorndike (1973).   A series of mono-
graphs dealing with aspects of the stage 3 surveys
in civic education, English and French as foreign
languages, are in press: Farnen, Marklund, Oppenheim,
and Torney (forthcoming): Lewis and Massad (forthcom-
ing); Carroll (forthcoming).   A monograph comparing
national educational systems in the IEA countries, a
technical report, and a summary report are also in
press: Passow, Noah, Eckstein (forthcoming);   Peaker
(forthcoming); and Walker (forthcoming).

Footnotes cont'd.

4.   Schooling conceived as a process of resource
conversion or modification is a relatively new idea
which may not have gained much common currency.   It
is based upon the notion that in interpersonal inter-
action settings it is the transactions or exchanges
that take place between actors that account for much
behaviour.   By school resources we are referring to
all within-school factors which constitu. assets or
liabilities in generating those outcomes . ' behaviors
of interest, such as scholastic achievements, attitud-
es of respect for one's fellow man, consideration of
the intere ts of others, ability to assume responsib-
ility and act rationally, and so on.   Assets are
those resources which are convertible into new resour-
ces.   As means to ethical ends they constitute cap-
ital resources.   Students who come to school with a
readiness to learn, with a prior interest in selected
school subjects, ready to assume responsibility for
their own learning, and with a determination to pursue
goals congruent with those constituting the aims of
schooling, already possess personal resources which
will be readily convertible by the application of
within-school resources (conversicn mechanisms) into
achievement outcomes and desired value commitments.
The school's conversion mechanisms include class ex-
ercises and drill, homework and study assignments,
and such obvious factors as the length of the school day,
the number of contact hours in the school year, the
intensity and frequency of the interpersonal contact
between teacher and student, knowledgeable teachers
and the extent of their responsibility for the learn-
ing of the pupils.   It is hypothesized that these
conversion mechanisms coalesce to form relatively in-
dependent (orthogonal) learning dimensions such as:

Footnotes cont'd.

reward structures, opportunity to learn structures,
expectations dimensions, and role model dimensions.
An additional school resource of great potency is the
peer group subculture, and the extent to which it is
at odds with or congruent with the formal value frame-
work of the school.

Liabilities are negative assets -- those person-
ality attributes or within-school resources that impede
resource conversion. Since even in the most equalit-
arian systems some school resources are likely to be
extremely scarce, they are impossible to distribute
equally. Thus, criteria have to be used on the basis
of which unequal resource distribution is justified.
On the whole there is a tendency for those students
who do better to receive different treatment; thus,
students who have done well in the past are likely to
be treated differently in the future -- a process of
double advantage since the different treatment will
likely enable them to do better in the future.

5. In general, the following terms, all referring
to outcome variables of primary interest are used
synonymously in the literature: dependent variable,
criterion or criterion measure, outcome, regressand,
and output variable. By the same token, a variety of
terms are used synonymously to refer to the indepen-
dent variables: predictors or predictor variables,
explanatory variables, factors, independent variables,
regressor variables. In this paper, conceptual model
nodules are usually referred to as components, while the
path r dules t the main and auxiliary theory levels
are referred to as independent variables or predictors.

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6.   Finney (1972) and Charner and Cohen (1973) draw
attention to some exceptions to this formula in the
four or more variable model; where the total effect
equals direct effect, plus indirect causal effect, plus
noncausal indirect effect, plus spurious component,
when the model is fully identified and an intervening
variable is present.   Charner and Cohen recommend that
under these conditions analysts refer to total causal
effects which are composed of direct effects and the
indirect causal effect.   When there are no intervening
variables the total effect equals the direct effect
plus a spurious component.

7.   The four rules are not inviolate.   Rather, their
importance stems from the fact that if the analyst with
intention breaks one, he ought to hold himself account-
able.   That is, in those instances where rule violation
is deemed necessary in the context of the particular
enquiry, it is incumbent on the researcher to justify
his action by pointing out its consequences, and where
possible drawing attention to compensatory practices.

8.   Despite close reading of the extant literature on
the relationship between reading rate and reading com-
prehension, there seems to be little or no consensus
on the functional form of the relationship.   One can
infer from popular accounts, as stated above, that com-
prehension is dependent on rate.   More informed accounts
draw attention to the complexity of the relationship
which is governed by a number of conditioning factors.
Consider, for example, the possibility of interaction
or multiplicative effects as depicted in Figure 3a.

Footnotes cont'd

Figure 3a about here

Figure 3a does not incorporate the possibility of
nonlinear interaction, but is still based on the assump-
ion that rate precedes comprehension.   Some leading
authorities suggest that the relationship is functional
rather than causal, though seldom explicitly.   For
example, Harris (1970: 484) suggests a kind of functional reci-
procity or interdependence.

> As the pupil learns through experience the degree
> of accuracy that is necessary in different kinds
> of reading, he will develop ability to adjust
> his rate to the requirements of his task.
> When comprehension is satisfactory but rate is
> below normal, the remedial teacher can concen-
> trate his energies directly on the problem of
> increasing speed.   This is the easiest of all
> remedial problems and one in which considerable
> improvement can be expected in most cases.

Harris' formulation would seem to support the notion
of a degree of functional independence between rate
and comprehension, and the desirability of maintaining
the interdependence at some normatively acceptable (op-
timum) level.   Since such relationships are captured
by nonrecursive or reciprocal path models, the possib-
ilities are depicted in Figure 3b.

Figure 3b about here

Neither Figure 3a nor 3b are tested here.   Data
is not available in the IEA data archive to examine such
relationships as those hypothesized in Figure 3a;   and
Figure 3b is not tested because the reading speed var-
iable was eventually eliminated from the revised form of
the model.   The reasons and implications of this decis-
ion are discussed below.

Footnotes cont'd

9.   The reciprocal relationship between attitudes
and achievements (that is, Kahn and Weiss' functional
rather than causal relationship) is captured by a
hypothetical model depicting a feedback loop as in
Figure 4.

<u>**Figure 4 about here**</u>

₄

10.   The word knowledge test directions read as
follows:

        In this test words are given to you in pairs.
In each pair, the two words have something in common.
You must decide whether the words mean nearly the
<u>same</u> thing, or nearly the <u>opposite</u> thing, with res-
pect to what they have in common.

        If you think the words have the same meaning,
blacken in the oval marked "+" on your answer card.

        If you think the words have opposite meaning,
blacken in the oval marked "O" on your answer card.

        Here is an example:

high   low   ⊕   ⓞ

        The two words "high" and "low" both refer to
height.   However, they are nearly opposite in mean-
ing.   Therefore you should blacken in the oval marked
"O" on your answer card.

        For each of the following pairs blacken in
either "+" or the "O".   You should attempt every
item for which you think you know the answer, but
do not guess if you have no idea of the answer.

1.   savory   insipid   ⊕   ⓞ

2.   informed   unaware   ⊕   ⓞ

3.   precarious   stable   ⊕   ⓞ
.   .   .
.
40.   obvious   indisputable   ⊕   ⓞ

Footnotes cont'd

11.   The item was number 55 on the student questionn-
aire, and read as follows:

>About how many books are there in your home?
>
>(Do not count newspapers or magazines)
>
>Indicate one.

>A. none   B. 1 - 10   C. 11 - 25
>
>D. 26 - 50   E. 51 or more

12.   The directions for the reading speed test were
as follows:

>Here is a story.   The story has many little
>parts.   When you come to the end of a part there
>will be three words like this:

>one   two   three

>Put a line under the word that fits the story.
>For this test you <u>underline</u> the words <u>in the booklet</u>.

>Read as fast as you can, and see how many
>parts of the story you can read and <u>underline</u> in
>the time that you have.
>
>Remember -- read as fast as you can, but be
>sure to mark the right word after each part of the
>story.

>Do not use an eraser.   If you change your
>mind, cross out your first answer and then put a
>line under your second choice.

>1.   Peter has a little dog.   The dog is black with
>a white spot on his back and one white leg.   The
>color of Peter's dog is mostly

>black   brown   gray

>2.   When Peter got the dog it was a small puppy.
>Now the dog is a little more than two years old.
>How many years has Peter had the dog?

>one   two   three

Footnotes cont'd

13.   The following excerpt is from the reading com-
prehension test.

        If you were to begin to enumerate the various uses
of paper, you would find the list almost without end. Yet,
there was a time when this familiar item was a precious
rarity, when the sheet of paper you now toss into the waste-
basket without thinking would have been purchased at a great
price and carefully preserved. Indeed, for long centuries
in man's history, paper was unknown. People wrote on spe-
cially prepared sheepskins or goatskins called parchment.

        About twenty-two hundred years ago, the Chinese
people discovered how to manufacture paper from wood pulp.
Later the secret reached Europe. But for many years, the
whole operation was done by hand. Imagine making paper by
hand, sheet by sheet! It was a reasonably simple process,
but it is easy to see why paper was used only by the wealthy.

        The first machine for making paper was invented by
a Frenchman named Louis Robert. It was a crude machine by
today's standards. Many European and American inventors
have since contributed to the development of the more efficient
papermaking machines now in use. In our time, paper is used
throughout the world.

21.   A long time ago people used parchment to write on because
      A.   parchment lasted a long time.
      B.   paper was unknown.
      C.   paper tore too easily.
      D.   parchment could be prepared easily.

22.   The process of making paper was first discovered by
      A.   an American.
      B.   the French.
      C.   the Chinese.
      D.   Louis Robert.

23.   Why was the process of making paper by hand unsatisfactory?
      A.   It was too complicated.
      B.   The paper was of poor quality.
      C.   It was too slow.
      D.   It was a secret.

24.   We may conclude that, after Robert's invention, paper
      became
      A.   cheaper.
      B.   more valuable.
      C.   stronger.
      D.   rarer.

25. The main point that is being brought out by the first
    paragraph of this story is that
    A. it is only recently that paper has been widely
       available.
    B. for some uses parchment is better than paper.
    C. one can invent many different uses for paper.
    D. one should not throw paper in the waste basket.

26. The person who wrote this story was trying to
    A. amuse us.
    B. help us to learn something new.
    C. change how we feel about something.
    D. write something very pretty.

14.   The liking for literature variable was based on

an item on the student questionnaire which read as follows:

       Listed below are a number of subjects studied in
school. Indicate for each subject listed either that you
have never studied it. or, if you have or are doing so
now, the extent to which you like or dislike it.

       Literature

       A. Have never studied this subject

       B. One of my favorite subjects

       C. Have generally liked this subject

       D. Have generally disliked this subject

       E. One of the subjects I have liked least in school

15.   The reading for pleasure variable was item 56 on

the student questionnaire and read as follows:

       About how many hours did you spend reading, just
for your own pleasure, during last week (excluding comics)?
Indicate one.

       A. 0 hours

       B. Less than or equal to 1 hour

       C. Greater than 1 hour but less than or equal
           to 2 hours

       D. Greater than 2 hours but less than or equal
           to 3 hours

       E. Greater than 3 hours

Footnotes cont'd

16.   There were 36 items on the two tests. These
items included the subtests, literature comprehension
and literature interpretation. The test used in the
models analyzed in the paper was the total test con-
sisting of the combined subtests. The correction for
guessing formula was $C = r - W/k - 1$; where C is the
corrected score, r the raw score, W the number of wrong
items, and k the number of alternative answers (4 in
each item).

        The directions to each test were as follows:

        On the next pages there is a short story. Read
the story carefully and thoughtfully before going on
to the questions about it.

        Read the questions carefully and answer them as
thoroughly and honestly as you can. The questions are
preceded by instructions which you should follow. All
your answers should be made on your answer card. You
will not need any other paper on which to write.

        If you have any questions ask your teacher.

        The following excerpt is from the Achievement in
literature test.

32.   Which of the following best summarizes Mrs. O'Brian's
      attitude towards Mr. Ramirez in the early part of the
      story - up to line 81?

      A.   She had grown to love him and think of him as a
           part of her family.
      B.   She liked him as a tenant but did not have any
           strong feelings about him one way or another.
      C.   She did not like him because he was a foreigner.
      D.   She liked him but was afraid he might quarrel
           with her sons.

33.   Which of the following comes nearest to what the writer
      thought of Mr. Ramirez?

      A.   A foreigner who should try to keep the laws of the
           country.
      B.   The unfortunate victim of official restrictions.
      C.   A well-behaved tenant for Mrs. O'Brian whom she
           would find hard to replace.
      D.   A simple-minded man who would in the long run be
           happier in his own country.

Footnotes cont'd

34. Who made the "soft knock" (line 1)?

    A. Mr. Ramirez.
    B. Mrs. O'Brian.
    C. The policeman.
    D. Mrs. O'Brian's son.

35. Which of the following best summarizes the sort
    of man Mr. Ramirez is?

    A. Nervous and crafty.
    B. Ambitious and industrious.
    C. Sociable and popular.
    D. Shy and gentle.

36. What is Mrs. O'Brian's first reaction to Mr. Ramirez's
    saying "I see you never"?

    A. She cries.
    B. She says good-bye.
    C. She sits down.
    D. None of the above.

37. In the context of the story as a whole, what is the
    significance of the last paragraph (lines 105 and 106)?

    A. It shows that Mrs. O'Brian found Mr. Ramirez's
       English hard to understand.
    B. It shows that Mrs. O'Brian finally understood what
       Mr. Ramirez's departure meant.
    C. It shows that Mrs. O'Brian hoped Mr. Ramirez would
       come back to her house again.
    D. It shows that Mrs. O'Brian had been so frightened
       by the police that she could do nothing.

17.   The question -- number 41 on the student questionnaire --
read as follows:

       Sex (Indicate one)

           A. Boy

           B. Girl

Footnotes cont'd

18.   The question -- number 45 on the student quest-
ionnaire -- read as follows:

        About how many hours of homework for all sub-
jects do you do each week?   (Indicate one)

        A. None, and/or less than or equal to two

        B. Greater than two but less than or equal to five

        C. Greater than five but less than or equal
            to ten

        D. Greater than ten but less than or equal to
            twenty

        E. Greater than twenty

19.   See above, pp. 14 - 20.

20.   See above, p. 15.

21.   Sarane S. Boocock has written a recent review
of the literature on sex differences and school ach-
ievement (1972: chap. 5).   Sex differences across
countries are remarkably consistent according to the
findings of IEA research.   See, for example, the
relevant sections of the following IEA monographs:
on mathematics (Husén, 1967: 233 - 250); on science
(Comber and Keeves, 1973: 256-267, 291-292, and esp.
Tables 9.3, 9.4); on literature (Purves, 1973: 159-
168, and esp. Table 6.1).   Areas of sexual specialty
seem to be as follows: boys outperform girls in
mathematics and science; whereas the reverse is
true in those subjects requiring verbal ability such
as mother tongue literature but not to the same extent
in reading comprehension,

        Though descriptions of sex differences are avail-
able, there is a singular lack of explanation except

Footnotes cont'd

for socio-cultural explanations (e.g., Simon and
Gagnon, 1969). But such explanations do no come to
grips with the cross cultural finding that sex differ-
er..ces are remarkably stable across cultural settings
and social groupings exhibiting considerable variation
in socializing practices. The point is illustrated
by examining Table 6.1 in the Purves monograph (1973).
Differential aptitudes with possible genetic bases,
or differential rates of neurological maturation
are seemingly never considered. It is agreed that
socialization theory is the single most profitable
expository source on this question, but possibly
not the only source, as the incongruencies in the data
would suggest.

22. This coefficient was obtained from the bivariate
printout in the data files at IEA International,
University of Stockholm.

23. Where subgroups of respondents in complex data
sets have different subgroup means on criterion meas-
ures, it is important to note that unless adjustments
are made the common Pearson product-moment correlat-
ions will not be correct (Finn, in press). The
errors can be corrected if the data is adjusted for
the separate subgroup means, thereby giving within-
group variances, covariances, and correlations which
are the same as those computed for the total sample.
Since the Finn multivariate program possesses this
feature it was used in calculating the common within-
groups matrix as the basis for the subsequent regr-
ession analyses (Finn, 1972). In this way, the bias
which would have been present had the subgroup structure

Footnotes cont'd

based on sex and effort been ignored, was removed
by pooling the within-groups measures.

24.   Reference to the overall finding for sex differ-
ences in reading comprehension is made by Thorndike
(1973a: 78); and in literature achievement by Purves
(1973. Tables 6:1 and 6:5).

26. Cf. pp. 16-17, and especially footnote 8 and
Figure 3a.

27.   On this point see Hirst (1966).

28.   See pp. 24-27.

TABLE 1

CORRELATION MATRIX OF MODEL I VARIABLES*

VARIABLE	X_1	X_2	X_3	X_4	X_{5a}	X_{5b}	X_6	BOYS (N=50) $\bar{X}$	SD	GIRLS (N=69) $\bar{X}$	SD
X_1 VERBAL								16.04	8.61	15.53	8.81
X_2 LITHOME	.051							4.42	1.07	4.76	0.49
X_3 RDGRATE	.085	.286						35.88	5.55	36.04	4.74
X_4 RDGCOMP	.591	.256	.179					26.20	11.21	28.67	9.88
X_{5a} ATTIT 1	.05	-0.000	-0.072	.135				3.14	1.43	3.68	1.34
X_{5b} ATTIT 2	-0.20	-0.124	-0.016	-0.207	-0.308			9.28	8.67	3.17	7.50
X_6 LITACH	.43	.350	.190	.678	.126	-0.115		15.61	7.98	18.89	7.07

* After adjustment for within group sex differences

Where: X_1 VERBAL = Verbal ability

X_2 LITHOME = Number of books in home

X_3 RDGRATE = Reading speed

X_4 RDGCOMP = Reading comprehension

X_{5a} ATTIT 1 = Hours spent reading for pleasure per week

X_{5b} ATTIT 2 = Literary interest

X_6 LITACH = Achievement in literature

TABLE 2

MULTIVARIATE REGRESSION ANALYSIS OF READING COMPREHENSION AND ACHIEVEMENT IN LITERATURE REGRESSED ON SIX PREDICTOR VARIABLES§

IN-DEPENDENT VARIABLES	UNSTANDARDIZED REGRESSION COEFFICIENTS		STANDARDIZED BETAS		STANDARD ERROR OF REGRESSION		STEP	MULTI-VARIATE F-RATIO	p*	% ADDITIONAL VARIANCE EXPLAINED	
	RDGCOMP	LITACH	RDGCOMP	LITACH	RDGCOMP	LITACH				RDGCOMP	LITACH
X_1 VERBAL	0.661	0.344	0.551	0.402	0.088	0.068	1	31.073	0.0001	34.901	18.627
X_2 LITHOME	2.937	3.180	0.221	0.335	1.015	0.788	2	9.273	0.0002	5.129	10.800
X_3 RDGRATE	0.195	0.133	0.095	0.090	0.135	0.121	3	0.508	ns	0.463	0.409
X_4 HRSHWK	-1.544	-1.646	-0.121	-0.126	0.947	0.736	4	1.327	ns	1.150	1.119
X_5 ATTIT 1	0.876	0.760	0.116	0.141	0.575	0.447	5	1.167	ns	1.590	1.761
X_6 ATTIT 2	-0.038	0.051	-0.029	0.055	0.101	0.079					

RDGCOMP

MULTR 0.658

COEFFICIENT OF DETERMINATION ($100R^2$) . . . 43.23

LITACH

MULTR 0.572

COEFFICIENT OF DETERMINATION ($100R^2$) . . . 32.72

§ After adjusting for within group sex differences

* ns = not significant at the .01 level

TABLE 3

OBSERVED CELL MEANS AND STANDARD DEVIATIONS

FOR MODELS II AND III

SEX	HRSIIWK	VERBAL		LITHOME		RDGCOMP		ATTIT 1		LITACH		CELL
		$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	N
MALE	1	13.41	7.21	4.00	1.51	24.32	10.01	2.67	1.5%	14.45	8.06	15
	2	19.69	8.61	4.50	0.86	29.98	10.90	3.23	1.27	17.35	8.06	26
	3	11.43	5.50	4.86	0.38	20.96	5.48	3.43	1.72	13.50	7.01	7
	4	6.00	0.0	5.00	0.0	-5.20	0.0	4.00	0.0	2.90	0.0	1
	5	3.00	0.0	5.0	0.0	24.00	0.0	5.0	0.0	15.60	0.0	1
FEMALE	1	15.14	7.58	4.64	0.63	26.14	11.61	4.0	1.24	17.56	7.28	14
	2	15.82	8.48	4.82	0.48	30.97	8.46	3.61	1.55	20.51	6.3C	28
	3	15.80	8.95	4.76	0.44	28.42	9.50	3.52	1.19	18.29	7.23	25
	4	10.55	24.68	5.00	0.0	17.30	16.97	4.50	0.71	12.70	14.14	2
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0

TABLE 4

REGRESSION COEFFICIENTS IN STANDARD FORM SHOWING THE INFLUENCE ON
ACHIEVEMENT IN LITERATURE IN MODEL II AFTER INTRODUCING EFFORT AS A
SECOND DESIGN FACTOR§

DESIGN FACTOR(S)	DEPENDENT VARIABLE	STANDARDIZED COEFFICIENTS				R^2	RESIDUAL
		VERBAL	LITHOME	RDGCOMP	ATTIT 1		
Sex only	RDGCOMP	0.579	0.227			.400	.775
Sex & Effort		0.548	0.273			.393	.781
Sex only	ATTIT 1	-0.052*	-0.043*	0.177		.021	.989
Sex & Effort		-0.065*	-0.121*	0.216**		.050	.975
Sex only	LITACH	0.081*	0.199	0.573	0.045*	.499	.707
Sex & Effort		0.093*	0.216	0.519	0.058*	.465	.728

§ Unless otherwise stated all relationships are significant at the .01
  level or less.
* Not significant at the .05 or .01 levels.
** Significant at the .05 level only.

TABLE 5

REGRESSION COEFFICIENTS FOR MODEL III: ACHIEVEMENT IN LITERATURE

INDEPENDENT VARIABLES	DEPENDENT VARIABLES					
	READING COMPREHENSION			LITERATURE ACHIEVEMENT		
	RAW COEFFICIENT	STANDARD ERROR	PATH COEFFICIENT	RAW COEFFICIENT	STANDARD ERROR	PATH COEFFICIENT
X_1 VERBAL	.634	.087	.548	.078*	.075	.090
X_2 LITHOME	3.437	.947	?73	1.99	.713	.210
X_3 RDGCOMP				.401	.068	.534

<u>RDGCOMP</u>

Squared Multiple Correlation (R^2) 0.393

Residual, $\sqrt{1-R^2}$ 0.779

<u>LITACH</u>

Squared Multiple Correlation (R^2) 0.462

Residual, $1-R^2$ 0.733

* not significant at .01 level.

FIGURE 1

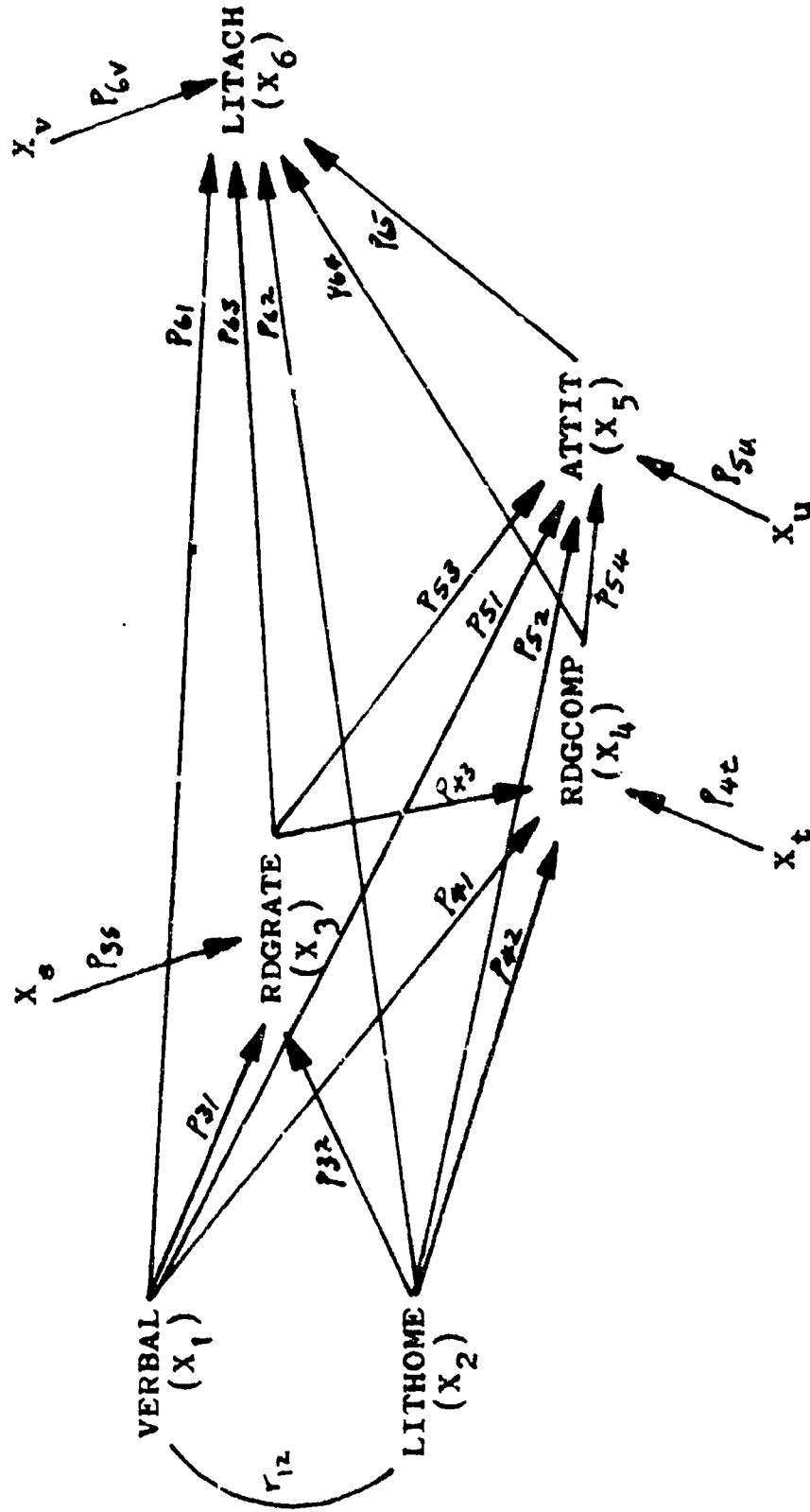A SCHOOL RESOURCE MODEL OF

ACHIEVEMENT IN LITERATURE
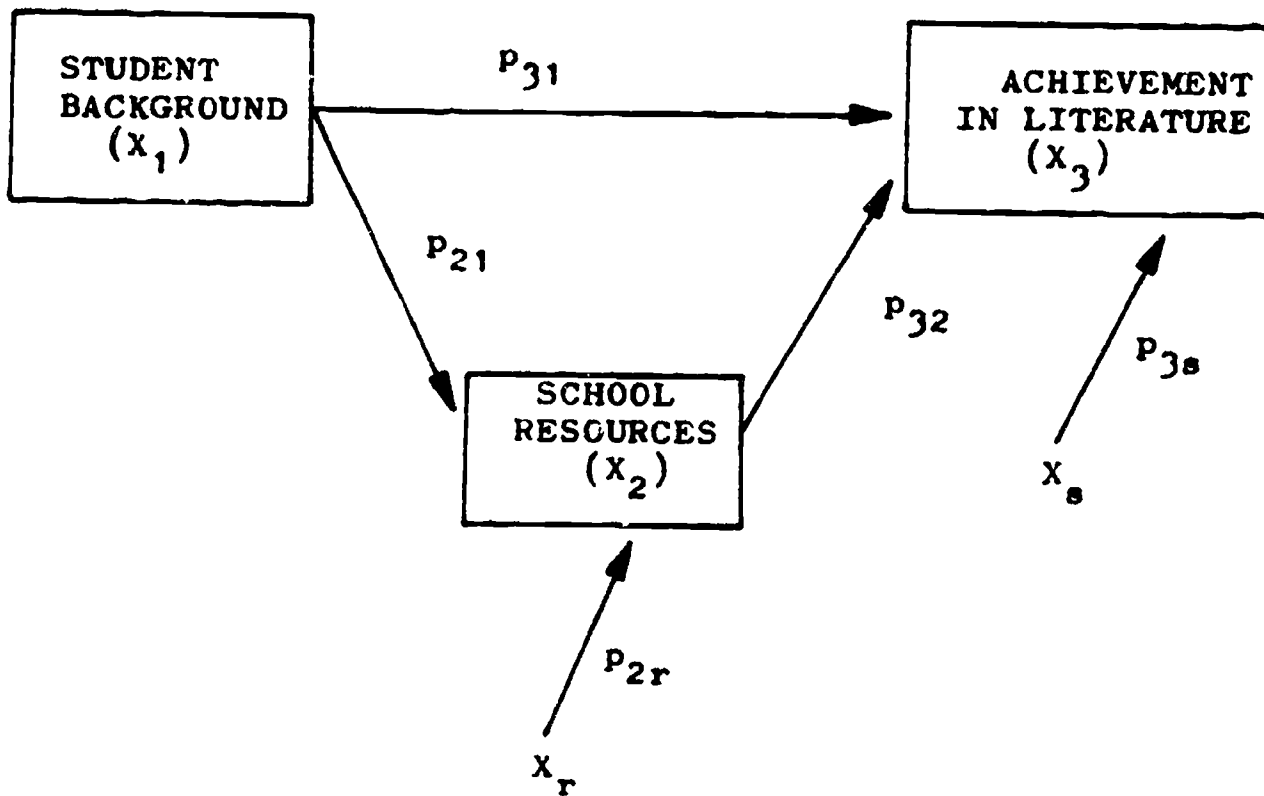
Path equations:

$$X_2 = P_{21}X_1 + P_{2r}X_r$$

$$X_3 = P_{32}X_2 + P_{31}X_1 + P_{3s}X_s$$

FIGURE 2

MODEL 1. THE ACHIEVEMENT PROCESS IN LITERATURE

LITACH (X_6)

X_v P_{6v}

P_{61} P_{63} P_{62} P_{65} P_{64}

ATTIT (X_5)

P_{54} X_u

P_{53} P_{51} P_{52} P_{54}

RDGCOMP (X_4)

P_{43} X_t P_{4t}

P_{41} P_{42}

RDGRATE (X_3)

X_s P_{3s}

P_{31} P_{32}

VERBAL (X_1)

LITHOME (X_2)

r_{12}

Where: X_1 = verbal ability; X_2 = literacy level of home; X_3 = reading rate;

X_4 = reading comprehension; X_5 = attitude toward literature;

X_6 = achievement in literature; X_s, X_t, X_u, X_v = residual terms $\sqrt{1 - R^2}$,

where R is the multiple correlation coefficient; and P_{ij} = the causal

paths, where i = the number of the dependent variable, and j = the

nuber of the independent variable.

FIGURE 3a

EFFECTS OF THE PURPOSE FOR READING
LITERATURE ON READING COMPREHENSION ACROSS
READING RATE AS A CONCOMITANT VARIABLE
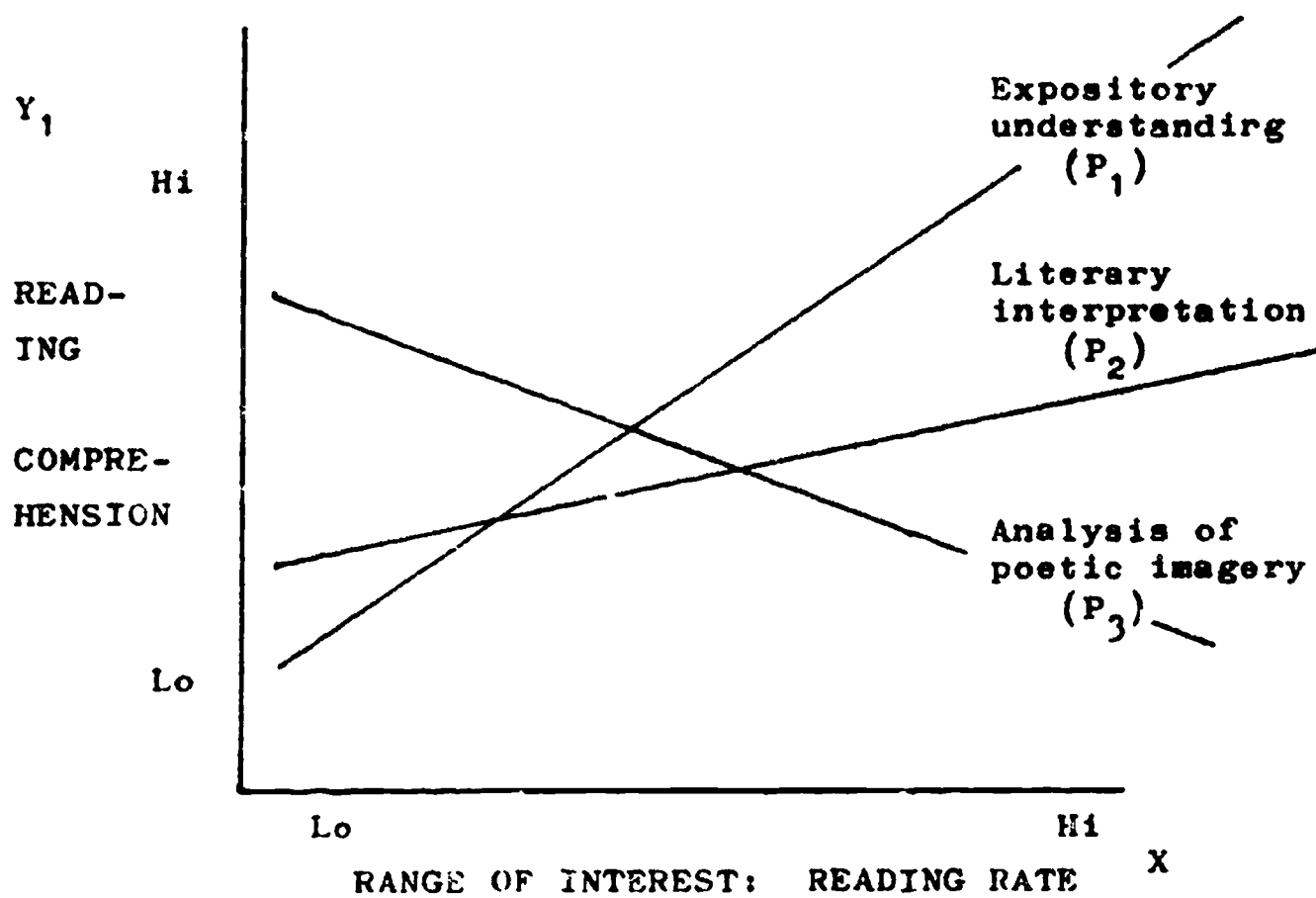
$$Y_1 = b_0 + b_1 P_1 + b_2 P_2 + b_3 P_3 + b_4 P_1 * X_1 + b_5 P_2 * X_1$$
$$+ b_6 P_3 * X_1 + E$$

H_1: test for linear interaction; i.e., does
$b_4 = b_5 = b_6 = 0$?

FIGURE 3b

RECIPROCAL PATH MODEL

ILLUSTRATING THE SIMULTANEOUS DETERMINATION

OF READING RATE AND READING COMPREHENSION
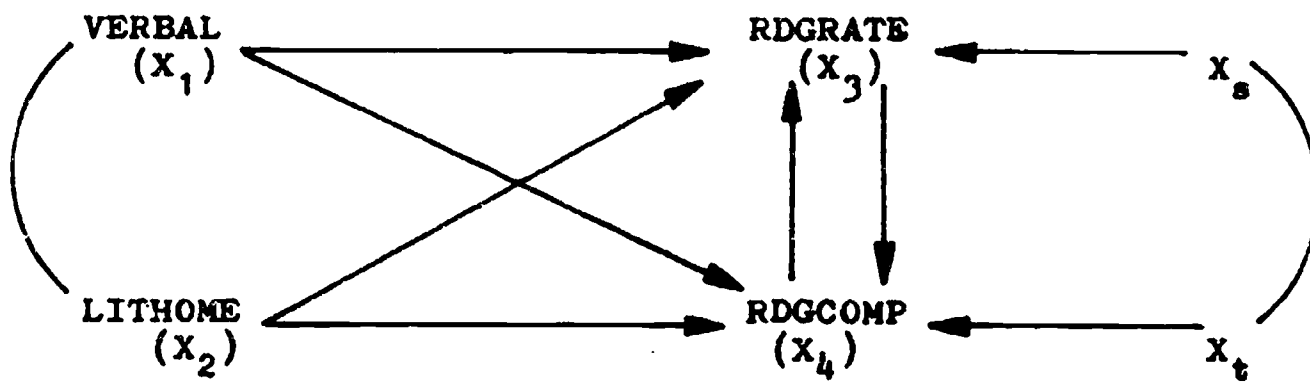
Where: X_1 = verbal ability; X_2 = literacy level of the home; X_3 = reading rate; X_4 = reading comprehension.

FIGURE 4

RECIPROCAL EFFECTS MODEL ILLUSTRATING RELATIONSHIPS

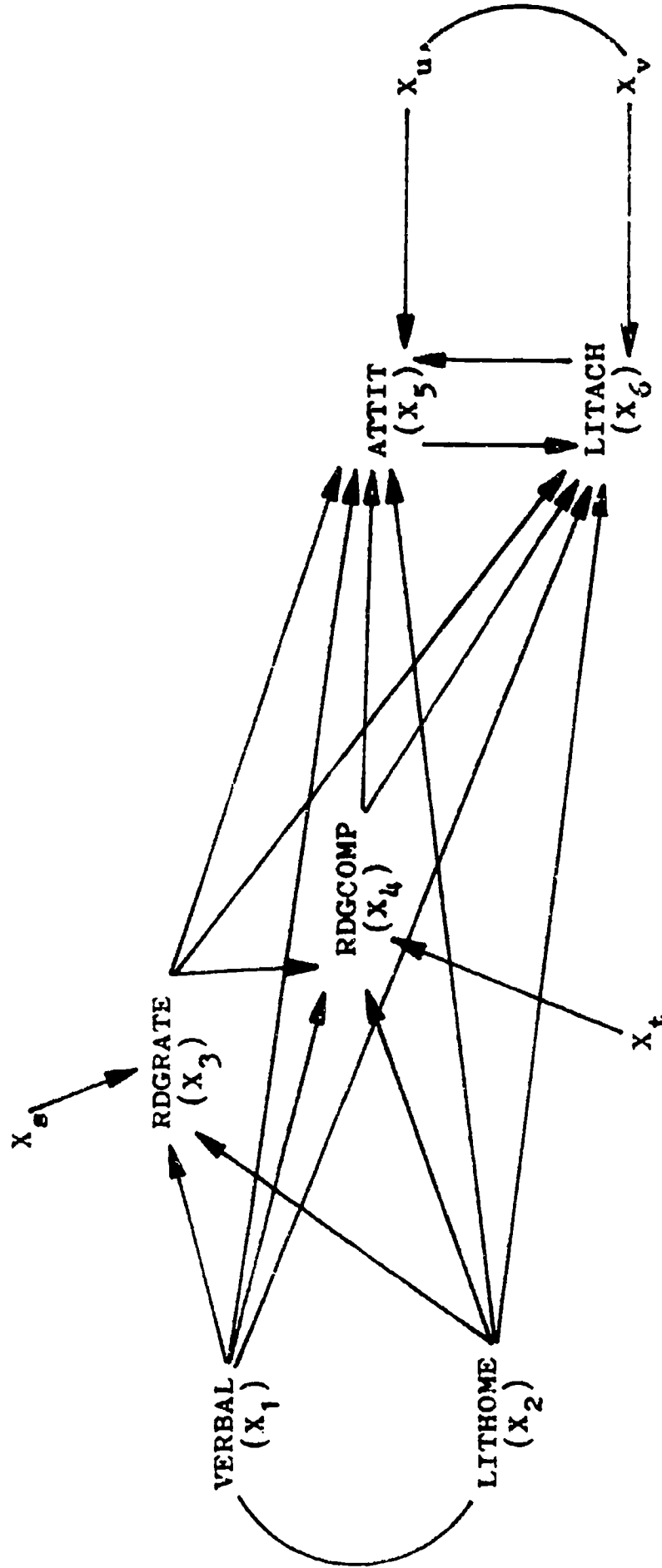BETWEEN ATTITUDES TOWARD LITERATURE AND ACHIEVEMENT IN LITERATURE

FIGURE 5

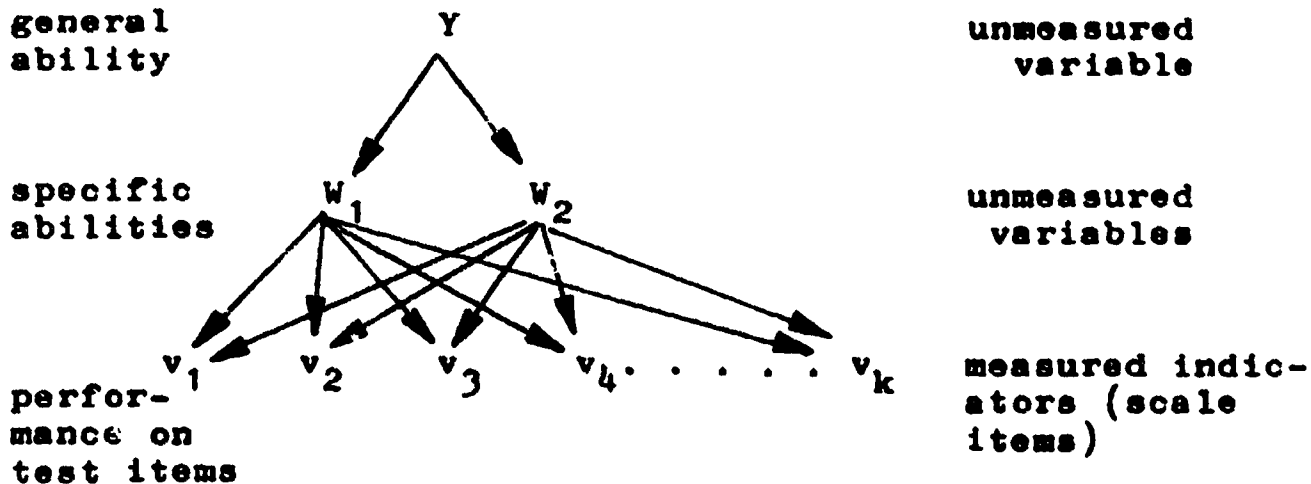## MULTIPLE INDICATOR MODELS OF UNMEASURED VARIABLES

general
ability

specific
abilities

perfor-
mance on
test items

unmeasured
variable

unmeasured
variables

measured indic-
ators (scale
items)

Fig. 5a: A Second Order Factor Model

literacy
level of
home

indicators
of lit. level
of home

unmeasured
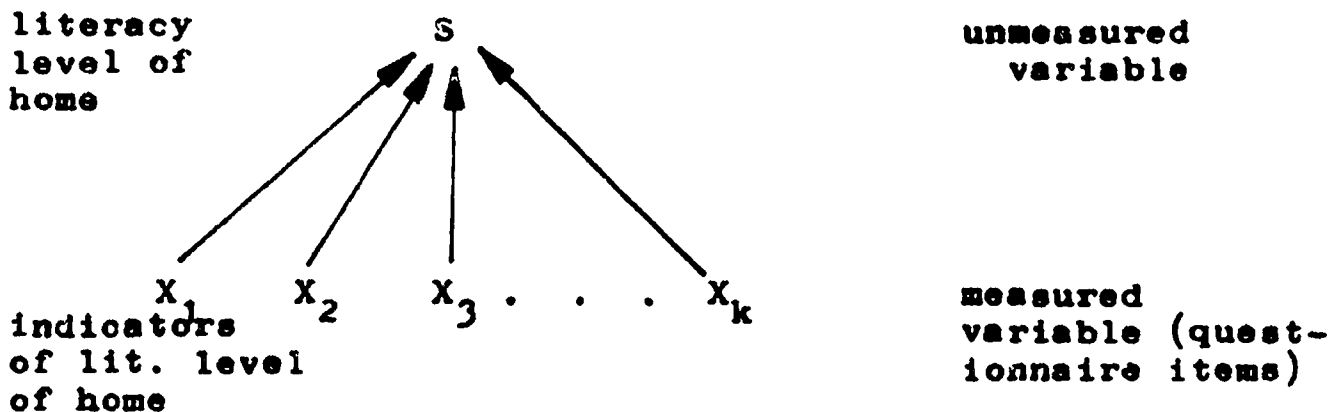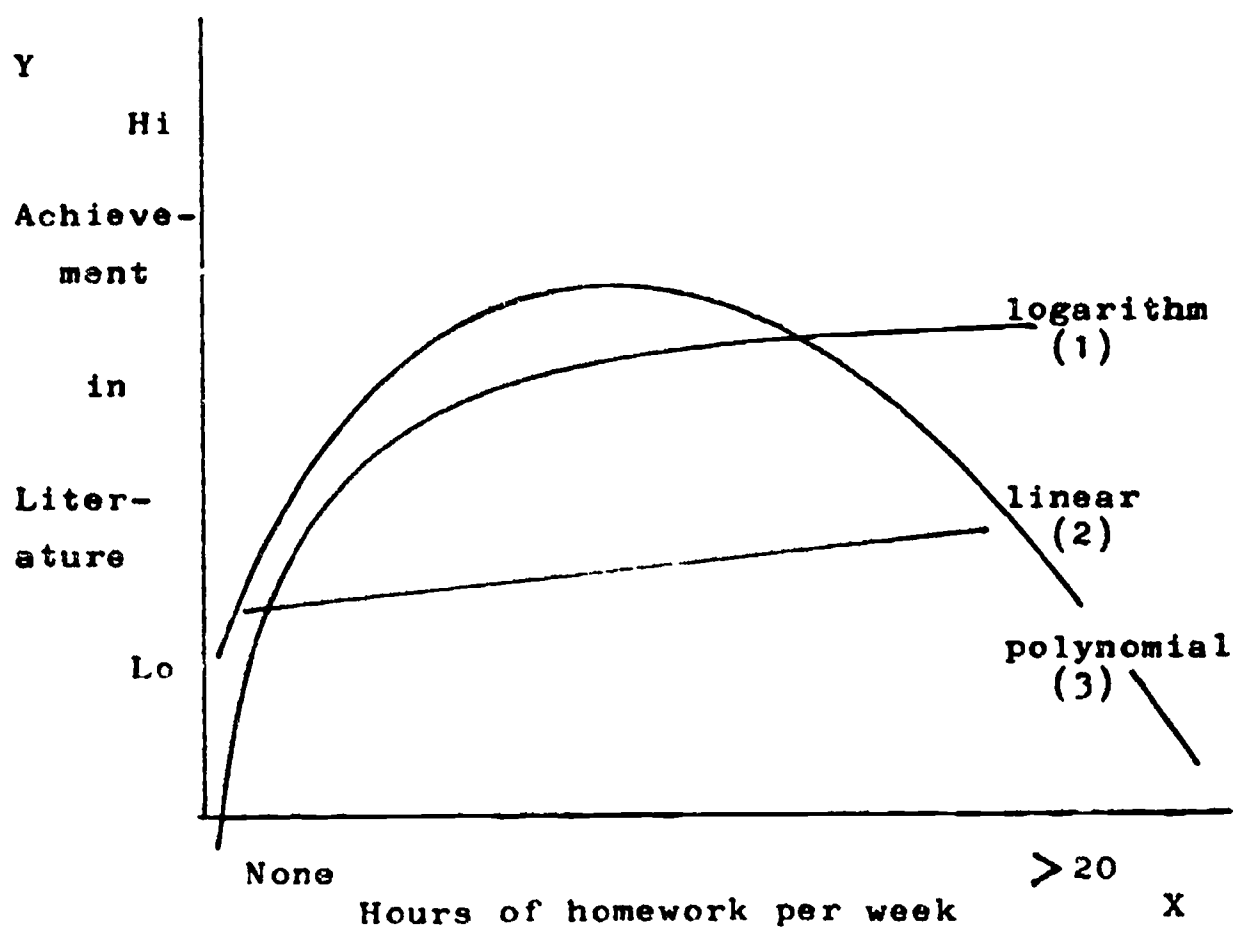variable

measured
variable (quest-
ionnaire items)

Fig. 5b: A Productive or Criterion Model

FIGURE 6

HYPOTHESIZED RELATIONSHIP BETWEEN ACHIEVEMENT
IN LITERATURE AND HOURS OF HOMEWORK PER WEEK

1. $Y = b_0 + b_1 \log X + e$ (logarithm)

2. $Y = b_0 + b_1 X + e$ (linear)

3. $Y = b_0 + b_1 X + b_2 X^2 + o$ (polynomial)

The IEA analysts examined the data for the possibility of the linear relation (no. 2) whereas there is some evidence that the best fitting relationship may be logarithmic or polynomial in form.

FIGURE 7

MODEL OF ABSOLUTE LEVELS OF ACHIEVEMENT IN MOTHER TONGUE LITERATURE (LITACH)

ILLUSTRATIVE OF THE EFFECTS OF DESIGN FACTORS ON PATH COEFFICIENTS*

* The standardized path coefficients when sex is included as the single design factor are presented to the right, or below, the path arrows. The path coefficients when both sex and effort are included as design factors are presented to the left of, or above, the path arrows.

FIGURE 8

PATH DIAGRAM OF MODEL III RELATIONSHIPS: LITERATURE ACHIEVEMENT PROCESS*

X_s

X_t

$.779$ $.733$

VERBAL (X_1)

LITHOME (X_2)

RDGCOMP (X_3)

LITACH (X_4)

$.549$ $.634$

$.273$ 3.437

$.090$ $.078$

$.534$ $.401$

$.210$ 1.99

$.05$
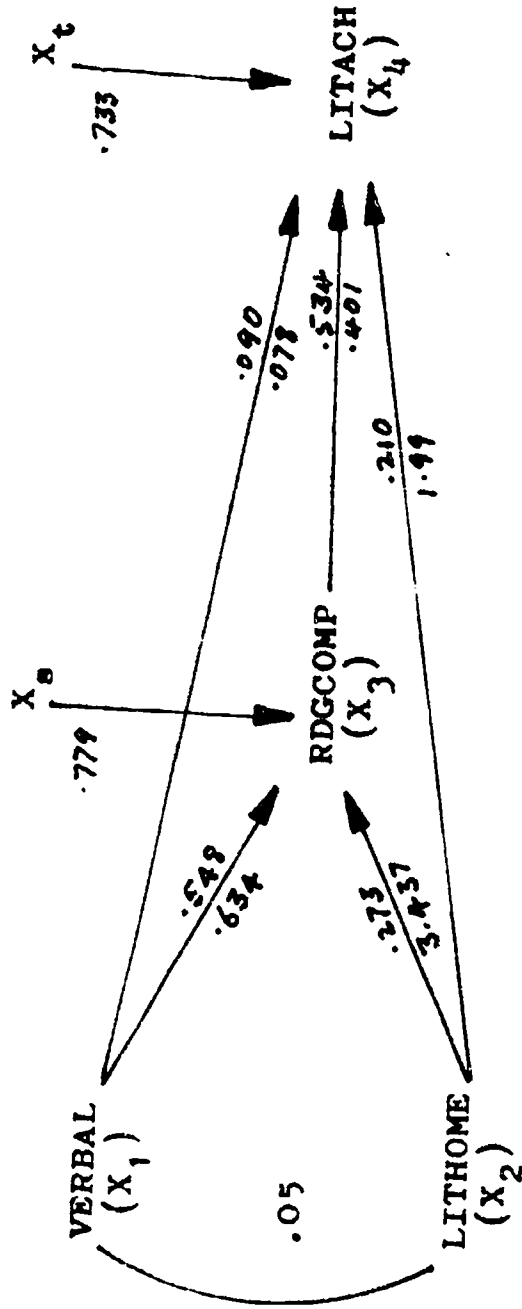
* After model revision by deleting reading speed and attitudes to literature, and after adjustments for the mean within-groups differences for sex and effort. The standardized path coefficients are shown above or to the left of the path arrows; the raw coefficients are shown below or to the right of the path arrows.