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ABSTRACT

The role of education in social change increases as more emphasis is put on planned change. One major aspect of this emphasis is the role of education as a change agent. Using a sample of 2,500 Canadian industrial workers, this presentation examines the relationship between amount and type of education, and types of general or work-related orientations to change. The influence of education was sorted out from other social class components by focusing on a population relatively homogeneous in social characteristics -- manual workers from only six different industries. The propositions tested are that education is positively related to social change orientation and that education is negatively related to the acceptance of social change costs. (Author)

EDUCATION AND ADAPTIVE CAPACITY

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Education and Adaptive Capacity*

The impact of education on the individual has traditionally been analyzed in terms of social and occupational mobility (eqs. Jackson and Marsden, 1962, Kraus, 1964). More recent literature has suggested that education increases or should increase adaptability to change (Clark, 1962, Goslin, 1965, Harvey et al, 1961:340-345). Not only is research on this tonic extremely scarce but also there has been very little theoretical development in conceptualizing adaptability.

In this paper I plan to do three things. First, to map out conceptually some of the major dimensions of adaptive capacity drawing on a wide range of sociological and psychological literature. Second, to indicate how education may be positively and negatively related to an individual's adaptive capacity. Third, to test some of these ideas on a secondary data analysis of a sample of manual workers by examining various aspects of individual orientations to change as they vary by level of education.

Adaptive Capacity

The concept of adaptive capacity has been most clearly stated in evolutionary theory. Essentially, adaptive capacity is the ability of an organism or a social system to cope with a wide range of environmental conditions (whether these be physical or social), (Sahlins and Service, 1960). Thus, this involves the capacity of the system to attain its goals in the face of a variegated and changing environment.

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It should be clear that adaptive capacity means more than passive adjustment. It also means that the organism is more autonomous vis-a-vis its environment. In Parsons' (1964:340) words, "this capacity includes an active concern with mastery, or the ability to change the environment to meet the needs of the system, as well as an ability to survive in the face of its unalterable features". Following Parsons this ability to actively cope with circumstances will be referred to as adaptive capacity.

Having stated a general definition of adaptive capacity it is necessary to be able to map out its major components, i.e. what specific features make a system highly adaptive. I believe that this mapping out process will be greatly facilitated if we start with the basic distinction in the Darwinian theory of evolution between variation and selective retention -- variation referring to the generation or occurrence of new patterns or forms and selective retention referring to the differential survival (as a result of selective elimination and retention) of certain types of variation (Campbell, 1965:27).

This distinction is manifested in the major sociological theory of evolution (Parsons, 1964, Eisenstadt, 1964). Differentiation is an obvious example of variation, and integration (or the institutionalization of the differentiated form) is clearly selective retention (Eisenstadt 1964:38). It can also be found in a less direct form in cybernetic systems theory (Deutsch, 1963, Buckley, 1967).

I would further maintain that this two phased process has a clear parallel in the adaptive functioning of individuals. Moreover, these two phases enable us to organize and interpret a wide range of concepts that have been used in the analysis of cognitive development, personality, creativity, problem solving and so on. This will be the focus in the rest of this section.

First, it may be helpful to state in general terms what I mean by variation and selective retention in individuals and how these processes relate to adaptive functioning. Variation refers to the quantity and quality of information that can be generated by the individual. It is the ability to generate alternate ideas and solutions that are potentially available to the individual. Selective retention involves the processes of analyzing and organizing these ideas for the purpose of selecting an appropriate response, that is, a response which is effective in coping with the problem at hand.

The argument is that the individual who can generate the greatest range of ideas and solutions and can order and organize these ideas has a competitive advantage in selecting the most adaptive response. It should be noted that these two functions can vary independently -- the ability to generate a large number of possible solutions does not imply the ability to order and select the most effective one.

The literature on psychological aspects of individual adaptive capacity as I have defined it is quite extensive. Some of the main studies include works on cognitive development (Harvey et al 1961, Rokeach 1960), personality needs (McClelland, 1961, Hagen, 1962) and especially the more recent theories of creativity (Guilford, 1967a, Barron, 1963). I will be drawing on these and other studies to illustrate how various aspects of psychological functioning relate to each of the two dimensions of adaptive capacity.

Variation refers to the capacity of the organism to generate information, new ideas, alternate solutions. In short, the openness of the organism to new information and new experiences. These aspects have been identified by a number of authors using similar and different terms.

The most comprehensive and theoretically developed statement of the variation phase of adaptive capacity is contained in Guilford's (1963, 1967a) structure of the intellect model. At least three functions are critical here. First, the ability of the organism to recall or retrieve information from its memory storage, for example, Guilford's (1967b:101) concept of fluency "which represents efficiency of calling out of memory storage items of information to fulfill certain specifications".

A second function is referred to by Guilford (1967b:101-103) as flexibility. Where the first function involves direct information retrieval, flexibility means the capacity to continually modify or redefine information or conceptions in order to use them in new situations. In the literature on creativity the concept of originality as the disposition to produce novel or uncommon responses to a problem is one good example of flexibility (Barron, 1963). Warshay's (1962:149) notion of "breadth of perspective" as the "range of alternative solutions that one is able to bring to mind when presented with a problem" (his emphasis) is another formulation of the same phenomenon. Rokeach's (1960) openmindedness also refers to the openness of the individual to alternate or new responses to a changing environment. Finally, Lerner's (1958:47) concept of empathy or the capacity to shift reflectively from one situation to another or more simply to see oneself in another fellow's situation is another example of flexible thinking.

A third set of phenomena in the variation phase of adaptive capacity concerns various factors associated with the notion of "openness to new experiences". Basic to this quality is independence or assurance in one's own judgment and the belief that the world is manipulable. The person with these characteristics will be less likely to accept the world as given and more likely to question and change traditional ways of doing things.

This orientation can at least be traced back to Weber's (1958) analysis of the protestant ethic, particularly the belief that one should actively work for his salvation and not passively accept the world as divinely set down. It appears again in McClelland's (1961) analysis of need achievement, especially the sense of mastery in making an impact on the environment. His conception of optimism which involves optimism and planning toward the future rather than fatalistically accepting it is another aspect of the same orientation (McClelland, 1961:226-227). Identical to this is Kahl's (1968:18-19) activism-fatalism dimension of modernism. The activist "comes to feel that control and change are not only desirable, but possible" while the fatalist "learns to take life as it comes, to adjust to it and accept it, rather than try constantly to change it" (Kahl, 1968:18). A further description of this same phenomenon is contained in Hagen's (1962, chapter 6) comparison of the innovational and authoritarian personalities. Another manifestation is found in Inkeles' (1966:14) description of "readiness for new experience".

In sum, there are two basic elements of an individual's openness to new experience. First, it involves a sense of control or mastery over the environment as a result of perceiving it as explainable and manipulable. Second, and probably a result of the first, the individual develops a lack of fear and optimism in facing the environment and the future. The upshot of all this is the tendency to perceive new or alternate ways of doing things instead of passively accepting traditional ones.

So far we have discussed the complex of factors related to the variation phase of individual adaptive capacity -- the repertoire of new ideas and alternate solutions to a problem that the individual can generate.

The factors associated with the second phase of adaptive capacity refer to the ability to order and organize this repertoire of ideas for the purpose of selecting the most effective response. Generally stated this involves the capacity to analyse, abstract and recombine elements in terms of their logical interrelations. This is most evident in Harvey et al's (1961) theory of conceptual development which they define as moving toward greater abstractness in conceptual thinking. For example, they state that the greater one's abstractness "the more capable he is of abstracting relationships from objects of his experience and of organizing them in terms of their interrelatedness" (Harvey et al, 1961:25). A further specification is the capacity for logical reasoning (Hitt, 1965). Its relevance for selective retention is seen in the importance of logical reasoning for arriving at the "correct" answer in I.Q. tests.[1]

These qualities of abstracting elements of a situation and systematizing them based on logical reasoning are evident in Guilford's (1967b) comments on problem solving (as opposed to creativity) in productive thinking, and in MacKinnon's (1967) statement of the adaptive responses of "effective individuals". They are important for adaptive capacity because they facilitate the adoption (or selective retention) of effective solutions to problems faced by the individual.

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[1]There is a close parallel between variation and selective retention on the one hand, and creativity and intelligence tests respectively, on the other hand. Creativity involves the range and novelty of ideas (variation), while intelligence tests emphasize analysis and reasoning (selective retention). Furthermore, there is an interesting analogue with Wilson's (1966) theory of organizational innovation. Wilson states that the diversity of the organization is positively related to the frequency of major innovations conceived (variation) but that the bureaucratic form of organization (i.e. based on logical (shall we say intellegent?) rules and regulations) is related to the likelihood that major innovative proposals will be successfully implemented (selective retention).

It is now possible to state quite explicitly and briefly the two major features of adaptive capacity which I have been discussing throughout. Variation refers to the process of divergent thinking which places a premium on the richness and novelty and range of ideas (MacKinnon, 1968:437). Selective retention involves convergent thinking, which places a premium on analysis and reasoning.[2] These two processes increase the adaptive capacity of the individual because through divergent thinking the individual is able to generate more information at his command and able to examine more alternative solutions to a problem, and through convergent thinking he is able to organize this range of alternatives for the purpose of selecting the most effective, i.e. adaptive response.

We are now in a position to consider the actual and potential relevance of education for the adaptive capacity of individuals.

Education and Adaptive Capacity

Change is occurring at such a rapid rate in modern society that we are faced with the problem of educating people for an unknown future (Goslin, 1965:86, Levy, 1967:207). Since rapid change involves coping with an ever changing and variegated environment it is necessary to educate for adaptability (Clark, 1962:19).

There is some evidence that current educational practices contribute to some aspects of adaptive functioning while stifling or at least not encouraging others. These issues will be discussed in relation to the major elements of adaptive capacity which I have outlined above.

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[2]The concepts of divergent and convergent thinking are the basic elements which have emerged from Guilford's (1956) theory of the structure of the intellect. Recent theories of creativity recognize that both divergent thinking and convergent thinking are required in the creative process which is defined to include the efficacy of the idea (problem solving) as well as its originality (MacKinnon, 1968:437). This obviously comes very close to the definition of adaptive capacity which is being developed here.

The main features of the variation phase of adaptive thinking are the cognitive capacities for information retrieval and flexible thinking (including both originality and range of ideas) and the cognitive orientation summed up in the phrase openness to new experience.

First, education would seem to make a direct contribution in sheer knowledge, at least through memorization of content if nothing else, that would provide a broader basis for information retrieval.

Second, recent research has emphasized that education has failed to develop, in fact has discouraged original or creative thinking. Getzels and Jackson (1963) found that teachers preferred the high IQ student (one who performs well on standard tests which stress arriving at the "correct" answer) while discouraging the highly creative one. They also show that intelligence tests are biased against the creative student. Similarly, Moustakas (1967) argues that education encourages conformity over creativity. Boyle (1969) also found that the characteristics associated with high aspiration rates in schools are negatively related to creativity rates.

The other aspect of flexible thinking concerns not the originality of ideas as such but the range of ideas. While no one would argue that education is maximizing its contribution here the evidence suggests that those with higher education have a greater facility for such thinking. Lerner (1958) argues that schooling is one of the main factors which increases the capacity to empathize or to imagine circumstances different from one's own. In Syria, for example, 39% of those with secondary school education or more scored high on an index of empathy, compared to 14% of those with elementary school education and only 5% of those who were classified as illiterate (Lerner, 1958:436).

Inkeles (1966:141-142) also reports that education is related to empathic thinking in his large sample drawn from seven developing countries. Similarly, Warshay (1962:168) found that education was positively related to an index of "breadth of perspective" constructed to measure "the range of alternate solutions that one is able to bring to mind".

Openness to new experiences is the final element in the variation phase of adaptive functioning. This consists of an independence or assurance in one's own judgment and a sense of control over the environment which result in an optimism or lack of fear in facing the unknown. Current educational practices seem to inhibit this orientation. For example, the obverse of the finding that education discourages creativity is that it encourages reliance on the customary and the tendency "to shy away from the risk and the uncertainty of the unknown and to seek out the safety and security of the known" (Getzels and Jackson, 1963:172).

On the other hand, Inkeles (1966:143) and Kahl (1968:49) present some evidence that education is positively related to their indexes of modernism which measure orientations toward new ways of doing things including the sense of mastery or control over the environment.

Perhaps a way of resolving this inconsistency is to note that education is not as powerful a force as it could be in stimulating readiness for new experience but that there are at least gross differences with the highly educated person being more open toward new experiences than the person with little or no education.

Another way in which education encourages openness toward change is by providing marketable skills which allow the individual a greater range of choices for moving out of unfavorable situations towards potentially more favorable ones. This conception of mobility orientation will be more fully developed below in connection with the hypotheses to be tested in this paper.

The selective retention phase of adaptive functioning primarily pertains to the abilities to analyze and to reason logically. These qualities apparently are emphasized in traditional educational training. This is quite evident when one examines the criteria for success in intelligence and achievement tests (Getzels and Jackson, 1963). The association between education and the development of scientific rationality, especially the realization of the tentative nature of ways of doing things and the willingness to change these ways according to scientifically meaningful knowledge (Bellah, 1964:371-372) is also relevant to this phase.

By way of conclusion, education more or less increases adaptive capacity. On balance, the more highly educated person would seem to have a competitive advantage in coping with a continually changing environment. It is also evident that its contribution has been deficient in some respects (particularly in the variation phase) and could be improved by altering current educational practices. Although much more work has to be done before we can specify a comprehensive training program for maximizing individual adaptive capacity some very good initial research has been carried out in developing training methods and courses in creative and flexible thinking (Torrance, 1963, 1967, Crutchfield, 1967) and problem solving (Parnes and Meadows, 1963). Harvey et al (1961:340-345) make some preliminary suggestions for promoting the capacity for abstract thinking through education.

In the rest of the paper I would like to examine some secondary data in order to illustrate how level of education relates to certain aspects of individual adaptive capacity. As usual in dealing with data gathered for another purpose we are missing a number of measures that we would ideally like to have. Nonetheless the data provide the opportunity to explore the general notion of adaptive capacity.

Data

The analysis is based on data gathered in 1968 for the Task Force on Labour Relations of the Federal Government of Canada (Loubser and Fullan, 1970). The sample consists of 2,352 Canadian industrial workers from seventeen plants representing the following six industries -- automobile, chemical, electrical equipment, oil, printing and steel.

The original sample was selected to represent different types of technologies. Firms were not selected on a random basis, but rather according to accessibility. The standard procedure for selecting respondents within firms was to sample hourly rated workers on direct production and skilled maintenance.

In fourteen of the seventeen plants all direct production and skilled maintenance workers were included in the sample. In the three largest plants workers were sampled according to a table of random numbers.

A self administered questionnaire mailed to respondents was the main means of gathering data. The 2,352 workers in the final sample represent 52% of the population to whom questionnaires were sent. Therefore, it is important to emphasize that I do not have a randomly selected sample of industrial workers. The primary aim of this paper is to examine relationships among variables in an area in which very little research has been done.

Hypotheses

Two dimensions of individual adaptive capacity toward change will be investigated. The first focuses on general openness toward change. The other can be referred to as mobility orientation including readiness to move out of unfavorable situations.

General Openness to Change

The first main hypothesis is that level of education will be positively related to openness toward change. The orientations to change which we will examine all relate directly or indirectly to the earlier discussion of the cognitive aspects of adaptive capacity. In general, these orientations refer to an individual's evaluation, openness or capacity to entertain new or different ways of doing things.

The particular dimensions for which we have data include three types of orientation to change -- general change, job change and technological change orientations -- optimism, authoritarianism, conformity, open-mindedness, and generality. A brief paragraph on each of these with a sample item from each scale should suffice to convey the general meaning of these orientations.

General Change Orientation (4 items)[3]

General change can be thought of as a general evaluation of change as good in itself ceteris paribus. Sister Neal, (1965:8) has characterized this in her statement that the change oriented person is more inclined to see "opportunity" in situations of crisis or change, whereas the nonchange oriented person is more likely to perceive "danger". This generalized approach to change should relate to openness toward new ways of doing things.

Sample item: If you start trying to change things very much you usually make them worse (agreeing denotes low general change orientation).

Job Change Orientation (6 items)

This scale, formulated by Trumbo (1961), is an important aspect of capacity for coping with change in the work world. It is designed to measure

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[3] In all but one case (conformity) the scales contain from four to six items in the standard Likert-type format with responses ranging on a five point agree-disagree continuum. All items were factor analyzed and rotated according to the varimax criterion. The criteria for including items in each scale were ce validity and having a factor loading above .30 on a single factor with her items from that scale.

the extent to which an individual has a predisposition toward continual changes in the content of his work.

Sample item: One can never feel at ease on a job when the ways of doing things are always being changed (agreeing denotes low job change orientation).

Technological Change Orientation (5 items)

This orientation concerns the individual's evaluation of whether technological change, in general, is good or bad. The reference is to the individual's predisposition to fear or welcome technological change.

Sample item: In spite of what many people say, technical change and automation is really a very good thing.

Optimism (5 items)

Optimism toward the future reflects the confidence and assurance with which one faces the uncertain. The optimist approaches the unknown willingly and accepts change as a sign of progress (Touraine et al, 1965:93).

Sample item: The time in which we live promises so much for the future of mankind that our expectations can hardly be too great.

Authoritarianism (5 itmes)

The authoritarian person fears using his own judgment and avoids this uncertainty by falling back on the safety and security of traditional ways that his parents and other earlier authorities taught him, and by relying on the judgment or will of individuals superior to him in authority (Hagen, 1962:97). The lack of openness to change is obvious.

Sample item: Obedience and respect for authority should be the very first requirement of a good citizen.

Conformity (2 items)

Similar to authoritarianism, conformity involves relying on the norms of the situation rather than one's own ideas or initiative. Again a lack of openness to uncommon or new ways.

Sample item: A person should conform in his ideas and his behavior to those of the group he happens to be with at the time.

Openmindedness (4 items)

In Rokeach's (1960:57) words, openmindedness is "the extent to which the person's can receive, evaluate, and act on relevant information.... on its own intrinsic merits". It denotes a cognitive openness to consider all types of information on the latter's own merits before responding. Basing one's actions on the intrinsic merits of the information relevant to a situation should increase the likelihood of an adaptive response. The four items in this scale are taken from Rokeach's dogmatism scale (Rokeach, 1960).

Sample item: Most of the ideas which get printed nowadays aren't worth the paper they are printed on (agreeing denotes dogmatism or low openmindedness).

Generality (4 items)

By generality I mean the ability to analyze by abstracting elements in a situation and relating them to general categories (Harvey et al, 1961). The validity of operationalizing this concept with attitudinal items is open to question.

Sample item: I analyze the motives of others to see how well I can understand them in terms of general ideas about why people behave the way the do.

In summary, these eight dimensions all signify an openness toward new ways of doing things. General change, job change, and technological change indicate an evaluation and positive approach toward various types of change.

Optimism is confidence and willingness in facing the future, the new and the uncertain. Authoritarianism and conformity are the other side of the coin in that they stress a reliance on traditional ways and rules in governing action. Openmindedness refers to a readiness to consider new information. Finally, generality is least directly related to openness toward change as it involves the abilities to analyze and abstract.

It is necessary to point out that we do not have data on all aspects of individual adaptive functioning. In particular, we do not have measures of originality, some aspects of flexible thinking, and logical reasoning ability. Furthermore, the generality scale probably measures abstract thinking only superficially. Despite these inadequacies we have a range of data that, taken together, should provide a meaningful guage of individual adaptive capacity.

Mobility Orientation

I emphasized earlier that adaptive capacity does not mean passive adjustment to change. In fact it involves the readiness to move out of unfavorable, unalterable situations (Parsons, 1964:340). The second main hypothesis is that level of education is positvely related to this readiness to move out of unfavorable job situations.

One simple measure of this which I use is a question asking whether the worker expects to remain on his particular job the rest of his career. A negative response to this question should indicate an orientation to seek out more favorable (job) situations.

A more direct measure of this hypothesis is our scale of readiness to accept the personal costs of change. The latter was conceived of as hypothetical costs of change in work which involved reduction in various aspects of job satisfaction.

This scale contained seven questions on reduction in the following aspects of job satisfaction -- interest in work, control over pace and quality, amount of responsibility, security, contact with other workers, pay, and general job satisfaction. All questions had factor loadings above .40 on a single factor and followed the same format as the sample item below:

Sample item: If some change in your work meant that you would receive much less pay in your job, which one of the following would you do?

1. Stay on the job, and adjust as well as you can.
2. Stay on the job, but complain to management and the union.
3. Stay on the job, but start looking for another job.
4. Take part in a strike against the company.
5. Quit the job for another.

(The closer the response to the first alternative the less the mobility orientation.)

Contradictory as it may sound acceptance of these kinds of changes implies a lack of orientation to change, of hanging on to a situation when change might well be advantageous (Loubser and Fullan, 1970). This scale, then, is designed to measure how a person would respond to clearly negative changes. The assumption is that the person with high adaptive capacity would attempt to move out of a negative situation, in the quest of one which is more favorable. Education should increase this readiness by qualifying the worker for a greater range of alternative positions to which to move.[4]

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[4]That education also increases the cognitive predisposition to move is the gist of the first hypothesis.

Findings

The first hypothesis proposes that level of education will be positively related to openness toward change. The data relevant to the eight dimensions of openness are presented in Table I.[5] They are arranged so that as one moves down each column (as education increases) an increase in percentage represents greater openness toward change. The significant finding is that level of education is consistently positively related to openness toward change as measured by these eight scales.

General change, job change and technological change orientation are related to level of education in a linear fashion with only one exception (general change orientation of those with post-secondary education). For example, 24% of those with grade school education or less score high on job change orientation compared to 42% and 44% of those with some high school (academic and technical respectively) 53% of those who have completed high school and 55% of those who have had some post-secondary schooling.

Similarly, those with more education score higher on the index of optimism toward the future. The scores range from 28% for those with grade school education or less to 49% for those with some post-secondary education.

Authoritarianism and conformity are also associated with level of education in the expected direction but the differences are not very large. Thus, the percentage difference between the lowest educational category and the highest category is only about 15% in each case.

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[5] In the interest of brevity of presentation only the percent scoring positive toward change are reported, i.e., the percent scoring high on the six dimensions emphasizing openness and low on the two dimensions measuring closedness (authoritarianism and conformity). Each scale was constructed by summing the responses to the items in the scale and trichotomizing them into categories labelled high, medium and low.

One of the strongest relationships occurs with the index of openmindedness. Nineteen percent of the grade school educated scored high on this scale versus 49% of those with some post-secondary training.

Finally, generality is barely related to education. There is virtually no difference among the first five categories of education. Perhaps this is a reflection of the inadequacy of our measurement of this concept.

A couple of other observations can be made concerning Table 1. It is interesting to note that in six of the eight scales the largest difference between adjacent categories occurs between those with grade school or less education and those with some high school. Apparently the transition between grade school and high school is a watershed which represents a qualitatively different experience regarding change orientation.

It is also noteworthy that it makes very little difference in change scores whether the worker had technical or academic education. If increasing adaptive capacity is one of the main goals of education this kind of streaming would seem to have little differential effect on the individual, at least for our sample of manual workers. Perhaps the impact of education on the individual does not derive so much from the content of the curriculum as from the latent effects of the very fact of attending school. This is Inkeles position in his view that the school has a latent socializing effect of inculcating values.

> These effects (inculcating values) of the school, I believe, reside not mainly in its formal, explicit self-conscious pedagogic activity, but rather are inherent in the school as an <u>organization</u>. The modernizing effects follow not from the school's curriculum, but rather from its informal, implicit, and often unconscious program for dealing with its young charges (Inkeles, 1969:213, his emphasis).

Although the specific relationships between education and each aspect of openness toward change were not particularly strong, the findings, taken together, show an impressive consistency in the expected direction.

The second hypothesis to be tested is that level of education is positively related to readiness to move out of unfavorable job situations. Our first rather simple measure of this predisposition is the question, Do you expect to remain in your present type of job all you working career? The responses to this question are strongly in the hypothesized direction (gamma = .330). Eighty-four percent of those with grade school education say that they do expect to remain in this type of job, compared to 76% of those with some high school, 60% of those who have completed high school and 49% of those who have had some post-secondary education.

The main measure of mobility orientation is an index designed to measure response to reduction in various aspects of job satisfaction. It was expected that workers with higher levels of education would be less likely to accept the costs of change without doing something about it. In other words, those with more education will be more likely to move out of an unsatisfactory situation rather than passively adjust to it. Scores on this index of readiness to accept reduction in job satisfaction clearly support this view (Table 2). Only 11% of the grade school educated imply that they would be more likely to quit the job and look for another. At the other end of the scale, 54% of the grade school educated imply that they would adjust to such change, while only 27% of the post-secondary educated give this kind of response.

This is not to say that those with higher education will refuse to undergo any cost of change, but rather that they will be less likely to passively accept a change that is evidently to their disadvantage. In fact, their readiness to act on changes that might be potentially advantageous is reflected in responses to a question about retraining. Thirty-two percent of those with grade school education say that they would retrain at their own expense if their job required it. This compares with 50% of those who completed high school and 56% of those with post-secondary education (gamma = -.195). This is another example of the adaptive capacity of the more educated person -- the readiness to learn new ways of doing things that seem appropriate to a changing situation.

Controls

I have not yet demonstrated that it is education per se that influences receptivity toward change. It is possible that other factors related to education determine receptivity. Although the fact that we have a fairly homogeneous sample (manual workers from only six different industries) makes this less of a likelihood, it is necessary to take into account the possible effects of factors extraneous to education. In this connection I controlled for certain background factors -- father's education, ethnicity, size of childhood community -- and present characteristics -- age, and length of time on present job.

Although two of the controls -- age and length of time in the present job -- were systematically related to some of the dependent variables, the original relationships between level of education and scores on the various orientations to change were maintained in all of the control categories. A few comments about age and length of time in the job should suffice.

Age was divided into three categories -- under 35, 35 to 50, and over 50 years of age. It might be expected that younger people are more able to cope with new ways of doing things, and less likely to adjust to negative changes without doing something about it. Our data do indicate this. For example, the younger group is much more likely to have positive attitudes toward job changes. Fifty-five percent of those under 35 score high on the index of job change orientation, compared to 40% of those between 35 and 50, and 25% of those over 50. By contrast, the older are more likely to passively accept change. Only 26% of those under 35 score high on the index of readiness to accept reduction in job satisfaction, while 41% of those between 35 and 50, and 60% of those over 50 are prepared to accept these costs. Perhaps, the lack of suitable job alternatives to the older people is one of the main reasons for this difference.

Length of time on the present job was also controlled for because it was thought to relate to readiness to accept the costs of change. Seniority, for instance, represents a considerable investment in the job. As expected this variable was associated with the tendency to accept a reduction in job satisfaction.

However, the main point has already been made, namely, that education is related to orientations to change regardless of which control variable category is examined.

Discussion

The concept of adaptive capacity enabled us to order and interpret a wide range of concepts which have appeared in psychological and sociological literature. Furthermore, the consistency of our findings provide considerable

support for the notion that level of education is positively related to individual adaptive capacity, although this statement should be qualified.

First, the data were attitudinal in nature. Although these data should indicate whether people are predisposed to be adaptive in one way or another, I do not have measures of the extent to which people will actually behave more or less adaptively.

Second, I was not able to test systematically the various dimensions of adaptive capacity which were outlined in the first part of the paper. For example, I did not have adequate data on capacities for original and flexible thinking, or on the abilities to abstract and to reason logically.

Third, further conceptualization of adaptive capacity is needed. In particular, the processes pertaining to selective retention, i.e., the efficacy of response to an adaptive problem, are not clear. Can we distinguish between adequate adaptive responses and optimal ones (March, and Simon, 1958:140-141)? Or are we ultimately faced with the tautology that the response that works is adaptive?

Fourth, it is necessary to investigate the impact of education on adaptive capacity more directly. As a start, this might involve a longitudinal study of the impact of education on the cognitive adaptive capacity of students, possibly using a matched control groups of non-students in an experimental design. More complex questions pertain to how different educational practices differentially affect adaptive capacity. What is the impact of open school plans, individualized instruction, nongrading and other recent changes in educational practices? How do other structural arrangements such as the organizational characteristics associated with innovativeness (Hagstrom, 1965) affect the adaptive capacities of students? Perhaps, innovative schools increase adaptive capacity by the very fact that they provide a continually changing environment.

Finally, may I suggest that this paper points to the viability of further investigating the concept of adaptive capacity. Once we agree that individual adaptive capacity is necessary for survival in the continually changing environments of modern societies we will have made an important step toward suggesting specific educational reforms.

Table 1 Indexes of Openness toward Change by Level of Education

EDUCATION	PERCENT SCORING HI GC*	HI JC	HI JC	HI OPT	LOW AUTH	LOW CON	HI OPEN	HI GE	N
Completed grade school or less	29	24	37	28	20	29	19	39	611
Some high school -- academic	43	42	47	38	21	41	33	39	694
Some high school -- technical	45	44	50	38	25	42	33	40	505
Completed high school -- academic	52	53	52	45	29	44	40	41	179
Completed nigh school -- technical	52	53	55	39	32	46	41	43	255
Some post-secondary training	45	55	60	49	35	43	49	53	94
GAMMA	.209	.289	.152	.108	.105	.137	.220	.045	2338

* Code for scales

GC - general change
JC - job change
TC - technological change
OPT - optimism
AUTH - authoritarianism
CON - conformity
OPEN - openmindedness
GE - generality

Table 2. Readiness to accept the Personal Costs of Change by Level of Education (in percentages)

EDUCATION	READINESS TO ACCEPT COSTS OF CHANGE			
	HIGH	MEDIUM	LOW	N
Completed grade school or less	54	35	11	602
Some high school -- academic	43	41	16	687
Some high school -- technical	41	42	17	499
Completed high school -- academic	33	45	22	177
Completed high school -- technical	24	50	26	254
Some post-secondary training	27	42	31	93
Total	42	41	17	2312

Gamma = .234

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