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Chapter 6: Piaget and Learning Economics

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CHAPTER SIX

Piaget and Learning Economics

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There are times when teachers of economics encounter unexpected responses to economics questions asked of students. Some of the unexpected responses which I have received are reproduced below and are worth rather careful consideration.

Question: One year ago I could have bought a Volksunota (a small foreign car) for 4900 shebangoes (which my banker tells me equals $3500). Now, however, due to inflation, a Volksunota costs 6300 shebangoes in its home country. Assuming the exchange rate (the rate at which shebangoes trade for dollars) has stayed constant, how many dollars would I now have to pay for a Volksunota?

Answers:

Student A—$4900. $3500 was $1400 less than 4900 shebangoes. So I subtracted 1400 from 6300 shebangoes and got $4900.

Student B—There is no way to tell. In the first case it cost 4900 shebangoes here, not in its home country, so you have to consider import taxes and export taxes, etc., plus the cars usually sell much cheaper in their own countries. Even if the rate of exchange is the same there may be more taxes in the home country you don't know about.

Student C—$3510. For constant exchange rate, the increase of 1400 shebangoes is equivalent to (3500)(1400)/(4900) = x dollars = $10. So you would have to pay $3510.

Question: Economists sometimes use what they call the "Equation of Exchange." This equation says that the supply of money (M) times the velocity of money (V) equals the general price level (P) times the real quantity of goods available (Q). The equation is therefore MV=PQ. Using that equation, what can you tell me about the effect of an increase in the money supply (M) on the general price level (P)?

Answers:

Student A—P will increase. More dollars chasing same amount of goods. Simple cause and effect.

Student B—Having only brief contact with this equation before I would say that increase in M would cause a reduction in P offset by an increase in Q and a decrease in V. Using present economic situation in reverse.

Student C—Increased money supply devaluates the dollar therefore the price level would increase. If the price level did not increase, there would be much more spending, but to tell you the truth, I think it would go the other way.

Question: I know of a manufacturer who has found that no matter what price he charges, the quantity he sells always adjusts so that the total revenue is constant. That is, if he lowers his price sales increase just enough to keep total revenue constant, and vice versa. He wants to know what quantity he should produce in order to maximize his profits. What would you tell him?

Answers:

Student A—He should produce to obtain a profit. He should lower his overhead.

Student B—He must pick his quantity so that the price is low enough so that the demand is high, but not so high that he cannot supply enough of the product to meet the demand.

Student C—It doesn't matter. Because if his total revenue is always the same, and his quantity sold, adjust to the price he is selling the goods for, keeping the total revenue a constant he could produce 1 or 1,000,000 units and never increase his total revenue.

These three questions are significant to me because each requires thought processes which are important in economics and in many other areas of problem solving. In addition, they are problems which, in spite of the specific "content words" do not require prior economic education to arrive at the correct answer. Just as one does not need to be a physicist to isolate variables which might influence the flexibility of solid rods, so one does not need to be an economist to utilize ratios to convert shebangoes to dollars. No economist has heard of a shebango anyway.

The first question implicitly asked the student to engage in proportional reasoning. The second demanded the capability of isolating a variable and analyzing its effect while mentally holding others constant. The third required the student to identify a relevant factor (cost) beyond those specified in the problem, and to apply a proper algorithm to find a solution. While some students (whose answers are not reproduced here) answered each problem well, a substantial number demonstrated inability to deal with the requirements of the problems. Why? What can the economics educator do about it?

Generalizing from introspection, I presume that many of us would respond by saying, "Those students are dumb. They shouldn't be in college." And, finding them in our classrooms, we would recognize two alternatives. We could "flunk them out." Or, we could gear our teaching to their answers and hope that by teaching the algorithm for each type of problem, and giving them a basketful of "clues" about when a ratio is appropriate and when to say "all other things equal," etc., they could memorize their way to a passing grade. We would also recognize that after we had "taught" them to calculate dollar prices of Volksunotas, it would be up to the mathematician to "teach" them how to calculate the distance in kilometers from Wahoo to Broken Bow, given the distance in miles and the conversion ratio. That is, although the problems are formally identical, we are aware that they do not appear so to many students.

Bafflement at some of these student responses, together with dissatisfaction at the perceived levels of dealing with them, evidently made me receptive to the possibilities in an alternative explanation and prescription. The alternative which has stimulated much of my recent educational thinking and activity is provided by Swiss psychologist and epistemologist Jean Piaget and his followers. While full explanations of Piaget's theories are available elsewhere (see

bibliography) by people more competent to offer them, some brief recitation of my interpretation of Piaget's possible relevance to instruction in economics might better illuminate my view of the economic component of ADAPT.

The focus of Piaget's research and writing is the process of human intellectual development. The idea of "development," that is, progressive change, is crucial to understanding possibilities for learning. For Piaget, in each of four developmental stages through which a person passes from infancy to childhood, certain kinds of mental capabilities are acquired. The developmental process is a process of acquisition of mental "structures" which allow performance of increasingly sophisticated mental tasks.

For one who has lived with and observed children growing up from birth through adolescence, the concept of mental stages of development is intuitively appealing. It seems clear that, regardless of the "intelligence" of a youngster, there are ages at which certain mental patterns or thought processes are not present. And it also seems clear that as the child grows older the complexity of mental tasks which can be performed increases. Piaget identifies the stages through which he believes we pass, suggests the kinds of mental processes associated with each stage, and cautions us that the rate of development is not uniform but varies between individuals and specifically between "cultures."

Piaget further hypothesizes that intellectual development is a function of four variables: maturation (and associated physiological changes), experiences (both physical and mental), education (broadly defined), and "self-regulation." For him, self-regulation, the most significant variable, is the process whereby an individual mentally wrestles with discomfiting information (such as experimental results contrary to expectations) until a satisfactory mental reconstruction allowing intellectual equilibrium takes place.

To a college educator, the most significant aspect of the developmental schema is that which appears to be relevant to college-age people. The final two developmental stages discussed by Piaget are the stages of "concrete operations" and "formal operations." An "operation" is a mental process, the "essence of knowledge," in which the "object of knowledge" is acted upon. An operation may be ordering, or classifying, or hypothesizing. It is "concrete" (characteristic of the penultimate stage of development) if it operates on concrete objects or experiences. The operation is "formal" (characteristic of the highest stage in the Piagetian developmental schema) if it involves reasoning about hypotheses, mental manipulation of abstractions, reasoning about contrary-to-fact situations, and operations of propositional logic. (These are not meant to be exhaustive or scientifically precise definitions.)

Obviously, against the background of the Piagetian theory, many persons with college classroom teaching experience may be tempted to wonder whether there is not a possible mismatch between the level at which the student is prepared to receive learning and the level at which instruction is offered. Piaget (1964, p. 180) specifically notes that

"(the student) can receive valuable information via language or via education.....only if he is in a state where he can understand the information. That is, to receive the information he must have a structure which enables him to assimilate this information. This is why you cannot teach higher mathematics to a five-year-old. He does not yet have the structures which enable him to understand."

My colleagues in ADAPT and I have succumbed to that temptation to wonder about consistency between levels of teaching and structures for learning and have begun to consider the consequences of teaching a subject (such as economics) using texts, problems, examples, and language which demand mental skills typical of a "formal operational" learner. If, as Piaget seems to believe, all persons attain the formal operational level during adolescence, or certainly by age 20, disparity between level of teaching and preparation for learning should not be a problem. If, however, we are aware of the several studies[1] which indicate that many of the skills identified with formal operations (combinatorial logic, proportional reasoning, separation of variables) are not evidenced by a large proportion of college students, we must consider our options.

If we are willing to consider the possibility of developmental stages, roughly as described by Piaget, and if we agree that many of our college students do not seem to function at the formal level, at least in some disciplines, two choices are apparent. We can ignore the theory and the data and continue to teach, presumably at the formal level, with continued mixed results, occasionally resembling those with which this essay began. Probably the less clever "concrete" thinkers will soon "flunk out" and quit giving us disquieting answers to exam questions. (Or, if we make those questions multiple-choice, we won't see the mental process at all.) The more clever or diligent concrete thinkers may struggle to a diploma via memorization or algorithmic applications.

Or, we can attempt to revise our pedagogy to make it accessible to the concrete as well as the formal student. How that might be done, or at least attempted, is the stuff of most of the rest of this essay. It is that attempt that consumes the time and energy of the ADAPT staff.

Before discussing concrete curricular or pedagogical adjustments which have resulted from the Piagetian perspective, one other aspect of the developmental theory should be re-emphasized. That is the speculation that experience and self-regulation are two of the agents which foster progress from one stage to the next. The idea of reconstructing higher education to make it accessible to pre-formal thinkers is attractive to me only as a development-stimulating process. If we can provide environment and experience necessary for self-regulation to occur, and hence to assist the transition from concrete to formal, the potential worth of such pedagogical modification is immense. If no development is fostered, or if the group of students we are trying to advance are not capable of making the transition, the benefit-cost ratio would not be appealing to me.

At this point we should become much more concrete and discuss the teaching of economics from a Piagetian perspective. We should first turn our attention to consideration of how a number of basic economic concepts, taught in almost every "principles of economics" course, fit within the Piagetian classification. My thoughts on this are preliminary and tentative.

As I understand Piaget, concepts which are concrete, or accessible to the person in the concrete operational stage of development, are likely to possess some of the following characteristics:

1) drawn directly from personal experience;
2) involve elementary classification and generalization concerning tangible objects;
3) utilize direct cause and effect relationships in a simple two-variable situation;
4) can be taught or understood by analogy, or algorithm, or "recipe;"
5) are "closed," not demanding exploration of possibilities outside the stated data.

Conversely, concepts which are formal, or accessible to the person in the formal operational stage of development, are likely to possess some of the characteristics in the following list:

1) may be hypothetical, imagined, contrary-to-fact;
2) may be "open-ended" demanding speculation about possibilities not spelled out;
3) may require deductive reasoning from unverified hypotheses;
4) may require definition by means of other concepts of abstractions, with no obvious correlation to tangible reality;
5) may require intermediate steps or concepts not established in the original data.

If we look at the content of early courses in economics, how do the things we teach fit within the classification system described here? A list of topics often covered might include, among many others, gross national product, demand, comparative costs, economic profit, multiplier, equilibrium, investment, economic efficiency, elasticity, marginalism, income tax, index numbers, and returns to scale.

Some of these ideas, such as income tax, investment, gross national product, seem amenable to definition and explanation in terms or familiar situations or examples and are probably properly thought of as within the concrete realm. (Some aspects of these, such as imputed income in GNP calculations, may be more difficult for the concrete operational person to comprehend.) On the other hand, comparative costs, multiplier, economic efficiency, and economic profit must be defined in terms of other proportional reasoning or idealized models, and may properly be classed as formal concepts. (Now I understand why so many students have so much trouble understanding those "Florida oranges"/"Nebraska wheat" comparative cost tables designed to illustrate potential gains from trade. They require a kind of proportional reasoning which may be out of reach for some students.) Concepts such as marginalism, or elasticity, are, I think, formal; but they can rather easily be explained quantitatively with simple formulae and algorithmic thinking. This last point is important because it suggests that formal ideas may be discussed concretely; it is equally likely that concrete ideas (such as demand) can be discussed quite formally.

Obviously, one conclusion which emerges from all of the preceding hypothesizing is that the topics we teach, or the way in which we teach them, may be inaccessible to learning by some of our students who have not yet achieved the formal operational stage in the development process. Whether their developmental process might be stimulated by a pedagogy which utilized their concrete operational skills, provided added experiences as raw material for mental growth, and encouraged self-regulation to take place is the question addressed by the ADAPT program.

The translation of Piagetian theorizing into a college economics curriculum by a person with no claim to competence in developmental psychology is a frustrating, time-consuming, difficult process. What follows is a discussion of premises from which I began, objectives by which I was guided, and pedagogical methods used in an attempt to create Piaget-based economic topics course for college freshmen. The process continues.

The premises on which the ADAPT economics curriculum is based are drawn from Piaget's work. They are, basically:

1) there is a process of human intellectual development;
2) a significant proportion of college freshmen are not yet "formal operational;"
3) utilizing an educational strategy which makes concepts accessible to the concrete operational student, and which causes intellectual "disequilibrium," may lead to "self-regulation" and intellectual development.

As I work from those premises to construct and implement an economics curriculum, my objectives include the following:

1) to build a "learning cycle" (exploration, invention, application, as described below) for each unit of instruction;
2) to ensure, as part of that learning cycle, that each unit has an "experiential," "concrete," exploration activity which allows students to generate data and actively participate in an economic activity;
3) to establish circumstances where mental "disequilibration" is likely to occur and where "self-regulation" could follow.

In my view, and as reflected in Piaget's experimental work a laboratory or similar opportunity for "doing" the exploratory work is a key element in the pedagogy. Such an involvement with the subject matter is vastly preferable to simply thinking about it or listening to someone talk about it. Of course, in this respect, natural sciences seem to have a pedagogical advantage over the social sciences; and the latter a similar advantage over disciplines such as English or philosophy.

Although economics is not usually taught as a laboratory subject, and, in fact, an economics laboratory is not easily developed, two kinds of activities have been useful to me in this Piagetian venture. The first, employed whenever possible, is direct, "real world" activity. This can be employed with topics such as price indices or public finance. The second kind of activity, resorted to when real world interaction is not feasible, is in-class simulation games and activities. This is suitable for macroeconomic theory, or money expansion, or international trade. Some topics, such as market structure, can be developed via a combination of gaming (to illustrate oligopolistic market behavior) and community activity (comparing prices in competitive versus oligopolistic markets).

One example from each pedagogical mode ("real world" and simulation) may indicate how I view the implementation of a learning cycle approach to economic activities.

Development of a College Student Price Index (analogous to the Consumer Price Index) is one "real world" activity which ADAPT students have accomplished and which exemplifies most of the pedagogical components discussed so far. Particularly during an inflationary period, a device which can help them see the shape and size of inflation as it affects them, is of interest to students.

The exploration phase of this learning cycle involved two components. One was a survey of the students themselves to determine what they bought and what they spent for it. The basis for the survey responses was a record the students were asked to keep for a period of two weeks, listing all purchases and amounts expended. The second exploration component was gathering price data from the shelves of Lincoln merchants.

Many "inventions" of kinds of concept formation were necessary to bring construction of a respectable price index to completion. One invention centered on the concept of a "representative market basket" of student utilized commodities. It was of course apparent to the students that we could not manage an index which contained every conceivable purchase during the school year. Thus their own records of purchases made were used to generate a list of 65 products, selected by the class, to represent their buying activity.

The students were soon confronted by the fact that simply adding up the prices of the selected commodities during two time periods and comparing the results was not sufficient as a representation of changes in their purchasing power. The importance of each item, or class of item, in their budget needed to be considered; thus the ideas of grouping the commodities into "classifications" and appropriately "weighting" each class were interjected. Six classifications were used (food, toiletries, school supplies, recreation, clothing and miscellaneous) and weights were assigned again based on recorded expenditures over the two week period. (Housing was omitted because of the anticipated stability of dorm rates during the academic year.)

The necessity for developing standards and specificity in product selection quickly became apparent. Simply going to the store and pricing "soap", or "gasoline" was not good enough; and our list soon specified "Dial, 5 oz.", and "DX plus" gasoline. Thus the idea of "care and rigor in data collection," and the possibility of subsequent "replication" were made tangible to the student.

Not to be forgotten among all the other inventions which were occurring is the concept of an "index number" itself. The students found indexation a useful concept to make some sense out of the mass of information gathered over a period of time; and it was regarded as a helpful aid rather than a teacher-imposed harassment by the time it was used in class.

Finally, the application phase of this unit is nicely built in, as the students were given the job of price gathering and index calculating at the first of each month. Thus we watched the index grow from 100 on September 1 to the level of 104.8 on March 1. Each month the movement of the components of the index is somewhat different, the effects of seasonal changes are apparent, and the students become more comfortable with this tool. Disequilibration and self-regulation were a natural and unavoidable part of the process. Having student A price soap one month at $.89 and having student B report it at $.35 the following month led to the self-regulation of product specification and standardization. The idea of grouping and weighting grew from the disequilibration caused by having the 10% change in the price of a pair of shoes

completely overwhelm price decreases in small-ticket items such as toothpaste when the entire list was aggregated in an undifferentiated way.

Simulation activities, although more artificial than price index construction, appear generally engrossing to students and have been used frequently. One successful venture involved several simple trading activities carried on in the classroom and designed to teach something about relative prices, market equilibrium, and gains from trade.

Our trading activity began by grouping students into clusters of eight (each of which could be regarded as a country), and allocating a set of commodities (jelly beans, gum, pencils, paper, paper clips) to each student. Allocations varied among students, and among groups, although some of the groups received allocations heavily weighted towards the edibles, and the rest received allocations heavily weighted toward the office supplies.

Intra-group trade then took place, with students recording the offer and trade process, until “equilibrium” was reached. We discussed why trade occurred, who “gained” from each trade, and why trade ceased.

Each group was then asked to develop group supply and demand curves for one commodity in terms of a second (gum in terms of jelly beans). They tested both supply and demand at various hypothetical prices, aggregated the data across the group, and graphed it. This exercise also established an equilibrium price for the commodity in question within each group.

Finally, the groups were free to engage in inter-group trade, again recording the process carefully. As expected, trade flowed from low cost to high cost countries, with all costs being dominated in goods. Thus the students could easily see that different gum:jelly bean prices in two countries established potential for gains to both via trade.

In this trading exercise the exploration activities involved the trading itself. Inventions included utility, demand and supply curves, relative prices, and gains from trade. Applications of these inventions were, unfortunately, primarily paper and pencil replications and problem-solving.

I would not claim any novelty in the use of classroom games or simulation activities. Such devices are familiar to many innovative educators and readers of pedagogically-oriented journals. What I do claim as novel is the establishment of a connection between all such “concrete” activities and a psychologically based theory which illumines the role such activities can play and the objectives they may fulfill. Thus instead of haphazard use for reasons of novelty or student enjoyment, they become the necessary exploration and disequilibration components of the concrete/formal transformation process.

Other concepts in economics can be approached via the learning cycle. Doing so generates greater student involvement with their own learning, allows them to work with data of their own development, and assures that the valued concepts emerge from concrete activities familiar to the students.

After one year of "ADAPTATION" in economics, what sort of appraisal is warranted? A cautious one. Quantitative information is not yet available on student mental development, personal growth, college dropout rate, etc. I believe I can identify pedagogical improvements yet to be made, such as further individualization of materials to accommodate better the wide range of student capacities and interest. I know that we dealt with fewer economic concepts during this academic year than I would have "covered" in a standard principles of economics course (perhaps this year we "uncovered" a few.) And yet I've worked much harder.

My professional assessment at the present time would include the following observations.

A. The Piagetian framework for understanding human intellectual development is useful in explaining the kinds of learning problems which appear in my classrooms. I am reasonably sure that a significant portion of my students cannot engage in "formal operations."

B. That understanding forces me to face that problem. I know that some of what I teach in economics is properly regarded as demanding formal thought. My past teaching habits involved extensive presentation of abstract concepts beyond the reach of "concrete operational" students. I can choose to revise my teaching to increase the accessibility of the material or I can "flunk out" the less advanced students.

C. The prospects of enhancing intellectual development through pedagogical activities which focus on that objective are stimulating enough to cause me to continue the attempt to develop techniques and materials suitable for that task. Until we demonstrate that such intervention is ineffectual, or is more costly in terms of effort, content mastery, or some other relevant variable, than the benefits merit, my involvement with this line of exploration will continue.

Occasionally I slip back into the comfortable lecture mode, and "tell the students what they need to know." They are respectful and attentive (probably relieved to sit quietly back in blissful inactivity for a change) and it "feels good" for me to be doing what I'm comfortable with. The lectures I deliver are generally good, clear, articulate, precise, sprinkled with humor, and well-paced. I leave the room on such occasions feeling very pleased with my hour's effort. But, when I try in a subsequent class period to retrieve from the students what was delivered to them two days previously, my "high" evaporates. There is little retrieval possible.

The results from the "learning cycle" are better—not perfect, but better. Students who have been involved with the materials and have generated the data seem to have a stronger, surer grasp of what concepts are involved. The ideas mean something to them, in terms they can understand, and therefore are better retained and used. And it's exciting, even for an instructor, to watch textbook concepts actively reproduced in a classroom setting.

On balance, I've seen enough to continue the activity. Perhaps, as an additional year or two of curriculum development and experience passes, strong positive results will be apparent. Perhaps not. But the pursuit of student intellectual development and the potential implications of Piagetian theory for college teaching makes the venture worth the effort.

Selected Sources of Further Information on Piaget and College Education

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EPILOGUE

The preceding essay, written four years ago, reflects my early involvement with Piagetian ideas and my attempts to modify my teaching to accommodate them. I am satisfied to have it stand as a marker on a path I have found helpful; but I also wish, through these few supplementary paragraphs, to comment on subsequent educational territory through which that interest in Piaget has led me.

On reflection, the fundamental perspective from which a variety of educational concerns have grown, for me, is awareness of the student as an educational variable. As surprising as it may seem, in retrospect, most educational innovation and experimentation, at least in the social sciences, appears to take the student as given and proceed to the modification of other educational factors (curriculum, pedagogy, equipment). The impact of these external variables on demonstrated student learning is, in most cases, the focal point of educational experimentation. The Piagetian perspective, on the other hand, opens the educator's eyes to internal states of student development as extraordinarily potent educational variables which must be considered and dealt with if we are to attain our educational objectives.

Grounded in that primacy of student internal state and potential as central concerns of the educational endeavor, my professional attention has been drawn beyond the preceding paper in three directions. The first of these is a relative shift from concern with the "stage of development" to concern with the nature of learning (epistemology) as a guide to educational strategy. The second direction which portends fruitful investigation is the expansion of the Piagetian view of intellectual development and its integration with parallel developmental theories into a more holistic picture of human growth. And, the third consequence of my Piagetian awareness has been consideration of the relationship between academic disciplines (more correctly, interdisciplinary education) and cognitive development. The following few paragraphs provide a hint of the progress which might be made along each of these intellectual paths.

1) Prodded and stimulated by the ideas of my colleague David Moshman, my attention has shifted a bit from Piaget's analysis of mental stages to the Piagetian "constructivist" epistemology.[1] While the differentiation between concrete and formal approaches to reasoning remains helpful to my understanding of students and my own teaching, consideration of the constructivist idea of learning provides more help to me in creating learning activities. Concentration on the interactive nature of learning is productive for me as it guides me toward a pedagogical method suitable for both concrete and formal reasoning approaches. After all, stage identification or classification does seem less important than proper development of effective teaching/learning strategies.

2) Piaget is not the only scholar assessing human maturational processes from a developmental perspective. The idea of integrating Piaget's views on cognitive development with related approaches such as William Perry's study of "intellectual and ethical" development[2], and Lawrence Kohlberg's analysis of moral development[3], seem to offer benefits to college educators.[4] By attending to a more complete understanding of the young adult learners who more often populate our classrooms, we may develop insight into their attitudes toward learning, toward authority, toward "right answers", toward intellectual curiosity, and toward the values system which drives them. All this in addition to awareness of their reasoning process! It is my view that such expanded awareness of the "whole person" may allow us to be much more effective in providing educational experiences better suited to the constructive abilities which our students possess.

3) An additional extension of my thinking "post-Piaget" has been reflection on the relationship between the constructivist epistemology and interdisciplinary education.[5] Paralleling the thoughts of other development-oriented educators[6], my hypothesis is that interdisciplinary education has the potential, in several ways, to be more conducive to constructive learning than

traditional discipline-oriented curricula. The "real world", at least for social scientists, is interdisciplinary; it is holistic. If we argue, as I do in the preceding paper, that "experiential" activities are consistent with the constructivist epistemology, we may then consider the use of society as our interactive laboratory. And that laboratory is best perceived through interdisciplinary eyes.

Further, the varied perspectives on any given social topic, problem, or issue provided via interdisciplinary investigation offer a non-contrived way to generate mental disequilibration or to challenge authority-based ideas of education which may dominate our students.

Finally, then, the Piagetian insights reflected in "Piaget and Learning Economics" remain a foundation for my approach to economic education. As does any foundation, they provide a base upon which further work can be constructed. In my own case, such extensions involve consideration of the significance of epistemological constructivism, more integrative understandings of human development, and the significance of interdisciplinary education for the developmentalists.

FOOTNOTES

[1] David Moshman, "(Muddling Through To) Piaget's Theory", (unpublished mimeo), University of Nebraska-Lincoln, 1979.

[2] William G. Perry, Jr., Forms of Intellectual and Ethical Development in the College Years: A Scheme (New York: Holt, Rinehard, and Winston, Inc., 1970).

[3] Lawrence Kohlberg, Moralization: The Cognitive-Developmental Approach (New York: Holt, Rinehart, and Winston, Inc. 1974).

[4] My own attempt to put some of these ideas together in preliminary form is contained in Jerry L. Petr, "Teacher Know Thy Student: Implications of Theories of Human Development for Teaching Economics", presented to the Western Social Science Association, April 1979.

[5] This idea is touched upon more fully in Jerry L. Petr, "Social Science Education from a Developmental Perspective", presented to the Association for Integrative Studies, March 1980.

[6] Barbara Hursh, "Interdisciplinary Education: The Piagetian Connection", (unpublished mimeo), Northeastern Illinois University, 1979.

