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Robert Fuller
rfuller@neb.rr.com

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ADAPT

A Multidisciplinary Piagetian-based Program for College Freshmen

Robert G. Fuller

ADAPT Program Director and Professor of Physics

University of Nebraska–Lincoln

In the beginning

At 9:30 am, on Thursday, February 1, 1973, I was sitting in the Trianon Ballroom in the Hilton Hotel in New York City listening to a talk by John W. Renner on "Intellectual Development and Science Teaching", based on the work of Jean Piaget (Renner, 1972). During his discussion of how the world looked to a science student using concrete reasoning I had an "ah-ha" experience. When I got back to the UNL campus, I found out that Renner's talk was based on his earlier paper in the American Journal of Physics, "Are Colleges Concerned With Intellectual Development?" (McKinnon & Renner, 1971). These two presentations of Piaget's work by Professor Renner had convinced me that there was, in Piaget's work, a way of understanding the inexplicable performances of college students in my physics courses. As I began to explore these ideas with other faculty, I discovered a small number of faculty members in other disciplines who were able to understand student difficulties within their disciplines in a similar manner. We decided to try to do something about it.

First, we needed to know more about the work of Piaget as it applied to college students. We invited John Renner (University of Oklahoma) and Robert Karplus (University of California, Berkeley) to our campus to give seminars on their understandings of Piaget's work. We were also mentored by Carol Tomlinson-Keasey (UNL) who had done Ph.D. research on formal operations in high school women students, college women students and 54-year-old women (Tomlinson-Keasey, 1972). During 1974, we tried to envision what a Piagetian-based program for college students would be and we submitted a proposal for financial support to the Exxon Education Foundation under the title of "A Multidisciplinary Piagetian-based Program for College Freshmen."⁽¹⁾ During that year, I

served on a national committee of physics educators with Professor Karplus to create a workshop for physics teachers based on the work of Piaget. Both of those activities culminated in January, 1975. The Exxon Education Foundation funded our proposal for almost \$100,000 and the Piaget workshop was first offered to physics teachers at a national meeting of the American Association of Physics Teachers (AAPT) under the title "Workshop on Physics Teaching and the Development of Reasoning" (Karplus, et al., 1975).

It was immediately recognized that we could never recruit students for a program with the title of our project proposal. My suggestion of PABLUM (Piagetian-based Approach to Basic Learning by Undergraduate Members) had already been rejected by my faculty colleagues. The name of the program, ADAPT, suggested by Jerry Petr, stood for "Accent on Developing Abstract Processes of Thought" and became the official name of the program in January, 1975.

During the spring semester of 1975, we studied Piaget together as a team under the leadership of Dr. Tomlinson-Keasey and were joined by Elizabeth Carpenter who had been using Piagetian-based methods to teach logic. We hosted a weekly public seminar for faculty in the student union building and took turns teaching a lesson in our discipline that we thought was based on Piagetian principles. We also broadened the AAPT materials into a workshop for all college faculty entitled "College Teaching and the Development of Reasoning" which we offered in March, 1975. Finally, we culminated our work together for the semester with a group trip to the Jean Piaget Society meeting in Philadelphia, where we heard Jean Piaget himself give a presentation on his latest work.(2) Now we were ready to try our first year of teaching in a Piagetian-based program for college students.

Before describing the ADAPT program, I want to digress, from a years-later perspective, to suggest what I now think we got right in the beginning. Piaget's work offered us some very powerful insights. First, as the Galileo of cognitive science, Piaget took seriously children's "wrong" answers and he set up systematic, semi-clinical interviews of children. He wanted to see how they reasoned about nature and he then built a mental model to understand their reasoning. Today, perhaps, this does not seem very radical. But it went against everything we faculty knew as professionals. The whole of our training had focused on the *content* of our disciplines and getting that sorted out for ourselves before presenting that sorted out version of "reality" to the students so that they could grasp it as we did. There was no awareness in our professional training that students might come to our courses with their own pre-shaped version of "reality" and be somewhat reluctant to give that up to adopt our versions. The simple act of hearing students' "wrong" answers and trying to figure out what that told us about how they were thinking about concepts in our discipline was a new task for all of us. But it was an essential act if we were to build learning experiences that could foster the intellectual growth of our students.

Second, Piaget's affirmation, that every human being goes through stages in the development of logical thought toward a highest level that he called Formal Operations or what we came to call scientific reasoning, or if-then-therefore logic, can put students' "wrong" answers in a new category. These answers can show the students as human be-

ings who are evolving through the stages of mental development by a process Piaget called Self Regulation. What we found interesting was that many of the mistakes students make in college courses arise because they use concrete operations in situations that demand formal operations.

Third, Piaget's discussion of self regulation as the process by which people grow from one stage of intellectual development to another was taken by Karplus and translated into a classroom instructional strategy which he called a "Learning Cycle" (Karplus, 1974). Karplus told us that he knew of no college programs that were trying to use the Learning Cycle approach to foster intellectual development by college students. So we decided to put together a college program that focused on self regulation rather than just content mastery and see if we could push college freshmen to develop the kind of advanced reasoning that is needed to do successful college work. Furthermore, we had the sense that the pushing would need to be done in more than one discipline if it were to be successful. Students needed to discover that formal operational reasoning can lead to success in humanities and social studies as well as in physics and mathematics. That was our goal.

Down from the mountain top

The ADAPT faculty had been to the mountain top (the Jean Piaget Society meeting in Philadelphia) and had heard the master (Piaget himself) speak. Now they had to return to Nebraska and spend the summer translating their understandings of Piagetian ideas into a college program for freshmen that would live up to the promises they had made in the brochures that had been mailed to about five thousand of the incoming students to recruit them for the program.

The ADAPT faculty, from the beginning, had a struggle to figure out how to describe the program to the entering students and their parents. The Piagetian framework that the faculty used to inform their curriculum and their teaching strategy seemed to them to have little, or perhaps negative, street value. High school seniors had little experience with alternative teaching and/or learning strategies. Parents and school counselors had only two categories for special programs, honors or remedial. In the following two pages are the first attempts by the ADAPT faculty to explain the program with integrity while still making the program attractive to freshmen students.

The paragraphs displayed in Figures 1 and 2 were taken from the brochure mailed to all prospective University of Nebraska-Lincoln freshmen. Forty students who expressed an interest in the ADAPT courses from the brochure were selected for the program. No attempt was made to select students on the basis of their previous school work or test scores. Rather, the program faculty wanted students in the program to be a representative cross section of the first year students coming to the University of Nebraska with no previous college experience.

Figure 1: Selections from the original ADAPT brochure to recruit students, 1975.

DESCRIPTION	PURPOSE
<p>ADAPT is a special program designed for freshmen. It consists of special courses in various departments. Content from these courses is closely interwoven and makes maximum use of your own experience.</p>	<p>ADAPT stands for Accent on Developing Abstract Processes of Thought. A program unique in the nation, ADAPT is a comprehensive and coordinated introduction to expectations of university-level work.</p>
<p>As an ADAPT student, you will work closely with experienced professors. Your classes will be much smaller than most freshman classes, and you will get to know your professors and your fellow students. Your advisor will be a member of the program so he will be able to discuss your program and goals with unusual understanding.</p>	<p>Since many freshmen throughout the nation experience some difficulty in meeting their own objectives in university work and are often unsure of their own potential and their career plans, the ADAPT courses will stress the students' ability to develop sound reasoning skills while gaining information and insights into several major disciplines.</p>
<p>ADAPT men and women earn 15 credits each semester, like most full time freshmen. These a credits will apply to group requirements in the Arts and Science College and most other colleges, so that you will be prepared to go on to advanced courses. Your adviser will help you divide your credits among the English, Mathematics and Logic, Natural Science (including lab), and Social Sciences requirements.</p>	<p>Persons who are exploring career opportunities as well as those who have already selected a major field will find the ADAPT program an ideal way to start their university education.</p>
<p>At the end of your freshmen year you will be well on your way to satisfying the group requirements for the BA or BS degree.</p>	<p>The ADAPT program is made possible by a grant from the Exxon Education Foundation. Exxon funds are only awarded to programs that hold promise of effective nationwide application. This program is another in a series of innovative educational programs at the University of Nebraska-Lincoln.</p>

Figure 2: Selections from the original ADAPT brochure to recruit students, 1975.

ADVANTAGES	ADAPT COURSES						
Explore many fields of study before starting on your chosen major.	<i>You may not necessarily find these courses listed in the various college catalogs, or the First Semester Schedule of Classes, since these classes are for ADAPT participants only.</i>						
Meet in small informal classes with experienced professors.	ADAPT requires twenty hours of class-work each week. Everyone in the program takes these special ADAPT courses:						
Be in close contact with faculty members interested in your performance and welfare.	<table border="0"> <tr> <td data-bbox="815 737 1003 768">English 198D</td> <td data-bbox="1068 737 1330 768">Anthropology 198D</td> </tr> <tr> <td data-bbox="815 772 1003 804">History 197</td> <td data-bbox="1068 772 1330 804">Mathematics 198</td> </tr> <tr> <td data-bbox="815 808 1003 840">Economics 198</td> <td data-bbox="1068 808 1330 840">Physics 198G</td> </tr> </table>	English 198D	Anthropology 198D	History 197	Mathematics 198	Economics 198	Physics 198G
English 198D	Anthropology 198D						
History 197	Mathematics 198						
Economics 198	Physics 198G						
Share several of your classes with some of the same students and get to know them personally.	These courses apply to appropriate Group Requirements for graduation from most colleges in the university.						
Take courses that fit together and build toward a common educational goal.	Specific registration instructions will be given after selection.						
Total academic work is evenly spread through-out the semester. This means that ADAPT men and women will never have several tests on the same day.							

At the first meeting of the ADAPT classes, students were given a handout that contained the class schedule (see Figure 3) and stressed the interactive aspects of the ADAPT program:

"The ADAPT program stresses activity centered learning. Your involvement in the total variety of classroom experiences provided in this program is essential. Many of the ADAPT classes will begin topics with open-ended, flexible exploration experiences. On the basis of what you and your student colleagues learn from these exploration activities, the ADAPT instructors will help you invent definitions and concepts and apply them to new experiences. In order to benefit from the ADAPT program, you should plan to actively participate in all of the scheduled ADAPT classes and seminars."

Figure 3: Weekly schedule of the ADAPT Program, 1975.

	Monday	Tuesday	Wednesday	Thursday	Friday
9:30	Econ		Econ		Econ
10:30	Eng	Anthro	Eng	Anthro	Eng
11:30	Hist		Hist		Hist
12:30					
1:30	Math-Phys				Math-Phys
2:30	Math	Seminar	Math		Math
3:30	Phys Lab				Phys Lab
5:00					

The ADAPT faculty met weekly for lunch and discussion. The social/collective effects of the program on the students became apparently almost immediately. The faculty had been concentrating so much on the cognitive development aspects of the program that its unique social dimensions had been overlooked.

From the beginning of the program, the ADAPT faculty were not committed to a specific curriculum. They saw themselves and the program as offering a different way of thinking about college teaching and learning. They resisted attempts by others to try ADAPT lessons to make an ADAPT course elsewhere. The workshop model was adopted as the primary dissemination mode.

In the early weeks much of the ADAPT course content was largely shaped by the traditional content imperatives of the various disciplines with a Karplus Learning Cycle process veneer. As the semesters progressed and the faculty developed a sense of how the students were and were not mastering essential reasoning patterns, the commitment to covering specific topics weakened. The course content shifted to serve the goals of intellectual development rather than content coverage. Certain sacred topics, such as vector mathematics in beginning physics, were dropped because of the inability of students to usefully master them. For example, after nine hours of hands-on laboratory experiences with vectors most of the students who could not understand them in the beginning were still not able to use vectors effectively. Never had so many spent so much time on such a small concept and made so little gain. It seemed clear that certain topics required formal operations and did not lend themselves to fostering the growth of reasoning.

The ADAPT faculty had offered a workshop on "College Teaching and the Development of Reasoning" on the UNL campus in March, 1975. They got a chance to take the workshop on the road in January, 1976, when they offered it for the faculty at Xavier University of Louisiana in New Orleans at the invitation of Professor J. W. Carmichael. It was the first of more than 100 workshops the faculty would subsequently lead.

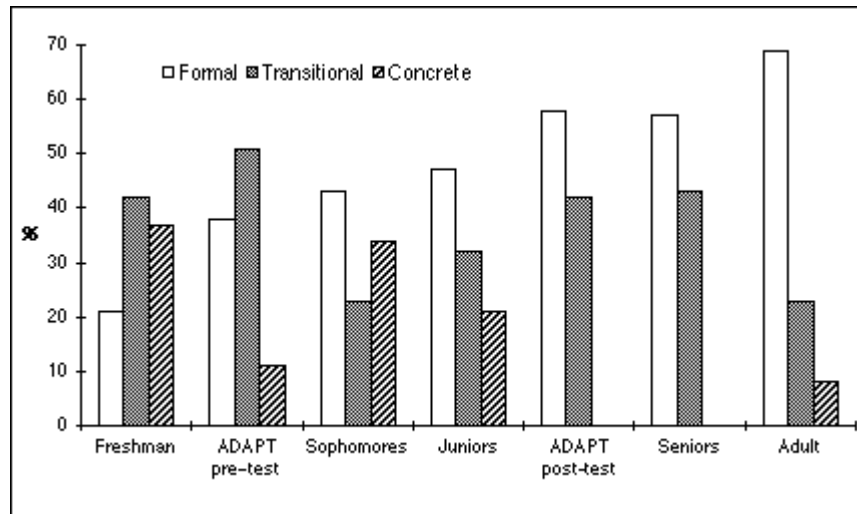
At the end of the first year, thirty students had completed both semesters of the ADAPT program. They were evaluated on formal operational thought and conceptual complexity using a pre-posttest model and compared to a control group of freshmen. On both of these

measures the ADAPT students showed growth over and above that typically seen during the freshmen year. (Tomlinson-Keasey, Williams, & Eisert, 1976).

A written test to measure proportional reasoning was developed. It also revealed significant gains by the ADAPT students when compared to other UNL students (Campbell, 1976). The ADAPT students on the posttest scored like typical seniors at UNL (see Figure 4).

The first year ended on an upbeat. The faculty and evaluators saw positive intellectual growth in comparison to typical first year students. The faculty had cooperated with Dr. J.W. Carmichael at Xavier University and Dr. T. C. Campbell at Illinois Central College. They both developed Piagetian-based programs at their institutions: the SOAR (Stress On Analytical Reasoning) program at Xavier; and the DOORS (Development Of Operational Reasoning Skills) at ICC.

Figure 4: Percentage of students using Formal, Transitional, and Concrete reasoning on Proportionality Tasks.



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ADAPT Faculty 1975-76

ELIZABETH T. CARPENTER, Department of Philosophy, Ph.D. Nebraska 1966

LESLIE C. DULY, Department of History, Ph.D. Duke 1965

ROBERT G. FULLER, Department of Physics, Ph.D. Illinois 1965

ROBERT D. NARVESON, Department of English, Ph.D. Chicago 1962

MARTIN Q. PETERSON, Department of Anthropology, Ph.D. Wisconsin 1969

JERRY L. PETR, Department of Economics, Ph.D. Indiana 1967

MELVIN C. THORNTON, Department of Mathematics, Ph.D. Illinois 1965

CAROL A. TOMLINSON-KEASEY, Dept. of Educational Psychology and Measurements, Ph.D. Berkeley 1970

VERNON G. WILLIAMS, Department of Educational Psychology and Department of History and Philosophy of Education, Ph.D. Michigan 1963

(1) The team of UNL faculty who wrote the proposal to the Exxon Educational Foundation which led to the creation of the ADAPT program were: Leslie Duly (History), Robert Fuller (Physics), Robert Narveson (English), Martin Peterson (Anthropology), Jerry Petr (Economics), Melvin Thornton (Mathematics), Carol Tomlinson-Keasey (Cognitive Psychology) and Vernon Williams (Educational Psychology).

(2) The ADAPT members who attended the Jean Piaget Society meeting in 1975 were Elizabeth Carpenter (Philosophy), Robert Fuller (Physics), Robert Narveson (English), Jerry Petr (Economics), Melvin Thornton (Mathematics), Rosemary Thornton (Elementary Education), Carol Tomlinson-Keasey (Cognitive Psychology) and Vernon Williams (Educational Psychology).

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