

**THE PROJECT APPROACH TO LEARNING**  
Documentation of the Success of an Existential Approach

A Master's Report

by

**OLIVEANN D. SLOTTA**

*Area 7*

Submitted to the Graduate School of the  
University of Colorado, Denver in partial fulfillment  
of the requirements for the degree of

**MASTER OF ARTS**

July 1991

Education

*Academic  
U.H. references  
at 10/10/91 to  
22 elements  
Scott  
Maltzman*

*"Set me a task in which I can  
put something of myself  
and it is a task no longer;  
it is a joy, it is art."  
B. Carmen*

*"Knowledge is experience;  
everything else is just  
information."  
Albert Einstein*

## ACKNOWLEDGEMENTS

I wish to express my sincere thanks to two members of the education faculty: Dr. Lyn Taylor for her guiding influence and exemplary teaching style, and Dr. William A. Juraschek for his continuous and thoughtful critique of my project work.

I would also like to thank my family - my husband Jim for his endurance and unlimited practical support and my children - Jim, who is at the University of Pittsburgh, for his advice on this research design - Lizann, from Case Western Reserve University, for her encouragement from an engineer's perspective, and Karen and Jon for lending new energy to the studies.

The Project Approach would not be possible without the special administrators at the CEC who encourage their teachers to try new things and provide the creative "space" to make that possible.

And finally I thank my close friends and colleagues for providing sustaining discussions and the promise of future celebrations.

## TABLE OF CONTENTS

	<u>Page</u>
ACKNOWLEDGEMENTS.....	iii
LIST OF FIGURES.....	v
INTRODUCTION.....	1
PART I.....	3
Overview of the Project Approach.....	4
Description of the Student Population.....	8
PART II.....	12
Study A - Analysis of Student-articulated Learnings.....	13
Study B - Comparison of Pretest and Posttest Results.....	17
Study C - Past Student Questionnaire Results...	22
CONCLUSION.....	28
NOTES.....	30
REFERENCES.....	31

## LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Photographs of energy project.....	10 &11
2. Table 1. Analysis of student-articulated learnings.....	14
3. Table 2. Comparison of pretest and posttest results.....	19
4. Program Alumni Graduation Statistics.....	25
5. Program Alumni Voting Statistics.....	26
6. Program Alumni Receiving Public Assistance.....	27

## INTRODUCTION

This report spans two years of graduate course work at the University of Colorado in Denver. Simultaneously with a graduate program in Curriculum and Instruction with a Secondary Mathematics Emphasis, this author held a teaching position at the Fred N. Thomas Career Education Center (CEC), a high school magnet of the Denver Public Schools. These dual engagements provided the distinct advantages of *an accessible applications laboratory* in which to try out new tools and ideas, and a plethora of *perspectives and insights* on an innovative approach already in place at CEC, the *Project Approach*.

Coincidentally, during these two school years (1989-90 and 1990-91) the program which I designed and in which I now teach, CEC's academic program - and of which the Project Approach is the key component - was scheduled for a regular program review.

Educational researchers have stated that "the affective objectives of any educational program are difficult if not impossible to document." These three situations- new graduate course insights, CEC's review of the author's program and the challenge of undocumentable success- prompted a year of consistent documentation of two different aspects of "The Project Approach." 1) *Academic Learnings*. Premise: Through interdisciplinary projects diverse and unpredictable academic facts and concepts are learned, even by the lowest achievers. 2) *Affective Outcomes*. Premise: The significant engagement of a student in solving a social problem does transfer to his/her adult lifestyle. When a student's image of himself/herself is that of a competent problem-solver, involvement in the larger community continues. It is important for educators to know if the problem-posing and image changing methods used in this approach

have a motivating effect on learning and a lasting impact on the student's relationship to school and community.

This report is presented in two parts: Part one is an *overview*. It describes the "Project Approach" and includes a description of a prototype project. Part one also includes a description of CEC's non-traditional students for whom the program was designed and from whom the study data was gleaned. This background information is offered in order to provide for the reader a frame in which to examine the data which follows.

Part two presents **four** bodies of research data from studies conducted with the student participants. The data are: **1.** The students' evaluations of the energy project (Study A) **2 & 3.** A test of basic energy knowledge which was administered at the beginning of the semester and again after the two week project (Study B) and **4.** A questionnaire mailed to the students after they departed high school (Study C).

## **PART I**

*Part one includes a history of the Project Approach, a description of the Spring 1991 project, and a statistical description of the Denver Public Schools (DPS) students who choose to come to the Fred N. Thomas Career Education Center for their academic as well as career, studies.*

### The Project Approach

The Project Approach was conceived by a team of four academic teachers to meet the needs of the non-traditional students attending the Fred. N. Thomas Career Education Center (CEC) fulltime. Students who participate in the program are primarily 11th and 12th graders; the program accommodates one hundred students and is coordinated and instructed by the four teachers who represent the disciplines mathematics, English, social studies and science. The students have been observed to be creative, action-oriented, and willing to risk. As the team leader of the teaching team, I worked with a consultant from the Institute of Cultural Affairs during the summer of 1986 to design the curriculum - procedures and timing - for a hands-on, problem-solving approach to learning - *The Project Approach*. The Project Approach is interdisciplinary by nature. It is thematic; the project topic provides continuity among the various academic classes for the entire semester as well as an urgent challenge for two weeks of team problem-solving.

Academic learning objectives are different for each project theme; however all projects share the following four, affective objectives: 1) To model life-long learning skills by teaming students with teachers and community leaders to apply new concepts together. 2) To identify latent leadership skills among the student body by mandating team problem-solving. 3) To promote effective citizenship by recognizing then working toward the solution to a widely-recognized, local problem. 4) To signify the life of each student by providing an opportunity for him/her to contribute personal skills or talents to an important cause.

The Project Approach was specifically designed to implement these objectives. Project themes are carefully selected one semester in advance.

Student research on the topic is enriched by a monthly project event such as an excursion, a feature movie or a guest speaker. Later in the semester, learning teams form and work intensively for two weeks to define an aspect of the problem for their own work, then brainstorm solutions and prepare a final product representing their best solution. The open-ended problem solving used in this approach implements an important mandate of NCTM's New Curriculum Standards as students are in a problem-solving mode all of the time. Students are motivated to learn particular mathematics skills, to use proper language forms, or to build scientific models in order to implement their team's solutions.

### **The Energy Project - A Prototype**

The essence of "The Project Approach" is its process; and because of its "organic" nature each project is different in academic learning objectives and in design. It therefore seems advisable to include in this documentation a description of one such project and illustrate by example the principles and procedures crucial to this learning approach.

During the Spring semester 1991, the project theme was formally titled: "Energy -Our Nation's Future Supply." Research on the issues began the first week of the semester with an all day seminar, "The Middle East - Blood for Oil?" Monthly research events included: **February** - A panel of community presenters representing Senator Tim Wirth's Office, The Public Service Company, Conoco Oil and EG & G Company spoke to the students from their perspective on long term energy issues. President Bush's energy policy had recently been presented to the U.S. Congress and local media reactions sparked the discussion. One of the previous year's projects was "The Wilderness Area Deadlock" so returning students had informed questions about President Bush's plans to pipe oil through a pristine wilderness reserve (ANWR). Each student maintained a personal research file containing the many

articles and documents which accumulated as the weeks progressed. **March** - Students viewed the film "Blue Planet" and the geo-thermal energy display at the Museum of Natural History. **April** - One of the founders of Earth Day was interviewed on KAOS, CEC's in-house radio station, about environmental issues related to energy. The research days complete, on April 8, problem-solving teams formed and began to work. The students contacted community groups and agencies concerned with the issue of energy in order to participate intelligently in a "Senate Hearing" on April 23, assuming the values and position of their own group. The students worked in the following team configurations: Chevron Oil, Automobile Designers, Anti-nuclear Activists, *Metaphor* Entrepreneurs, COPRIG, the Sierra Club, Solar Energy Engineers, Wind Energy Engineers, an Energy Law Firm, the Senate Energy Committee, the Underground Newspaper, the Green Party, Oil Shale Researchers, and the Natural Resource Committee. (All the local "players" in Colorado's energy drama.) Whenever possible team assignments reflected a student's career class or a personal interest. By now, teams met daily for two weeks. Each team was asked to prepare a one-page "position paper" for distribution at the hearing; each team also prepared a display promoting their position. Most teams produced banners, buttons and placards for hearing day.

The Senate Hearing was lively. It coincided with the "real" one in Washington, which was observable on C-SPAN. Guests came from various community groups and the school administration and faculty. Following the presentation of position papers by each team, the "Senate" team adjourned to formulate their recommendation. (It was an unpopular one - "support Bush's energy policy.") **May** - The Oil Shale team organized a three day trip to Colorado's western slope, which had been planned and promoted during the two weeks of teamwork. The students visited Unical Oil Company in Parachute

and an energy efficient house in Snowmass. Upon their return the team reported their learnings on energy impact in Colorado to the larger group with a slide presentation of the trip.

All of the project documentation which follows was collected from the student participants before, during and after this particular project.

## **B. The Student Population**

*Source of information: "Why Kids Stay In School" - a 222 item instrument written by a CEC faculty committee in order to better understand the needs of its student population.*

During the fall semester of 1989 the instrument "Why Kids Stay In School" was administered to 481 of the 648 students who attend CEC. Eighty-nine academic students (project participants) were among the population tested. (Only 9% of the parents refused permission for their child to participate in the study.) This instrument had been designed the previous Spring by a faculty committee to measure to what degree students who stay in school perceive themselves to experience the same circumstances commonly identified as prevelant variables among high school drop-outs: poverty, illiteracy, failure and retention, lack of parental support, poor grades, alienation. I will use the personal data on the student population collected from this instrument to define the uniqueness of the students who experience the problem-solving, project approach to learning.

The instrument contains 222 items designed to measure - in addition to drop-out factors- a wide range of personal perceptions: the student's experience in school, effects of his or her peer relationships on learning, family relationships and customs, financial status, and social values. The 89 academic students were coded separately to enable a computer sort of this subset. Following are the statistics relevant to this report on the 89 academic students: **Age** - 87% are 17 and older **Gender** - 52% are male, 48% female **Ethnic** - 33% are hispanic, 49% anglo, 9% black, 9% no response **Family** - 16% do not live at home, 26% live with both parents **Work**- 57% work; 12% work fulltime, 29% work to support themselves, 37% of those working find both attending school and working stressful. **Risk factors** - 43% frequently feel

suicidal, 43% frequently use alcohol, 35% frequently use drugs, 8% do not feel safe at home, 41% have either dropped out of school and returned or have "seriously considered" dropping out, 73% consider themselves "at-risk."

**Community involvement** - 57% believe it is important to be a good citizen.

I include this data to provide for the reader a perspective on the uniqueness of the non-traditional students who are the participants in my studies, the results of which follow.

## PART II

*Part II contains three studies , A, B, and C, which involve four bodies of research data(see pg. 2). Studies A & B discuss academic learnings about the project topic - specifically, what students articulated as learnings (study A) and what test comparisons show they learned (study B). Study C, on the other hand, documents the impact of the Project Approach's affective outcomes (see pg. 4) by comparing data from a post-high school questionnaire and official Denver county statistics for the same age group (18 - 24 years).*

### Study A - Analysis of Student-articulated Learnings from Energy Project Evaluations

*Instrument description:* The project evaluation instrument consisted of ten sections requiring twenty-five responses. Questions elicited mainly written responses to open-ended questions. The instrument was three pages long and took the students approximately 30 minutes to complete. The teaching team designed the student evaluation form, particularizing it for the energy project.

For this study we are concerned with the one section on *student-perceived, personal learning*. The question this section addressed is, "What did the students learn about energy?" Following is an analysis of the responses in that section of the evaluation. The section is formally titled "Personal Learning"; its directive reads: "List three things you learned about energy during the Energy Project that you were not aware of before and/or that will impact your actions in the future."

*Analysis design:* Fifty-two students completed and turned in project evaluations. Since the section calls for each student to articulate three learnings, there exists a potential data base of one hundred fifty-six responses. There were one hundred fifty-four actual responses from the fifty-two students. Together they listed one hundred and two *different learnings*. Twenty-six items occurred more than once on student forms. Ten students named one learning, the largest response item. When analyzing this data, I grouped the one hundred and two different items into the following *thirteen different categories or subtopics*: The U.S and world energy consumption; President Bush's energy policy; Cars; energy and the environment; Drilling for oil in Alaska; Energy conservation and its effect on supply; Nuclear energy; Solar energy; Alternative forms of energy; General energy comments; Energy for our homes; The

research and problem-solving process; and Implied social actions. The following table compares the categories by the number of student responses and provides a sample individual student response for each category.

**Table 1: ANALYSIS OF SELF-ARTICULATED STUDENT LEARNINGS BY TOPIC**

<b>CATEGORY TITLE</b>	<b>#STUDENT RESPONSES</b>
<b>Energy conservation and future supply</b>	<b>22</b>
"In 60 years our natural resources will be depleted."	
<b>Alternative forms of energy</b>	<b>20</b>
"How much the U.S. uses wind energy."	
<b>General energy comments</b>	<b>19</b>
"There are law firms that deal with only energy."	
<b>Solar energy</b>	<b>16</b>
"There are two kinds of solar energy-active and passive,"	
<b>The U.S. and world energy consumption</b>	<b>16</b>
"The U.S. uses 1/4 of all the energy in the world."	
<b>Drilling for oil in Alaska</b>	<b>12</b>
"How much oil we now take from Alaska."	
<b>Cars</b>	<b>11</b>
"My dream car has the worst gas mileage of all."	
<b>Energy and the environment</b>	<b>9</b>
"How oil companies have environmental safe programs."	
<b>Nuclear energy</b>	<b>8</b>
"Nuclear waste is dangerous."	
<b>President Bush's energy policy</b>	<b>7</b>
"How much the government covers up our energy crisis."	
<b>Implied social action</b>	<b>6</b>
"What the future will bring if we don't find a good way to save energy."	
<b>The problem-solving process</b>	<b>5</b>
"We'd better use this process to save the environment."	
<b>Energy for homes</b>	<b>3</b>
"How to conserve energy at night by storing it in batteries."	
<b>TOTAL RESPONSES</b>	<b>154</b>

Figure 1 - Category titles appear in bold. The sample student response for each category appears in quotes beneath exactly as stated on the evaluation.

The student *values* evident in this comparison are intriguing and further analysis of these responses is relevant to this documentation effort. The single item recalled by **ten different students** is the first quote in figure 1: "The U.S. uses 1/4 of all the energy in the world." A powerful image, which no doubt explains its easy recall-ability, and a *mathematical relationship*. Approximately **20%** of these non-traditional learners remembered a *statistic* from their energy research, and remembered it accurately! **Five students** mentioned an aspect of President Bush's energy policy. The following items were recalled by **four students** each: "How solar panels are made and how they work."; "The fuel of the future (herbs and plants)"; "Statistics on energy in general." Six items were mentioned by **three different students**: "In 60 years our natural resources will be depleted "; "ANWAR is over 1,000,000 acres "; "There are a lot of alternatives "; "Chevron gets 1/4 of their oil from Alaska "; and "Teamwork will get you far."

Let us also consider the *diversity* of student responses in this study. Though they were mentioned by only one or two students, the following additional articulated learnings are insightful. "Almost everyone is against drilling in ANWR." "I learned how to set up a field trip." "We could make cars more efficient, but we don't because of greed." "It's possible to run a car on solar energy." "It is not too late to change." "The car with the best mileage is an American car." "If our cars would go 40 miles per gallon we would save 2.4 million gallons of oil per day." "Brick houses hold the most radiation." "What we are doing to Mother Earth." "People all have different views on the topic of energy and conservation." "I learned how to act like a real, live Senate member." "Without energy our culture would not be able to run." "Without electricity CEC would not be able to run." "We destroy a lot of the wilderness area and animals when we drill for oil." "I learned how oil shale works." "That

you can produce about 1 volt of electricity with a lemon, orange or potato." "If emissions were raised 20% we would save 2.5 million barrels of oil per day." "We need mass alternative energy education."

The above learnings came from approx. 60% of the academic students, (52 of 92). The total body of learning by this group of students in this 20 hours of contact time must be even larger. Since these learnings are the students' own verbal articulations after a reflection on the two weeks' experience *they are likely to retain them.* (Keith 1988, pg. 717)

*Conclusion:* In his book The Fifth Discipline, Peter Senge says, "there are striking examples where the intelligence of the team exceeds the intelligence of the individuals on the team, and where teams develop extraordinary capacities for coordinated action. . . The discipline of team learning starts with 'dialogue', the capacity of members of a team to suspend assumptions and enter into a genuine 'thinking together.'" (Senge 1990, pg. 10) As we continue to examine data in the face of this documentation task, let us note that as students in the academic program *shared* these learnings (through their on-going reporting process) each team and the entire learning community of academic students does know an impressive (if unspecifiable) amount about the future of U.S. energy. Study B examines a different set of knowledge-based data and allows us to discuss the obviously significant question, "how much does an individual student learn?"

### Study B - A Comparison of Energy Project from Pretest and Posttest results

*Instrument description:* The same test - administered both before and after the project - contained fifteen items; one item had ten parts making a total of twenty-four possible correct responses. The test contained questions in each of the four discipline areas: mathematics, English, social studies and science. Each of the four academic teachers contributed the questions in her/his subject area, according to the project learning objectives. Of the fifteen, six were multiple choice, four - yes or no, three short answer and one essay. The test was three pages in length. For this study each correct answer was awarded one point.

*Study design:* The test was first given at the beginning of the semester and prior to the Middle East Seminar; it was then given approximately three months later, after the two weeks of project teamwork. It was administered in five separate classrooms by five teachers; the same teacher administered both the pretest and posttest for each group.

Following are two variables which impact this particular study and the way we read the analysis of results. 1) **Student motivation** at the beginning of a semester is high - some students are new to the program and are out to make a good first impression. By late April, Spring fever has set in. Seniors are counting their last twenty days, and motivation is negligible. About half of the students in this program are juniors and half are seniors. 2) Since each academic student can enroll in classes in just three of the four academic subjects, **not every student participated in classes in each subject area**. Consequently, to compare the number of correct answers for a particular item among students who both did and did not cover the material in a classroom does not provide a valid measure of teaching or learning success. Because of

these two factors, I believe that this instrument should not be considered a valid measure against *particular* academic outcomes. Therefore I focused my analysis on a small subgroup of students whose results are most significant - the students who scored *lowest* on the *pretest*.

*Analysis design:* Of the ninety-two students enrolled in the academic program in April, fifty-five turned in both a pretest and posttest. (Thirty-five students were absent from class on one of the two days of testing.) Of these fifty-five, twenty got approximately half or less of the answers correct on the pretest. Because I would expect their results to be dramatic and obvious I chose to examine the results of these twenty students. Of the twenty students, four failed to do one of the three pages; their results were discounted. The data which follows is based on test results from the sixteen lowest scoring students who include five seniors, two sophomores and nine juniors. All these students tried most of the items on both tests.

I compared these two factors: 1) The pretest raw score with the posttest raw score; and 2) the number of words in the essay.

The students were ranked alphabetically, then numbered. The results appear in table 2 (figure 2).

**Table 2 - COMPARISON OF THE PRETEST AND POSTTEST RESULTS OF SIXTEEN STUDENTS WITH LOWEST PRETEST SCORES**

STUDENT #	PRETEST SCORE	#WORDS	POSTTEST SCORE	#WORDS
1	18	49	13	0
2	0	0	0	0
3	6	41	10	26
4	7	0	18	43
5	3	0	5	0
6	9	19	14	10
7	12	0	18	0
8	11	30	19	22
9	6	0	20	14
10	12	24	20	15
11	9	20	18	13
12	7	0	8	0
13	12	29	17	26
14	4	0	2	0
15	0	0	12	30
16	2	0	6	0

**Pretest scores:** Statistically the mean pretest score is 6.5 and the median score is 7. The total of the raw pretest scores is 118. The range of pretest scores was 18 - 0. **Posttest scores:** The mean posttest score is 11.4 and the median is 12 & 13. The total of the raw posttest scores is 205. The range of posttest scores is 20 - 2.

Two students (or 12%) scored lower on the posttest than on the pretest. Both were seniors. Together their net loss was -7. Thirteen, or 81% of the scores were raised. Their gain in points was + 92. The net gain in total raw scores of the posttest over the pretest was 85 representing a 74% increase. *Six students increased their scores by more than 50%.* Since these were the lowest achievers in a high risk program I find such an increase in individual learning to be extremely significant.

Further examination of the data in table 2 indicates that six of the sixteen students did not write a response to *either* the pretest or posttest essay question. I attribute this to the non-traditional students in the program and their natural reluctance to perform academic functions. The fact that the total number of words written for pretest responses was 212 and the total number for posttest responses, 199, may be explained by the difference in motivation levels between January and April.

On their project evaluations (Study A) several of these sixteen students mentioned the following team activities as important learning experiences: "visiting an energy law firm"; "designing a poster and logo for my team"; "I contacted the American Air Association in Washington and talked to an organizer"; "I asked for the latest info on Wind Energy"; "studied and summarized Bush's energy policy"; "I studied gas mileages." (and discovered that her dream car had really bad mileage ); "I called Rocky Flats"; "I was the camera-man for the lawyers' commercial." *One of the sixteen students went on the research trek to the Western Slope.*

*Conclusion:* The pretest - posttest analysis indicates a significant increase in the knowledge of energy data among sixteen students with the lowest beginning scores. These same students performed well on their teams, gaining impressive insights through the process. We can never measure

exactly all that students learn. Tests don't do it; evaluations don't; in fact, as humans we are never fully aware of what we know. Study B has merely shown that specific learning did occur through the Project Approach.

**Study C - Past Student Questionnaire Results  
from 1986 - 1989 Program Participants**

*Instrument Description:* The instrument used contained eight sections; six of the sections elicited eight short answers by checking boxes. Two asked for written comments. It was in questionnaire format and comprised two sides of a single page; it took students approximately 10 minutes to complete.

For study C we are concerned with sections 1, 2, 4 & 5, which address the following five arenas: 1) High school completion. 2) Continuing education at a college or technical school. 3) Community volunteer work. 4) Activity in the political process -ie registered to vote and voted and 5) Self-sufficiency -ie received public assistance money (ADC) or food stamps. The instrument was designed by this author during the summer of 1990.

*Study design:* The study collected objective data about past students' accomplishments and community involvement since they left the program. By comparing this data with community norms we will measure whether immersion in community issues and participation in their successful solutions during their formal high school years transfers into participatory adult patterns. (see pg 3-affective outcomes)

Three hundred seven students had completed at least one semester in the academic program at CEC during the four years of Fall 1986 through Spring 1990. Of these three hundred seven, addresses were available for all but ninety-three. In August of 1990 the questionnaire was mailed with a stamped, return envelope to these two hundred and fourteen "program alumni." Forty-three or 20% returned the questionnaire by mail or in person. Results from these forty-three will be referred to as the "motivated responses." Forty-three additional names were randomly drawn by number from the remaining one hundred seventy-one "program alumni" and surveyed by telephone. If a

telephone number had been disconnected the number of that student was returned to the drawing pool and another student's number drawn. Forty-three additional students were documented in this manner. (Questionnaires were filled out for them by the telephoner and results compiled.) These results will be referred to as the "unmotivated responses." This study compares these two bodies of data and then combines it for a valid representation of participatory patterns of the young adults who as high school youth experienced the "Project Approach" as a part of their high school curriculum. By comparing these results with participatory statistics of Denver county residents in this same age group (18 - 24yrs\*) we will draw conclusions about the impact of "The Project Approach." (\*The 1990 alumni would be at least 18 years old and the 1986 alumni not older than 24 years. Students in the DPS may remain in school until the age of 20 increasing our span to 18 -24 yrs.)

•**Motivated results:** Question 1) High school completion: Forty-two or 98% graduated from one of Denver's ten high schools. The remaining one has received a GED. Question 2) Continuing education: Twenty-three or 53% of these past students have attended a college or technical program since graduation. Four others, or 9% are in the military service. Question 3) Community volunteer work: Thirteen or 30% said "yes" and four did not respond. Question 4) Voted: Twenty-one or 49% have voted. Three did not respond. Question 5) Self-sufficiency: Forty-one have not received public assistance or 95% are self-sufficient.

•**Unmotivated results:** Question 1) High school completion: Thirty-one or 72% graduated from one of Denver's ten high schools. Seven have received a GED. Question 2) Continuing education: Sixteen or 37% of these past students have attended a college or technical program since graduation. Two others are in the military service. Question 3) Community volunteer work: 33%

responded "yes" Question 4) Voted: Twelve or 28% have voted. Five did not respond. Question 5) Self-sufficiency: Forty have not received public assistance of whom four are under eighteen for an 84% self-sufficient rate.

•**Combining the results** of the motivated and unmotivated data to correlate with available comparison statistics follows: Question 1) High school completion: Seventy-three of the eighty-six total respondents have graduated from high school. Eight of the remaining thirteen have received GEDs and two are still enrolled in school for an **87% graduation rate**. Eleven of our eighty-four did *not* receive a diploma for a **drop-out rate of 13%**. (figure 4) Question 4) Voted: Thirty-three respondents or **38%** have voted. (figure 5) Question 5) Self-sufficiency: Seventy-seven of the eighty-six have not received public assistance or 90% are self-sufficient. (figure 6) Five respondents or **6% have received public assistance**.

For **comparison** purposes **statistics** were obtained from state and Denver county agencies. By question, results follow: Question 1) Denver Public Schools lists a **drop out rate of 14.5%** for 11th graders and **8.7%** for 12th graders or a loss of 21.9 students per hundred (**21%**) during the 1989-90 school year. *No statistics were available on drop out rates for high-risk students only.* Question 2) No statistics available Question 3) No statistics available. (Colorado's citizens advocacy office has been abolished.) Question 4) Voted: 1,284 of Denver county's 45,880 18 - 24 year olds or **3%** are classified as **active voters**. Question 5) Self-sufficiency: 5,270 of Denver county's 45,880 18 - 24 year olds or **11%** received public assistance money in 1990.

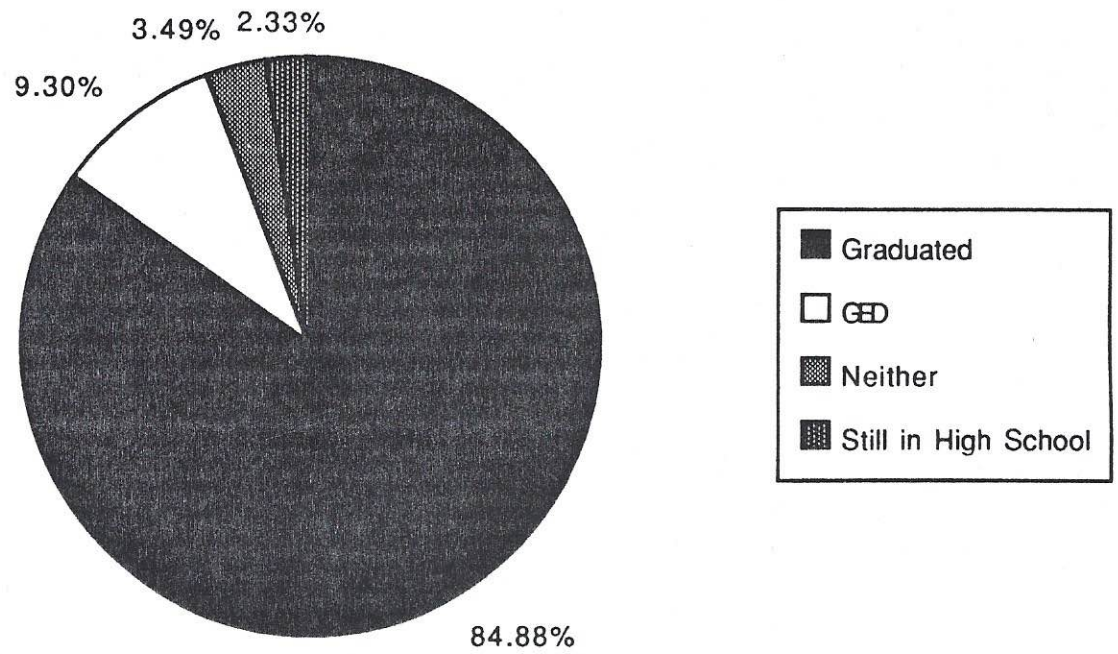


Figure 4: Program alumni graduating from high school

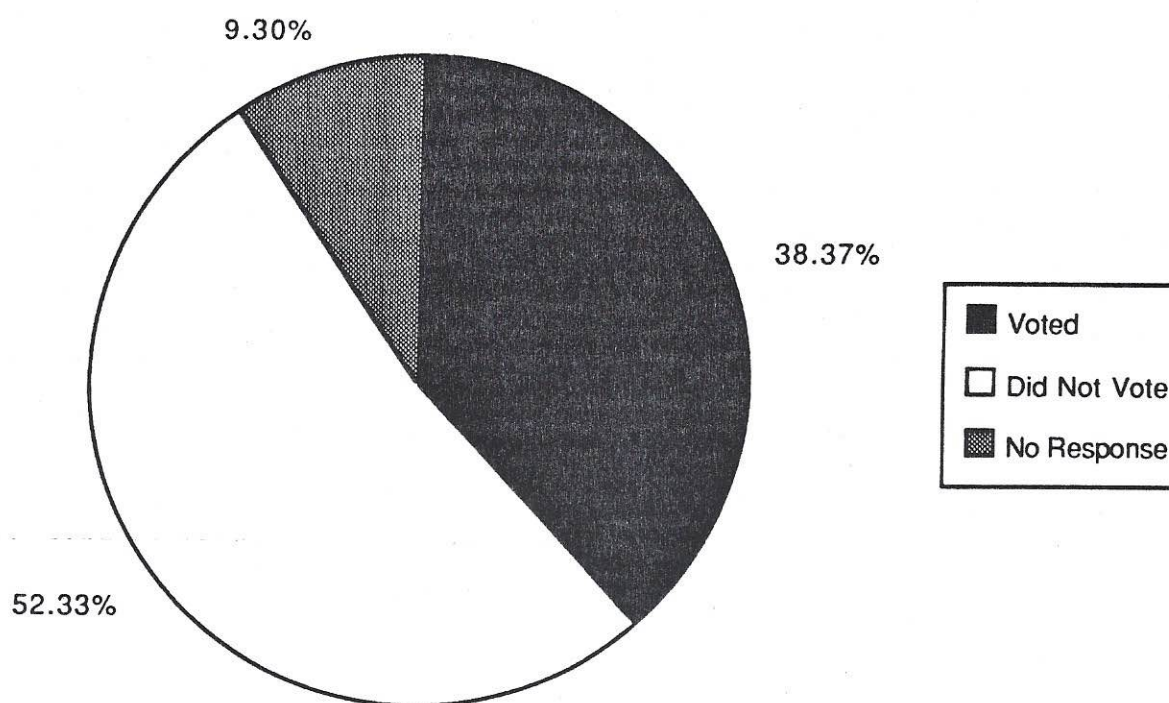


Figure 5: Program alumni voting statistics

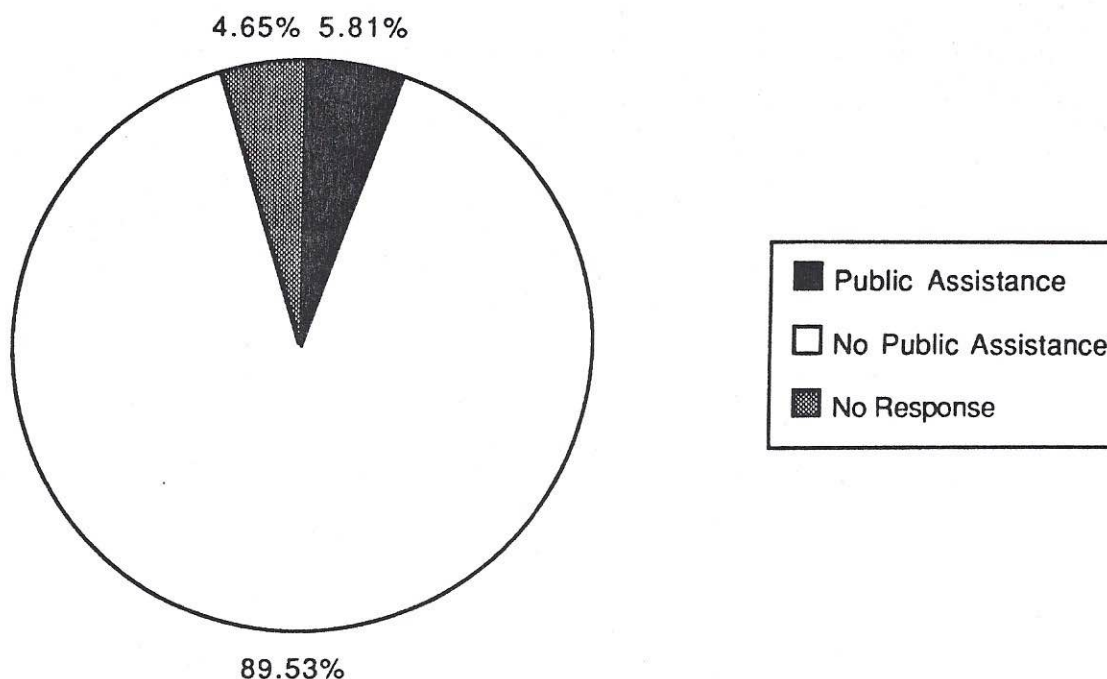


Figure 6: Program alumni receiving public assistance

*Conclusions:* On page four the affective objectives of the academic program are listed. The Project Approach is the strategy used to implement these objectives. Study C has shown that based on available alumni information and local norms, young adults who have participated in learning projects have amazingly higher participation patterns after leaving high school.

## CONCLUSIONS

The schedules and delivery systems of traditional high schools were designed to prepare students for success in an industrial society where assembly lines and production quotas were the norm. In today's information age, entrepreneurship and team problem-solving are desired qualities for workers. Traditional programs tend to reward the highest achieving students, sending by implication messages of inadequacy to nearly half of a typical class, leaving a residue of images of low self-esteem.

The Project Approach, in response to the challenge of our times, presents an alternative. Teams excel, and team creativity is rewarded. All are enticed to participate. Unlimited learning occurs as images of school, self and the world slowly shift. (Boulding 1961, pgs. 6-10)

This report documents the success of this *Project Approach* - the key component of a non-traditional program designed for one hundred diverse high school students, 73% of whom consider themselves to be "at risk." Several drop-out identifiers are statistically present in this group (see pg.10).

Study C has shown that 87% of the program's past participants actually did graduate from high school, that 38% are now voting citizens and 90% have been economically self-sufficient. When compared with official Denver county and DPS statistics the students in our group have performed radically different from the Denver community norms. They are economically, politically and culturally more involved in Denver society.

Study B produced less clear conclusions. It will never be proven that students can acquire more academic information about energy in 20 hours of project work than they would have in 20 hours in a science classroom. We did

however show that these students can clearly articulate their multi-faceted, personalized energy concepts and concluded that they will therefore likely retain it.

Study A quantified individual learning by comparing student performances on the same test, given before and after the project work. By the very nature of the Project Approach, not all of the students will ever have the same learning experience, so an item-by-item analysis was not conducted. The sixteen students scoring lowest on the pretest showed a marked improvement on their posttest scores, some as high as 50%. Studies A & B together show that the student body acquired a diverse and massive amount of information with the Project Approach, driven as it is by individual students' own interests and skills.

Foundational to this learning approach is the concept of *image change* mentioned above, and first referenced in the Introduction (see pg. 2). The concept that "everyone operates out of images" was presented by Dr. Kenneth Boulding in his book The Image. (Boulding, 1961 pg. 5) The Project Approach intentionally promotes for each student the image of him/herself as a competent problem solver; it promotes the image of school as a helpful source of information and methods; and it promotes the images of the world and community as in urgent need of everyone's care. By design the Project Approach assumes these operating images and reinforces them as the semester progresses. The student emerges as a stronger human being than ever before for s-he has seen that s-he has made a difference, and that is an empowering experience.

good

## NOTES

1. Denver Public Schools' drop-out rates were obtained from their drop-out office at 900 Grant Street, Denver, Colorado.
2. Voting statistics for 18 - 24 year olds were calculated using information from two sources. There are 18,202 18 - 20 year olds and 27,678 21 - 24 year olds in Denver county according to the 1990 census. Source: State of Colorado's office of planning and community development. The Secretary of State's election office documents that 1,284 adults under 25 voted in 1990 and either in 1989 or 1987, classifying them as "active voters."
3. Public assistance data for 18 - 24 year olds in 1990 will be available through a special computer run by July 15, 1991 from the income and assistance division of Denver County Social Services at 2200 W. Alameda Ave. Denver, Colorado.

## REFERENCES

Boulding, Kenneth. The Image. Ann Arbor: The University of Michigan Press. 1961.

Dewey, John. The School and Society. Chicago: The University of Chicago Press. 1915.

Keith, Sandra. "Explorative Writing and Learning Mathematics." The Mathematics Teacher. December 1988.

The National Council of Teachers of Mathematics Commission on Standards for School Mathematics. Curriculum and Evaluation Standards for Teaching Mathematics. Reston, Va: The Council, 1989.

Perkins, David. "Mindware, The New Science of Learnable Intelligence." (audiotape) Association for Supervision and Curriculum Development 1989.

Senge, Peter. The Fifth Discipline. New York: Currency and Doubleday. 1990.

Shanahan, Lynn and Johnson, Sharon A. "Why Kids Stay In School" (Research Instrument) Denver Public Schools. Unpublished as of July 1991.

Spencer, Laura. The Group Facilitation Methods of The Institute of Cultural Affairs. Winning Through Participation. Dubuque, Iowa: Kendall/Hunt Publishing Co. 1989.

Didactics and Mathematics "Goals Through Discovery Lessons." Chapter 9 Sunnyvale, Ca: Creative Publications. 1978.

**The Fred N. Thomas Career Education Center**  
 Affective Learning Plan for Full-time Students    Applied Imaginal Education TM  
 Desired *Image Changes* for Effective Learning

**CHANGING IMAGES**

**Of Self:**  
 From: A failure or unsuccessful learner  
 To: A successful, curious learner with creative potential  
 From: A high school kid  
 To: A young adult

**Of School:**  
 From: A place to play  
 To: A place to work  
 From: A place where passive endurance is rewarded  
 To: A place where passive endurance results in failure  
 From: An inaccessible pre-determined program  
 To: A learning community that requires everyone's participation

**Of Community:**  
 From: A sometimes hostile and closed group of elected officials  
 To: Particular, dedicated people working on special causes

**2 weeks**

**A COMMUNITY PROJECT**

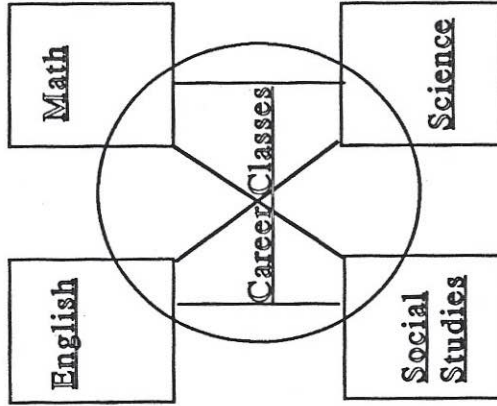
**Of Self:**  
 From: A disengaged high school student  
 To: An effective, practical problem-solver

**Of School:**  
 From: A place where facts are dispensed in classrooms  
 To: A community resource center

**Of Community:**  
 From: Inaccessible, scattered groups of people in unknown buildings  
 To: Coherent groups of people whose causes need everyone's care.

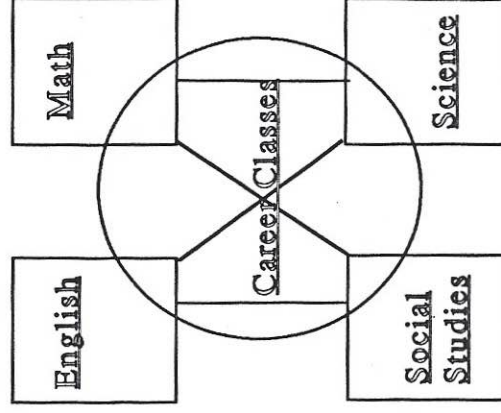
**2 weeks**

**ACADEMIC SEMINARS**



**6 weeks**

**ACADEMIC SEMINARS**



**6 weeks**

**PERSONAL PORTFOLIO**

**Of Self:**  
 From: Student of facts  
 To: Creator of products

**Of School:**  
 From: Dispenser of rewards in segmented grades  
 To: Acknowledger of integrated, learning accomplishments

**Of Community**  
 Enhanced From: Cause of my care  
 To: A source of resume recognition  
 From: A place where luck is required to succeed  
 To: A world in which my future is within my control.    **2 weeks**