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To test the effectiveness of a program of acceleration and enrichment, five ninth grade classes of students (25 in each class, IQ's 120 or above) who had been in this program for 2 years were compared to two control (C) classes of academically talented students who had not had the program. All students were given a series of standardized achievement tests and were asked to complete a school attitude questionnaire. Two experimental (E) classes were significantly superior in all comparisons in mathematics, in two of three comparisons in reading, and in one of three comparisons in science (p=.05). In school systems A and B the E-groups were significantly superior in only two of six comparisons with the C-groups. An analysis of the total performance of all the experimental classes revealed that they were significantly superior to the controls in only 10 of 21 cases (p=.05). The performances of average E-groups from the same schools were significantly different from C's in only four of 30 comparisons. Responses from questionnaires did not indicate a significant difference in attitudes between the groups. Conclusions were that the acceleration and enrichment program did not hurt either academically talented or average students, that the special program could be improved, and that the program was more appealing to students and teachers than a more traditional approach. (RP)

# ACCELERATION
# and
# ENRICHMENT
# in the
# JUNIOR HIGH SCHOOL

## A FOLLOW-UP STUDY

Walla Walla
Public Schools


LOUIS BRUNO
SUPERINTENDENT OF PUBLIC INSTRUCTION
OLYMPIA

# ACCELERATION AND ENRICHMENT IN THE JUNIOR HIGH SCHOOL

## (A Follow-up Study)

By Mr. Richard Arends
Walla Walla Public Schools

Dr. Paul M. Ford
Principal Investigator
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This contract research project was made possible by appropriations for educational research and gifted programs by the 1961 and the 1963 Washington State Legislature.

LOUIS BRUNO
State Superintendent of Public Instruction
Olympia, Washington

Research Report 03-05
July 1964

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# WALLA WALLA PUBLIC SCHOOLS

SCHOOL DISTRICT NO. 140

WALLA WALLA, WASHINGTON

ALLEN REYNOLDS, ASST. SUPT.
K. A. TIDRICK, HIGH SCHOOL PRINCIPAL
EARL BLAKE, SECY. OF THE BOARD


June 29, 1964

Mr. Louis Bruno
State Superintendent of Public Instruction
Olympia, Washington

Dear Mr. Bruno:

The Walla Walla Public Schools have been operating a program for the academically talented since 1958. The first real analysis of the effectiveness of acceleration and enrichment in the junior high schools was initiated in the fall of 1962 through research funds from your office. Your additional support of this study has made it possible to continue this research during the 1963-64 school year. This project has been very valuable to us and has been a stimulus to the entire staff in their continuing re-evaluation and improvement of the instructional program. We hope that it will also be of real value to other school districts.

The research study was supervised by Dr. Paul M. Ford, Assistant Professor of Education at Whitman College. We are indebted to both Dr. Ford and Mr. Richard Arends, Garrison Junior High School teacher, for the fine way in which they conducted the research and compiled the final report.

We would like to express our appreciation to you, to Dr. Ray Jongeward, Director of Research, and to the members of your staff for all of the assistance which we have received in carrying out this project. May we also express our thanks to the State Department of Education for making such a research study available, and to the Research Advisory Committee for their approval of the grant.

We submit herewith a copy of the research project "Acceleration and Enrichment in the Junior High School - A Follow-up Study" for your approval.

Sincerely yours,

Allen Reynolds

Allen Reynolds
Assistant Superintendent

AR:wb

# PREFACE

The research described in this report is a continuation of a study undertaken in 1962-63 by Mr. Harry H. Cobain of the Walla Walla Public Schools and Dr. Paul Ford of Whitman College. Both the 1962-63 and the 1963-64 studies were supported with funds appropriated by Walla Walla School District 140 and the Research Office of the State Superintendent of Public Instruction.

The researchers wish to acknowledge their gratitude to Dr. Ray E. Jongeward, Research Director, Office of the Superintendent of Public Instruction, for his aid in supporting this study. Administrators from school systems "A", "B", "C" and "D" were most cooperative in supplying data required by the study. The following individuals from the Walla Walla Public Schools encouraged and aided the researchers: Mr. Arthur Jones, Superintendent of Schools; Mr. Allen Reynolds, Assistant Superintendent of Schools; Mrs. Catherine Rew, Director of Special Services; and Mr. Erwin Beard, Curriculum Director.

The interest of all who participated in this study is very much appreciated and hereby acknowledged.

R. A.

P. F.

Walla Walla, Washington
June, 1964

## HISTORICAL BACKGROUND

In September of 1962 Walla Walla School District 140 and the Research Office of the Office of the State Superintendent of Public Instruction entered an agreement to carry on research during 1962-63 to test the effectiveness of a program of acceleration and enrichment in two Walla Walla junior high schools.[1] Subject acceleration was practiced in mathematics, while the science and reading programs were enriched. Two hypotheses were tested: (1) A program of acceleration and enrichment for the academically talented student causes him to gain more academically than equally talented students not exposed to such a program; (2) a program of acceleration and enrichment for the academically talented student produces a school atmosphere in which the average student gains more academically, even though he is not exposed to acceleration and enrichment, than do his peers in schools in which there is no such program.

The experimental groups, those students educated in the two Walla Walla junior high schools, were compared to matched control groups. All students considered were September ninth graders; thus, the experimental groups of academically talented students had been exposed in grades seven and eight to acceleration and enrichment, and the experimental groups of average students had been exposed to an atmosphere on acceleration and enrichment in grades seven and eight. The basis for comparison of the experimental to control groups was a series of standardized achievement tests in reading, science and mathematics, STEP 3A, administered to both groups in September of 1962. The dependent variable was the difference in achievement between the experimental and control groups. The basic research design was represented in the following manner:

1 This study is fully described in H.H. Cobain and P.M. Ford, ACCELERATION AND ENRICHMENT IN THE JUNIOR HIGH SCHOOL (Olympia, Washington: State Superintendent of Public Instruction, 1963)

| Experimental Groups | Control Groups | |
|---|---|---|
| School A | School D | School F |
| $X^1$ | $C^1$ - rejected because of inadequate sample | $C^3$ |
| $X^2$ | | |
| School B | $C^2$ | $C^4$ |
| $X^3$ | | |
| $X^4$ | | |

$X^1$, $X^3$ - Academically talented students exposed to acceleration and enrichment

$X^2$, $X^4$ - Average students in schools where acceleration and enrichment are practiced

$C^1$, $C^3$ - Control groups - academically talented students

$C^2$, $C^4$ - Control groups - average students

Note: Groups $X^1$ and $X^3$ were compared through testing to group $C^3$.
Groups $X^2$ and $X^4$ were compared to groups $C^2$ and $C^4$.

Statistical analysis of test scores resulted in these findings: (1) While the experimental sections of academically talented students proved to be superior to the control groups in all tests, in only three of six instances of comparison were the experimental sections significantly superior to the control group; (2) the experimental sections of average students proved to be superior to the control sections in all tests, but in eight of twelve comparisons the experimental sections were significantly superior to the control groups. These results proved inconclusive in regard to the first hypothesis, while they tended to support the second or "atmosphere" hypothesis.

Another set of findings was important in the comparison of the academically talented and average experimental sections to the control sections. (1) In reading, all of the experimental groups were significantly superior to the control groups. (2) In mathematics, in four of six comparisons the experimental groups were significantly superior to the control groups. (3) But in science,

in only one of six comparisons was an experimental group significantly superior to a control group.

As a result of these findings, the researchers suggested two questions involving curriculum design which might be subjected to a thorough-going analysis by School District 140. First, was there some flaw in the mathematics curriculum which would account for the inadequate performance of two experimental sections--one of academically talented students and the other of average students? Second, what was it about the instructional material and/or methodology offered in science which accounted for the inadequate performance of the experimental sections?

Finally, in comparing the two experimental schools to the two control schools, experimental school "B" proved to be consistently superior to experimental school "A". The academically talented group from school "B" was significantly superior to the control school in two of three cases of comparison, while the academically talented group from school "A" was significantly superior to the control school in only one of three comparisons. The group of average students from school "B" was significantly superior to the two groups from the control schools in five of six comparisons, while the average students from school "A" were significantly superior to the two groups from the control schools in only three of six comparisons. Taking into account the performance of both the sections of academically talented and average students from the experimental schools, school "B" was significantly superior to the control schools in seven of nine comparisons, while school "A" was superior in four of nine comparisons.

These figures seemed to indicate a variance in the quality of the programs, both for the academically talented and average student from one experimental school to the other. Certain questions required answers. Why was it that matched student populations from two different schools exposed to the same instructional materials performed so differently on standardized achievement tests? Were

these differences a function of differences in the instructional materials or teaching methodology offered from one school to the other? If such differences were present, why were they present? All of these questions suggested by the researchers' findings indicated a need for further research.

To begin to answer some of the questions posed by the 1962-63 research project, School District 140 undertook the following steps: First, during 1963-64 a science committee composed of several science teachers, a curriculum director, and an elementary school principal analyzed the performance of academically talented students on each item of the science achievement test taken during the fall of 1962 as part of the 1962-63 research project. This analysis, it was hoped, would lead to a strengthening of the science curriculum. Second, this committee systematically examined instructional materials used in grades K through 12 in science to see if within the curriculum itself reasons for the demonstrated weaknesses could be found. The committee hoped to pinpoint any weaknesses and to suggest means by which instructional materials could be improved. During 1964-65, District 140 plans to make a similar study in the area of mathematics. The science and mathematics committees will submit to the administration of School District 140 concrete proposals for curriculum revision in the Walla Walla Schools. A third step taken was the appointment of a curriculum director for grades K through nine in the Walla Walla Schools. It was felt that this appointment would contribute to an early systematic re-appraisal of the science and mathematics programs. Administrators of School District 140 hoped that the three steps described above would help to answer some of the questions and meet some of the problems which appeared as a result of the 1962-63 research project.

## THE 1963-64 STUDY

In September of 1963 funds were made available by the Research Office of the Office of the Superintendent of Public Instruction and by Walla Walla School District 140 for a continuation of the 1962-63 study. The 1963-64 study again involved an investigation of acceleration in mathematics and enrichment in reading and science in the junior high school. But the researchers broadened the experimental design used in the 1962-63 study in order to explore more deeply the effects of acceleration and enrichment; a number of schools outside of Walla Walla were included in the 1963-64 study.

### The Problems and Hypotheses

The following problems were considered by means of an experimental design that included a considerably larger and more varied type of sample than did the 1962-63 design. Only September, 1963 ninth graders were considered.

1. What conclusive results can be obtained concerning the positive effects of acceleration and enrichment on the academically talented student? Will the academically talented student exposed to acceleration and enrichment achieve more academically than his peers not exposed to such a program?

2. Does a program of acceleration and enrichment for the academically talented student produce a school atmosphere in which the average student, even though he is not exposed to acceleration and enrichment except indirectly, achieve more academically than his peers in schools in which there is no such program? This question is asked as a means of either confirming or calling into question the 1962-63 Walla Walla research results which tended to support the "atmosphere" hypothesis.

3. What variance is there from one school district to another in the performance of academically talented students exposed to acceleration and enrichment? Is there a difference in the performance of the Walla Walla experimental groups as compared to the other experimental groups of talented students?

4. Do the attitudes toward learning of academically talented students and average students educated in a school situation where acceleration and enrichment are practiced differ from those attitudes held by similar groups of students educated in schools in which there is no program of acceleration and enrichment?

These four questions served as the basis for four hypotheses which the researchers wished to test.

1. A program of acceleration and enrichment for the academically talented student causes him to learn more than students of equal ability not exposed to such a program.

2. A program of acceleration and enrichment for the academically talented student produces a school atmosphere in which the average student, though not directly exposed to acceleration and enrichment, will learn more than his peers in schools in which there is no such program.

3. The performance of academically talented students exposed to acceleration and enrichment in the Walla Walla Schools does not differ significantly from that of other experimental groups of academically talented students exposed to acceleration and enrichment.

4. Both the academically talented and the average student, when educated in schools where enrichment and acceleration are practiced, will display more favorable attitudes toward learning than their peers educated in schools where there is no such program.

## Definition of Terms

The following terms used in the junior high schools involved in this study require definition: "academically talented", "average", "acceleration" and "enrichment."

(1) An academically talented student is one whose I.Q. is 120 or above as measured by the California Test of Mental Maturity, 7-10; a few students included among the academically talented classes in this study did not have an I.Q. as high as 120. They were included in classes for the academically talented, however, because of high level performance in their school work. In addition to I.Q. and previous grades received in school, each student in order to qualify for placement in the program for the academically talented was rated by his teachers on a number of personality factors and other factors pertaining to academic and study skills. While all of the schools involved in this study did not use exactly the same rating system for identifying the academically talented, there appeared to be but slight variance in rating procedure. (Please see APPENDIX A.) If a student ranked in the top fifteen percent of his class

at the beginning of the seventh grade, according to all of the academic and personality factors mentioned, he was placed in the program for the academically talented.

(2) The average student is one whose I.Q. falls between 90 and 115 as measured by the California Test of Mental Maturity.

(3) Acceleration, or an accelerated program, is a means by which academically talented students complete a sequence of learning experiences in less time than would be the case traditionally. In the experimental schools involved in this study, acceleration was practiced only in the mathematics curriculum; thus, academically talented students took seventh and eighth grade mathematics in grade seven and algebra in grade eight.

(4) Enrichment of the curriculum means that the curriculum is given more depth and breadth than it has been given traditionally, although students do not accelerate. Enrichment in this study applies to the science and reading programs offered to academically talented students in the experimental schools. In reading, students were exposed to two years of enrichment; in science, students were exposed to two semesters of science.

## Research Design

The research design described below sought to test the hypotheses posed above. Seven classes (approximately twenty-five students to each class) of academically talented students were selected early in the fall of 1963 when these students entered the ninth grade. Five of the classes, the experimental groups, had been exposed to acceleration and enrichment in grades seven and eight; two, the control classes, had not. Identification of the academically talented students, both the experimental and control groups, was made as a result of evaluation of academic and personality factors listed above in the

definition of "academically talented."[1] The experimental classes of academically talented students were matched as closely as possible for I.Q., chronological age and sex to the control classes not exposed to acceleration or enrichment. Two of the experimental classes were taken from the Walla Walla schools, while three were selected from two other communities of the same size and socio-economic composition as Walla Walla. Each of the control groups was selected from two different communities outside of Walla Walla.

Essentially the same pattern was used, though with differing academic criteria as noted above, for selecting experimental and control classes of average students. The basic design can be represented in the following manner:

| Experimental Groups | Control Groups |
|---|---|
| Walla Walla Schools | School System C |
| $ATX^1$ | $ATC^1$ |
| $AX^1$ | $AC^1$ |
| $ATX^2$ | School System D |
| $AX^2$ | $ATC^2$ |
| School System A | $AC^2$ |
| $ATX^3$ | |
| $AX^3$ | |
| $ATX^4$ | |
| $AX^4$ | |
| School System B | |
| $ATX^5$ | |
| $AX^5$ | |

1 All students involved in the study were tested with the California Test of Mental Maturity.

| | |
|---|---|
| $ATX^1$, $ATX^2$, $ATX^3$, $ATX^4$, $ATX^5$ | - Academically talented students exposed to acceleration and enrichment |
| $ATC^1$, $ATC^2$ | - Academically talented students not exposed to acceleration and enrichment |
| $AX^1$, $AX^2$, $AX^3$, $AX^4$, $AX^5$ | - Average students educated in schools in which acceleration and enrichment are practiced |
| $AC^1$, $AC^2$ | - Average students educated in schools in which there is no program of acceleration and enrichment |

A number of comparisons could be made through the use of this design. First, the five ATX groups were compared to the ATC groups to test Hypothesis 1. Second, the five AX sections were compared to the AC sections to test Hypothesis 2. Third, cross comparisons among the experimental groups of academically talented students were made to see if there were significant differences in the performance of the Walla Walla groups as compared to that of the other experimental groups. Fourth, sets of questionnaires were circulated among teachers and students in the experimental and control schools to see if there were differences in student attitudes toward school work in the experimental schools as compared to the control schools.

Testing Program

During the last week in September and the first week of October, 1963, all experimental and control groups were given a series of standardized achievement tests. The dependent variable was the difference between scores made by the experimental groups and those made by the control groups. The reading, mathematics, and science sub-tests of the Educational Testing Service's SEQUENTIAL TESTS OF EDUCATIONAL PROGRESS, Form 3A, were used. The reason for the use of this particular test series can be explained in terms of the following statement from the CATALOG OF THE COOPERATIVE TEST DIVISION OF E.T.S. (p. 12). "The STEP Series are achievement tests which evaluate the student's application of knowledge. . .in fundamental fields; they are designed to measure the

general outcomes of education rather than specific course content." Since the researchers wished (1) to compare students who had studied algebra to those who had not, and (2) to compare students who had been exposed to breadth and depth in curriculum content in science and reading to those who had not, the STEP Series--because of its emphasis on general rather than specific achievement--seemed to be an appropriate instrument.

Questionnaires were circulated among students and teachers in the experimental and control schools early in the fall of 1963. Student questionnaires dealt with students' general attitudes toward school and more specifically with students' attitudes toward subjects in which acceleration or enrichment are practiced. It was hoped that attitudes held by students in the experimental schools could be compared to those held by students in the control schools. (See APPENDIX C for a sample of this questionnaire.) Questionnaires were also circulated among reading, mathematics and science teachers of academically talented students in the experimental schools. (See APPENDIX B for a sample of this questionnaire.) The purpose of the questionnaires was to see if teachers in the experimental schools would be favorable or unfavorably impressed with programs of acceleration and enrichment.

Administrators and guidance personnel in the schools involved in this study were most cooperative in carrying out the testing program and in circulating questionnaires. Answer sheets for the achievement tests were scored by the Educational Testing Service; the questionnaires were processed by the research staff.

Test Results For Academically Talented Students

In the first set of comparisons the academically talented classes from Walla Walla, $ATX^1$ and $ATX^2$, were compared to the control classes of academically talented students, $ATC^1$ and $ATC^2$. The experimental groups were matched as closely as possible to the control groups for I.Q., chronological

age and sex. While there was some variation in mean I.Q. for the experimental and control groups as noted in TABLE I below, the mean chronological age in months was 172 and the ratio of males to females in each group was 3 to 2.

The converted scores made by each experimental group on each of the three sections of the STEP Series were compared to the converted scores made by the control groups of each of the three sections of the STEP Series. The "t" test was used to determine significance in comparing the scores of the experimental groups to those of the control groups.

TABLE I

WALLA WALLA ATX GROUPS COMPARED TO ATC GROUPS

| GROUPS COMPARED | I.Q. | TEST | "t" TEST RESULT | SIGNIFICANCE |
|---|---|---|---|---|
| $ATX^1$ to $ATC^1$ | 126 - 126 | Reading | t - 1.09[a] | Not Significant |
| $ATX^1$ to $ATC^1$ | 126 - 126 | Mathematics | t - 2.17 | Significant |
| $ATX^1$ to $ATC^1$ | 126 - 126 | Science | t - 0.43 | Not Significant |
| $ATX^1$ to $ATC^2$ | 127 - 127 | Reading | t - 3.05[b] | Significant |
| $ATX^1$ to $ATC^2$ | 127 - 127 | Mathematics | t - 3.89 | Significant |
| $ATX^1$ to $ATC^2$ | 127 - 127 | Science | t - 2.08 | Significant |
| $ATX^2$ was not compared to $ATC^1$ because of excessive variance in I.Q. between groups. | | | | |
| $ATX^2$ to $ATC^2$ | 129 - 129 | Reading | t - 5.69[c] | Significant |
| $ATX^2$ to $ATC^2$ | 129 - 129 | Mathematics | t - 5.90 | Significant |
| $ATX^2$ to $ATC^2$ | 129 - 129 | Science | t - 0.48 | Not Significant |

a - A "t" score of 2.032 or higher is significant at the five percent level of confidence.

b - A "t" score of 2.010 or higher is significant at the five percent level of confidence.

c - A "t" score of 2.017 or higher is significant at the five percent level of confidence.

$ATX^1$'s performance on the Reading and Science Tests was not significantly superior to that of $ATC^1$ even though $ATX^1$ had been exposed to enrichment in these subjects and $ATC^1$ had not. $ATX^1$'s performance on the Mathematics Test was significantly superior to that of $ATC^1$; $ATX^1$ had been exposed to acceleration in mathematics, $ATC^1$ had not. $ATX^1$'s performance on the Reading, Mathematics and Science Tests was significantly superior to that of $ATC^2$. $ATX^2$'s performance was significantly superior to that of $ATC^2$ on the Reading and Mathematics Tests, but not on the Science Test.

The test results and comparisons indicate that in all instances the experimental groups were superior to the control groups. In addition, in six of nine comparisons the performance of the experimental groups was significantly superior to that of the control groups. In mathematics, the performance of the experimental groups was significantly superior to the control groups in three of three comparisons; in reading, the experimental groups were significantly superior to the control groups in two of three comparisons. But in science, the experimental groups were significantly superior to the control groups in but one of three comparisons.

It appears that the programs of enrichment in reading and acceleration in mathematics have not harmed academically talented students in Walla Walla's junior high schools. Indeed it might well be argued that the mathematics and reading programs have been very useful. Yet on the other hand, the science program did not produce the results, at least on the basis of this testing, that the reading and mathematics programs produced. When considering the science test results noted above it must be remembered that the academically talented students from Walla Walla and the other experimental schools had experienced two semesters of science, while the control groups had been exposed to no formal course work in science. Also, it is interesting to note that in the 1962-63

Walla Walla study much the same result was found regarding the science program.[1]

In the table which follows the academically talented experimental classes from School System A are compared to the two control classes. The experimental groups were matched as closely as possible to the control groups for I.Q, chronological age and sex. There was some variation in mean I.Q. for the experimental and control groups as noted in TABLE II below; the mean chronological age in months was 172 and the ratio of males to females in each group was 1 to 1.

TABLE II

ATX GROUPS FROM SCHOOL SYSTEM A COMPARED TO ATC GROUPS

| GROUPS COMPARED | I.Q. | TEST | "t" TEST RESULT | SIGNIFICANCE |
|---|---|---|---|---|
| $ATX^3$ to $ATC^2$ | 129.5 - 129.5 | Reading | t - 1.64[a] | Not Significant |
| $ATX^3$ to $ATC^2$ | 129.5 - 129.5 | Mathematics | t - 3.53 | Significant |
| $ATX^3$ to $ATC^2$ | 129.5 - 129.5 | Science | t - 2.67 | Significant |
| $ATX^3$ could not be compared to $ATC^1$ because of excessive variance in I.Q. between groups. | | | | |
| $ATX^4$ to $ATC^1$ | 124.5 - 124.5 | Reading | t - .025[b] | Not Significant |
| $ATX^4$ to $ATC^1$ | 124.5 - 124.5 | Mathematics | t - 0.52 | Not Significant |
| $ATX^4$ to $ATC^1$ | 124.5 - 124.5 | Science | t - 1.37 | Not Significant |
| $ATX^4$ could not be compared to $ATC^2$ because of excessive variance in I.Q. between groups. | | | | |

a - A "t" score of 2.010 is significant at the five percent level of confidence.

b - A "t" score of 2.027 is significant at the five percent level of confidence.

TABLE II indicates that $ATX^3$'s test performance was significantly superior to that of $ATC^2$ in two of three comparisons. On the other hand, $ATX^4$'s test performance was not significantly superior to that of $ATC^1$ in any of three comparisons. Unfortunately, it was impossible to match either $ATX^3$ to $ATC^1$ or $ATX^4$

1 See Cobain and Ford, ACCELERATION AND ENRICHMENT IN THE JUNIOR HIGH SCHOOL, pp. 15-16.

to $ATC^2$; had such additional sets of comparisons been possible, more definite conclusions about the program for academically talented students in School System A might have been reached. It can be noted, however, that one of the junior high schools from School System A had an experimental class that was not significantly superior to the control class in any of three comparisons. This might serve as sufficient reason for reappraisal of the program offered in this school to class $ATX^4$.

In TABLE III the academically talented experimental class from School System B is compared to the two control sections of academically talented students. The groups were matched for age at 172 months; the ratio of males to females in each group was 1 to 1. The I.Q. for each group was 126.5.

TABLE III

ATX GROUP FROM SCHOOL SYSTEM B COMPARED TO THE ATC GROUPS

| GROUPS COMPARED | I.Q. | TEST | "t" TEST RESULTS | SIGNIFICANCE |
|---|---|---|---|---|
| $ATX^5$ to $ATC^1$ | 126.5 - 126.5 | Reading | t - .88[a] | Not Significant |
| $ATX^5$ to $ATC^1$ | 126.5 - 126.5 | Mathematics | t - .70 | Not Significant |
| $ATX^5$ to $ATC^1$ | 126.5 - 126.5 | Science | t - .13 | Not Significant |
| $ATX^5$ to $ATC^2$ | 126.5 - 126.5 | Reading | t - 2.53[b] | Significant |
| $ATX^5$ to $ATC^2$ | 126.5 - 126.5 | Mathematics | t - 2.026 | Significant |
| $ATX^5$ to $ATC^2$ | 126.5 - 126.5 | Science | t - 1.95 | Not Significant |

a - A "t" score of 2.010 is significant at the five percent level of confidence.

b - A "t" score of 2.027 is significant at the five percent level of confidence.

$ATX^5$, even though exposed to acceleration and enrichment, did not perform on the Reading, Mathematics or Science Tests in a fashion that was significantly superior to the performance of $ATC^1$. On the other hand, $ATX^5$'s performance was significantly superior to that of $ATC^2$ in two of three cases of comparison. It

can be noted, then, that in only two of six instances of comparison was the experimental group of academically talented students superior to that of the control groups. Here, too, it would seem reasonable to ask why the experimental group, exposed both to more depth and breadth in curriculum content, did not show up better when compared to control groups not exposed to this depth and breadth.

In summarizing the total performance of the academically talented experimental groups as compared to the academically talented control groups, we find that in only ten of twenty-one cases of comparison were the experimental groups significantly superior to the control groups. These results would certainly not support the researchers' hypothesis that academically talented students exposed to acceleration in mathematics and enrichment in reading and science will learn more than equally talented students not exposed to such programs.

This is not to say, however, that the program for academically talented students is ineffective in all school districts considered. In the Walla Walla junior high schools, in six of nine comparisons, the experimental groups were significantly superior to the control groups; in School System A, in only two of six comparisons were the experimental groups significantly superior to the control groups; in School System B, in only two of six comparisons were the experimental groups significantly superior to the control groups. Thus, inconsistencies appear in the performance of the Walla Walla groups as contrasted to that of the classes from School Systems A and B. At this point, the reason for this variance is not clear; but it is clear that there is variance from school district to school district, from school to school, and from subject to subject.

It will be observed from an examination of TABLES I, II and III that in five of the ten cases in which experimental groups were superior to control groups, the subject area involved was mathematics. Said another way, in five of

seven cases where experimental groups were compared to control groups in mathematics, test results show the experimental groups to have been significantly superior to the control classes. This indicates that in mathematics, at least, the experimental groups were consistently and significantly superior to the control groups.

In reading, however, in only three of seven instances of comparison, were the experimental groups significantly superior to the control groups. It should be noted also that in the 1962-63 study the Walla Walla experimental groups were significantly superior in reading to the control group in the two comparisons that were made; further, in the present study, in two of three comparisons, it was the Walla Walla experimental groups that were significantly superior in reading to the control groups. The results obtained from comparing the Walla Walla groups to the control groups may be pure coincidence; yet, on the other hand, these results may in fact indicate strength in the Walla Walla reading enrichment program that is lacking in the programs offered by School Systems A and B.

The results of the testing in science are somewhat more conclusive. In only two of seven comparisons were the experimental groups significantly superior to the control groups; the experimental groups had been exposed to two semesters of science, the control groups had no science. Further, none of the school systems involved with providing an enriched science curriculum for academically talented students had more than one experimental class which was significantly superior to a control class. The only consistency in these results then is this: That the enriched science programs for academically talented students do not seem to provide very satisfactory results--at least in terms of student performance on the Science Test of STEP, Form 3. Perhaps one reason why the experimental groups did not make a more satisfactory showing is that the students need more than two semesters of science in two years. It may be, too, that the

quality of the science programs offered is in some way lacking. Certainly the situation needs further investigation.

In summary then, the results of the testing program for academically talented students exposed to acceleration and enrichment indicate: (1) that acceleration in mathematics seems generally to be effective; (2) that enrichment in reading does not seem to be generally effective in the experimental schools; (3) that generally, enrichment in science has not been proved to be effective in experimental schools.

Test Results for Average Students

The second hypothesis to be tested was a program of acceleration and enrichment for the academically talented student produces a school atmosphere in which the average student, though not directly exposed to acceleration and enrichment, will learn more than his peers in schools in which there is no such program. The 1962-63 Walla Walla study had provided statistics to support this hypothesis; in eight of twelve comparisons the experimental groups were significantly superior to the control groups. The researchers hoped that the broader sample provided for in the 1963-64 design would contribute additional insights into the so-called "atmosphere" hypothesis.

In the first set of comparisons described in TABLE IV below, the average experimental classes from the Walla Walla junior high schools, $AX^1$ and $AX^2$, were compared to the control classes of average students, $AC^1$ and $AC^2$. The experimental groups were matched to the control classes for I.Q., chronological age, and sex. The mean I.Q. for these classes was 106, the mean chronological age was 173 months, and the ratio of males to females was 1 to 1. The statistical process used to compare the performance of the experimental groups of average students to the control groups was the same as that used for comparing the ATX groups to the ATC groups.

TABLE IV

WALLA WALLA AX GROUPS COMPARED TO AC GROUPS

| GROUPS COMPARED | I.Q. | TEST | "t" TEST RESULT | SIGNIFICANCE |
|---|---|---|---|---|
| $AX^1$ to $AC^1$ | 106 - 106 | Reading | t - .35[a] | Not Significant |
| $AX^1$ to $AC^1$ | 106 - 106 | Mathematics | t - .98 | Not Significant |
| $AX^1$ to $AC^1$ | 106 - 106 | Science | t - 1.03 | Not Significant |
| $AX^1$ to $AC^2$ | 106 - 106 | Reading | t - 1.83[b] | Not Significant |
| $AX^1$ to $AC^2$ | 106 - 106 | Mathematics | t - 0 | Not Significant |
| $AX^1$ to $AC^2$ | 106 - 106 | Science | t - 1.55 | Not Significant |
| $AX^2$ to $AC^1$ | 106 - 106 | Reading | t - .32[c] | Not Significant |
| $AX^2$ to $AC^1$ | 106 - 106 | Mathematics | t - 1.72 | Not Significant |
| $AX^2$ to $AC^1$ | 106 - 106 | Science | t - 3.06 | Significant |
| $AX^2$ to $AC^2$ | 106 - 106 | Reading | t - 1.62[d] | Not Significant |
| $AX^2$ to $AC^2$ | 106 - 106 | Mathematics | t - .66 | Not Significant |
| $AX^2$ to $AC^2$ | 106 - 106 | Science | t - .85 | Not Significant |

a - A "t" score of 2.014 is significant at the five percent level of confidence.

b - A "t" score of 2.011 is significant at the five percent level of confidence.

c - A "t" score of 2.016 is significant at the five percent level of confidence.

d - A "t" score of 2.019 is significant at the five percent level of confidence.

TABLE IV above indicates that in only one of twelve comparisons was an experimental group significantly superior to a control group. This result is clearly contrary to the result of the 1962-63 Walla Walla study; this result does not support the atmosphere hypothesis.

In TABLE V below, experimental groups from School System A are compared to the two control groups. The experimental groups were again matched to the control groups for I.Q., chronological age, and sex. The mean I.Q. varied slightly for

the groups involved; this is noted in the table. The mean chronological age was 173 months; the ratio of males to females was 1 to 1.

TABLE V

AX GROUPS FROM SCHOOL SYSTEM A COMPARED TO AC GROUPS

| GROUPS COMPARED | I.Q. | TEST | "t" TEST RESULT | SIGNIFICANCE |
|---|---|---|---|---|
| $AX^3$ to $AC^1$ | 105.9 - 105.9 | Reading | t - 1.11[a] | Not Significant |
| $AX^3$ to $AC^1$ | 105.9 - 105.9 | Mathematics | t - 1.40 | Not Significant |
| $AX^3$ to $AC^1$ | 105.9 - 105.9 | Science | t - 2.012 | Not Significant |
| $AX^3$ to $AC^2$ | 105.9 - 105.9 | Reading | t - .50[b] | Not Significant |
| $AX^3$ to $AC^2$ | 105.9 - 105.9 | Mathematics | t - .42 | Not Significant |
| $AX^3$ to $AC^2$ | 105.9 - 105.9 | Science | t - .38 | Not Significant |
| $AX^4$ to $AC^1$ | 106 - 106 | Reading | t - .21[c] | Not Significant |
| $AX^4$ to $AC^1$ | 106 - 106 | Mathematics | t - .47 | Not Significant |
| $AX^4$ to $AC^1$ | 106 - 106 | Science | t - .08 | Not Significant |
| $AX^4$ to $AC^2$ | 106 - 106 | Reading | t - 2.20[d] | Significant |
| $AX^4$ to $AC^2$ | 106 - 106 | Mathematics | t - .30 | Not Significant |
| $AX^4$ to $AC^2$ | 106 - 106 | Science | t - 2.092 | Significant |

a - A "t" score of 2.019 is significant at the five percent level of confidence.

b - A "t" score of 2.012 is significant at the five percent level of confidence.

c - A "t" score of 2.017 is significant at the five percent level of confidence.

d - A "t" score of 2.019 is significant at the five percent level of confidence.

TABLE V above indicates that in two of twelve cases of comparison an experimental group was significantly superior to a control group; in this case the same experimental group, $AC^2$, in two of three comparisons. The results described in TABLE V, however, do not support the atmosphere hypothesis.

Finally, the AX group from School System B was compared to the two control groups. Again the groups were matched for I.Q., for chronological age and for sex. The mean I.Q. for each group was 104.6, the mean chronological age was 173 months and the ratio of males to females was 1 to 1.

TABLE VI

AX GROUP FROM SCHOOL SYSTEM B COMPARED TO AC GROUPS

| GROUPS COMPARED | I.Q. | TEST | "t" TEST RESULT | SIGNIFICANCE |
|---|---|---|---|---|
| $AX^5$ to $AC^1$ | 104.6 | Reading | t - .24[a] | Not Significant |
| $AX^5$ to $AC^1$ | 104.6 | Mathematics | t - 1.84 | Not Significant |
| $AX^5$ to $AC^1$ | 104.6 | Science | t - 2.31 | Significant |
| $AX^5$ to $AC^2$ | 104.6 | Reading | t - 1.61[b] | Not Significant |
| $AX^5$ to $AC^2$ | 104.6 | Mathematics | t - .81 | Not Significant |
| $AX^5$ to $AC^2$ | 104.6 | Science | t - .19 | Not Significant |

a - A "t" score of 2.019 is significant at the five percent level of confidence.

b - A "t" score of 2.017 is significant at the five percent level of confidence.

As is shown by TABLE VI, in only one of six comparisons was the experimental group from School System B significantly superior to the control groups. This data does not support the atmosphere hypothesis.

The total performance of all experimental groups of average students compared to the control groups does not support the atmosphere hypothesis. In only four of thirty comparisons were experimental groups significantly superior to the control groups.

Cross Comparisons Among Experimental Groups of Academically Talented Students

Experimental groups of academically talented students from Walla Walla were compared through the "t" Test to experimental groups from School Systems A and B; comparisons were made on the basis of student performance on the reading, mathematics and science sub-tests of STEP, Form 3A. The cross comparisons were

made to see if there were significant differences in performance between the Walla Walla groups and the groups from School Systems A and B. The groups were matched for chronological age at 172 months; the ratio of males to females for each group was 3 to 2. There was some variance in I.Q. from group to group; this is shown together with the other data in TABLE VII below.

TABLE VII

WALLA WALLA ATX GROUPS COMPARED TO ATX GROUPS FROM SCHOOL SYSTEMS A AND B

| GROUPS COMPARED | I.Q. | TEST | "t" TEST RESULT | SIGNIFICANCE |
|---|---|---|---|---|
| $ATX^1$ to $ATX^3$ | 127 - 129.5 | Reading | t - .62[a] | Not Significant |
| $ATX^1$ to $ATX^3$ | 127 - 129.5 | Mathematics | t - 0 | Not Significant |
| $ATX^1$ to $ATX^3$ | 127 - 129.5 | Science | t - .55 | Not Significant |
| $ATX^1$ to $ATX^4$ | 126 - 124.5 | Reading | t - 1.03[a] | Not Significant |
| $ATX^1$ to $ATX^4$ | 126 - 124.5 | Mathematics | t - 1.42 | Not Significant |
| $ATX^1$ to $ATX^4$ | 126 - 124.5 | Science | t - .75 | Not Significant |
| $ATX^1$ to $ATX^5$ | 126 - 126 | Reading | t - 0[a] | Not Significant |
| $ATX^1$ to $ATX^5$ | 126 - 126 | Mathematics | t - 1.75 | Not Significant |
| $ATX^1$ to $ATX^5$ | 126 - 126 | Science | t - .31 | Not Significant |
| $ATX^2$ to $ATX^3$ | 129 - 129.5 | Reading | t - 2.22[a] | Significant |
| $ATX^2$ to $ATX^3$ | 129 - 129.5 | Mathematics | t - 1.71 | Not Significant |
| $ATX^2$ to $ATX^3$ | 129 - 129.5 | Science | t - 2.59 | Significant |
| $ATX^2$ could not be compared to $ATX^4$ because of the high variance in I.Q. between groups | | | | |
| $ATX^2$ to $ATX^5$ | 129 - 127 | Reading | t - 1.96[a] | Not Significant |
| $ATX^2$ to $ATX^5$ | 129 - 127 | Mathematics | t - 3.84 | Significant |
| $ATX^2$ to $ATX^5$ | 129 - 127 | Science | t - 1.77 | Not Significant |
| a - A "t" score of 2.02 is significant at the five percent level of confidence. | | | | |

The performance of ATX[1] from Walla Walla was in no case significantly superior to that of an ATX group from either School System A or B. On the other hand, ATX[2] from Walla Walla was significantly superior to ATX groups from School Systems A and B in three of six comparisons. Taking into consideration the total performance of the ATX groups from Walla Walla as compared to those from School Systems A and B, it can be noted that in three of fifteen comparisons the Walla Walla groups were significantly superior. It would appear, therefore, on the basis of the tests used in this study, that in general there is some, though little, difference between the performance of the Walla Walla experimental groups and the groups from School Systems A and B; it must be noted, however, that the performance of ATX[2] from Walla Walla might well be an exception to this generalization. Unfortunately, there is not sufficient data to reach a definite conclusion here.

## Questionnaires Circulated Among Teachers of the ATX Groups

Questionnaires were circulated among teachers who worked with experimental groups of academically talented students in reading, mathematics and science. (see APPENDIX B) It was hoped that the questionnaires would serve to indicate whether or not accelerated and enriched programs for academically talented students were meeting the intellectual needs of the students involved. Questionnaires were circulated randomly among the teachers of the experimental groups.

### Reading

Five teachers of ATX groups responded to the reading questionnaires. Of the five, four saw the enriched reading program as necessary and beneficial. There was among all five teachers replying a commonly held view that both the curriculum and methodology of the program could be improved. There was general criticism of the lack of materials--books, films, records--available for use.

Further, four of the five teachers criticized the quality of the curricular material available; they saw the materials as being too easy for talented students - "certainly not challenging enough." Another criticism held by three of the teachers was that of the grouping procedures for academically talented students. These teachers objected strenuously to the failure of administrators to group academically talented students homogenously. Thus it appears that reading teachers of academically talented students feel that while reading enrichment is necessary, existing provisions for the program are not sufficient.

Science

The five science teachers who replied to the questionnaire regarding the enriched science program for the ATX groups were more enthusiastic about the challenges offered students by this program than were reading teachers. Only one of the science teachers felt that the science program was not sufficiently challenging. All science teachers indicated the need for additional materials, including such things as supplemental texts, microscopes, slides, mounts - even a terraruim! Four of the five teachers felt that the basic failing of the science program was that it was not organized in a systematic fashion for grades one through twelve; four of the teachers also indicated the need for more than two semesters of science in grades seven and eight. Generally speaking, while the science teachers did have criticisms of their programs, they seemed to feel that their programs were adequately challenging to students.

Mathematics

Of the three groups of teachers questioned, the teachers of mathematics were the most enthusiastic. The five mathematics teachers felt adequately challenged by the accelerated mathematics program and they felt that their students, too, were challenged. These teachers felt that the pace of this mathematics program made it more satisfying to them personally than did the traditional approach.

The mathematics teachers suggested only one detrimental effect of the program; two teachers said that the program tended to exert unnecessary "pressures" on the "nervous child." However, the general feeling of the teachers who responded to the questionnaire can be summed up in this statement: "The program is, and has been, a real shot in the arm as far as mathematics is concerned. We are moving in the right direction."

Questionnaires Circulated Among Students in Experimental and Control Groups

A fourth problem with which the researchers were concerned was that of the attitudes toward school held by the experimental classes as compared to those held by the control classes. To investigate this, questionnaires were circulated randomly among the two groups. The student questionnaire (see APPENDIX C) sought to examine student attitudes toward school in general and toward the specific subjects, reading, mathematics, and science, being considered in this study. The questionnaire was composed for the most part of a series of open ended questions which, instead of confining the student to a definite choice, allowed him to state his own preferences in respect to his school program. Responses from the experimental groups were compared to those of the control groups.

First, an item analysis was made of the responses to each question; the responses were tabulated according to each school; then responses were summarized according to the following groups: (1) Academically talented students from the experimental schools, exposed to a program of enrichment and acceleration. (2) Average students from the experimental schools. (3) Academically talented students from the control schools, not exposed to acceleration and enrichment. (4) Average students from the control schools. Responding to the questionnaire were one hundred and forty-six academically talented from the experimental schools, one hundred and forty-nine average students from the experimental schools, fifty-eight academically talented from

The control schools, and sixty-two average students from the control schools. Since the absolute number of students answering the questionnaire varied significantly in the various groups, percentage figures were used to form a basis for analysis and possible conclusions.

Analysis of the Questionnaires

This analysis proceeds item by item through the questionnaire. In response to the first question, students in all groups indicated that they found school interesting. The control groups indicated slightly more interest than did the experimental groups. Further, there was a surprising similarity between the attitudes of the academically talented and average students in both the experimental and control schools.

TABLE VIII

IN GENERAL, HAVE YOU FOUND SCHOOL TO BE DULL OR INTERESTING?

| | ATX | ATC | AX | AC |
|---|---|---|---|---|
| INTERESTING | 82% | 88% | 84% | 88% |
| DULL | 08% | 05% | 07% | 06% |
| NO OPINION | 10% | 07% | 09% | 06% |

In response to questions two and three - "Which grades in school have you enjoyed most and least," - students from all groups indicated a preference for grades six through nine. There was very little difference in attitudes expressed by the ATX groups as opposed to that of the ATC groups; similarly, there was little difference in the attitudes of the AX groups as compared with the AC groups. Though there was little consistency in the results, it is worth noting that both the experimental and control groups seemed to get a good deal of satisfaction from their junior high school experience--with the experimental groups slightly more satisfied than the control groups.

The students were next asked what they liked best and least about school. Many aspects of school life were mentioned, but the largest percentage of votes

went to a few well-defined activities. "Some class" received the highest percentage of votes from all groups. The average students mentioned a class more often than did the academically talented. Among the academically talented and the average students in the experimental schools the "social aspects" of school, namely, being with "friends and meeting people," ranked second. A relatively high percentage of students in all groups also listed their teachers as the thing they liked best about school. Students in the experimental schools seemed slightly more prone to do so.

Students questioned in all groups also listed "some special class" as the thing they liked least about school. This was followed closely by the traditional student peeve, homework.

TABLES IX AND X

WHAT ABOUT SCHOOL HAVE YOU LIKED BEST

| | ATX | ATC | AX | AC |
|---|---|---|---|---|
| SOME SPECIAL CLASS | 26% | 26% | 35% | 37% |
| MY FRIENDS AND MEETING PEOPLE | 25% | 14% | 23% | 10% |
| MY TEACHERS | 16% | 09% | 21% | 11% |
| SPORTS | 12% | 07% | 13% | 11% |
| EXTRA ACTIVITIES | 12% | 09% | 04% | 10% |

WHAT ABOUT SCHOOL HAVE YOU LIKED LEAST?

| | | | | |
|---|---|---|---|---|
| SOME CLASS | 32% | 29% | 37% | 37% |
| HOMEWORK | 17% | 21% | 16% | 15% |
| TEACHERS | 05% | 09% | 03% | 03% |
| TESTS | 05% | 05% | 07% | 13% |

Although the above aspects of school life received the largest percentage of student votes, they do not tell the whole story as to differences of attitudes in the various groups. It should be noted that the academically talented from the experimental schools listed many more items that they liked best about school,

while with the exception of the above categories, the other groups were relatively mute. This, we might add, held true with responses to all questions. The academically talented from the experimental schools answered their questionnaires much more carefully and completely than did others from merely subjective observation. Their answers displayed more intellectual curiosity and critical evaluation than did their peers in the control schools. This definite superiority could not be observed among the average students in either group.

The academically talented from the experimental schools were also quicker to find fault with their school program. Five percent listed boring or dull work as the aspect of school they liked least and three percent mentioned their dislike for meaningless repetition in various classes, generally English. Other critical comments were made frequently in regard to the schedule, large classes, the lecture method, the bus system, social cliques, rules and regulations, the teachers' lack of discipline, noise in the library or in some class, and school mates who did not take school seriously. A few like comments were made by students in the other groups, but not nearly as frequently.

From the students' responses concerning their reading habits, it would seem that such habits are probably more a function of ability than of school. A significantly higher percentage of the academically talented students in both the experimental and control schools stated that they read books outside of school and that they enjoyed reading more than did the average students in the two groups. Academically talented students could also name the title of a book they had read recently more often than could the average students. It may be of some significance to note that more academically talented students from the experimental schools could name a book than could their peers in the control schools.

TABLES XI, XII, AND XIII

DO YOU READ ANY BOOKS OUTSIDE OF SCHOOL?

| | ATX | ATC | AX | AC |
|---|---|---|---|---|
| YES | 92% | 93% | 81% | 85% |
| NO | 06% | 05% | 19% | 13% |
| NO ANSWER | 02% | 02% | 00% | 02% |

DO YOU LIKE TO READ?

| | | | | |
|---|---|---|---|---|
| YES | 91% | 95% | 76% | 66% |
| NO | 09% | 03% | 24% | 32% |
| NO ANSWER | 00% | 02% | 00% | 02% |

PERCENTAGE OF STUDENTS WHO COULD NAME A BOOK THEY HAD READ RECENTLY

| | | | | |
|---|---|---|---|---|
| | 73% | 60% | 48% | 45% |

One section of the questionnaire evaluated students' attitudes toward subjects in which acceleration or enrichment are practiced in relation to other subjects which are treated in the more traditional fashion. The students were asked to list the subjects in grade seven and eight which they liked best and least and their reasons for liking these best and least. They were also asked to list the subjects in which they felt they had learned the most and the least.

When total responses were tabulated a meaningful pattern seemed to emerge. All subjects in the curriculum received votes as being liked best or least, but the academic solids (math, science, history, English, and social studies) received a significantly higher percentage of votes than did any of the electives (music, art, shop, etc.) Of course it should be remembered that all students had not been exposed to the same electives in the various schools or even within the same school; therefore, it would be expected that the required solids would receive the highest percentage of votes.

From student response, it also became apparent that student attitude toward a subject was often very dependent upon the individual teacher. Percentage

figures varied as much as forty percent in regard to a single subject from school to school; therefore, it is very difficult to determine whether student attitudes toward subjects in which acceleration and enrichment are practiced are a result of the acceleration and enrichment or merely a result of the teacher and his methods.

When subject by subject comparisons are made we find that a higher percentage of students in all groups, except the average students from the control schools, found math to be their favorite subject in grade seven and eight. Thirty-two percent of the academically talented students in the experimental schools listed algebra as their favorite subject. Of course, students in the other groups had not been exposed to algebra. Science received the second highest percentage of votes among the academically talented in both the experimental and control schools. It ranked first with the average students in the control group and received the least percentage of votes from the average students in the experimental schools. Reading, which was the third subject of concern in this project, ranked rather low as a student favorite, except with the academically talented in the control schools. Literature, which is a part of the enriched reading program in the experimental schools, was not mentioned by the control groups. It, too, ranked low in student favor, even below several of the electives.

TABLE XIV

IN GRADE 7 AND 8, WHAT WERE YOUR TWO FAVORITE SUBJECTS?

| | ATX | ATC | AX | AC |
|---|---|---|---|---|
| MATHEMATICS | 40% | 31% | 33% | 35% |
| ALGEBRA | 32% | 00% | 00% | 00% |
| SCIENCE | 26% | 29% | 16% | 37% |
| READING | 03% | 17% | 08% | 03% |
| LITERATURE | 08% | 00% | 12% | 00% |
| ENGLISH | 16% | 21% | 23% | 21% |
| HISTORY | 20% | 17% | 17% | 23% |
| SOCIAL STUDIES | 09% | 16% | 10% | 06% |

Math was liked least by a higher percentage of academically talented and average students in the control schools than any other subject. This negative response is significant and it may indicate that a program of math acceleration challenges the imagination of students more than the traditional curriculum. A very low percentage of academically talented students from the experimental schools listed math as the subject they liked least and only four percent showed dissatisfaction with algebra. In percentage terms, the response from the average students in regard to math was the same. Of course, it should be remembered that the average students in the experimental schools were experiencing approximately the same math program as their peers in the control schools.

Science did not fare as well as did math. Next to English, science was the least liked subject with academically talented students in the experimental schools. It also ranked second next to math as the least liked subject among the academically talented in the control group. Its relative position among the average students was somewhat better as can be observed in the table below.

Reading again received a very small percentage of unfavorable votes. Students from all groups appeared not to react to their reading program either positively or negatively.

TABLE XV

IN GRADES 7 AND 8, WHICH SUBJECTS DID YOU LIKE LEAST?

| | ATX | ATC | AX | AC |
|---|---|---|---|---|
| MATHEMATICS | 09% | 36% | 25% | 27% |
| ALGEBRA | 04% | 00% | 00% | 00% |
| SCIENCE | 28% | 34% | 23% | 18% |
| READING | 03% | 05% | 06% | 10% |
| LITERATURE | 14% | 00% | 00% | 00% |
| ENGLISH | 38% | 29% | 38% | 19% |
| HISTORY | 21% | 14% | 27% | 15% |
| SOCIAL STUDIES | 13% | 09% | 10% | 08% |

Notice that English and history were subjects liked least by a significantly larger percentage of students in the experimental schools than in the control schools. Could this suggest that when acceleration and enrichment are practiced in some subjects of the curriculum that subjects taught in a traditional fashion fall into disfavor?

For the most part, there was a very close correlation between the subjects which the students listed as their favorite or least favorite and the subjects in which they felt they learned the most or the least. A high percentage of academically talented students from the experimental schools felt algebra was the subject in which they learned the most. But math ranked first with both the academically talented and the average students from the control schools. Quite surprisingly, English ranked first with the average students from the experimental schools. Students from the control schools felt they learned more in science than did their peers in the experimental schools. Reading and literature again ranked low with all groups.

When we look at responses to the question "In grades 7 and 8, in which subjects did you learn the least?" we again find that fewer academically talented students from the experimental groups listed math than did their peers in the control group. And again, a significantly larger percentage showed their dislike for English and science.

TABLES XVI AND XVII

IN GRADE 7 AND 8, WHICH SUBJECTS DID YOU LEARN THE MOST?

| | ATX | ATC | AX | AC |
|---|---|---|---|---|
| MATHEMATICS | 33% | 36% | 32% | 47% |
| ALGEBRA | 36% | 00% | 00% | 00% |
| SCIENCE | 25% | 33% | 17% | 29% |
| READING | 02% | 07% | 04% | 02% |
| LITERATURE | 13% | 00% | 07% | 00% |
| ENGLISH | 28% | 34% | 40% | 29% |
| HISTORY | 28% | 22% | 25% | 23% |
| SOCIAL STUDIES | 13% | 24% | 11% | 08% |

IN GRADES 7 AND 8, WHICH SUBJECTS DID YOU LEARN THE LEAST?

| | ATX | ATC | AX | AC |
|---|---|---|---|---|
| MATHEMATICS | 03% | 19% | 19% | 10% |
| ALGEBRA | 01% | 00% | 00% | 00% |
| SCIENCE | 25% | 19% | 17% | 16% |
| READING | 08% | 12% | 06% | 10% |
| LITERATURE | 13% | 00% | 04% | 00% |
| ENGLISH | 35% | 17% | 25% | 23% |
| HISTORY | 05% | 10% | 16% | 10% |
| SOCIAL STUDIES | 10% | 03% | 09% | 03% |

The reasons given by the students explaining why they liked or disliked a subject were for the most part as is to be expected. Again and again a subject was listed as a favorite if it was interesting, had a "good" teacher, and if the student was feeling a measure of success in the class. By the same standards, the subjects fell into disfavor if the course was dull and uninteresting, had a poor teacher (by students' standards) and was too difficult for the student to be successful.

As suggested before, the academically talented from the experimental schools answered their questionnaires more completely and their reasons for liking or disliking a class appeared to show a mature and sophisticated judgment. These students were quick to evaluate the teacher's methods, the over-all value of the course, and they were not hesitant to condemn meaningless repetition or busy work.

TABLES XVIII AND XIX

WHY DID YOU LIKE THE SUBJECT OF YOUR CHOICE BEST?

| | ATX | ATC | AX | AC |
|---|---|---|---|---|
| INTERESTING | 65% | 66% | 52% | 50% |
| THE TEACHER | 21% | 14% | 12% | 13% |
| FUN | 12% | 07% | 20% | 08% |
| CHALLENGING | 10% | 00% | 03% | 11% |
| ACHIEVED SUCCESS | 06% | 10% | 08% | 16% |
| EASY | 05% | 14% | 09% | 11% |

WHY DID YOU LIKE THE SUBJECT OF YOUR CHOICE LEAST?

| | ATX | ATC | AX | AC |
|---|---|---|---|---|
| UNINTERESTING | 51% | 52% | 40% | 32% |
| THE TEACHER | 17% | 24% | 08% | 21% |
| TOO DIFFICULT | 13% | 00% | 15% | 08% |
| UNSUCCESSFUL | 12% | 38% | 23% | 18% |

As to plans for the future, each group had more students who planned to be teachers than any other single vocation. The academically talented from the experimental schools showed slightly more interest in the professions, teaching, medicine, law, science, engineering, than did students in the other groups. We should, however, be careful not to conclude that this choice was a result of any school function as quite likely vocational choice at the junior high level is more dependent on the socio-economic status of the home. For example, one school in the study from a community that depends almost entirely on agriculture and forest resources for its livelihood had more students stating an interest in agriculture and forestry than students in other groups. For the most part, votes for various jobs were so scattered that any meaningful differences were not observable. The program of acceleration and enrichment does not seem to have influenced career choices to any large degree.

Summary

Responses from the questionnaire do not indicate that students' attitudes and opinions from the experimental schools differ strikingly from those in the control schools, though some of the evidence would appear to support the researchers' hypothesis. One thing is clear, however. The responses from the ATX and AX groups do not indicate that acceleration and enrichment have a debilitating effect on students. Further, the ATX students certainly displayed more favorable attitudes toward mathematics, an accelerated subject, than did the other groups--especially the ATC groups. In addition, as has been pointed

out earlier in this report, it was on the mathematics test that the ATX groups showed up so very well as compared to the ATC groups. In other words, the favorable ATX response to the questionnaire as it related to mathematics reflected the superior performance of these students in the mathematics testing. Similarly, the less favorable, and in some cases the passive response of the ATX students to the science and reading programs, again is mirrored in their performance on the reading and especially the science test.

It could also be noted that the ATX groups seemed to indicate a more mature evaluation of their school program than did their peers in the control schools. No differences in such maturity could be noted among the average students in either the experimental or control groups.

## CONCLUSIONS

The program of acceleration and enrichment for the academically talented in the Walla Walla Schools and in School System A and B produces students whose performance on standardized tests is consistently, though not always significantly, superior to their peers not exposed to acceleration and enrichment. The program is at its strongest in the area of mathematics; it appears weakest in science. Perhaps two semesters of science spread over two years is not enough for academically talented students; perhaps they need, and should have, more science.

Second, the data does not support the hypothesis that a program of acceleration and enrichment for the academically talented student produces a school atmosphere in which the average student, exposed to acceleration and enrichment indirectly, achieves more academically than his peers in schools in which there is no such program. Again, comparisons indicate that the experimental groups were consistently superior to the control groups; but the differences between groups were not significant. Apparently the program does not harm the academic performance of these students.

Third, the performance of academically talented students exposed to acceleration and enrichment in the Walla Walla Schools does not differ significantly, except in one case, from that of the other experimental groups of academically talented students exposed to acceleration and enrichment.

Finally, drawing on the data gained from test results and from analysis of questionnaires completed by students and teachers in the experimental and control schools, it seems clear (1) that the program of acceleration and enrichment does not hurt either the academically talented student or the average student; (2) that the program for the academically talented could be upgraded, and (3) that, even though there are difficulties involved in offering such a program, the

program is generally more appealing both to students and teachers than a more traditional approach to the curriculum. In addition, there are certain marginal academic gains, demonstrated by student performance on standardized tests, which appear to come as a consequence of such a program. Granted, the gains are not always statistically significant; still they are gains.

## APPENDIX A

Student's Name _____ Grade _____ Home Room _____

Teacher _____ Subject _____ Date _____

| ACADEMIC AND STUDY SKILLS | | ATTITUDE AND PERSONALITY FACTORS | |
|---|---|---|---|
| Mastery of Subject | | Desire for Excellence | |
| Meeting Requirements | | Respect for School Rules | |
| Performance Beyond Requirements | | Respect for Others | |
| Organization of Materials | | Interest in Welfare of School | |
| Research Ability (Use of Library) | | Honesty | |
| Initiative | | Attention to Instruction | |
| Use of Language | | Respect for High Ideals | |
| Contribution to Class | | Politeness in Class | |
| Independence in Study | | Leadership | |
| Reasoning | | Attendance Habits | |

List special talents or outside activities observed

_____

_____

_____

List any special social, physical, or emotional problems observed

_____

_____

_____

Reason Why Student Does Not Belong in Program: _____

_____

Mean Score _____ Mean Score _____

Scale:

1. Superior
2. Excellent
3. Good
4. Fair
5. Poor

## APPENDIX B

## (Subsection 1)

## QUESTIONNAIRE

For teachers of academically talented students exposed to acceleration in mathematics in grade seven or eight. To be completed, left unsigned, and mailed in the enclosed envelope.

1. Do your academically talented students seem to be more challenged by the accelerated math program than equally talented students you have had who were not exposed to such a program?

2. What are the beneficial effects of acceleration on your academically talented students?

3. What are the detrimental effects of acceleration on your academically talented students?

4. Would you say that the pace at which you and your academically talented students progress through the math curriculum is too slow, just right, too fast?

5. Do you personally find it more satisfying to work with an accelerated curriculum in math or would you prefer to move at the traditional pace? Please explain.

6. Do you feel that the present curriculum could be improved? If so, in what way?

## APPENDIX B

(Subsection 2)

## QUESTIONNAIRE

For teachers of academically talented students exposed to enrichment in science in grades seven and eight. To be completed, left unsigned, and mailed in the enclosed envelope.

1. Would you say that the pace at which you and your students progress through the science curriculum is too fast, just right, too slow?

2. What are the beneficial effects of enrichment on your students?

3. Are there detrimental effects? If so, what are these?

4. Do you feel that the present curriculum could be improved? If so, in what ways?

5. What, in the way of curriculum guides, textbook and laboratory materials, do you need?

6. Do you feel that the present science curriculum adequately challenges:

   (a) you

   (b) your students

## APPENDIX B

(Subsection 3)

## QUESTIONNAIRE

For teachers of academically talented students exposed to enrichment in reading in grades seven and eight. To be completed, left unsigned, and mailed in the enclosed envelope.

1. Do you feel that the enrichment program in reading is beneficial to your students?

   (a) If so, in what ways?

   (b) If not, why not?

2. Do you feel that the curriculum could be improved? If so, how?

3. What, in the way of curriculum materials or equipment, do you need most?

4. Do you feel that the present reading curriculum adequately challenges your students? Why, or why not?

## APPENDIX C

### QUESTIONNAIRE

### For Students

1. In general, have you found school to be dull or interesting?
2. Which grades in school have you enjoyed most?
3. Which grades have you liked least?
4. What about school have you liked best?
5. What about school have you liked least?
6. Do you read any books outside of school? Yes___ No___
7. Do you like to read? Yes___ No___
8. What kind of books do you like best? Name one please.
9. In grades seven and eight, what were your two favorite subjects?
10. Why did you like these best?
11. In grades seven and eight, what subjects did you like least?
12. Why did you like these subjects least?
13. In what subject or subjects (grades seven and eight) did you learn most?
14. In what subject or subjects (grades seven and eight) did you learn least?
15. What kind of work would you like to do when you finish your education?
16. When did you decide that this work would be right for you? Please check one of the following:

    This Summer _____
    In Grade 8 _____
    In Grade 7 _____

17. Are you male ___ or female ___
18. If you like, you may sign your name here _____