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Retention as a Function of Competition in Learning

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RETENTION AS A FUNCTION OF COMPETITION
IN LEARNING

A Thesis
Presented to
the Graduate Faculty
Central Washington State College

In Partial Fulfillment
of the Requirements for the Degree
Master of Education

by
William Wayne Parker

August, 1969

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DEDICATION

This thesis is dedicated to my children, Nip, Tuck, Kim, Marion, Robin, and Kirk; to my wife, Dot; and to my father, Mr. Platt H. Parker, for their patience and cooperation during the past several years.

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CHAPTER I

THE PROBLEM AND REVIEW OF LITERATURE

Although there has been much controversy over the use of competition as a motivator to learning and retention, there are far too few empirical studies on the subject. Our society is built upon competition and many people feel that the best way to prepare our young people for adulthood is to let them experience some forms of competition in the school situation. Others feel that there is far too much competition in the present school system and that efforts toward more cooperative learning should be made.

Baxter found that competition affected sixth grade boys differently depending on the amount of anxiety. Concerned with the effects of a competitive situation upon performance level, Baxter showed that from an individual point of view, competition increased the quantity of work (1).

Weinberg (16) takes issue with Baxter by viewing competition in the school situation as detrimental to learning. He writes that competition increases anxiety and impedes problem solving. He feels that competition with others is not self-motivating, since praise for success comes from others rather than from self and enjoyment of the activity.

Agreeing with Weinberg, Blatz (2) feels that students learn more rapidly and with less anxiety when there is no competition and

while they are under self-direction and supervised inspiration. Blatz writes that this will be pleasant learning.

Weiner (17) studied the relationship between the inhibition of achievement motivation and the social context in which the achievement-related behavior occurs. Of interest to the present study was that no significant difference in task recall was found between female and male Ss.

There has been much concern about the effects of competition upon the individual. The present investigation, however, was undertaken to study the effects of competition upon the group. Differences of opinion have been voiced by various investigators.

Hurlock (8) found that in boy-girl competition there was not much difference in learning, but accuracy and quantity improved, which adds credence to the motivation factor. She used seventy-three boys and eighty-two girls from grades four and six as Ss in an experiment measuring the effects of competition. They were assigned to control and rivalry groups which were equated on the basis of age, initial ability in an arithmetic test, and on the number of boys and girls within each group. The groups were given five math tests each and were compared regarding differences in age and sex. The rivalry group was further split into two groups who competed against each other for higher test scores.

Hurlock found that the rivalry group, which scored highest on the initial test, continued to lead in the other tests. She suggests that

this could be a result of the feedback of the previous test score before the next test was given. Hurlock summarizes her findings as follows:

The average score made by the Rivalry group exceeded that made by the Control group on every day of the experiment, after the introduction of the incentive. The gain at the end of the experiment was 41 per cent, over and above practice effect, as measured by the Control group.

When a comparison was made between the boys and girls, it was found that only a very slight difference occurred, and this was in favor of the girls. The per cent of average gain for the girls on the last day of the experiment was 46, and for the boys, 39.

Increase in accuracy of performance came only with the application of the incentive. This increase, however, was small, the maximum being 8 per cent--but was an improvement over the Control group, which showed a decrease in accuracy throughout the experiment (8:289-290).

Hurlock further summarizes that ". . . rivalry is an effective incentive to use with children of the elementary school grades as a means of inducing them to do better work in connection with their school studies"(8:290) .

Although Vincent (15), in his article "Another Look at Competition in the Classroom," admits that extreme "cut throat" competition is undesirable and should be eliminated from the classroom, he argues that:

If education is preparation for the present, as some authorities contend, then it is logical to assume that pupils should be taught healthy responses to competition so as to prepare them to react favorably to the competition they face daily outside of the classroom. It is questionable if shielding is ultimately beneficial, for the person who is excessively shielded from competition tends to be disorganized and bewildered when he encounters it. Naturally, the

pupil should be prepared for the realities of life, and the teacher cannot prepare him by denying him the very experience and direction he needs (15:289).

Vincent feels that teachers should aid their students' social adjustment by helping them adjust to the competition which is a part of our culture. The teacher, he suggests, should counteract the detrimental tendencies of ego-inflation and ego-deflation resulting from competition so that students will be better prepared for future competition.

Forlano (6), who also feels that competition has positive results, studied the effects of different incentives on the cooperative behavior of nineteen girls and fifteen boys from a private language school. Median age of the Ss was eleven years nine months with a median IQ of 109.

The task was to cancel out e's from a booklet with number correct used as measurement. Ss were involved in the following experimental conditions: work for self, work for class, team work, and sex competition. No incentive was offered in the sex competition condition. The other conditions were rewarded. Forlano concludes that:

The new motives in this experiment suggest that team competition and sex competition called forth in boys cooperative effort that was superior to their effort in individual competition, . . . (6:131).

The negative views of group competition are expressed by Campanelle (4) and Shaw (13). Competition among groups is viewed by Campanelle as causing unhealthy rivalry and jeopardizing productive relationships because of the resentment and anxiety generated. He

feels that there is value in allowing an individual to meet difficulty and to experience trouble, and that certain obstacles result in the individual responding even more vigorously to an assignment. He warns, however, that:

Yet we want to caution that promiscuously placing obstacles in the path of students does not fulfill the area of motivation. The obstacles must be appropriate to the pupil's level of maturity and then the desired stimulation will result (4:312).

Elaborating on the use and overuse of competition, Campanelle states:

Still another factor to be aware of in our eagerness to motivate the individual properly is the ever-present problem of competition. Competition is a function of scarcity and the goods of education are plentiful, making competition an inappropriate motivator for group development (4:312).

Campanelle feels that it is very important to a teenager to become an important figure and that educators should assume some responsibility to meet this need. Relating this to the fact that sometimes sports become the all-consuming part of school life, Campanelle states that ". . . This competitive spirit leads to the spirit of indifference, anxiety, and resentment either in individuals or in groups" (4:313). He further states that the teacher has the opportunity to offer aid to the student ". . . in the form of an encouraging compliment, basic information, or giving security and understanding according to individual needs . . ." (4:313).

Studying the effects of anxiety upon learning, Shaw found that too much anxiety was negative to learning and that students will learn better when in a cooperative situation. In defining cooperation and competition, Shaw states:

In the cooperative situation the movement of one member of a group toward the goal will to some extent facilitate the movement of other members toward the goal; in the competitive situation the movement of one member toward the goal will to some extent impede the movement of other members toward the goal . . . (13:155).

Shaw also suggests that interference may occur as a result of task-irrelevant responses due to threat to self-esteem. He feels that individuals working alone (without the variables of competition or cooperation) and those in competitive situations in perceptual-motor tasks become more anxious and exhibit poorer performance than those persons in a cooperative situation. In memory-reasoning tasks, Shaw concludes that the individual results and the cooperative results are about equal, and both exceed those of the competitive group.

From the above studies and articles, it seems apparent that researchers have not found a solution to the problem of the effects of competition in learning situations. Since this investigation was concerned with retention, variables involved in methodology of retention studies were important. Variables of retroactive and proactive inhibition, spaced recall, learning by recall, similarity interference, and change of task, which support the present study, are discussed by various authors.

In their article, "Instructional Psychology," Gagne and Rohwer state that "Evidence from verbal learning studies particularly suggests a need for investigations of spaced recall in the retention of meaningful materials" (7:398). They add further support to the present study by suggesting that retention is greater when learning is by recall rather than by recognition. Gagne and Rohwer comment on the methodology of retention studies:

In view of the pervasive import of the phenomena attached to degree of original learning, it is well to keep in mind that effects on retention reported in many studies are probably more accurately attributable to variables that affect acquisition rather than retention. Two major exceptions to this must be underlined: (a) the effects of variations in activities that intervene between acquisition and retention, viz., retroactive effects; and, possibly (b) the effects of motivational variables (7:402).

Underwood (14), in his article "Interference and Forgetting," stresses the importance of proactive interference on forgetting. He feels that forgetting can be decreased from 75 per cent to 25 per cent over twenty-four hours when interference of similar material learned previously in the laboratory is removed. He expands, however, by stating:

It is my belief that we can narrow down the cause of forgetting to interference from previously learned habits, from habits being currently learned, and from habits we have yet to learn. The amount of this interference is primarily a function of similarity and associative strength, the latter being important because it interacts with similarity (14:58).

It is also felt by Underwood that proactive interference ceases with sleep and that time sleeping should be subtracted from the total retention time.

The present study used the same recall-completion test for retention tests T_1 , T_2 , and T_3 . This gave the Ss a higher probability of recall and is supported by Weiner's quote of Melton (1963) that "At the time of recall, change of task or situation variables from those existing at the time of original learning decreases the probability of recall" (18:24).

Weiner also states that Heyer and O'Kelley (1949) found no significant difference in learning a list of nonsense syllables under different intensities of motivation, but did find differences in retention.

In the present study, this investigator attempted to control the variables discussed in the review of literature.

Statement of the Problem

Authorities disagree as to the negative or positive influences of competition as it affects retention of learning. For purposes of this study, the investigator introduced competition into classroom groups and measured retention by recall. The problem was whether competition would affect retention of learning. The investigator proposed the null hypothesis:

The use of competition as a motivator to learning will not significantly increase retention as measured by recall.

Significance of the Study

This study was undertaken to add to empirical evidence for use in drawing some sort of conclusions as to the significance of competition as a factor in retention of learning. This is necessary if teachers are to offer optimum learning conditions to their students.

It was assumed that the results of this study would be significant to school administrators, teachers, curriculum specialists, psychologists, and counselors. The results of this study may provide insight as to whether there is a need for competition in classroom activities. This study should help teachers and school personnel in the planning of total classroom activities, as well as develop a sound philosophy in regard to factors of learning.

The purpose of this study was to determine whether a group of ninth grade students motivated by competition would significantly increase retention of learning as compared to a group of ninth grade students not motivated by competition.

Many Indian children from the Yakima Tribes score low in academic achievement. These students come from a cultural milieu that stresses cooperative rather than competitive undertakings. Since the population of ninth grade students included a sub-group of twenty-two Indian students, it was felt that a comparison of test results between those Indian students given a competitive motive for retention over those

students not given the competitive motive, would provide data for analysis regarding cultural influences.

Limitations of the Study

This study was limited to ninth grade English students at Wapato, Washington, Wapato Junior High School. It was further limited to the formulation of two groups: (1) Control Group, composed of four class sections and not motivated by competition; and (2) Experimental Group, composed of four class sections, motivated by competition.

The study was limited to testing the recall or retention of learning of a taped drama lesson, consisting of thirty terms and their definitions. The study took place over a four-week period in March, 1969.

One variable which is impossible to control in a retention experiment is the amount of studying a child does between the original learning (OL) period and the retention test (RT) period. The extent to which the Ss study the same material within this time period can only be assumed to be that which they normally spend on this type and amount of learning. This is based on the fact that they were unaware of any experimental situation.

This investigator has considered the arguments that might be made toward an experiment of this type having more validity if nonsense syllables were to be used rather than meaningful drama terms. His answer to this is that although nonsense syllables might give more

validity to the experiment, they do not fit the reality of the school situation. Our schools are not teaching nonsense syllables. Admittedly, the use of meaningful terms may add confusion to the control of variables, but if we are to find answers to real situations, we must eventually find ways to test them.

Definition of Terms

Proactive inhibition. When a learning activity is inhibited by a previously learned activity.

Retroactive inhibition. When retention of previously learned material is inhibited by more recently learned material.

Hawthorne effect. Doing better in an experiment as a result of knowing you are in an experiment.

Interpolated rest (IR) period. The time period between the original test and the retention test.

Original learning (OL) period. The presentation of the taped drama lesson.

Retention test (RT) period. The second and third tests given one and four weeks respectively after the OL period.

Independent study opportunity (ISO). The last period of the school day at Wapato Junior High School, designed to free the student so he may explore on his own.

Retention. For the purposes of this study, Lawson's definition is used:

Retention is the generic name for that part of the field of learning that deals with the phenomena that are more popularly called "memory," "remembering," or "forgetting." "Retention" and "memory" are practically synonymous, both referring to the measurement of the amount of remembering that an organism demonstrates. The following "equation" describes the relationship between remembering and forgetting: amount remembered + amount forgotten = amount originally learned" (10:400).

Fatigue factor. A decrement in performance, shown in increased errors, as a result of tiring over a period of time.

Nonsense syllables. A three-letter (consonant-vowel-consonant) combination which is not a word in our culture nor has any meaning to the S.

CHAPTER II

METHODS AND PROCEDURES

The entire ninth grade of Wapato Junior High School, Wapato, Washington, was used in conducting this study.

The study was composed of T₁, T₂, and T₃ drama test results of Experimental and Control groups to measure retention of learning as provided by a taped drama lesson.

On December 16, 1968, this investigator received permission from Mr. Wayne E. Heffner, Principal of Wapato Junior High School, to use ninth grade English students in this study (Appendix A). He also gave permission for the use of two ninth grade English teachers to serve as experimenters (Es). Both Es were enthusiastic about the study and cooperated well. This lesson fit well into the Wapato ninth grade English course design as both teachers were about to proceed into a drama unit. They agreed to postpone their units until the experiment was completed. It appeared to this investigator that there were no feelings of competition between the Es which could possibly have tempted them to prompt students.

Subjects

Ss consisted of 170 ninth grade English students from Wapato Junior High School, Wapato, Washington. These students comprised eight classes of which four served as experimental groups and four as

control groups. Table I describes each class as a section, gives the number of students enrolled in each section, tells whether students are in the control group or experimental group, and whether they are in the early or late groups. Early experimental sessions included control groups 9-1 and 9-2, and experimental groups 9-3 and 9-4. Late sessions included control groups 9-7 and 9-8, and experimental groups 9-5 and 9-6. The groups consisted of the following numbers of students: 9-1 = 28, 9-2 = 22, 9-3 = 20, 9-4 = 19, 9-5 = 24, 9-6 = 22, 9-7 = 18, and 9-8 = 17, thereby placing eighty-five students each in the control and experimental groups.

Table II indicates the time schedule of each English class. Control groups 9-1 and 9-2 began at 8:45 a.m.; 9-7 and 9-8 at 1:20 p.m. Experimental groups 9-3 and 9-4 began at 10:27 a.m.; 9-5 at 11:16 a.m., and 9-6 at 12:01 p.m. The control and experimental groups were divided evenly between early and late sections to control the fatigue level factor.

Wapato, an agricultural community located in the Yakima Valley in central Washington, is populated by many ethnic groups. The ethnic groups were represented in this study in the following numbers, as can be seen in Table III: 108 Caucasian, 3 Filipino, 22 Indian, 3 Japanese, and 34 Mexican students. Since the availability and time schedules made it impossible to randomly assign Ss to groups, the t test (3:10)

TABLE I

PLACEMENT AND NUMBER OF SUBJECTS IN CLASS SECTIONS, CONTROL OR
EXPERIMENTAL GROUPS, AND EARLY OR LATE GROUPS

	<u>Early Sections</u>		<u>Late Sections</u>		Total No. Students
	Section No.	Students	Section No.	Students	
Control Groups	9-1	28	9-7	18	85
	9-2	22	9-8	17	
Experimental Groups	9-3	20	9-5	24	85
	9-4	19	9-6	22	
Totals		89		81	170

Source: Ninth grade English classes at Wapato Junior High School, Wapato, Washington, 1968-69.

TABLE II

TIME SCHEDULE OF NINTH GRADE ENGLISH CLASSES AT
WAPATO (WASHINGTON) JUNIOR HIGH SCHOOL

Class Section	Scheduled Time for Start of Classes	
	Early Sections	Late Sections
9-1	8:45	
9-2	8:45	
9-3	10:27	
9-4	10:27	
9-5		11:16
9-6		12:01
9-7		1:20
9-8		1:20

Note: Each class period is forty-five minutes in length.

Source: Class schedule at Wapato (Washington) Junior High School, 1968-69.

TABLE III

ETHNIC AND SEX REPRESENTATION IN NINTH GRADE ENGLISH CLASSES
AT WAPATO JUNIOR HIGH SCHOOL

Class Section	Caucasian			Filipino			Indian			Japanese			Mexican			Total			
	F	M	Total	F	M	Total	F	M	Total	F	M	Total	F	M	Total	F	M	Total	
9-1	5	9	14	1		1	1	2	3		1	1	6	3	9	13	15	28	
9-2	6	5	11					3	2	5			4	2	6	13	9	22	
9-3	9	5	14		1	1	3		3				1	1	2	13	7	20	
9-4	7	7	14				1	1	2		1	1	2		2	10	9	19	
9-5	4	10	14				1	3	4				2	4	6	7	17	24	
9-6	8	10	18		1	1		2	2					1	1	8	14	22	
9-7	6	7	13				1		1				3	1	4	10	8	18	
9-8	8	2	10					2	2		1		1	2	2	4	11	6	17
Totals	53	55	108	1	2	3	10	12	22	1	2	3	20	14	34	85	85	170	

Source: Registration Files at Wapato (Washington) Junior High School, 1968-69.

using the distribution of scores from the initial test, was used to determine if the groups were equal.

Apparatus

The apparatus consisted of thirty 4" x 12" flash cards of meaningful terms related to the subject of drama, a twenty-minute taped lesson, a completion test designed to measure recall, and standardized introductions to the taped lesson and the test.

The terms used were taken from Modern Speech, a speech and drama textbook designed for grades nine through twelve, by John V. Irwin and Marjorie Rosenberger (9:478-480). It was assumed that the Ss had not been exposed to the terms previous to the experiment. This investigator checked with teachers and studied past curriculum of the Ss and found no evidence of any of these terms having been taught. The terms and definitions were prepared by a ninth grade drama teacher. Each flash card consisted of a drama term printed on one side with its definition on the opposite side. These drama terms and their definitions are listed in the order of presentation and can be seen in Appendix B.

The same drama teacher prepared the taped lesson which presented each term, its definition, and a brief explanation when needed (Appendix C). Refer also to the taped lesson which is filed with the Graduate Office at Central Washington State College.

The recall completion test was designed for the Ss to fill in the blank space with the correct term (Appendix D).

Standardized directions were prepared for the taped presentation and initial test (Appendix E). These directions differed in the content read to the Ss between the experimental and control groups. Standardized directions were also prepared for the first and second retention tests (Appendix F).

Procedure

This investigator met with the two ninth grade male English teachers on February 28, 1969, and again on March 3, 1969, to explain the purpose and procedure of the study. Regular classroom teachers were used as Es to reduce the possibility of the Hawthorne Effect, described by McDonald (11:21-22) as a S doing better than that which is ordinary because he knows he is in an experiment. At no time were the students told they were in an experiment.

All groups were presented the twenty-minute taped lesson of meaningful drama terms and tested immediately following the presentation. They were given a standardized introduction to the taped lesson and test. This introduction differed between the experimental and control groups. All groups were told they would be presented with a taped lesson on the definitions of specific drama terms, to listen carefully because they would be tested at the end of the lesson, not to take notes,

not to raise their hands as no discussion would be allowed, and that a card would be held up which correctly spelled the term being presented. In addition to the above instructions, the experimental groups were told that they were in competition against three other English sections, which were designated as follows: 9-3 competed against 9-4, 9-5, and 9-6; 9-4 competed against 9-3, 9-5, and 9-6; 9-5 competed against 9-3, 9-4, and 9-6; and 9-6 competed against 9-3, 9-4, and 9-5. They were told that the English section achieving the highest test score would be rewarded with a party during one of the Independent Study Opportunity (ISO) periods. It was emphasized to the experimental groups that they were in competition. According to the Es, competition was in effect as shown by the enthusiasm of the students both during the experiment and while waiting for the results.

After the taped presentation, all groups were given the recall completion test and were asked to fill in the blanks with the correct term from the thirty definitions they heard on the tape. All groups were allowed fifteen minutes for this initial test.

Between the OL period and the first RT, there was an interpolated rest (IR) period of one week. During the experiment the Es were instructed not to give out or discuss with the Ss any material similar to the terms given in the taped lesson.

In his paper on retention and forgetting, Underwood (14) expresses that similarity with other material and situational similarity are by far the most critical factors in forgetting. The type of interference from proactive inhibition may cause up to 75 per cent forgetting. Lawson (10:404-405) extends this idea further by relating the similarity of materials learned to retroactive inhibition and forgetting. These two variables--proactive and retroactive inhibition--must be controlled by the experimenter (E) to give validity to any retention experiment. This experiment controlled the two variables by using the regular classroom teachers as Es.

The party was given to the winning group, 9-6, on Thursday, March 6, 1969, two days after the OL period. The party included music, pop, ice cream, popcorn, cookies, and donuts. Three girls from the winning group planned, prepared, and directed activities of the party.

On March 11, 1969, one week after the OL period, the first RT was given to all groups. This was the same test given previously, and again the Ss were allowed fifteen minutes for completion. Standardized instructions preceded this first RT. The Ss were told that one week ago they were presented with a taped lesson on drama terms and were tested immediately following the presentation; they would now be given the same test to see how much they remembered. They were encouraged to do their best. In case any students asked if they were in competition, the Es

were instructed to tell them that the only instructions they could give them was to do their best.

There was an IR period of three weeks between the first and second RTs. During this period the Es were again instructed not to give out or discuss with the Ss any material similar to that given in the taped lesson.

On April 1, 1969, the second RT was given to all groups. Again, this was the same test given previously and the Ss were allowed fifteen minutes for completion. The standardized instructions to this test were identical to those of the first RT. The Ss were told that the taped lesson on drama terms was given four weeks ago.

This was the basic design of the experiment. Experimental groups: (Step 1) Presented the standardized introduction to the taped lesson. These included instructions of competition; (Step 2) presented the taped lesson and flash cards; (Step 3) gave Ss the recall completion test; (Step 4) IR period of one week in which the winning group was given a party; (Step 5) Ss given the first RT, with standardized instructions, one week after the OL period; (Step 6) IR period of three weeks; and (Step 7) Ss were given the second RT, with standardized instructions, four weeks after the OL period.

Control groups: (Step 1) Presented the standardized introduction to the taped lesson; (Step 2) presented the taped lesson and flash cards;

(Step 3) gave Ss the recall completion test; (Step 4) IR period of one week; (Step 5) Ss were given the first RT, with standardized instructions, one week after the OL period; (Step 6) IR period of three weeks; and (Step 7) Ss were given the second RT, with standardized instructions, four weeks after the OL period.

CHAPTER III

RESULTS AND DISCUSSION

I. RESULTS

The primary purpose of this study was to investigate the effects of competition on retention of learning, using recall of thirty meaningful drama terms and their definitions as measurement. A secondary purpose was to investigate the effects of competition on retention of learning, using recall of thirty meaningful drama terms and their definitions as measurement on Indian students only.

After all the data were tabulated (See Table IV), t tests (3:10) were computed to determine the significance of the mean differences between the competition and control groups on all three tests. A Sign Test (5:100) was used to compute the significance within groups on all three tests.

Results of Primary Study

Significance between groups. On T_1 , the \underline{S} s not motivated by competition had a mean score of 12.165. Those \underline{S} s motivated by competition had a mean score of 12.447. Since it was impossible to randomly assign the \underline{S} s to the non-competitive and competitive groups, a t of .322 was computed on T_1 and it was found that the groups were not significantly

TABLE IV

MEAN SCORES AND THE t VALUE ON DRAMA TEST (T) TERMS GIVEN TO
 NINTH GRADE ENGLISH STUDENTS IMMEDIATELY, ONE WEEK,
 AND FOUR WEEKS, RESPECTIVELY, AFTER
 PRESENTATION OF TAPED LESSON

	N	T ₁	T ₂	T ₃
Not motivated by competition	85	12.165	10.071	10.141
Motivated by competition	85	12.447	10.424	9.941
t values		.332	.403	.224

different (.05). This gave meaning to the results of T_2 and T_3 retention tests.

Mean scores of 10.071 and 10.424 were computed for Ss not motivated by competition and those motivated by competition respectively on T_2 . A t of .403 on T_2 was found not to be significant (.05). Since there was no significant difference between groups on T_2 given one week after the OL period, it was assumed that competition had no effect on the retention of learning of the thirty drama terms during this time period.

A t of .224 was also found not significant (.05) on T_3 . This test, given four weeks after the OL period; resulted in means of 10.141 and 9.941 for the non-competitive and competitive groups respectively. It was also assumed that competition had no effect on retention of the thirty drama terms during this time period. Results of T_1 , T_2 , and T_3 are shown in Table IV.

Significance within groups. Signed differences of 51 and 49 for the non-competitive and competitive groups respectively were found to be significant (.05) between T_1 and T_2 . This was expected and accounts for the forgetting factor expressed in Lawson's formula (10:400).

Found to be significant (.05) were signed differences of 49 and 51 for the non-competitive and competitive groups respectively between T_1 and T_3 . This was also expected.

Results found between T_2 and T_3 were of significance to this investigation. No significant difference (.05) was found in the Signed differences of 6 and 12 for the non-competitive and competitive groups respectively. These results lead to the assumption that no difference in retention of the drama terms existed between T_2 and T_3 , which were given three weeks apart.

Results of the Indian Study

As was the case in the overall group design, it was impossible to randomly assign the Indian Ss to the non-competitive and competitive groups. Each of the two groups was comprised of eleven Ss--five girls and six boys. A t test, computed on T_1 results, found the non-competitive group with a mean of 6.636 and the competitive group with a mean of 11.545 to be significantly different (.05); thus invalidating the secondary purpose of the study. Of interest, however, was the per cent of retention on T_1 and T_2 . The non-competitive group results showed a mean of 4.636 on both T_2 and T_3 with 70 per cent retention of T_1 . The competitive group results showed a mean of 7.727 on T_2 with 67 per cent retention of T_1 (Table V). This showed that the non-competitive group retained more than the competitive group, but significance could not be prove. These results seem to agree with the cultural heritage of the non-competitive Yakima Indian Tribe.

TABLE V

MEAN SCORES AND PER CENT OF RETENTION ON DRAMA TEST (T) TERMS
GIVEN TO NINTH GRADE INDIAN ENGLISH STUDENTS IMMEDIATELY,
ONE WEEK, AND FOUR WEEKS, RESPECTIVELY, AFTER
PRESENTATION OF TAPED LESSON

	N	T ₁	T ₂	Per Cent Retention	T ₃	Per Cent Retention
Not motivated by competition	11	6.636	4.636	70%	4.636	70%
Motivated by competition	11	11.545	7.727	67	7.363	64

II. DISCUSSION

Motivation through competition was introduced into the classroom situation as was evidenced by the enthusiasm of the competition groups. The null hypothesis was proposed and proven that, in this study, competition did not affect retention of learning. Since classroom teachers served as Es, it is assumed that the variables of proactive and retroactive inhibition were controlled. At no time was either group aware that they were in an experimental situation; therefore, the results cannot be construed to have resulted from the Hawthorne Effect.

One variable which is impossible to control in such an experiment is the amount of studying a child does at home between the OL period and the RT period. The extent to which Ss studied the terms within this time period can only be assumed to be that which they normally spend on this type and amount of learning. This is based on the fact that Ss were unaware of an experimental situation. Also, they were not allowed to take notes during the OL period. In both groups, mean scores decreased significantly (.05) between T_1 and T_2 , indicating that forgetting did occur.

CHAPTER IV

SUMMARY AND CONCLUSIONS

An experiment on the effects of competition on retention of learning was conducted in this study. The study consisted of a four-weeks period in which the Ss were given an OL period and three tests. Ss comprised two groups, each with eighty-five ninth grade English students at Wapato (Washington) Junior High School. Both groups were further divided into four sub-groups each. Two regular classroom teachers served as Es.

Both groups of Ss were given a taped lesson consisting of thirty drama terms and their definitions and were tested immediately following the presentation. The competition group differed from the control group in that Ss were motivated by instructions of competition prior to the OL period. The form of motivation used was a party offered to the winning sub-group. Both groups were retested, with the same test given previously, one week and four weeks after the OL period.

During the two IR periods, no similar materials were presented to the Ss and at no time during the investigation were the Ss aware that they were in an experiment.

The RT was recall-completion, with the number correct being used as individual scores. A t test was computed on mean differences

between the non-competitive and competitive groups on all three tests. No significant difference (.05) was found on any of the tests, allowing this investigator to assume that the groups were equal on T_1 and that competition did not affect retention of learning as shown by the results of T_2 and T_3 .

The results of the Sign Test, computing differences within groups, showed that the expected forgetting between T_1 and T_2 among both groups did occur. There was no significant difference (.05) within groups between T_2 and T_3 .

This investigation was unable to give any significance to the secondary purpose--studying the effects of competition on retention of learning among Indian students. The design of the experiment and a significant t (.05) between the non-competitive and competitive Indian groups on T_1 combined to make the data insignificant to this study.

Conclusions

Since it appeared that competition was in effect in the competitive learning situation, and that no significant difference (.05) was found in retention between the non-competitive and competitive groups, this investigator assumes that competition did not affect retention of learning in this study. It is also assumed that, since cooperation was not stressed in the study, the results do not conclude that competition and cooperation have the same effect on retention of learning.

It is recommended by this investigator that further studies, capable of measuring both variables of competition and cooperation, need to be made. The suggested design includes, in addition to control and competition groups, a cooperative group. More meaning could be attached to such a study because all variables would affect each independent variable equally.

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BIBLIOGRAPHY

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APPENDIX A
CORRESPONDENCE

Wapato Public Schools

School District 207, Yakima County

Wapato, Washington 98951

High School Principal
Mr. Jack Dorr
Junior High Principal
Mr. Wayne Heffner
Intermediate School Principal
Mr. James Divine
Primary School Principal
Miss Myrtle Haugen
Parker-Parker Heights Principal
Mr. William Frazier

Superintendent
Mr. Robert Deal
Administrative Assistant
Mr. Lewis Patton
Administrative Assistant
Mr. David Plesha
Board President
Mr. Charles Guthrie

December 16, 1968

Mr. William W. Parker
807 East Capitol
Ellensburg, Washington

Dear Mr. Parker:

In a previous discussion you asked about the use of ninth grade students as subjects in a retention experiment you wish to conduct. This has been discussed with the ninth grade English teachers who have offered themselves and their students to aid you in this experiment.

Please notify us of the date you wish to start the experiment and give pertinent information on the groups needed so that they might be available to you.

Sincerely,

Wayne E. Heffner
Principal

Please note:
signature has been redacted due to security concerns

APPENDIX B

CONTENTS OF FLASH CARDS

CONTENTS OF FLASH CARDS

- cue - - - - - the final words of a previous speech or stage business which gives you the signal to begin speaking.
- clip cues - - - - - to come in with lines before the cue speech has been finished.
- plant - - - - - a person in the audience who works with the cast on stage; a member of the cast with definite lines and cues.
- ad lib - - - - - to make up lines or to move without definite cues.
- throw a line - - - - - to repeat a cue to a fellow actor who has forgotten lines.
- muffing - - - - - misreading a line, reading the wrong line, or missing a cue.
- wings - - - - - the space behind scenes on each side of the stage.
- walk-on - - - - - a bit part either with or without lines.
- teaser - - - - - the narrow overhead drapery which conceals the top of the stage and reduces height.
- byplay - - - - - side action used to make scenes seem natural while other actors are speaking.
- foots - - - - - footlights at the front of the stage.
- properties (props) - all objects except scenery which are used on stage.
- blackouts - - - - - brief sketches or scenes with surprise endings; so named because lights are blacked out at the end instead of lowering the curtain.
- business - - - - - any action done on stage other than movement from one area to another, such as knitting, eating, reading, etc.

- catwalk - - - - - the narrow ledge near the overhead lights used by electricians.
- character part - - - any role which requires an actor to change his natural habits of speaking or acting.
- batten - - - - - a long strip of material, usually lumber or pipe, above the stage on which scenery is fastened.
- frame an entrance - to pause in entrance in order to attract attention.
- hamming - - - - - to exaggerate acting to the point of being ridiculous.
- mugging - - - - - overacting in a part to capture attention.
- pace - - - - - to regulate the timing of actions and speech.
- plant a line - - - - to say a line with such emphasis that the audience will remember it later.
- trouper - - - - - an experienced actor who puts the interests of the company ahead of his own.
- understudy- - - - - an actor who has studied the lines and actions of another and who could take that person's place in an emergency.
- upstaging - - - - - moving toward the back (upstage area), forcing fellow actors to follow--with the result that their backs are to the audience, and you have the advantage of facing front.
- block - - - - - to hide a fellow actor from view by getting in front of him; also hiding yourself from view by getting behind someone.
- apron - - - - - the part of the stage between the front curtain and the footlights.
- backdrop - - - - - the curtain hiding the back wall; may be painted to represent skyline or any other scene.

flies - - - - - the space above the stage where scenery can be removed from sight or "flown."

blocking a scene - deciding on all of the movement of the characters during a scene.

APPENDIX C

CONTENTS OF TAPED DRAMA LESSON

CONTENTS OF TAPED DRAMA LESSON

These are the terms you will learn. Now, look at the card your teacher is holding and listen carefully.

The first term you will learn is cue. Cue means the final or last words of a previous speech, or stage business which gives the actor the signal to begin speaking. Since the actor must know when to speak his lines, he must pay close attention to the last words of the person who speaks before him. I repeat, a cue means the final or last words of a previous speech, or stage business which gives the actor the signal to begin speaking.

Term number two, clip cues. To clip cues means to come in with lines before the cue speech has been finished. Remember, a cue or cue speech means the final or last words of a previous speech. Again, clip cues means to come in with lines before the cue speech is finished.

The term plant means a person in the audience who works with the cast on stage. He is a member of the cast with definite lines and cues. A plant is placed in the audience for a specific purpose dealing with the play. Repeat, a plant is a person in the audience who works with the cast on stage.

Next is the term ad lib. Ad lib means to make up lines or to move without definite cue. If someone on stage forgets a line, another

actor may ad lib to cover for him. Ad lib means to make up lines or to move without definite cue.

Throw a line means to repeat a cue to a fellow actor who has forgotten lines. For example, if an actor were to say, "Let's go," and then repeat, "I said let's go," he is throwing a line. To repeat a cue for a fellow actor who has forgotten a line is to throw a line.

The term muffing means to misread a line, to read the wrong line, or to miss a cue. Again, muffing means to misread a line, to read the wrong line, or to miss a cue.

The next term is wings. The space behind scenes on each side of the stage is called wings. This space on either side of the stage is used for the actors to wait for their entrance, and for backstage work such as lighting and props. Remember, the space behind scenes on each side of the stage is called wings.

The term walk-on means a bit part or small part, either with or without lines. I repeat, walk-on means a bit part either with or without lines.

The narrow overhead drapery which conceals the top of the stage and reduces height is called a teaser. Teasers work the imagination by covering up things that should not be seen. A teaser is an overhead drapery that conceals the top of the stage and reduces height.

The term byplay means side action that is used to make scenes seem natural while other actors are speaking. Side action refers to movements such as two actors carrying on a whispered conversation while another actor speaks. Byplay means side action that is used to make scenes seem natural while other actors are speaking.

A term which more or less explains itself is called foots. Foots are footlights at the front of the stage. They are set or built into the floor. Again, foots are footlights at the front of the stage.

Properties, better known as props, include all objects except scenery which are used on stage. Props include furniture and objects that remain in one place as well as all objects that are handled or carried by actors. Again, properties, or props, include all objects except scenery which are used on stage.

The next term, blackouts, means brief sketches or scenes with surprise endings. They are so named because the lights are blacked out at the end instead of lowering the curtain. Blackouts are brief sketches or scenes with surprise endings; lights are blacked out at the end instead of lowering the curtain.

The term business means any action done on stage other than movement from one area to another. This movement would include such things as knitting, reading, eating, and others. Remember, business means any action done on stage other than movement from one area to another, such as knitting, reading, or eating.

The narrow overhead ledge near the lights that is used by electricians is called a catwalk. This ledge or catwalk is just wide enough for the electrician to walk on so he may have access to any of the overhead lights. A catwalk is a narrow overhead ledge used by electricians to reach the lights.

The next term is called character part. Character part refers to any role which requires an actor to change his natural habits of speaking or acting. For example, a sixteen-year-old girl might play the part of a seventy-year-old woman. She would have to change her way of speaking and her movements to fit those of the character. I repeat, a character part refers to any role which requires an actor to change his natural habits of speaking or acting.

A long strip of material above the stage, usually lumber or pipe on which scenery is fastened, is called batten. The scenery, and quite often the draperies, hang suspended from the batten. Batten is a long strip of material above the stage on which scenery is fastened. It is usually made of lumber or pipe.

The following term, frame an entrance, tends to be self-explanatory. Frame an entrance means to pause in entering to attract attention. Remember, if an actor pauses in entering to attract attention, he is framing an entrance.

The expression, "He's a big ham!" comes from the following term, hamming. Hamming means to exaggerate acting to the point of being ridiculous.

A similar term is called mugging. Mugging is overacting in a part to capture attention. Remember, hamming is exaggerating acting to the point of being ridiculous, while mugging is overacting in a part to capture attention.

The term pace means to regulate the timing of actions and speech. Timing is of great importance in helping to build up certain scenes. An example would be suspense. Pace means to regulate the timing of actions and speech.

To say a line with such emphasis that the audience will remember it later is called plant a line. Certain lines in a play may be key lines that are important to the meaning of the play. To emphasize key lines, an actor may plant a line. Again, plant a line means to say a line with such emphasis that the audience will remember it later.

An experienced actor who puts the interests of the company ahead of his own is called a trouper. This is the actor who thinks first of what he can do for the company and the field of acting rather than of himself. A trouper is an experienced actor who puts the interests of the company ahead of his own.

The next term is understudy. An understudy is an actor who has studied the lines and actions of another, and who could take that person's place in an emergency. An understudy is important, because at any moment he/she might have to step in and take the place of the regular actor.

The term upstaging is important. A play can be ruined by one actor upstaging another. Upstaging means moving toward the back of the stage forcing fellow actors to follow, with the result that their backs are to the audience and you have the advantage of facing front. I repeat, upstaging means moving toward the back of the stage forcing fellow actors to follow, with the result that their backs are toward the audience and you have the advantage of facing front.

To hide a fellow actor from view by getting in front of him; also hiding yourself from view by getting behind someone is to block. To block, then, is to hide yourself from view by getting behind a fellow actor or to hide a fellow actor from view by getting in front of him.

The next term, apron, refers to the part of the stage between the front curtain and the footlights. In some theaters, the apron extends part way out into the audience. The apron is the part of the stage between the front curtain and the footlights.

The term backdrop refers to the curtain hiding the back wall. The backdrop may be painted to represent skyline or any other scene. The curtain hiding the back wall of the stage is called a backdrop.

The space above the stage where scenery can be removed from sight or "flown" is called flies. This space extends from above stage, where teasers hide the lights, on up to a height of approximately twenty to twenty-five feet. Scenery hangs suspended in this area. Flies refers to the space above stage where scenery can be removed from sight, or "flown."

The last term is blocking a scene. Blocking a scene means deciding on all of the movement of the characters during a scene. The director of a play decides in advance what movement from one area to another is necessary so the actors can learn this quickly. Blocking a scene means deciding on all of the movements of the characters during a scene.

This concludes the lesson on drama terms.

APPENDIX D
DRAMA TERMS TEST

DRAMA TERMS

Completion Test

Using the drama terms that were presented to you on the tape, fill in the correct term for each blank space.

1. batten is a long strip of material, usually lumber or pipe, above the stage on which scenery is fastened.
2. Any role which requires an actor to change his natural habits of speaking or acting is called a character part.
3. The space above stage where scenery can be removed from sight or "flown" is called flies.
4. A plant is a person in the audience who works with the cast on stage; a member of the cast with definite lines and cues.
5. The narrow overhead draperies which conceal the top of the stage and reduce height are called teasers.
6. The space behind scenes on each side of the stage is called wings.
7. To make up lines or to move without definite cue is to ad lib.
8. business is any action done on stage other than movement from one area to another, such as knitting, eating, reading, etc.
9. Pausing in entrance in order to attract attention is called framing an entrance.
10. properties (props) are all objects except scenery which are used on stage.
11. A bit part either with or without lines is a walk-on.
12. The part of the stage between the front curtain and the footlights is the apron.

13. blocking a scene is deciding on all of the movements of the characters during a scene.
14. The final words of a previous speech or stage business, which give you the signal to begin speaking are called a cue.
15. mugging is overacting in a part to capture attention.
16. An experienced actor who puts the interests of the company ahead of his own is called a trouper.
17. A backdrop is the curtain hiding the back wall; it may be painted to represent skyline or any other scene.
18. byplay is side action used to make scenes seem natural while other actors are speaking.
19. Footlights at the front of the stage are called foots.
20. To regulate the timing of actions and speech is to pace.
21. Moving toward the back (upstage area), forcing fellow actors to follow--with the result that their backs are to the audience and you have the advantage of facing front--is called upstaging.
22. blackouts are brief sketches or scenes with surprise endings; so named because lights are blacked out at the end instead of lowering the curtain.
23. To clip cues is to come in with lines before the cue speech has been finished.
24. Saying a line with such emphasis that the audience will remember it later is called plant a line.
25. To block is to hide a fellow actor from view by getting in front of him; also hiding yourself from view by getting behind someone.
26. muffing is misreading a line, reading the wrong line, or missing a cue.
27. A cat walk is a narrow ledge near the overhead lights used by electricians.

28. An actor who has studied the lines and actions of another and who could take that person's place in an emergency is an understudy.
29. To exaggerate acting to the point of being ridiculous is called hamming.
30. To throw a line is to repeat a cue to a fellow actor who has forgotten lines.

APPENDIX E
INSTRUCTIONS TO EXPERIMENTER
ON THE TAPED DRAMA LESSON AND TEST

INSTRUCTIONS TO EXPERIMENTER ON THE
TAPED DRAMA LESSON AND TEST

DIRECTIONS FOR CONTROL GROUPS

1. Read the following introduction to the taped lesson.

You are going to be presented with a taped lesson on the definitions of specific drama terms. Please listen carefully, but do not take any notes. Remember, please do not take any notes. No discussion will be allowed during the presentation, so please do not raise your hand to ask questions. Do pay close attention. You will be given a test on these terms at the end of the lesson. During the presentation, I will hold up a card which correctly spells the term being presented.

Now, listen carefully.

2. Present the tape and flash cards.
3. Read the following introduction to the test.

The test you are about to receive contains the thirty definitions you heard on the tape. You are to fill in each blank with the correct term you learned from the tape. Read each definition carefully before you fill in the blank.

4. Pass out tests and allow 15 minutes for testing.

INSTRUCTIONS TO EXPERIMENTER ON THE
TAPED DRAMA LESSON AND TEST

DIRECTIONS FOR EXPERIMENTAL GROUPS

1. Read the following introduction to the taped lesson.

You are going to be presented with a taped lesson on the definitions of specific drama terms. This class is competing against English sections _____ to see who can achieve the highest test scores. The winning class will be rewarded with a party during one of the ISO periods. Remember, you are competing against these classes so that your class might win the party. Please listen carefully, but do not take any notes. Remember, please do not take any notes. No discussion will be allowed during the presentation, so please do not raise your hand to ask questions. Do pay close attention. You will be given a test on these terms at the end of the lesson. During the presentation, I will hold up a card which correctly spells the term being presented.

Now, listen carefully.

2. Present the tape and flash cards.
3. Read the following introduction to the test.

The test you are about to receive contains the thirty definitions you heard on the tape. You are to fill in each blank with the correct term you learned from the tape. Read each definition carefully before you fill in the blanks.

4. Pass out tests and allow 15 minutes for testing.

APPENDIX F
INSTRUCTIONS TO EXPERIMENTER ON THE
FIRST AND SECOND RETENTION TESTS

INSTRUCTIONS TO EXPERIMENTER ON THE
FIRST RETENTION TEST

DIRECTIONS TO STUDENTS (CONTROL AND EXPERIMENTAL GROUPS)

1. Read the following introduction to the test.

One week ago you were presented with a taped lesson on drama terms and were tested immediately following the presentation. You will now be given the same test to see how much you remember. Please do your best.

2. Pass out tests and allow 15 minutes (exactly) for completion.

NOTE: If any students ask if they are in competition, say: "The only instructions I can give you is to do your best."

INSTRUCTIONS TO EXPERIMENTER ON THE
SECOND RETENTION TEST

DIRECTIONS TO STUDENTS (CONTROL AND EXPERIMENTAL GROUPS)

1. Read the following introduction to the test.

Four weeks ago you were presented with a taped lesson on drama terms and were tested immediately following the presentation. You will now be given the same test to see how much you remember. Please do your best.

2. Pass out tests and allow 15 minutes (exactly) for completion.

NOTE: If any students ask if they are in competition, say: "The only instructions I can give you is to do your best."

APPENDIX G

TABLE VI
 NUMBER, ETHNIC, AND SEX IDENTIFICATION OF SUBJECTS
 AND T₁, T₂, AND T₃ DRAMA TERM TEST SCORES
 FOR CLASS SECTIONS

Number	Ethnic*	Sex	T ₁	T ₂	T ₃
<u>Section 9-3 Experimental</u>					
1	C	F	15	11	9
2	C	F	23	22	20
3	C	F	25	22	22
4	C	F	15	5	7
5	C	F	17	15	17
6	C	F	16	16	15
7	C	F	21	16	14
8	C	F	3	4	2
9	C	F	5	5	5
10	C	M	18	14	14
11	C	M	4	3	3
12	C	M	25	23	22
13	C	M	19	15	13
14	C	M	13	7	9
15	I	F	19	14	13
16	I	F	14	8	6
17	I	F	8	8	7
18	M	F	15	15	12
19	M	M	15	14	13
20	F	M	8	2	3

* C refers to Caucasian
 F refers to Filipino
 I refers to Indian
 J refers to Japanese
 M refers to Mexican

Source of Ethnic and Sex Identification: Registration files at Wapato (Washington) Junior High School.

TABLE VI (Continued)

Number	Ethnic*	Sex	T ₁	T ₂	T ₃
<u>Section 9-4 Experimental</u>					
21	C	F	18	19	19
22	C	F	1	0	0
23	C	F	6	8	6
24	C	F	9	8	3
25	C	F	5	5	7
26	C	F	8	6	3
27	C	F	18	18	18
28	C	M	16	16	17
29	C	M	6	13	9
30	C	M	17	12	11
31	C	M	6	14	10
32	C	M	7	12	9
33	C	M	12	7	7
34	C	M	12	7	7
35	I	F	9	7	7
36	I	M	17	9	9
37	M	F	13	11	8
38	M	F	5	5	2
39	J	M	15	12	11

- * C refers to Caucasian
 F refers to Filipino
 I refers to Indian
 J refers to Japanese
 M refers to Mexican

Source of Ethnic and Sex Identification: Registration files at Wapato (Washington) Junior High School.

TABLE VI (Continued)

Number	Ethnic*	Sex	T ₁	T ₂	T ₃
<u>Section 9-5 Experimental</u>					
40	C	F	14	11	14
41	C	F	9	6	5
42	C	F	14	11	11
43	C	F	7	7	3
44	C	M	13	7	6
45	C	M	14	9	12
46	C	M	16	13	10
47	C	M	8	4	4
48	C	M	12	9	10
49	C	M	15	11	9
50	C	M	7	4	5
51	C	M	22	20	21
52	C	M	12	8	9
53	C	M	8	9	5
54	I	F	8	2	1
55	I	M	8	4	6
56	I	M	6	2	1
57	I	M	3	3	2
58	M	F	3	3	1
59	M	F	9	7	6
60	M	M	6	2	3
61	M	M	6	5	4
62	M	M	2	0	2
63	M	M	3	5	5

* C refers to Caucasian
 F refers to Filipino
 I refers to Indian
 J refers to Japanese
 M refers to Mexican

Source of Ethnic and Sex Identification: Registration files at Wapato (Washington) Junior High School.

TABLE VI (Continued)

Number	Ethnic*	Sex	T ₁	T ₂	T ₃
<u>Section 9-6 Experimental</u>					
64	C	F	23	18	19
65	C	F	23	21	21
66	C	F	6	6	4
67	C	F	14	12	13
68	C	F	9	6	6
69	C	F	23	19	19
70	C	F	23	22	22
71	C	F	23	24	25
72	C	M	8	5	4
73	C	M	21	20	21
74	C	M	14	7	9
75	C	M	8	2	4
76	C	M	18	17	15
77	C	M	9	9	10
78	C	M	7	7	6
79	C	M	27	27	27
80	C	M	23	23	24
81	C	M	14	13	11
82	I	M	23	21	22
83	I	M	12	7	7
84	M	M	1	0	0
85	F	M	12	10	12

- * C refers to Caucasian
 F refers to Filipino
 I refers to Indian
 J refers to Japanese
 M refers to Mexican

Source of Ethnic and Sex Identification: Registration files at Wapato (Washington) Junior High School.

TABLE VI (Continued)

Number	Ethnic*	Sex	T ₁	T ₂	T ₃
<u>Section 9-1 Control</u>					
1	C	F	23	21	22
2	C	F	16	10	9
3	C	F	18	15	14
4	C	F	28	26	25
5	C	F	10	7	7
6	C	M	26	24	22
7	C	M	21	21	20
8	C	M	9	8	6
9	C	M	16	10	10
10	C	M	20	12	15
11	C	M	19	9	11
12	C	M	25	25	27
13	C	M	16	15	16
14	C	M	27	26	26
15	I	F	2	2	2
16	I	M	6	4	4
17	I	M	8	5	7
18	M	F	5	4	6
19	M	F	6	4	4
20	M	F	8	2	2
21	M	F	21	17	17
22	M	F	14	11	5
23	M	F	13	11	10
24	M	M	14	11	9
25	M	M	2	0	1
26	M	M	7	6	5
27	J	M	17	18	20
28	F	F	13	9	9

- * C refers to Caucasian
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 M refers to Mexican

Source of Ethnic and Sex Identification: Registration files at Wapato (Washington) Junior High School.

TABLE VI (Continued)

Number	Ethnic*	Sex	T ₁	T ₂	T ₃
<u>Section 9-2 Control</u>					
29	C	F	13	12	19
30	C	F	4	4	3
31	C	F	23	26	25
32	C	F	21	23	20
33	C	F	24	18	23
34	C	F	8	7	16
35	C	M	11	10	9
36	C	M	2	2	2
37	C	M	9	5	4
38	C	M	20	17	16
39	C	M	6	5	5
40	I	F	2	0	0
41	I	F	2	0	0
42	I	F	13	8	9
43	I	M	3	2	1
44	I	M	11	7	8
45	M	F	12	8	10
46	M	F	5	2	2
47	M	F	5	9	10
48	M	F	3	0	0
49	M	M	1	3	3
50	M	M	7	4	4

- * C refers to Caucasian
 F refers to Filipino
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 J refers to Japanese
 M refers to Mexican

Source of Ethnic and Sex Identification: Registration files at Wapato (Washington) Junior High School.

TABLE VI (Continued)

Number	Ethnic*	Sex	T ₁	T ₂	T ₃
<u>Section 9-7 Control</u>					
51	C	F	10	10	9
52	C	F	22	20	21
53	C	F	11	11	12
54	C	F	13	13	14
55	C	F	13	14	11
56	C	F	11	3	4
57	C	M	13	15	15
58	C	M	15	17	14
59	C	M	19	16	15
60	C	M	5	4	3
61	C	M	21	21	14
62	C	M	13	14	16
63	C	M	2	1	0
64	I	F	10	12	11
65	M	F	9	4	3
66	M	F	9	9	9
67	M	F	9	1	1
68	M	M	8	10	10

- * C refers to Caucasian
 F refers to Filipino
 I refers to Indian
 J refers to Japanese
 M refers to Mexican

Source of Ethnic and Sex Identification: Registration files at Wapato (Washington) Junior High School.

TABLE VI (Continued)

Number	Ethnic*	Sex	T ₁	T ₂	T ₃
<u>Section 9-8 Control</u>					
69	C	F	14	12	13
70	C	F	11	7	7
71	C	F	13	8	7
72	C	F	14	9	8
73	C	F	15	12	10
74	C	F	16	16	14
75	C	F	22	21	19
76	C	F	14	11	13
77	C	M	16	8	8
78	C	M	17	12	9
79	I	M	14	8	8
80	I	M	2	3	1
81	M	F	18	14	17
82	M	F	8	3	5
83	M	M	4	2	7
84	M	M	7	5	6
85	J	F	7	5	8

- * C refers to Caucasian
 F refers to Filipino
 I refers to Indian
 J refers to Japanese
 M refers to Mexican

Source of Ethnic and Sex Identification: Registration files at Wapato (Washington) Junior High School.