THE EFFECT OF REVIEW CRAMMING UPON RETENTION IMMEDIATE AND DELAYED.

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Bachelor of Science

Southeastern State Teachers College

1931

Submitted to the School of Education

Oklahoma Agricultural and Mechanical College

In Partial Fulfillment of the Requirements

For the Degree of

Master of Science

1938

APPROVED

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ACKNOWLEDGEMENT

The writer makes grateful acknowledgement to Dr. John Charles Muerman for his help and advice in selection of this topic for study, and particularly does he wish to acknowledge the untiring and constant advice and help given by Dr. S. L. Reed and Dr. Melvin G. Rigg.

Acknowledgement is also made to Miss Waltina Price and Miss Rachel Nicholas for their assistance and cooperation in the testing and checking of the tests used in this study, to Supt. E. L. Thomas for his permission to carry on the study in his school.

Finally, the writer is grateful to his wife, Mrs. Lillian Tyler Fulton, for her patient understanding attitude toward the entire study, and for her untiring assistance in checking the figures which form such a large part of this work.

E. E. F.

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CHAPTER I

INTRODUCTION

PURPOSE AND METHOD OF STUDY

The writer's interest in this subject came through a discussion with a fellow student upon the effect of cramming and its relation to securing grades.

The purpose of this study is to determine the effect of fifty minutes of intensive study, or cramming, in Social Science on material previously covered in the regular course subsequent to the examination, and to determine statistically if such cramming will have any advantage upon retention, immediately, six weeks later, and twelve weeks later.

The word "cramming" is used here to mean intensive review of work previously covered in the regular course.

The pupils used in this study are high school pupils enrolled in Oklahoma History, Modern European History, and American History, in the Quinton High School. The material covered in the tests is the material which the average high school class in these respective subjects cover during the first six-weeks period of the first semester of the school year.

There has been some disagreement among psychologists as to the effect of cramming upon retention. Little experi-

mental work on a practical basis has been done in this field on the secondary level. It is with the idea of setting up the problem in such a way that its methods could be followed by most any high school teacher, that this problem is approached.

The real problem is the value of time spent in cramming. In terms of time, and effort, is such cramming worth anything to the student? Does it have a value on retention immediate and delayed? Meuman[1] says that one of the characteristics of the rapid learner is that he begins sooner to forget. "He who learns rapidly also forgets rapidly." Bright children retain twice as much as dull children of the same age. Dockeray[2] found by his experiments that children who do a part of their work every day will accomplish more than those who wait until near the end of the term and then cram.

Betts contends that cramming is a poor method of study. He says:

> If this method of study would yield as valuable permanent results, it would be by far the most sensible and economic method to use; for under the stress of necessity we often are able to accomplish results much faster than when no pressure is resting upon us. The difficulty is, however, that the results are not permanent; the facts learned do not have time to seek out and link themselves to well established associates;

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[1] E. Meumann, The Psychology of Learning, Translated from the third edition of "The Economy and Technique of Learning", by John Wallace Baird. p. 170.

[2] Floyd C. Dockeray, General Psychology, Revised Edition. p. 382.

> learned in an hour, their retention is as ephemeral as the application which gave them to us. Facts which are needed but temporarily and which cannot become a part of our body of permanent knowledge may profitably be learned by cramming. ---But those facts which are to become a permanent part of our mental equipment,-- cannot be crammed. Crammed facts may serve us during a recitation or an examination, but they never really become a part of us. Nothing can take the place of the logical placing of facts if they are to be remembered with facility, and be usable in thinking when recalled.[3]

Benson, Lough, Skinner, West[4] say that students who postpone logical, systematic study until shortly before the examination and then expect cramming to carry them through the tests usually find the results disappointing. However, they find that intensive reviews before examination, of material mastered during the course to be beneficial and effective in fixing them in memory.

Pyle[5] says that if one has to organize a large amount of material for a particular occasion, it is a legitimate and economical procedure to concentrate the learning and do it just before the knowledge is needed, but for material that is to be remembered for life it is more economical to spread the learning time out over a long period of time. He says that the cramming process is not effective for lasting memory, unless there has been previous learning of the parts in detail.

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[3] George Herbert Betts, The Mind and Its Education. p. 123.

[4] Charles E. Benson, James E. Lough, Charles E. Skinner, Paul V. West, Psychology for Teachers, pp. 246-247.

[5] William Henry Pyle, Psychology of Learning, p. 184.

Concentrated learning of material previously learned is profitable.

Titchener found that the quick learner retains as well as the slow learner, that he has the advantage from the start and he loses nothing by the lapse of time. He asserted:

> The results of these experiments throw some light on the nature of cramming, which has for the most part been roundly condemned by educators. Against cramming it may be urged that the hasty impression of a mass of heterogeneous material cannot be lasting; the law of retroactive inhibition will come into play, to weaken the associative tendencies. The student who crams trusts to recency of experience to carry him through; he hopes that a certain amount of his reading will cling to him just for the day or two that he needs it.--- Good cramming,---, is a very valuable asset to the quick learner.[6]

Woodworth[7] declared that continuous cramming just before an examination may accomplish its immediate purpose, but accomplishes little of permanent knowledge.

Woodworth[8] found that the old saying that "quick learning means quick forgetting" was not wholly born out by experiments. He observed that a learner who learns quickly because he is on the alert for significant facts and connections retained better than a learner who is slow from lack of alertness, that the wider awake the learner, the quicker will be

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[6] Edward Bradford Titchener, A Text Book of Psychology, pp. 405-406.

[7] Robert S. Woodworth, Psychology A Study of Mental Life, p. 342.

[8] Robert S. Woodworth, Psychology, Third Edition, p. 282.

his learning and the slower the forgetting.

Breese[9] states that we usually forget quickly that which we learn quickly, because in the rapid acquisition few associative connections are formed. As an example he says that after cramming practically everything is forgotten after examination.

Odell[10] says that cramming to be effective must be based almost wholly upon facts. He found that a certain amount of cramming was not undesirable. It is not desirable that children cram on material that should have been learned during the regular course, but that intensive reviews before the examinations are contributing to the desired end.

Skinner, Gast and Skinner say:

> Material that is learned by cramming can be recalled fairly well within a short time after learning. It does not leave as permanent impression, as work learned by distributing repetitions over several weeks or months. ----------.
>
> Cramming is justifiable on many occasions.[11]

Horne[12] found very little to recommend cramming. He says it means less associations are formed with the other things in the mind, that the Crammer is upset by an original problem, that paths are shallow and less permanent, that things may be

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9 Burtis Burr Breese, Psychology, p. 254.

10 Charles Walter Odell, Traditional Examinations and New Type Tests, pp. 13-14.

11 Charles Edward Skinner, Ira Morris Gast, and Harley Clay Skinner, Readings in Educational Psychology, p. 515.

12 Herman Harrel Horne, Psychological Principles of Education. p. 132.

repeated but cannot be applied, and consequently very quick loss from memory of what is so acquired. He says that cramming eliminates the element of time necessary for the growth of the nervous system.

Pease[13] in a similar study to this one found that among college students, the Crammers on the initial test exceeded the Non-crammers by a mean of 11.1 points on a 100 item test. In the retest six weeks later he found that the Crammers still held the lead by 6.3 points over the non-crammers. He found that, from the standpoint of the student, it pays to cram, not only for the purpose of raising the grade on the immediate test, but for any test occurring up to six weeks later than the time of the cramming. He also found that the value of cramming is in direct proportion to the intelligence of the one doing the cramming.

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[13] Gleenn R. Pease, Should Teachers Give Warning of Tests and Examinations?, Journal of Educational Psychology, XXI. April 1930, pp. 273-277.

CHAPTER II

COLLECTION AND TREATMENT OF DATA

The data for this study were gathered from the following sources:

Form A, and Form B of the Otis Self-Administering Test of Mental Ability.

Test papers of each of the pupils on the same material, given three different times with six-weeks intervals, in each of the three classes.

At the beginning of the school year in which this study was made every pupil in the high school was given the Otis Self-Administering Test of Mental Ability, Form A and Form B. The I. Q. of each of the students in the study was computed on each of these tests. The I. Q. of Form A, and the I. Q. of Form B were computed. These I. Q.'s were added together for each pupil; averaged, and the resulting quotient was, for the purpose of this study, assumed to be the I. Q.

In each of the respective classes the groups were equated on the basis of their I. Q.'s.

In all tables Oklahoma History is shown as Group I, Modern History as Group II, and American History as Group III. Each of these groups is broken down into a Control and an Experimental Section.

The tests used were of the objective type, composed of True-False, Multiple Choice, Best Answer, and Matching types.

The test used in Oklahoma History was composed of 116 items. The test used in Modern European History was composed of 110 items. The test used in American History was composed of 133 items. The material in each of these tests was selected by the writer, with the assistance of the teacher in the course, from material covered during the first six-weeks period of the school year. (See appendix)

In this school the six-weeks period is used. The six-weeks tests are usually given on Thursday and Friday of the sixth week. In order to prevent students in this experiment from making any special preparations for the tests the initial tests were given on Tuesday of the Sixth week.

The students having been equated on the basis of their I. Q.'s, were told of the general nature of the experiment. To encourage them to do their best, they were told that the grades on this test would be used to make up the six-weeks grade. They were also told that in order not to penalize those who would take the test without an opportunity to study, each section within the group would compete against members of that section.

The Control Section in this study is defined as those students who took the initial test without opportunity to study. The Experimental Section in this study is defined as those students who were required to cram fifty minutes, preceding the initial test. A coin was tossed to determine which would be the Control Section and which the Experimental

Section in each group.

The Experimental Sections were sent from the room and encouraged to study or cram, for fifty minutes, over material previously covered in the course.

The Control Sections were required to take the examination at once. They were given all the time needed, up to fifty minutes, to complete the test. The papers were collected as the pupils finished in order to prevent the communication of one student with another. Most papers were turned in by the end of forty-five minutes.

The Experimental Sections were given the test the following period. Precaution was taken to prevent members of the Experimental Sections from coming into contact with any members of the Control Sections. The Experimental Sections were given all the time needed, up to fifty minutes, to complete the test. There was no noticeable difference in the amount of time required by the students in the Experimental Sections to complete the test over the time required for the students in the Control Sections. Their papers were collected as they finished.

The same tests were given without warning to both Control and Experimental Sections in each of the three groups six weeks after the initial tests were given. Then six weeks later, or twelve weeks after the initial test, the same test was given without warning to both sections of all three groups respectively. During the time between the initial test and the remaining tests, all class drills over the material covered

in the tests were carefully avoided. Only mention of such material as was considered absolutely essential to give background for material studied in the following weeks was made in class.

The test scores of each of these tests were collected. These test scores were treated statistically as follows: A frequency table of the raw score was made. The Mean, S. D., S. E. M., S. E. difference of the means and ratio of observed difference of the means and S. E. difference of the means, were determined.

To compare the results of the Control and the Experimental Section of the same group, having been tested with the same test material each of the three times, is only a matter of comparing the Standard Error of the Mean designated as S. E. $M._1$ of the Control Section with the Standard Error of the Mean designated as the S. E. $M._2$ of the Experimental Section, then determining the Standard Error of the difference of means and getting the ratio of the observed difference of the means and S. E. difference of the means to determine the chances that the difference is above any given point. This procedure was followed in all groups in all three tests.

To be able to compare the results of all three Control Sections with all three Experimental Sections, in as much as each group was tested with different data, all scores in each of the respective groups were combined.

From these combined groups the mean and the S. D. of Test 1 was determined. In each of these respective groups this mean was used as the mean on the tables in Test 1, 2, 3 of each group, which are expressed in standard scores, instead of raw scores. On all tables in which the Standard Score is used, one-third of the signs as determined from Test 1 was used as the step intervals. In the S. D. Score column of each table all scores below zero and negative numbers. The mean, S. D., and the S. E. M. of the sigma score tables were determined. Since the scores of each of the three groups are expressed in sigma scores, it is possible to compare the scores of the Control Sections of Groups I, II, III with the scores of the Experimental Sections in Groups I, II, III, respectively and collectively by using Transmuted Steps. These comparisons were made by the same general method as outlined above.

The combined results of the Control and the Experimental Sections of Group I are shown on Table No. 1. The mean of this group of fifty-two students was found to be 53.17, and the S. D. was found to be 16.50.

FREQUENCY TABLE SHOWING THE COMBINED RESULTS OF FIFTY TWO FRESHMEN IN OKLAHOMA HISTORY DIVIDED INTO CONTROL AND EXPERIMENTAL SECTIONS.

TEST NO. 1.

TABLE NO. 1.

Score	f	d	fd	fd^2	Cum. f.
85-89.9	1	7	7	49	52
80-84.9	2	6	12	72	51
75-79.9	4	5	20	100	49
70-74.9	2	4	8	32	45
65-69.9	4	3	12	36	43
60-64.9	6	2	12	24	39
55-59.9	3	1	3	3	33
50-54.9	7	0	0	0	30
45-49.9	3	-1	-3	3	23
40-44.9	9	-2	-18	36	20
35-39.9	5	-3	-15	45	11
30-34.9	2	-4	-8	32	6
25-29.9	2	-5	-10	50	4
20-24.9	1	-6	-6	36	2
15-19.9	1	-7	-7	49	1
Totals	52		7	567	

M. = 53.17

S. D. = 16.50

It is observed that on Table No. 1 the mean of Group I, Control and Experimental Sections, was found to be 53.17. The S. D. was found to be 16.50. The mean of this group was used as the mean from which the S. D. scores on the following tables were derived. The raw scores on the tests were changed to S. D. scores. The step intervals of the following tables were computed at one-third of the sigma on the Combined scores of the initial test shown on Table No. 1.

Table No. 2 shows the results of the Control Section of Group I, Test No. 1.

Study of the Table will show that the mean was found to be 46.57, or between the sigma score of - .67 to - .34, which is the second step interval below the mean as found in Table No. 1 of the Combined Group. The S. D. was found to be 15.23, and the S. E. $M._1$ is 2.99.

FREQUENCY TABLE SHOWING THE RESULTS OF THE CONTROL SECTION OF GROUP 1 ON TEST 1 IN OKLAHOMA HISTORY.

TABLE NO. 2

S. D. Score	R. Score	f	d	fd	fd^2	Cum. f.
2.68-3.00	97.17-102.66					
2.34-2.67	91.67- 97.16					
2.01-2.33	86.17- 91.66					
1.68.2.00	80.67- 86.16					
1.34-1.67	75.17- 80.66	1	4	4	16	26
1.01-1.33	69.67- 75.16	2	3	6	18	25
.68-1.00	64.17- 69.66	1	2	2	4	23
.34- .67	58.67- 64.16	1	1	1	1	22
.00- .33	53.17- 58.66	2	0	0	0	21
.33- .00	47.67- 53.16	5	-1	-5	5	19
.67- .34	42.17- 47.66	2	-2	-4	8	14
1.00- .68	36.67- 42.16	7	-3	-21	63	12
1.33-1.01	31.17- 36.66	1	-4	-4	16	5
1.67-1.34	25.67- 31.16	1	-5	-5	25	4
2.00-1.68	20.17-25.66	2	-6	-12	72	3
2.33-2.01	14.67- 20.16	1	-7	-7	49	1
2.67-2.34	9.17- 14.66					
3.00-2.68	3.67- 9.16					
Totals		26		-45	277	

M.=46.57 = -.67.....-.34 S. D.

S. D. = 15.23

S. E. $M._1$. = 2.99

Table No. 3 on the following page shows the results of the Experimental Section of Group I, on the initial test.

The mean of the Experimental Section Group I was found to be 58.66 or between .34 to .67 S. D. above the mean as found on Table No. 1. The S. D. was found to be 15.90 and the S. E. $M._2$ to be 3.12.

Just how much is this difference of a mean of 46.57 with a S. D. of 15.23 and the mean of 58.66 with a S. D. of 15.90? This difference may be determined by treating the mean statistically as mentioned above. The S. E. $M._1$ of the Control Section was found to equal 2.99. The S. E. $M._2$ of the Experimental Section was found to be equal to 3.12. The S. E. difference of the means was computed and was found to be 4.33. Since in an infinite number of cases they will distribute themselves approximately according to the normal curve, the chances are about 2 to 1 that the true difference will lie within 4.33 units of the observed difference of 12.09[1]. On this test the Crammers will exceed Non-crammers from 7.76 to 16.42 units. To determine the chances that this difference is significant the ratio of the difference was computed by dividing the observed difference of the means of 12.09 by the S. E. difference of the means of 4.33. The resulting quotient was found to be 2.89, which might be considered significant statistically. This quotient of 2.89 tells us that the observed

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[1] Ernest W. Tiegs, Claud C. Crawford, Statistics for Teachers p. 140.

FREQUENCY TABLE SHOWING THE RESULTS OF THE EXPERIMENTAL SECTION OF GROUP I ON TEST NO. 1 IN OKLAHOMA HISTORY

TABLE NO. 3.

S.D.Scores	R. Scores	f	d	fd	fd^2	Cum. f.
2.68-3.00	97.17-102.66					
2.34-2.67	91.67- 97.16					
2.01-2.33	86.17- 91.66					
1.68-2.00	80.67- 86.16	3	5	15	75	26
1.34-1.67	75.17- 80.66	3	4	12	48	23
1.01-1.33	69.67- 75.16	0	3	0	0	20
.68-1.00	64.17- 69.66	3	2	6	12	20
.34- .67	58.67- 64.16	5	1	5	5	17
.00- .33	53.17- 58.66	2	0	0	0	12
.33- .00	47.67- 53.16	2	-1	-2	2	10
.67- .34	42.17- 47.66	3	-2	-6	12	8
1.00- .68	36.67- 42.16	3	-3	-9	27	5
1.33-1.01	31.17- 36.66	1	-4	-4	16	2
1.67-1.34	25.67- 31.16	1	-5	-5	25	1
2.00-1.68	20.17-25.66					
2.33-2.01	14.67- 20.16					
2.67-2.34	9.17- 14.66					
3.00-2.68	3.67- 9.16					
Totals		26		12	282	

M. = 58.66 = .34.....67 S. D.

S. D. = 15.90

S. E. M_2. = 3.12

difference is 2.89 standard error of difference, S. E. D., units away from zero. The chances are about 511 to 1 that on this test students who cram for fifty minutes before taking the test will exceed students with equal I. Q.'s. who do not cram.[2]

On Table No. 4 on the following page the mean was found to be 61.58 with a S. D. of 18.25. For the following tables the mean of the Combined Group on Test 1 was placed at zero sigma, and the step intervals of one-third of the S. D. are used.

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[2] Ibid., p. 137.

FREQUENCY TABLE SHOWING THE COMBINED RESULTS OF CONTROL AND EXPERIMENTAL SECTIONS OF GROUP II, TEST NO. 1 IN MODERN HISTORY

TABLE NO. 4.

R. Score	f	d	fd	fd^2	Cum. f.
100-104.9	2	8	16	128	38
95- 99.9	0	7	0	0	36
90- 94.9	1	6	6	36	36
85- 89.9	1	5	5	25	35
80- 84.9	1	4	4	16	34
75- 79.9	3	3	9	27	33
70- 74.9	5	2	10	20	30
65- 69.9	3	1	3	3	25
60- 64.9	4	0	0	0	22
55- 59.9	3	-1	-3	3	18
50- 54.9	3	-2	-6	12	15
45- 49.9	4	-3	-12	36	12
40- 44.9	5	-4	-20	80	8
35- 39.9	0	-5	0	0	3
30- 34.9	2	-6	-12	72	3
25- 29.9	1	-7	-7	49	1
Totals	38		-7	507	

M. = 61.58

S. D. = 18.25

S. E. M. = 2.96

Table No. 5 on the following page shows the results of the Control Section of Group II, Test 1. Since the mean as shown on Table No. 4 is 61.58 it was placed at zero sigma to change the scores to S. D. scores.

On Table No. 5 the mean was found to be 59.50 with a S. D. of 16.61 and a S. E. $M._1$ of 3.81.

The mean of the Experimental Section Group II, Test No. 1 as shown on Table No. 6 was found to be 62.06 with a S. D. of 20.38 and a S. E. $M._2$ of 4.66.

To determine the difference of a mean of 59.50 with a S. D. of 16.61 and a S. E. $M._1$ of 3.81, and a mean of 62.06 with a S. D. of 20.38 and a S. E. $M._2$ of 4.66 it was necessary to find the S. E. difference of the mean. This S. E. difference of the means was found to be 6.02. The chances are about 2 to 1 that the true difference will be within 6.02 units of the observed difference of 2.56[3] In so far as this test is concerned the Crammers hold very little, if any advantage over Non-crammers since the true difference will be between -3.46 and 8.58 units.

To determine the chances that the true difference is above zero the ratio of the observed difference of the means to the S. E. difference of the means was found to be .23. The chance is about 1.46 to 1 the true difference would always be above zero since the true difference is only .23 S. E. D. units away from zero.[4]

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3. Ibid., p. 140
4. Ibid., p. 137.

FREQUENCY TABLE SHOWING THE RESULTS OF THE CONTROL SECTION OF GROUP II, TEST NO. 1. IN MODERN HISTORY.

TABLE NO. 5.

S. D. SCORE	R. SCORE	f	d	fd	fd^2	Cum. f.
2.68-3.00	110.22-116.29					
2.34-2.67	104.14-110.21					
2.01-2.33	98.06-104.13					
1.68-2.00	91.98- 98.05					
1.34-1.67	85.90- 91.97	1	4	4	16	19
1.01-1.33	79.82- 85.89	0	3	0	0	18
.68-1.00	73.74- 79.81	4	2	8	16	18
.34- .67	67.66- 73.73	1	1	1	1	14
.00- .33	61.58- 67.65	4	0	0	0	13
.33- .00	55.50- 61.57	2	-1	-2	2	9
.67- .34	49.42- 55.49	2	-2	-4	8	7
1.00- .68	43.34- 49.41	1	-3	-3	9	5
1.33-1.01	37.26- 43.33	1	-4	-4	16	4
1.67-1.34	31.18- 37.25	2	-5	-10	50	3
2.00-1.68	25.10- 31.17	1	-6	-6	36	1
2.33-2.01	19.02- 25.09					
2.67-2.34	12.94- 19.01					
3.00-2.68	6.86- 12.93					
Totals		19		-16	154	

M. = 59.50 = ⅓3--0. S. D.

S. D. = 16.61

S. E. M_1. = 3. 81

FREQUENCY TABLE SHOWING THE RESULTS OF THE EXPERIMENTAL SECTION OF GROUP II, TEST NO. 1. IN MODERN HISTORY.

TABLE NO. 6.

S. D. Score	R. Score	f	d	fd	fd^2	Cum. f.
2.68-3.00	110.22-116.29					
2.34-2.67	104.14-110.21					
2.01-2.33	98.06-104.13	2	6	12	72	19
1.68-2.00	91.98- 98.05	0	5	0	0	17
1.34-1.67	85.90- 91.97	1	4	4	16	17
1.01-1.33	79.82- 85.89	1	3	3	9	16
.68-1.00	73.74- 79.81	0	2	0	0	15
.34- .67	67.66- 73.73	3	1	3	3	15
.00- .33	61.58- 67.65	1	0	0	0	12
.33- .00	55.50- 61.57	3	-1	-3	3	11
.67- .34	49.42- 55.49	1	-2	-2	4	8
1.00- .68	43.34- 49.41	3	-3	-9	27	7
1.33-1.01	37.26- 43.33	4	-4	-16	64	4
1.67-1.34	31.18- 37.25					
2.00-1.68	25.10- 31.17					
2.33-2.01	19.02- 25.09					
2.67-2.34	12.94- 19.01					
3.00-2.68	6.86- 12.93					
Totals		19		-8	198	

M. = 62.06 = .0.....33 S. D.

S. D. = 20.38

S. E. $M._2$. = 4.66

On the following page Table No. 7 shows the combined results of Control and Experimental Sections of Group III, Test No. 1. The mean of 80.84 was used as the zero sigma of the following S. D. Tables, the step intervals of which are one-third the S. D. of 19.30 which was found to be the S. D. of the Combined Group.

FREQUENCY TABLE SHOWING THE COMBINED RESULTS OF CONTROL AND EXPERIMENTAL SECTIONS OF GROUP III, TEST NO. 1. AMERICAN HISTORY

TABLE NO. 7

Score	f	d	fd	fd^2	Cum. f.
120-124.9	1	8	8	64	24
115-119.9	0	7	0	0	23
110-114.9	1	6	6	36	23
105-109.9	0	5	0	0	22
100-104.9	1	4	4	16	22
95- 99.9	2	3	6	18	21
90- 94.9	2	2	4	8	19
85- 89.9	4	1	4	4	17
80- 84.9	2	0	0	0	13
75- 79.9	2	-1	-2	2	11
70- 74.9	4	-2	-8	16	9
65- 69.9	0	-3	0	0	5
60- 64.9	2	-4	-8	32	5
55- 59.9	0	-5	0	0	3
50- 54.9	1	-6	-6	36	3
45- 49.9	1	-7	-7	49	2
40- 44.9	0	-8	0	0	1
35- 39.9	1	-9	-9	81	1
Totals	24		-8	362	

M. = 80.84

S. D. = 19.30

S. E. M. = 3.96

On the next page is shown Table No. 8 which shows the results of the Control Section of Group III, Test No. 1. The mean was found to be 75.49; S. D. 21.59; S. E. $M._1$ 6.23.

On the following page is shown Table No. 9 which shows the results of the Experimental Section of Group III, Test No. 1. The mean was found to be 84.59; the S. D. 17.10; the S. E. $M._2$ 4.94.

It will be observed that the Control Section was exceeded by the Experimental Section by a difference of the means of 9.10 units.

The S. E. difference of the means was found to be 7.97. The chances are about 2 to 1 that the true difference will be within 7.95 units of the observed difference of 9.10.[5] On this test the Crammers will exceed Non-crammers between 1.15 and 17.05 units. To determine the chance that this difference will be above zero the ratio of the observed difference of the means and the S. E. difference of the means was computed. This ratio was found to be 1.14. This is not a significant difference statistically. The chances are only about 6.88 to 1 that the true difference is above zero, since it is only 1.14 S. E. units away from zero.[6]

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5 Ibid., p. 140.

6 Ibid., p. 137.

FREQUENCY TABLE SHOWING THE RESULTS OF THE CONTROL SECTION OF GROUP III, TEST NO. 1. IN AMERICAN HISTORY

TABLE NO. 8

S. D. Score	R. Score	f	d	fd	fd^2	Cum. f.
2.68-3.00	132.28-138.70					
2.34-2.67	125.85-132.27					
2.01-2.33	119.42-125.84					
1.68-2.00	112.99-119.41	1	5	5	25	12
1.34-1.67	106.56-112.98	0	4	0	0	11
1.01-1.33	100.13-106.55	0	3	0	0	11
.68-1.00	93.70-100.12	1	2	2	4	11
.34- .67	87.27- 93.69	2	1	2	2	10
.00- .33	80.84- 87.26	2	0	0	0	8
.33- .00	74.41- 80.83	0	-1	0	0	6
.67- .34	67.98- 74.40	2	-2	-4	8	6
1.00- .68	61.55- 67.97	0	-3	0	0	4
1.33-1.01	55.12- 61.54	2	-4	-8	32	4
1.67-1.34	48.69- 53.11	0	-5	0	0	2
2.00-1.68	42.26- 48.68	1	-6	-6	36	2
2.33-2.01	35.83- 42.25	1	-7	-7	49	1
2.67-2.34	29.40- 35.82					
3.00-2.68	22.97- 29.39					
Totals.		12		-16	156	

M. = 75.49 = -.33....0 S. D.

S. D. = 21.59

S. E. M_1. = 6.23

FREQUENCY TABLE SHOWING THE RESULTS OF THE EXPERIMENTAL SECTION OF GROUP III, TEST NO. 1. IN AMERICAN HISTORY

TABLE NO. 9

S. D. Score	R. Score	f	d	fd	fd^2	Cum. f.
2.68-3.00	132.28-138.70					
2.34-2.67	125.85-132.27					
2.01-2.33	119.42-125.84	1	6	6	36	12
1.68-2.00	112.99-119.41	0	5	0	0	11
1.34-1.67	106.56-112.98	0	4	0	0	11
1.01-1.33	100-13-106.55	1	3	3	9	11
.68-1.00	93.70-100.12	1	2	2	4	10
.34- .67	87.27- 93.69	1	1	1	1	9
.00- .33	80.84- 87.26	3	0	0	0	8
.33- .00	74.41- 80.83	2	-1	-2	2	5
.67- .34	67.98- 74.40	2	-2	-4	8	3
1.00- .68	61.55- 67.97	0	-3	0	0	1
1.33-1.01	55.12- 61.54	0	-4	0	0	1
1.67-1.34	48.69- 53.11	1	-5	-5	25	1
2.00-1.68	42.26- 48.68					
2.33-2.01	35.83- 42.25					
2.67-2.34	29.40- 35.82					
3.00-2.68	22.97- 29.39					
Totals		12		1	85	

M. = 84.59 = .0.....33 S. D.

S. D. = 17.10

S. E. $M_{2.}$ = 4.94

The second series of tests were given six weeks after the initial test in each group respectively. These tests were given to both sections of each group without warning. No special preparation had been made for the regular six-weeks test that was to be given the latter part of the week. The various groups had not been warned that the previous tests were to be repeated. Both sections of each group took this test at the same time, in each of the three respective groups. They were given all the time needed up to fifty-five minutes to complete the test. Papers were collected as soon as the pupils finished to prevent them communicating with other students. Most students had handed in their paper before the full fifty-five minutes of the time allowed.

On all tables showing the results of Test No. 2 the same step intervals, as were used for Test No. 1, have been used. Zero sigma was placed at what was shown to be the mean of each group respectively, on the combined tables in Test No. 1.

On the next page Table No. 10 shows the results of the Control Section of Group I, Test No. 2. It will be observed that the mean was found to be 50.40; the S. D. 16.81; and the S. E. $M._1$ 3.30.

The following page, Table No. 11, shows the results of the Experimental Section of Group I, Test No. 2. The mean of this group was found to be 56.33; the S. D. to be 16.49; and the S. E. $M._2$ to be 3.22.

FREQUENCY TABLE SHOWING THE RESULTS OF THE CONTROL SECTION

GROUP I, TEST NO. 2. IN OKLAHOMA HISTORY

TABLE NO. 10

S. D. Score	R. Score	f	d	fd	fd^2	Cum.f.
2.68-3.00	97.17-102.66					
2.34-2.67	91.67- 97.16					
2.01-2.33	86.17- 91.66					
1.68-2.00	80.67- 86.16	1	5	5	25	26
1.34-1.67	75.17- 80.66	3	4	12	48	25
1.01-1.33	69.67- 75.16	0	3	0	0	22
.68-1.00	64.17- 69.66	1	2	2	4	22
.34- .67	58.67- 64.16	2	1	2	2	21
.00- .33	53.17- 58.66	3	0	0	0	19
.33- .00	47.67- 53.16	3	-1	-3	3	16
.67- .34	42.17- 47.66	5	-2	-10	20	13
1.00- .68	36.67-42.16	3	-3	-9	27	8
1.33-1.01	31.17- 36.66	1	-4	-4	16	5
1.67-1.34	25.67- 31.16	2	-5	-10	50	4
2.00-1.68	20.17- 25.66	2	-6	-12	72	2
2.33-2.01	14.67- 20.16					
2.67-2.34	9.17- 14.66					
3.00-2.68	3.67- 9.16					
Totals		26		-27	267	

M = 50.40 = .33-0 S. D.

S. D. = 16.81

S. E. $M_{1.}$ = 3.30

FREQUENCY TABLE SHOWING THE RESULTS OF THE EXPERIMENTAL SECTION GROUP I, TEST NO. 2, IN OKLAHOMA HISTORY.

TABLE NO. 11.

S. D. Score	R. SCORE	f	d	fd	fd^2	Cum. f
2.68-3.00	97.17-102.66					
2.34-2.67	91.67- 97.16					
2.01-2.33	86.17- 91.66					
1.68-2.00	80.67- 86.16	1	5	5	25	26
1.34-1.67	75.17- 80.66	2	4	8	32	25
1.01-1.33	69.67- 75.16	3	3	9	27	23
.68-1.00	64.17- 69.66	5	2	10	20	20
.34- .67	58.67- 64.16	2	1	2	2	15
.00- .33	53.17- 58.66	3	0	0	0	13
.33- .00	47.67- 53.16	1	-1	-1	1	10
.67- .34	42.17- 47.66	2	-2	-4	8	9
1.00- .68	36.67- 42.16	2	-3	-6	18	7
1.33-1.01	31.17- 36.66	3	-4	-12	48	5
1.67-1.34	25.67- 31.16	2	-5	-10	50	2
2.00-1.68	20.17- 25.66					
2.33-2.01	14.67- 20.16					
2.67-2.34	9.17- 14.66					
3.00-2.68	3.67- 9.16					
Totals		26		1	231	

M. = 56.33 = 0-.33 S. D.

S. D. = 16.49

S. E. $M_{.2}$ = 3.22

It will be observed that the Experimental Section with a mean of 56.33, and the Control Section with a mean of 50.40 showed that the Experimental Section was, as in the initial test again in the lead. The difference of a mean of 50.40 with a S. D. of 16.81 and a mean of 56.33 with a S. D. of 16.49 was treated statistically to determine the real difference, if any. The S. E. $M._1$ of the Control Section was found to be 3.30. The S. E. $M._2$ of the Experimental Section was found to be 3.22. The S. E. D. of the means was found to be 4.61.

In an infinite number of cases they will distribute themselves approximately according to the normal curve. The chances are about 2 to 1 that the true difference will lie within 4.61 units of the observed difference of 5.93, or will be between 1.32 and 10.54.[7]

The results still leave us a bit uncertain, because we would like to know what the chances are that the Crammers will always exceed the Non-crammers. To determine this, the ratio of the observed difference of the means to the S. E. D. of the means were computed. This ratio was found to be 1.29. The chances are about 9.14 to 1 that the Crammers, on this test will exceed the Non-crammers, since the true difference is 1.29 S. E. units away from zero.[8]

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[7] Ibid., p. 140.

[8] Ibid., p. 137.

Table No. 12 on the next page shows the results of the Control Section Group II, Test No. 2. The mean was found to be 64.62; the S. D. to be 15.10; the S. E. $M._1$ to be 3.46.

Table No. 13 on the following page shows the results of the Experimental Section of Group II, Test No. 2. The mean was found to be 61.74; the S. D. to be 22.18; the S. E. $M._2$ to be 5.08.

It will be observed that in this test the mean of the Control Section exceeded the mean of the Experimental Section by 2.88 units. The S. E. D. of the means was found to be 6.15. Since in an infinite number of cases they will distribute themselves approximately according to the normal curve the chances are about 2 to 1 that the Non-crammers will exceed the Crammers on this test, given six-weeks after the cramming period, by the score between -3.27 and 9.03 units.[9]

To determine the chance that this difference is above zero the ratio of the observed difference of the means to the S. E. D. of the means was found to be .47, which is insignificant statistically. The chances are about 2.16 to 1 that the true difference will always be above zero.[10]

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[9] Ibid., p. 140

[10] Ibid., p. 137

FREQUENCY TABLE SHOWING THE RESULTS OF THE CONTROL SECTION OF GROUP II, TEST NO. 2. IN MODERN HISTORY.

TABLE NO. 12

S. D. Score	R. Score	f	d	fd	fd^2	Cum. f.
2.68-3.00	110.22-116.29					
2.34-2.67	104.14-110.21					
2.01-2.33	98.06-104.13					
1.68-2.00	91.98- 98.05	1	5	5	25	19
1.34-1.67	85.90- 91.97	0	4	0	0	18
1.01-1.33	79.82- 85.89	1	3	3	9	18
.68-1.00	73.74- 79.81	4	2	8	16	17
.34- .67	67.66- 73.73	3	1	3	3	13
.00- .33	61.58- 67.65	1	0	0	0	10
.33- .00	55.50- 61.57	5	-1	-5	5	9
.67- .34	49.42- 55.49	2	-2	-4	8	4
1.00- .68	43.34- 49.41	0	-3	0	0	2
1.33-1.01	37.26- 43.33	1	-4	-4	16	2
1.67-1.34	31.18- 37.25	0	-5	0	0	1
2.00-1.68	25.10- 31.17	1	-6	-6	36	1
2.33-2.01	19.02- 25.09					
2.67-2.34	12.94- 19.01					
3.00-2.68	6.86- 12.93					
Totals		19		0	118	

M. = 64.62 = 0.....33 S. D.

S. D. = 15.10

S. E. M_1. = 3.46

FREQUENCY TABLE SHOWING THE RESULTS OF THE EXPERIMENTAL SECTION OF GROUP II, TEST NO. 2. IN MODERN HISTORY.

TABLE NO. 13

S. D. Score	R. Score	f	d	fd	fd^2	Cum. f.
2.68-3.00	110.22-116.29	1	8	8	64	19
2.34-2.67	104.14-110.21	0	7	0	0	18
2.01-2.33	98.06-104.13	1	6	6	36	18
1.68-2.00	91.98- 98.05	1	5	5	25	17
1.34-1.67	85.90- 91.97	0	4	0	0	16
1.01-1.33	79.82- 85.89	0	3	0	0	16
.68-1.00	73.74- 79.81	3	2	6	12	16
.34- .67	67.66- 73.73	1	1	1	1	13
.00- .33	61.58- 67.65	0	0	0	0	12
.33- .00	55.50- 61.57	1	-1	-1	1	12
.67- .34	49.42- 55.49	5	-2	-10	20	11
1.00- .68	43.34- 49.41	1	-3	-3	9	6
1.33-1.01	37.26- 43.33	4	-4	-16	64	5
1.67-1.34	31.18- 37.25	1	-5	-5	25	1
2.00-1.68	25.10- 31.17					
2.33-2.01	19.02- 25.09					
2.67-2.34	12.94- 19.01					
3.00-2.68	6.86- 12.93					
Totals		19		-9	257	

M. = 61.74 = 0.....33. S. D.

S. D. = 22.18

S. E. M_2. = 5.08

Table No. 14 on the following page shows the results of the Control Section of Group III, Test No. 2. The mean was found to be 87.81; the S. D. to be 20.25; and the S. E. $M._1$ to be 5.85.

Table No. 15 shows the results of the Experimental Section of Group III, Test No. 2. The mean was found to be 84.06; the S. D. to be 17.00; and the S. E. $M._2$ to be 4.92.

It will be noted that on this test the Control Section exceeded the Experimental Section by a difference of the mean of 3.75. The S. E. difference of the means was found to be 7.15. The chances are about 2 to 1 that on this test, given six weeks after the period of cramming, that the Non-crammers will exceed the Crammers; that the true difference will lie within 7.15 units of the observed difference of 3.75, or between -3.40 and 10.90.[11]

To determine the chances that this difference will always be above zero the ratio of the observed difference of the means of 3.75 to the S. E. difference of the mean of 7.15 was computed and the quotient was found to be .49. This difference is not significant statistically since the chances are about 2.18 to 1 that the difference will always be above zero.[12]

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[11] Ibid., p. 140.

[12] Ibid., p. 137.

FREQUENCY TABLE SHOWING THE RESULTS OF THE CONTROL SECTION OF GROUP III, TEST NO. 2. IN AMERICAN HISTORY.

TABLE NO. 14

S. D. Score	R. Score	f	d	fd	fd^2	Cum. f.
2.68-3.00	132.28-138.70					
2.34-2.67	125.85-132.27					
2.01-2.33	119.42-125.84	1	6	6	36	12
1.68-2.00	112.99-119.41	0	5	0	0	11
1.34-1.67	106.56-112.98	2	4	8	32	11
1.01-1.33	100.13-106.55	0	3	0	0	9
.68-1.00	93.70-100.12	2	2	4	8	9
.34- .67	87.27- 93.69	2	1	2	2	7
.00- .33	80.84- 87.26	1	0	0	0	5
.33- .00	74.41- 80.83	0	-1	0	0	4
.67- .34	67.98- 74.40	1	-2	-2	4	4
1.00- .68	61.55- 67.97	1	-3	-3	9	3
1.33-1.01	55.12- 61.54	2	-4	-8	32	2
1.67-1.34	48.69- 55.11					
2.00-1.68	42.26- 48.68					
2.33-2.01	35.83- 42.25					
2.67-2.34	29.40- 35.82					
3.00-2.68	22.97- 29.39					
Totals		12		7	123	

M. = 87.81 = .34.....67 S. D.

S. D. = 20.25

S. E. $M._1$ = 5.85

FREQUENCY TABLE SHOWING THE RESULTS OF THE EXPERIMENTAL SECTION OF GROUP III, TEST NO. 2. IN AMERICAN HISTORY.

TABLE NO. 15.

S. D. Score	R. Score	f	d	fd	fd^2	Cum. f.
2.68-3.00	132.28-138.70					
2.34-2.67	125.85-132.27					
2.01-2.33	119.42-125.84	1	6	6	36	12
1.68-2.00	112.99-119.41	0	5	0	0	11
1.34-1.67	106.56-112.98	0	4	0	0	11
1.01-1.33	100.13-106.55	0	3	0	0	11
.68-1.00	93.70-100.12	2	2	4	8	11
.34- .67	87.27- 93.69	3	1	3	3	9
.00- .33	80.84- 87.26	1	0	0	0	6
.33- .00	74.41- 80.83	1	-1	-1	1	5
.67- .34	67.98- 74.40	0	-2	0	0	4
1.00- .68	61.55- 67.97	4	-3	-12	36	4
1.33-1.01	55.12- 61.54					
1.67-1.34	48.68- 55.11					
2.00-1.68	42.26- 48.68					
2.33-2.01	35.83- 42.25					
2.67-2.34	29.40- 35.82					
3.00-2.68	22.97- 29.39					
Totals		12		0	84	

M. = 84.06 = 0.....33 S. D.

S. D. = 17.00

S. E. $M._2$ = 4.92

Test No. 3 was given six weeks after test No. 2, or twelve weeks after the initial test. The same test materials were used in all three groups respectively. The tests were given to the Control and Experimental Sections at the same time in each of the respective groups. The students were given all the time required, up to fifty-five minutes, to complete the test. The papers were collected as soon as the student finished. There was no noticeable difference in the amount of time required for this test and either of the previous ones.

On the following page Table No. 16 shows the results of the Control Section of Group I, Test No. 3. In this test the mean was found to be 49.34; the S. D. to be 15.48; the S. E. $M._1$ to be 3.20.

On the following page Table No. 17 shows the results of the Experimental Section of Group I, Test No. 3. The mean was found to be 55.27; the S. D. to be 16.13; the S. E. $M._2$ to be 3.29.

It will be noted there is an observed difference of the means of 5.93 in favor of the Crammers. The S. E. difference of the means was found to be 4.59. Since in an infinite number of cases they will distribute themselves approximately according to the normal curve the chances are about 2 to 1 that the true difference will be found between 1.34 and 10.52 units of the observed difference of the means.[13]

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13 Ibid., p. 140.

FREQUENCY TABLE SHOWING THE RESULTS OF THE CONTROL SECTION GROUP I TEST NO. 3. IN OKLAHOMA HISTORY.

TABLE NO. 16.

S. D. Score	R. Score	f	d	fd	fd^2	cum. f.
2.68-3.00	97.17-102.66					
2.34-2.67	91.67- 97.16					
2.01-2.33	86.17- 91.66					
1.68-2.00	80.67- 86.16					
1.34-1.67	75.17- 80.66	1	4	4	16	26
1.01-1.33	69.67- 75.16	2	3	6	18	25
.68-1.00	64.17- 69.66	2	2	4	8	23
.34- .67	58.67- 64.16	2	1	2	2	21
.00- .33	53.17- 58.66	3	0	0	0	19
.33- .00	47.67- 53.16	6	-1	-6	6	16
.67- .34	42.17- 47.66	1	-2	-2	4	10
1.00- .68	36.67- 42.16	3	-3	-9	27	9
1.33-1.01	31.17- 36.66	1	-4	-4	16	6
1.67-1.34	25.67- 31.16	3	-5	-15	75	5
2.00-1.68	20.17- 25.66	2	-6	-12	72	2
2.33-2.01	14.67- 20.16					
2.67-2.34	9.17- 14.66					
3.00-2.68	3.67- 9.16					
Totals		26		-32	244	

M = 49.34 =-.33.....0 S. D.

S. D. = 15.48

S. E. M_1. = 3.20

FREQUENCY TABLE SHOWING THE RESULTS OF THE EXPERIMENTAL SECTION GROUP I TEST 3, IN OKLAHOMA HISTORY.

TABLE NO. 17

S. D. Score	R. Score	f	d	fd	fd^2	cum. f.
2.68-3.00	97.17-102.66					
2.34-2.67	91.67- 97.16					
2.01-2.33	86.17- 91.66					
1.68-2.00	80.67- 86.16	2	5	10	50	26
1.34-1.67	75.17- 80.66	1	4	4	16	24
1.01-1.33	69.67- 75.16	2	3	6	18	23
.68-1.00	64.17- 69.66	4	2	8	16	21
.34- .67	58.67- 64.16	2	1	2	2	17
.00- .33	53.17- 58.66	3	0	0	0	15
.33- .00	47.67- 53.16	3	-1	-3	3	12
.67- .34	42.17- 47.66	2	-2	-4	8	9
1.00- .68	36.67- 42.16	3	-3	-9	27	7
1.33-1.01	31.17- 36.66	2	-4	-8	32	4
1.67-1.34	25.67- 31.16	2	-5	-10	50	2
2.00-1.68	20.17- 25.66					
2.33-2.01	14.67- 20.16					
2.67-2.34	9.17- 14.66					
3.00-2.68	3.67- 9.16					
Totals		26		-4	222	

M = 55.27 = 0.....-33 S. D.

S. D. = 16.13

S. E. $M_{.2}$ = 3.29

To determine the chances that the true difference will always be above zero the ratio of the observed difference of the means and the S. E. difference of the means was computed and was found to be 1.29. This difference is of little value statistically, however, the chances are about 9.14 to 1 that the Crammers will exceed the Non-crammers on this test, although the cramming was done twelve weeks before the test.[14]

On the following page, Table No. 18, shows the results of the Control Section of Group II, Test 3. The mean was found to be 60.78; the S. D. to be 15.94; the S. E. $M._1$ to be 3.66.

On Table No. 19 is shown the results of the Experimental Section of Group II, Test No. 3. It will be observed that the mean was found to be 58.86; the S. D. to be 20.60; and the S. E. $M._2$ to be 4.72.

On this test the observed difference of the means was found to be 1.92. The S. E. difference of the means was found to be 5.97. The chances are about 2 to 1 that the true difference will always be within 5.97 units of the observed difference of the means of 1.92.[15] The ratio of the observed difference of the means and the S. E. difference of the means was found to be .32. This difference is not statistically significant. The chances are about 1.68 to 1 that the true difference will always be above zero.[16]

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14 Ibid., p. 137.
15 Ibid., p. 140.
16 Ibid., p. 137.

FREQUENCY TABLE SHOWING THE RESULTS OF THE CONTROL SECTION OF GROUP II, TEST NO. 3. IN MODERN HISTORY.

TABLE NO. 18

S. D. Score	R. Score	f	d	fd	fd^2	cum. f.
2.68-3.00	110.22-116.29					
2.34-2.67	104.14-110.21					
2.01-2.33	98.06-104.13					
1.68-2.00	91.98- 98.05					
1.34-1.67	85.90- 91.97	2	4	8	32	19
1.01-1.33	79.82- 85.89	0	3	0	0	17
.68-1.00	73.74- 79.81	0	2	0	0	17
.34- .67	67.66- 73.73	5	1	5	5	17
.00- .33	61.58- 67.65	3	0	0	0	12
.33- .00	55.50- 61.57	3	-1	-3	3	9
.67- .34	49.42- 55.49	3	-2	-6	12	6
1.00- .68	43.34- 49.41	0	-3	0	0	3
1.33-1.01	37.26- 43.33	0	-4	0	0	3
1.67-1.34	31.18- 37.25	2	-5	-10	50	3
2.00-1.68	25.10- 31.17	1	-6	-6	36	1
2.33-2.01	19.02- 25.09					
2.67-2.34	12.94- 19.01					
3.00-2.68	6.86- 12.93					
Totals		19		-12	138	

M. = 60.78 = .33.....0 S. D.

S. D. = 15.94

S. E. M_1. = 3.66

FREQUENCY TABLE SHOWING THE RESULTS OF THE EXPERIMENTAL SECTION OF GROUP II, TEST NO. 3. IN MODERN HISTORY.

TABLE NO. 19

S. D. Score	R. Score	f	d	fd	fd^2	cum. f.
2.68-3.00	110.22-116.29					
2.34-2.67	104.14-110.21	1	7	7	49	19
2.01-2.33	98.06-104.13	1	6	6	36	18
1.68-2.00	91.98- 98.05	0	5	0	0	17
1.34-1.67	85.90- 91.97	1	4	4	16	17
1.01-1.33	79.82- 85.89	0	3	0	0	16
.68-1.00	73.74- 79.81	1	2	2	4	16
.34- .67	67.66- 73.73	1	1	1	1	15
.00- .33	61.58- 67.65	2	0	0	0	14
.33- .00	55.50- 61.57	0	-1	0	0	12
.67- .34	49.42- 55.49	3	-2	-6	12	12
1.00- .68	43.34- 49.41	4	-3	-12	36	9
1.33-1.01	37.26- 43.33	5	-4	-20	80	5
1.67-1.34	31.18- 37.25					
2.00-1.68	25.10- 31.17					
2.33-2.01	19.02- 25.09					
2.67-2.34	12.94- 19.01					
3.00-2.68	6.86- 12.93					
Totals		19		-18	234	

M. = 58.86 = -.33.....0 S. D.

S. D. = 20.60

S. E. $M_{2.}$ = 4.72

Table No. 20 shows the results of the Control Section of Group III, Test No. 3. The mean was found to be 85.13; the S. D. to be 25.00; the S. E. $M._1$ to be 7.22.

Table No. 21 shows the results of the Experimental Section of Group III, Test No. 3. It will be observed that on this test the Control and Experimental Sections have equal means. There is a small difference in the S. D. of the two sections. And some difference in the S. E. M. of the two sections.

The chances are on this test, given twelve weeks after the cramming period, that neither section will show an advantage sufficient to be considered of significance.

FREQUENCY TABLE SHOWING THE RESULTS OF THE CONTROL SECTION GROUP III, TEST NO. 3 IN AMERICAN HISTORY.

TABLE NO. 20

S. D. Score	R. Score	f	d	fd	fd^2	Cum. f.
2.68-3.00	132.28-138.70					
2.34-2.67	125.85-132.27					
2.01-2.33	119.42-125.84					
1.68-2.00	112.99-119.41	1	5	5	25	12
1.34-1.67	106.56-112.98	4	4	16	64	11
1.01-1.33	100.13-106.55	0	3	0	0	7
.68-1.00	93.70-100.12	0	2	0	0	7
.34- .67	87.27- 93.69	0	1	0	0	7
.00- .33	80.84- 87.26	2	0	0	0	7
.33- .00	74.41- 80.83	0	-1	0	0	5
.67- .34	67.98- 74.40	2	-2	-4	8	5
1.00- .68	61.55- 67.97	1	-3	-3	9	3
1.33-1.01	55.12- 61.54	0	-4	0	0	2
1.67-1.34	48.69- 55.11	1	-5	-5	25	2
2.00-1.68	42.26- 48.68	0	-6	0	0	1
2.33-2.01	35.83- 42.25	1	-7	-7	49	1
2.67-2.34	29.40- 35.82					
3.00-2.68	22.97- 29.39					
Totals		12		2	180	

M. = 85.13 = 0.....33 S. D.

S. D. = 25.00

S. E. M_1. = 7.22

FREQUENCY TABLE SHOWING THE RESULTS OF THE EXPERIMENTAL SECTION OF GROUP III, TEST NO. 3. IN AMERICAN HISTORY

TABLE NO. 21

S. D. Score	R. Score	f	d	fd	fd^2	Cum. f.
2.68-3.00	132.28-138.70					
2.34-2.67	125.85-132.27					
2.01-2.33	119.42-125.84					
1.68-2.00	112.99-119.41	1	5	5	25	12
1.34-1.67	106.56-112.98	0	4	0	0	11
1.01-1.33	100.13-106.55	2	3	6	18	11
.68-1.00	93.70-100.12	1	2	2	4	9
.34-.67	87.27- 93.69	1	1	1	1	8
.00- .33	80.84- 87.26	2	0	0	0	7
.33- .00	74.41- 80.83	1	-1	-1	1	5
.67- .34	67.98- 74.40	2	-2	-4	8	4
1.00- .68	61.55- 67.97	1	-3	-3	9	2
1.33-1.01	55.12- 61.54	1	-4	-4	16	1
1.67-1.34	48.69- 55.11					
2.00-1.68	42.26- 48.68					
2.33-2.01	35.83- 42.25					
2.67-2.34	29.40- 35.82					
3.00-2.68	22.97- 29.39					
Totals		12		2	82	

M. = 85.13 = 0.....33 S. D.

S. D. = 16.98

S. E. $M_{2:}$ = 4.90

Table No. 22 on the following page shows the combined frequency of the Control Section of Group I, Tests No. 1, 2, and 3. In the first column is shown the S. D. Score. The second column shows the Raw Score. The third, fourth, and fifth columns show the frequency made on Tests 1, 2, and 3, respectively. Since the step intervals of all tables have been one-third sigma, as determined on the combined results of the Control and Experimental Sections of Groups I, II, and III, respectively, of Test No. 1, there are 18 step intervals. Since each Group was tested with separate material, all scores were changed to transmuted steps to compare the combined results of all Crammers and all Non-crammers. The Transmuted Step Intervals are shown in column six.

At the bottom of the table is a summary of the mean of the Control Section of Group I on all three tests.

Tables No. 23, 24, 25, 26, and 27 on the following pages show the combined results of the Experimental Section Group I; Control Section Group II; Experimental Section Group II; Control Section Group III; and the Experimental Section Group III; respectively. What has been said above in regard to Table No. 21 is true in regard to Tables No. 23, 24, 25, 26, and 27, except for different data as shown at the top of each table.

FREQUENCY TABLE SHOWING THE RESULTS OF CONTROL SECTION GROUP I ON TESTS NO. 1, 2, 3. IN OKLAHOMA HISTORY

TABLE NO. 22

S. D. Score	R. Score	1f	2f	3f	Transmuted Steps
2.68-3.00	97.17-102.66				17
2.34-2.67	91.67- 97.16				16
2.01-2.33	86.17- 91.66				15
1.68-2.00	80.67- 86.16		1	0	14
1.34-1.67	75.17- 80.66	1	3	1	13
1.01-1.33	69.67- 75.16	2	0	2	12
.68-1.00	64.17- 69.66	1	1	2	11
.34- .67	58.67- 64.16	1	2	2	10
.00- .33	53.17- 58.66	2	3	3	9
.33- .00	47.67- 53.16	5	3	6	8
.67- .34	42.17- 47.66	2	5	1	7
1.00- .68	36.67- 42.16	7	3	3	6
1.33-1.01	31.17- 36.66	1	1	1	5
1.67-1.34	25.67- 31.16	1	2	3	4
2.00-1.68	20.17- 25.66	2	2	2	3
2.33-2.01	14.67- 20.16	1	0	0	2
2.67-2.34	9.17- 14.66				1
3.00-2.68	3.67- 9.16				0

Test No. 1. M= 46.57 = -.67.....-.34 S. D.

Test No. 2. M= 50.40 = -.33.....0 S. D.

Test No. 3. M= 49.34 = -.33.....0 S. D.

FREQUENCY TABLE SHOWING THE RESULTS OF EXPERIMENTAL SECTION GROUP I ON TESTS NO. 1, 2, 3. IN OKLAHOMA HISTORY.

TABLE NO. 23

S. D. Score	R. Score	1f	2f	3f	Transmuted Steps
2.68-3.00	97.17-102.66				17
2.34-2.67	91.67- 97.16				16
2.01-2.33	96.17- 91.66				15
1.68-2.00	80.67- 86.16	3	1	2	14
1.34-1.67	75.17- 80.66	3	2	1	13
1.01-1.33	69.67- 75.16	0	3	2	12
.68-1.00	64.17- 69.66	3	5	4	11
.34- .67	58.67- 64.16	5	2	2	10
.00- .33	53.17- 58.66	2	3	3	9
.33- .00	47.67- 53.16	2	1	3	8
.67- .34	42.17- 47.66	3	2	2	7
1.00- .68	36.67- 42.16	3	2	3	6
1.33-1.01	31.17- 36.66	1	3	2	5
1.67-1.34	25.67-31.16	1	2	2	4
2.00-1.68	20.17- 25.66				3
2.33-2.01	14.67- 20.16				2
2.67-2.34	9.17- 14.66				1
3.00-2.68	3.67- 9.16				0

Test No. 1. M = 58.66 = 0.....33 S. D.

Test No. 2. M = 56.33 = 0.....33 S. D.

Test No. 3. M = 55.27 = 0.....33 S. D.

FREQUENCY TABLE SHOWING THE RESULTS OF CONTROL SECTION GROUP II ON TESTS NO. 1, 2, 3. IN MODERN HISTORY.

TABLE NO. 24

S. D. Score	R. Score	1f	2f	3f	Transmuted Steps
2.68-3.00	110.22-116.29				17
2.34-2.67	104.14-110.21				16
2.01-2.33	98.06-104.13				15
1.68-2.00	91.98- 98.05		1		14
1.34-1.67	85.90- 91.97	1	0	2	13
1.01-1.33	79.82- 85.89	0	1	0	12
.68-1.00	73.74- 79.81	4	4	0	11
.34- .67	67.66- 73.73	1	3	5	10
.00- .33	61.58- 67.65	4	1	3	9
.33- .00	55.50- 61.57	2	5	3	8
.67- .34	49.42- 55.49	2	2	3	7
1.00- .68	43.34- 49.41	1	0	0	6
1.33-1.01	37.26- 43.33	1	1	0	5
1.67-1.34	31.18- 37.25	2	0	2	4
2.00-1.68	25.10- 31.17	1	1	1	3
2.33-2.01	19.02- 25.09				2
2.67-2.34	12.94- 19.01				1
3.00-2.68	6.86- 12.93				0

Test No. 1. M = 59.50 = -.33.....0 S. D.

Test No. 2. M = 64.62 = .00.....33 S. D.

Test No. 3. M = 60.78 = -.33.....0 S. D.

FREQUENCY TABLE SHOWING THE RESULTS OF THE EXPERIMENTAL SECTION OF GROUP II ON TEST NO. 1, 2, 3. IN MODERN HISTORY.

TABLE NO. 25.

S. D. Score	R. Score	1f	2f	3f	Transmuted Steps
2.68-3.00	110.22-116.29		1		17
2.34-2.67	104.14-110.21		0	1	16
2.01-2.33	98.06-104.13	2	1	1	15
1.68-2.00	91.98- 98.05	0	1	0	14
1.34-1.67	85.90- 91.97	1	0	1	13
1.01-1.33	79.82- 85.89	1	0	0	12
.68-1.00	73.74- 79.81	0	3	1	11
.34- .67	67.66- 73.73	3	1	1	10
.00- .33	61.58- 67.65	1	0	2	9
.33- .00	55.50- 61.57	3	1	0	8
.67- .34	49.42- 55.49	1	5	3	7
1.00- .68	43.34- 49.41	3	1	4	6
1.33-1.01	37.26- 43.33	4	4	5	5
1.67-1.34	31.18- 37.25		1		4
2.00-1.68	25.10- 31.17				3
2.33-2.01	19.02- 25.09				2
2.67-2.34	12.94- 19.01				1
3.00-2.68	6.86- 12.93				0

Test No. 1. M = 62.06 = .0.....33 S. D.

Test No. 2. M = 61.74 = .0.....33 S. D.

Test No. 3. M = 58.86 =-.33.....0 S. D.

FREQUENCY TABLE SHOWING THE RESULTS OF THE CONTROL SECTION GROUP III ON TEST NO. 1, 2, 3. IN AMERICAN HISTORY

TABLE NO. 26

S. D. Score	R. Score	1f	2f	3f	Transmuted Steps
2.68-3.00	132.28-138.70				17
2.34-2.67	125.85-132.27				16
2.01-2.33	119.42-125.84	0	1	0	15
1.68-2.00	112.99-119.41	1	0	1	14
1.34-1.67	106.56-112.98	0	2	4	13
1.01-1.33	100.13-106.55	0	0	0	12
.68-1.00	93.70-100.12	1	2	0	11
.34- .67	87.27- 93.69	2	2	0	10
.00- .33	80.84- 87.26	2	1	2	9
.33- .00	74.41- 80.83	0	0	0	8
.67- .34	67.98- 74.40	2	1	2	7
1.00- .68	61.55- 67.97	0	1	1	6
1.33-1.01	55.12- 61.54	2	2	0	5
1.67-1.34	48.69- 55.11	0	0	1	4
2.00-1.68	42.26- 48.68	1	0	0	3
2.33-2.01	35.83- 42.25	1	0	1	2
2.67-2.34	29.40- 35.82				1
3.00-2.68	22.97- 29.39				0

Test No. 1. M = 75.49 = -.33.....0 S. D.

Test No. 2. M = 87.81 = .34.....67 S. D.

Test No. 3. M = 85.13 = .0.....33 S. D.

FREQUENCY TABLE SHOWING THE RESULTS OF THE EXPERIMENTAL SECTION OF GROUP III ON TESTS NO. 1, 2, 3. IN AMERICAN HISTORY.

TABLE NO. 27

S. D. Score	R. Score	1f	2f	3f	Transmuted Steps
2.68-3.00	132.28-138.70				17
2.34-2.67	125.85-132.27				16
2.01-2.33	119.42-125.84	1	1	0	15
1.68-2.00	112.99-119.41	0	0	1	14
1.34-1.67	106.56-112.98	0	0	0	13
1.01-1.33	100.13-106.55	1	0	2	12
.68-1.00	93.70-100.12	1	2	1	11
.34- .67	87.27- 93.69	1	3	1	10
.00- .33	80.84- 87.26	3	1	2	9
.33- .00	74.41- 80.83	2	1	1	8
.67- .34	67.98- 74.40	2	0	2	7
1.00- .68	61.55- 67.97	0	4	1	6
1.33-1.01	55.12- 61.54	0	0	1	5
1.67-1.34	48.69- 55.11	1	0	0	4
2.00-1.68	42.26- 48.68				3
2.33-2.01	35.83- 42.25				2
2.67-2.34	29.40- 35.82				1
3.00-2.68	22.97- 29.39				0

Test No. 1. M = 84.59 = 0.....33 S. D.

Test No. 2. M = 84.06 = 0.....33 S. D.

Test No. 3. M = 85.13 = 0.....33 S. D.

Table No. 28 shows the combined results of the Control Section of Groups I, II, III on Test No. 1. In the first column is shown the S. D. scores divided into one-third step intervals as used in previous tables. The second column shows the eighteen transmuted step intervals ranging from 0 to 17 inclusive. The "f" column shows the combined frequency of all three Sections of the Controls in Groups I, II, and III, of Test No. 1. The next three columns, "d", "fd", and the "fd^2", are the same as shown on all frequency tables.

Table No. 29 shows the combined results of all Experimental Sections of Groups I, II, and III of Test No. 1.

Table No. 30 shows combined results of all Control Sections of Groups I, II, and III, of Test No. 2.

Table No. 31 shows combined results of all Experimental Sections of Groups I, II, and III, of Test No. 2.

Table No. 32 shows the combined results of all Control Sections of Groups I, II, and III, of Test No. 3.

Table No. 33 shows the combined results of all Experimental Sections of Test No. 3.

Tables No. 29, 30, 31, 32, and 33 are each interpreted as Table No. 28, except showing different data.

To determine if cramming showed any immediate effect upon retention on the entire number of students making up the study, it was necessary to use the data shown in Tables No. 28 and 29. On Table No. 28 it was found that the mean was 8.14 or -.33 to 0 S. D. The S. D. was found to be

2.9; the S. E. $M._1$ to be 3.85. Table No. 29 shows the mean of the Experimental Section to be 9.59 or between 0 to .33 S. D. The S. D. was found to be 3.06; the S. E. $M._2$ to be 4.05. These data were statistically treated to find the S. E. difference of the means, as was done in all other comparisons. The S. E. D. of the means was found to be 5.59.

We know that the chances are about 2 to 1 that the true difference, in favor of the Experimental Sections over the Control Sections, will be found within 5.59 units of the observed difference of the means of 1.45, or between -4.14 and 7.04.[17]

To determine the chances that the true difference will always be found above zero the ratio of the observed difference of the means to the S. E. D. of the means was computed. This ratio was found to be .26 which is insignificant statistically. The chances are about 1.52 to 1 that the Crammers will exceed the Non-crammers.[18]

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[17] Ibid., p. 140.

[18] Ibid., p. 137.

FREQUENCY TABLE SHOWING THE COMBINED RESULTS OF THE CONTROL SECTIONS OF GROUPS I, II, III, OF TEST NO. 1.; USING THE TRANSMUTED STEP INTERVALS.

TABLE NO. 28

S. D. Score	Transmuted Step	f	d	fd	fd^2
2.68-3.00	17				
2.34-2.67	16				
2.01-2.33	15				
1.68-2.00	14	1	6	6	36
1.34-1.67	13	2	5	10	50
1.01-1.33	12	2	4	8	32
.68-1.00	11	6	3	18	54
.34- .67	10	4	2	8	16
.00- .33	9	8	1	8	8
.33- .00	8	7	0	0	0
.67- .34	7	6	-1	-6	6
1.00- .68	6	8	-2	-16	32
1.33-1.01	5	4	-3	-12	36
1.67-1.34	4	3	-4	-12	48
2.00-1.68	3	4	-5	-20	100
2.33-2.01	2	2	-6	-12	72
2.67-2.34	1				
3.00-2.68	0				
Totals		57		-20	490

M. = 8.14 = -.33....0 S. D.

S. D. = 2.9

S. E. M_1. = 3.85

FREQUENCY TABLE SHOWING THE COMBINED RESULTS OF THE EXPERIMENTAL SECTIONS OF GROUPS I, II, III, OF TEST NO. 1; USING THE TRANSMUTED STEP INTERVALS.

TABLE NO. 29

S. D. Score	Transmuted Step	f	d	fd	fd^2
2.68-3.00	17				
2.34-2.67	16				
2.01-2.33	15	3	6	18	108
1.68-2.00	14	3	5	15	75
1.34-1.67	13	4	4	16	64
1.01-1.33	12	2	3	6	18
.68-1.00	11	4	2	8	16
.34- .67	10	9	1	9	9
.00- .33	9	6	0	0	0
.33- .00	8	7	-1	-7	7
.67- .34	7	6	-2	-12	24
1.00- .68	6	6	-3	-18	54
1.33-1.01	5	5	-4	-20	80
1.67-1.34	4	2	-5	-10	50
2.00-1.68	3				
2.33-2.01	2				
2.67-2.34	1				
3.00-2.68	0				
Totals		57		5	505

M. = 9.59 = 0....33 S. D.

S. D. = 3.06

S. E. $M_{2.}$ = 4.05

On the next page is shown Table No. 30 which shows the combined results of the Control Sections of Group I, II, and III, on Test No. 2. The mean was found to be 9.32 or between 0 and .33 S. D. The S. D. was found to be 2.92; the S. E. $M._1$ to be 3.86.

On Table No. 31 is shown the combined results of the Experimental Sections of Groups I, II, and III, of Test No. 2. The mean was found to be 9.36 or between 0 and .33 S. D. The S. D. was found to be 3.16; the S. E. $M._2$ to be 4.18.

The observed difference of the means is only .04 units. The S. E. D. of the means is 5.69. The chances are about 2 to 1 that the true difference will lie within 5.69 units of the observed difference of the means of .04 or between -5.65 and 5.73.[19]

The ratio of the observed difference of the means to the S. E. D. of the means was found to be 0. The chances that the true difference will always be above zero and that the Crammers will show an advantage over Non-crammers are about 1 to 1.[20]

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[19] Ibid., p. 140.

[20] Ibid., p. 137.

FREQUENCY TABLE SHOWING THE COMBINED RESULTS OF THE CONTROL SECTIONS OF GROUPS I, II, III, OF TEST NO. 2; USING THE TRANSMUTED STEP INTERVALS.

TABLE NO. 30

S. D. Score	Transmuted Step	f	d	fd	fd^2
2.68-3.00	17				
2.34-2.67	16				
2.01-2.33	15	1	7	7	49
1.68-2.00	14	2	6	12	72
1.34-1.67	13	5	5	25	125
1.01-1.33	12	1	4	4	16
.68-1.00	11	7	3	21	63
.34- .67	10	7	2	14	28
.00- .33	9	5	1	5	5
.33- .00	8	8	0	0	0
.67- .34	7	8	-1	-8	8
1.00- .68	6	4	-2	-8	16
1.33-1.01	5	4	-3	-12	36
1.67-1.34	4	2	-4	-8	32
2.00-1.68	3	3	-5	-15	75
2.33-2.01	2				
2.67-2.34	1				
3.00-2.68	0				
Totals		57		47	525

M. = 9.32 = 0.....33 S. D.

S. D. = 2.92

S. E. $M_{.1.}$ = 3.86

FREQUENCY TABLE SHOWING THE RESULTS OF THE COMBINED EXPERIMENTAL SECTIONS OF GROUPS I, II, III, OF TEST NO. 2; USING THE TRANSMUTED STEP INTERVALS.

TABLE NO. 31

S. D. Score	Transmuted Step	f	d	fd	fd^2
2.68-3.00	17	1	8	8	64
2.34-2.67	16	0	7	0	0
2.01-2.33	15	2	6	12	72
1.68-2.00	14	2	5	10	50
1.34-1.67	13	2	4	8	32
1.01-1.33	12	3	3	9	27
.68-1.00	11	10	2	20	40
.34- .67	10	6	1	6	6
.00- .33	9	4	0	0	0
.33- .00	8	3	-1	-3	3
.67- .34	7	7	-2	-14	28
1.00- .68	6	7	-3	-21	63
1.33-1.01	5	7	-4	-28	112
1.67-1.34	4	3	-5	-15	75
2.00-1.68	3				
2.33-2.01	2				
2.67-2.34	1				
3.00-2.68	0				
Totals		57		-8	572

M. = 9.36 = 0.....33 S. D.

S. D. = 3.16

S. E. M_2. = 4.18

Table No. 32 shows the combined results of the Control Sections of Groups I, II, and III, on Test No. 3. The mean was found to be 8.76, or between -.33 and 0 S. D. The S. D. was determined to be 3.06; the S. E. $M._1$ to be 4.05.

Table No. 33 shows the combined results of the Experimental Sections of Groups I, II, and III, on Test No. 3. The mean was found to be 9.15 or between 0 and . 33 S. D. The S. D. was found to be 3.06; the S. E. $M._2$ to be 4.05.

The observed difference of the means shows the Crammers to lead the Non-crammers by .39 units. The S. E. D. of the means was found to be 5.43. Since in an infinite number of cases they will distribute themselves approximately according to the normal curve, the chances are about 2 to 1 that the true difference will be between -5.04 and 5.82.[21]

To determine the chances that this difference will always be above zero, the ratio of the observed difference of the means to the S. E. D. of the means was computed and found to be .07. This difference is insignificant statistically. The chances are about 1.14 to 1 that the true difference will always be found above zero.[22]

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[21] Ibid., p. 140.

[22] Ibid., p. 137.

FREQUENCY TABLE SHOWING THE COMBINED RESULTS OF THE CONTROL SECTIONS OF GROUPS I, II, III, OF TEST NO. 3; USING THE TRANSMUTED STEP INTERVALS.

TABLE NO. 32

S. D. Score	Transmuted Step	f	d	fd	fd^2
2.68-3.00	17				
2.34-2.67	16				
2.01-2.33	15				
1.68-2.00	14	1	6	6	36
1.34-1.67	13	7	5	35	175
1.01-1.33	12	2	4	8	32
.68-1.00	11	2	3	6	18
.34- .67	10	7	2	14	28
.00- .33	9	8	1	8	8
.33- .00	8	9	0	0	0
.67- .34	7	6	-1	-6	6
1.00- .68	6	4	-2	-8	16
1.33-1.01	5	1	-3	-3	9
1.67-1.34	4	6	-4	-24	96
2.00-1.68	3	3	-5	-15	75
2.33-2.01	2	1	-6	-6	36
2.67-2.34	1				
3.00-2.68	0				
Totals		57		15	535

M. = 8.76 = -.33.....0 S. D.

S. D. = 3.06

S. E. M_1. = 4.05

FREQUENCY TABLE SHOWING THE RESULTS OF THE COMBINED EXPERIMENTAL SECTIONS OF GROUPS I, II, III, OF TEST NO. 3; USING THE TRANSMUTED STEP INTERVALS.

TABLE NO. 33

S. D. Score	Transmuted Step	f	d	fd	fd^2
2.68-3.00	17				
2.34-2.67	16	1	8	8	64
2.01-2.33	15	1	7	7	49
1.68-2.00	14	3	6	18	108
1.34-1.67	13	2	5	10	50
1.01-1.33	12	4	4	16	64
.68-1.00	11	6	3	18	54
.34- .67	10	4	2	8	16
.00- .33	9	7	1	7	7
.33- .00	8	4	0	0	0
.67- .34	7	7	-1	-7	7
1.00- .68	6	8	-2	-16	32
1.33-1.01	5	8	-3	-24	72
1.67-1.34	4	2	-4	-8	32
2.00-1.68	3				
2.33-2.01	2				
2.67-2.34	1				
3.00-2.68	0				
Totals		57		37	555

M. = 9.15 = 0.....33 S. D.

S. D. = 3.06

S. E. $M_{.2}$. = 4.05

SUMMARY.

	Test No. 1			Test No. 2			Test No. 3		
	M	S.D.	S.E.M.	M	S.D.	S.E.M.	M	S.D.	S.E.M.
Control									
Group I.	46.57	15.23	2.99	50.40	16.81	3.30	49.34	15.48	3.20
Group II.	59.50	16.61	3.81	64.62	15.10	3.46	60.78	15.94	3.66
Group III.	75.49	21.59	6.23	87.81	20.25	5.85	85.13	25.00	7.22
Experimental									
Group I.	58.66	15.90	3.12	56.33	16.49	3.22	55.27	16.13	3.29
Group II.	62.06	20.38	4.66	61.74	22.18	5.08	58.86	20.60	4.72
Group III.	84.59	17.10	4.94	84.06	17.00	4.92	85.13	16.98	4.90
				TRANSMUTED SCORES					
Control	8.14	2.90	3.85	9.32	2.92	3.86	8.76	3.06	4.05
Experimental	9.59	3.06	4.05	9.36	3.16	4.18	9.15	3.06	4.05
Critical Ratios		.26			.00			.07	

CHAPTER III

SUMMARY AND CONCLUSIONS

The problem in this study was an attempt to determine whether review cramming before a test would have any effect upon the retention, not only for the test that was to be given immediately following the cramming period, but for any test occurring within six weeks and twelve weeks later.

High school students of about average intelligence were used in the experiment. Social science was chosen as the field of investigation because it was believed there would be fewer drills required over the materials covered in the tests than there would have been in other fields, such as mathematics or science. Three classes were involved in the experiment, namely, Oklahoma History designated as Group I; Modern History designated as Group II; and American History designated as Group III.

Each of the Groups was broken down into a Control and an Experimental Section. These Sections were equated on the basis of I. Q.'s. There were 114 students who took all three tests that could be used to equate. Some students who took all three tests were discarded because it was impossible to find others in the opposite section with whom they could be equated. The totals of the I. Q.'s of each Section included in the study are within a very few points of being equal.

On the initial test given immediately following the review cramming period, the Crammers in Group I, Oklahoma

History, showed a gain over the Non-crammers of an average of 12.09 units. This comparison shows that review cramming preceding the test is effective, the chances being that the true difference will be above zero in about 511 to 1 cases.[1] It will be noted that on this test the Control Section is grouped closer to the mean, as shown on Tables No. 2 and 3.

The Experimental Section of Group I, six weeks later had lost part of the gain shown on the first test. They still led the Control Section, but on the second test, by only 5.93 units; and the chance is about 9.14 to 1 that the true difference would always be above zero.[2] The Experimental Section on Test No. 2 was grouped only slightly closer to the mean than the Control Section. The difference in the S. D. of the two groups as shown by Tables No. 10 and 11 is only .32 units. It will be observed that on the second test the mean of the Experimental Section declined from 58.66 on Test No. 1 to 56.33 on Test No. 2, while the mean of the Control Section increased from 46.57 on Test No. 1 to 50.40 on Test No. 2.

The writer knows of no reason why the mean of the Control Section of Group I should increase and the mean of the Experimental Section decrease except for the fact that the members of the Control Section had missed so many more

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1 Ernest W. Tiegs, Claud C. Crawford, Statistics for Teachers, p. 137.

2. Tiegs, Crawford, loc. cit.

questions on Test 1 than the students of the Experimental Section, that being more conscious of their errors, some effort may have been made to correct them.

On Test No. 3 the Experimental Section of Group I led the Control Section by exactly the same amount they exceeded them by in Test No. 2. The chance that the true difference will always be above zero was found to be exactly the same, 9.14 to 1.[3] This difference is insignificant statistically.

On Test No. 3 it will be observed that the mean of the Experimental Section declined from 56.33 to 55.27. The mean of the Control Section declined from 50.40 to 49.34. This shows that the ratio of forgetting was nearly equal in both Sections. The S. D. of the Control Section on Test No. 3 shows they were more closely grouped about the mean.

In general it seems that the information learned in the cramming period caused the grades to be scattered and to have a wider range. The advantage shown by review cramming for the initial test was mostly lost during the first six weeks following. During the second six weeks following the first test, the rate of forgetting was slower for the Experimental Section.

It seems that on this test the cramming does have some effect immediately and little, if any, on delayed retention.

On Test No. 1 Group II, the mean of the Experimental Section only exceeded the mean of the Control Section by

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[3] Tiegs, Crawford, loc. cit.

2.56 units as shown by Tables No. 5 and No. 6. The chances are about 1.46 to 1 that the true difference will always be above zero.[4] It will, however, be noted that the S. D. of the Control Section was 3.77 units lower than the S. D. of the Experimental Section. Review cramming shows to have no immediate effect upon this Group.

On Test No. 2, as shown on Tables No. 12 and No. 13, the mean of the Control Section of Group II exceeded the mean of the Experimental Section by 2.88 units. The chances that the difference will always be above zero are about 2.18 to 1, which is insignificant. On this test the S. D. of the Control Section was 7.08 units lower than the S. D. of the Experimental Section. The mean of the Experimental Section declined from Test No. 1 to Test No. 2, while the mean of the Control Section increased. This increase may be attributed to mere chance or to study by the Control Section over questions they knew they missed on the first test. It is the opinion of the writer that since the increase is so small, it was probably pure chance.

On Test No. 3 the mean of the Control Section again exceeded the mean of the Experimental Section by a few points. The difference this time was found to be 1.92 units. The chances that this difference will always be above zero are about 1.46 to 1 which is insignificant.[5]

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4 Tiegs, Crawford, loc. cit.

5 Tiegs, Crawford, loc. cit.

It will be observed that the S. D. of the Control Section was 4.66 units lower than the S. D. of the Experimental Section. Review cramming seems to cause a wider range in the scores made.

In Group III, Test No. 1 the Crammers led the Non-crammers by a mean score of 9.10 units. The chance that this difference will always be above zero was found to be about 6.88 to 1, which is insignificant statistically.[6] In this test the S. D. of the Experimental Section was shown by Tables No. 8 and No. 9, to be 4.49 units lower than the mean of the Control Section.

On Test No. 2 the Control Section increased their mean 12.32 units while the Experimental Section's mean declined .54 units. The Control Section's S. D. was also found to be higher on Test No. 2 as well as on Test No. 1, than the S. D. of the Experimental Section. To the writer it seems that a rise of the mean of 12.32 units can only be accounted for by the students' realizing their mistakes on the first test and attempting to learn some of the answers afterward.

The difference in the means on Test No. 2 of the two Sections was only 3.75 units. This difference was in favor of the Non-crammers, as was shown on Tables No. 13 and No. 14. The chances that the difference will always be above zero are only about 2.18 to 1, which is insignificant statistically.[7]

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6 Tiegs, Crawford, loc. cit.

7 Tiegs, Crawford, loc. cit.

On Test No. 3 both the Control and the Experimental Sections showed a decline in their means. From Test No. 2 to Test No. 3 the Control Section shows the greater decline. Both Sections have a mean of 85.13 for Test No. 3, as shown on Tables No. 20 and No. 21. On this test their chances are about 1 to 1.[8]

To summarize the combined results of the Control Sections of Groups I, II, and III of Test No. 1 on Table No. 28, it will be observed that the mean was equal to 8.14 transmuted step units; the S. D. 2.9; the S. E. $M._1$ 3.85

On Table No. 29 showing the combined results of the Experimental Sections of Groups I, II, and III of Test No. 1, the mean was found to be 9.59 transmuted step units; the S. D. 3.06; the S. E. $M._2$ 4.05. Although the Experimental Sections exceeded the Control Sections by a mean of 1.45 units, the chances that this difference will always be above zero were found to be only about 1.52 to 1 in favor of the Experimental Sections.[9] It will be noted that the S. D. of the Control Sections of Groups I, II, and III on Test 1 was smaller than the S. D. of the Experimental Sections of Groups I, II, and III on Test 1.

On Table No. 30 showing the combined results of the Control Sections of Groups I, II, III of Test No. 2, it will be observed that the mean was found to equal 9.32 transmuted

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8 Tiegs, Crawford, loc. cit.

9 Tiegs, Crawford, loc. cit.

step units; the S. D. 2.92; the S. E. $M._1$ 3.86.

On Table No. 31 showing the combined results of the Experimental Sections of Groups I, II, III of Test No. 2, the mean was found to be 9.36 transmuted step units; S. D. to equal 3.16; S. E. $M._2$ to equal 4.18. Again the Experimental Sections exceeded the Control Sections, but by a very small margin. The S. E. D. of the means was found to be zero. The chances are that on this test, given six-weeks after the cramming period, the effects upon retention will be zero.[10] It will be noted, however, that the S. D. of the Control Section was considerably lower than the S. D. of the Experimental Section.

On Table No. 32, the combined results of the Control Sections of Groups I, II, and III of Test No. 3 are shown. It will be observed that the mean was found to be 8.76 transmuted step units; the S. D. 3.06; the S. E. $M._1$ 4.05.

On Table 33, showing the combined results of the Experimental Sections of Group I, II, and III of Test No. 3 the mean was found to equal 9.15 transmuted step units; the S. D. 3.06; the S. E. $M._2$ 4.05. The mean of the Experimental Sections exceeded the mean of the Control Sections by .39 transmuted step units. The chances that this difference will always be above zero in favor of the Experimental Sections were found to be about 1.14 to 1.[11] In this third test given

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10 Tiegs, Crawford, loc. cit.

11 Tiegs, Crawford, loc. cit.

twelve weeks after the period of cramming, the difference between the Control and Experimental Sections was found to be statistically insignificant. The S. D. of both Sections was found to be equal.

CONCLUSIONS

On the basis of the findings in this study the following conclusions were drawn:

1. Review cramming for fifty minutes preceding the test has little if any effect upon retention immediately, six-weeks later, or twelve weeks later.

2. The Oklahoma History Students, who were the youngest Group in the study, appeared to gain more by review cramming than did either of the other Groups.

3. The period of review cramming seems to have caused a greater range in the scores.

4. The number of students involved in the study is not so large as it should have been.

5. There was no way to keep students from studying questions they knew they missed in the first test. The results of this studying could have affected the results of the second and third tests.

6. The tests used in the study were objective and could they have been more general and less factual the results might have been different.

7. The fifty minutes of cramming preceding the first test was probably too short a period.

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Appendix.

OKLAHOMA HISTORY TEST

DIRECTIONS: Select the best answer and place the correct number in the blank at the right.

1. The natives of America were first called Indians by (1) Balboa,(2) Columbus,(3) Magellan,(4) Coronado, (5) Cortez. _____

2. The scientist in arranging the Indians into groups did so by (1) language,(2) religion,(3) occupation, (4) type of houses,(5) manner of dress,(6) color of skin. _____

3. The number of tribes in the "League of the Iroquois" was (1) five,(2) ten,(3) twelve, (4) three,(5) twenty,(6) eleven. _____

4. The Indians of the five civilized tribes generally lived in (1) tepees,(2) sod houses, (3) brick houses,(4) bark houses,(5) log houses,(6) trailers. _____

5. The home of the five civilized tribes was in (1) Southeastern United States,(2) Missouri, (3) Mexico,(4) Oregon,(5) New Jersey. _____

6. The Creek Indians called the rulers of their tribes (1) chief,(2) kings,(3) miccos,(5) governors,(6) senators. _____

7. The Seminoles lived in what is now (1) Georgia, (2) Florida,(3) Mississippi,(4) Tennessee, (5) Texas,(6) Kansas.

8. The Chicksaws were close kinsman to the (1) Seminoles,(2) Osages,(3) Cherokees (4) Choctaws, (5) Creeks. _____

9. When America was discovered the only animal possessed by any Indian tribe was the (1) horse,(2) hog,(3) sheep,(4) dog,(5) goat. _____

10. The Wichitas lived in houses made of (1) grass,(2) sod,(3) bark,(4) logs,(5) stone, (6) hides. _____

11. The Plains Indians made their living mostly by (1) farming, (2) trading,(3) hunting,(4) stock raising, (5) mining,(6) traping. _____

12. Before the discovery of America the Indians made their knives from (1) copper, (2) bone, (3) stone, (4) steel, (5) iron. _____

13. Lewis and Clark went westward until they reached (1) the Rocky Mountains (2) the source of the Mississippi river, (3) the Mandan villages, (4) the Pacific Ocean (5) the head waters of the Columbia. _____

14. Pikes Peak was discovered by (1) Wilkinson, (2) Albert Pike, (3) William Clark, (4) Zebulon M. Pike, (5) Major Long. _____

15. The boundary between the Louisiana Purchase and the Spanish Territory was definitely drawn in (1) 1803, (2) 1795, (3) 1819,(4) 1825, (5) 1832, (6) 1805. _____

16. The first official American Explorer to make a trip into Oklahoma and to write about what he saw was (1) Catlin, (2) Lewis, (3) Nathaniel Boone, (4) Wilkinson, (5) Leavenworth. _____

17. Clermont was (1) an Indian chief, (2) a trader, (3) a missionary, (4) an explorer, (5) a trapper, (6) an Indian painter. _____

18. Colonel Sibley wrote a very interesting description of the (1) Salt Plains, (2) vegetation, (3) Indians, (4) animals, (5) mountains. _____

19. Major Long found no Indians in Oklahoma except a few (1) Osages, (2) Cherokees, (3) Shawnees, (4) Poncas, (5) Senecas. _____

20. Catlin was (1) a writer, (2) a botanist, (3) an army officer (4) a trader (5) a painter of pictures. _____

21. A Tour of the Prairies was written by (1) Jefferson Davis, (2) Latrobe, (3) Payne (4) Washington Irving, (5) Sam Houston. _____

22. The most important post in Oklahoma for many years was (1) Fort Sill, (2) Fort Gibson,(3) Fort Supply, (4) Glenn's Trading House, (5) Fort Towson. _____

23. Chouteau owned several (1) farms, (2) ranches, (3) salt works, (4) sawmills. _____

24. The West Cherokees before removing to what is now Oklahoma, moved to (1) Tennessee,(2) Arkansas, (3) Texas, (4) Louisiana, (5) Kansas. _____

25. The Chicksaws bought lands from the (1) Choctaws, (2) Creeks, (3) Kiowas, (4) Wichitas, (5) Seminoles. _____

DIRECTIONS: Write a word in each blank which will make the statement true.

26. Spain first lay claim to what is now Oklahoma through the discovery of _____.

27. The Spanish Captain _____ was the first Spaniard to visit Mexico. There he met _____ at Mexico City and captured the city.

28. Spain's chief motive in colonization in America was _____.

29. The first American explorer to visit Oklahoma was _____.

30. The Mississippi River was discovered by _____ about the year of _____.

31. Spain claimed the Mississippi valley as a result of the exploration of _____.

32. The second nation to explore the new world was _____.

33. English colonists came to the New World to _____.

34. The French were first attracted to the New World by _____.

35. The French and Indian War closed by the Treaty of _____ in the year of _____.

36. As a result of the French and Indian War the _____ were driven from North America.

_____ was the first American to lead in the settlement west of the Appalachian Mountains.

38. We bought Louisiana from _____ in the year of _____ for $_____.

39. Oklahoma was a part of the French Empire from 1683 to _____.

40. The first real name of Oklahoma was _____.

41. During the American Revolution Oklahoma belonged to _____.

42. The first white man to explore Red River as far west as Oklahoma was _____.

43. _____ was the first white man to explore Western Oklahoma.

44. The first Negro connected with the exploration of Oklahoma was _____.

45. Desota's exploration of Oklahoma was confined to the _____ section.

46. The site for Ft. Smith was selected by _____ at the mouth of _____ river.

47. Captain Marcy in 1849 explored the _____ river.

48. _____ was for a long time the most important post in Oklahoma. It was established in the year of _____, by _____.

49. Chouteau trading post was established near the present town of _____.

50. Wm. McIntosh favored the removal of the _____ Indians to Oklahoma.

51. Washington Irving visited Oklahoma in the year of _____ and wrote about his travels in a book called _____.

52. The Southern boundary of Oklahoma was established by the treaty of _____ with _____.

53. The Chickasaws were settled with the _____.

54. The Cherokees that came to Arkansas in 1817 were known as the _____ Cherokees.

55. The least civilized of all the five civilized tribes were the _____.

56. A noted American author who visited Oklahoma in 1832 was _____.

57. The first railroad to be built across the state from North to South was the _____.

58. The United States bought Oklahoma in the year _____.

59. Lieutenant Zebulon M. Pike explored Oklahoma in the year _____.

60. The original home of the Creek Indians was in _____.

61. The Capitol of the Creek nation was in _____.

62. The Choctaws came to Oklahoma in the year of _____.

63. The Salt Plains of Oklahoma were explored in the year of _____.

64. Fort Towson is located in the _____ section of Oklahoma.

65. Most of the coal of the state is located on the land given the _____.

66. The Comanches, Kiowas, and Wichitas were known as the _____.

67. During the time of the tribal government of the five civilized tribes all land was held in _____.

DIRECTIONS: Below at the left are names and at the right are phrases. Connect the names and phrases by placing the correct number in front of the phrase.

68.	De Sota	( ) Expedition into Eastern Oklahoma in 1540.
69.	La Harp	( ) A leader of the Seminoles.
70.	John Ross	( ) Cherokee leader who opposed the removal of the Cherokees from Georgia.
71.	Washington Irving	( ) The Southern boundary of Oklahoma.
72.	Cabeza de Vaca	( ) Inventor of the Cherokee alphabet.
73.	Stephen H. Long	( ) Named for the King of France.
74.	Father Marquette	( ) Expedition down the Canadian river.

75. Red River	( )	Wrote the"Tour of the Prairies."
76. Sequoyah	( )	A tribe of Plains Indians.
77. Louisiana	( )	French explorer in Eastern Okla.
78. Siouan	( )	French Missionary and explorer.
79. James B. Wilkinson	( )	Explorer of the Salt Plains.
80. Comanche	( )	Spanish explorer in Southwest Texas.
81. Pushmataha	( )	An Indian confederation living in Oklahoma when history dawned.
82. Verdigris	( )	First official American expedition into Oklahoma.
83. Major George Sibley	( )	Leader of the Choctaws.
84. "Pins"	( )	Explore the north bank of Red River.
85. Osceola	( )	Condemned to death by Creeks.
86. Col. Wm. McIntosh	( )	Opposed to slavery.
87. Captain Marcy	( )	Governor of Canada.
88. "Knight of the Golden Circle"	( )	A river in northeastern Oklahoma.
89. Frontenac	( )	Explored Little River.
90. Stevens	( )	Mexican ruler.
91. Montezuma	( )	Guide
92. "Turk"		

DIRECTIONS: If a statement is true, underline TRUE; if false, underline FALSE; if in doubt, omit the item. Do Not Guess.

93. The report of Fray Marcos discouraged Coronado.	TRUE	FALSE
94. Charles V of Spain was friendly to Cortez.	TRUE	FALSE
95. Early Indian claims to this land was not very good.	TRUE	FALSE
96. The Iroquois Indians were good friends of the French.	TRUE	FALSE
97. San Bois is a French name.	TRUE	FALSE
98. As a general rule, the French won the friendship of the Indians.	TRUE	FALSE
99. The French and Spanish were both especially interested in the agricultural development of Oklahoma.	TRUE	FALSE
100. Spain ceded Louisiana to France in the treaty of 1763.	TRUE	FALSE
101. The early English settlers were interested in the fur trade.	TRUE	FALSE
102. The Red River was the first stream in Oklahoma explored by American explorers.	TRUE	FALSE
103. Quebec was a Spanish out-post in 1700.	TRUE	FALSE
104. England first lay claim to Oklahoma under the charter of Virginia.	TRUE	FALSE

105. Coronado and DeSota both visited Oklahoma about 1540. TRUE FALSE

106. By the treaty with Spain in 1819 the Arkansas River became the southern boundary of United States. TRUE FALSE

107. Louis XIV encouraged the best of settlers to come to America. TRUE FALSE

108. Joilet explored the Mississippi river to its mouth. TRUE FALSE

109. Some of the Cherokees did not want to come to Oklahoma. TRUE FALSE

110. The U.S. Government agreed with the Indians that the five civilized tribes should never be included in any territory. TRUE FALSE

MODERN HISTORY

DIRECTIONS: Select the best answer and place the correct number in the space at the right.

1. We learn of prehistoric man from (1) written records that have been discovered, (2) things he used, (3) folk-stories, (4) temples he built.

2. Government grew out of (1) the family, (2) primitive warfare, (3) woman's importance in primitive life.

3. The most important geographical factors in the development of Egypt was, (1) deserts which protected it, (2) harbours to encourage trade, (3) rivers which watered it, (4) rainfall. _____.

4. The greatest highway of ancient trade and commerce was (1) Nile, (2) Tigris and Euphrates,(3) Mediterranean, (4) Agean sea. _____.

5. Feudalism grew up because (1) it made the king more powerful, (2) protection from invading barbarians was necessary, (3) it gave the people opportunity to become feudal lords. _____.

6. The peasants (1) enjoyed many privileges, (2) had to support the higher classes in feudal society by their labors, (3) took an active part in government._____.

7. The Renaissance was a trend in (1) Parliamentary Government, (2) navigation, (3) athletics, (4) learning, (5) religion. _____.

8. The Protestants were (1) Spanish nobles, (2) religious reformers, (3) Irish rebels, (4) royal family of Austria. _____.

9. William and Mary came to England from (1) Norway, (2) France, (3) Netherlands (4) Ireland. _____.

10. In England the law which provided that no one was to be held in prison without reason being given was (1) Test Act, (2) Habeas Corpus Act, (3) Magna Carta, (4) Petition of Right. _____.

11. The Restoration ended with the (1) Seven Year's War, (2) Commonwealth, (3) Protectorate, (4) English Monarchy, (5) reigh of Henry the Eighth. _____.

12. The Dutch won their independence from (1) England, (2) Spain, (3) France, (4) Germany, (5) Russia. _____.

13. The Renaissance began in (1) Italy, (2) France, (3) Germany, (4) England, (5) Greece. _____.

14. Raphael was (1) a writer (2) an inventor, (3) an artist, (4) religious leader._____.

15. A new theory of the Universe, that the earth and planets revolve around the sun, was developed by (1) Petrarch, (2) Copernious and Galileo, (3) Luther and Calvin, (4) Gutenburg. _____.

16. The universal language during the time of the Romans was (1) Greek, (2) Hebrew, (3) Latin, (4) Gaelic. _____.

17. The reform within the church itself was known as (1) Reformation, (2) Counter-reformation, (3) Indulgences, (4) Heresy.

18. Democracy began in (1) Rome, (2) England, (3) Nile Valley, (4) Greek City states, (5) Switzerland. _____.

19. The Illiad and the Odyssey were written by (1) Petrarch, (2) Calvin, (3) Homer, (4) Sappho. _____.

20. The Otteman Turks were (1) Christians, (2) Lutherans, (3) Mohemmedans, (4) Greek Catholic, (5) Roman Catholics. _____.

21. The new commerce brought freedom to (1) nobles, (2) clergy, (3) lords, (4) serfs. _____.

22. The death blow of feudalism was given by (1) Commerce, (2) gun powder, (3) church, (4) printing press. _____.

23. About 1648 France was (1) Protestant, (2) Greek Catholic, (3) Roman Catholic, (4) Lutheran. _____.

24. A scholar who encouraged students to study literature in its original language was (1) Sir Thomas Moore, (2) Erasmus, (3) Loyola, (4) Petrarch.

25. The defeat of the Spanish Armada meant the supremacy of the seas should be controlled by (1) France, (2) England, (3) Spain, (4) Holland.

DIRECTIONS: Write a word in each blank which will make the statement true.

26. The small political divisions of Greece were called _____.

27. The most famous City States were _____ and _____.

28. Persia became a great empire under _____.

29. The greatest Greek statesman was _____.

30. An important Greek historian was _____.

31. The purpose of the Crusade was to _____.

32. The conflict between Athens and Sparta for leadership was known as _____.

33. A great development of commerce was the result of _____.

34. The church disliked to have its officers bestowed by kings because that led to the control of _____ by the kings and sale of _____.

35. The only agency to relieve distress in the Middle Ages was _____.

36. The government of _____ was like a pyramid.

37. The splitting of the church into factions is called _____.

38. The rise of commerce and the use of money led to the growth of _____.

39. Education in the Middle Ages was in the hands of _____.

40. An important leader of the Reformation in Germany was _____.

41. The great Reformation leader from France was _____.

42. French Protestants were known as _____.

43. The Pyrenees Mountains form the northern boundary of _____.

44. Rights of the French Protestants were protected by the Edict of _____.

45. The Jesuit organization was founded by _____.

46. The City of Madrid is in _____.

47. The Restoration gave the English crown to _____.

48. Those opposed to Charles II were nicknamed _____.

49. William and Mary became the rulers of _____ in 1688.

50. The last English king who tried to carry out the theory of divine right was _____.

51. The outstanding English playwright of the Elizabethian period was _____.

52. The principal cause of the Thirty Year's War in _____ was the revival strength of the _____ church.

53. The most important types of civilization were _____, _____ and _____.

54. The _____ was defeated by the English navy in 1588.

55. The Spanish king responsible for the Inquisition was _____.

DIRECTIONS: In each group you are to connect each item in the right-hand column with the proper topic in the left-hand column by writing the proper number in the parenthesis.

GROUP I

56. Primitive Man	( ) Parthenon
57. Egypt and Mespotamia	( ) An ideal standard of conduct
58. Phoenicia	( ) Use of fire
59. Greece	( ) Physical training
60. Rome	( ) Idea that earth is round

61. Christianity	( ) Idea of World unity
	( ) Law
	( ) Good roads
	( ) Democracy
	( ) Alphabet
	( ) Earliest written language
	( ) Reckoning of time

GROUP II

62. Fall of the Roman Empire of the West	( ) Social classes consisting Nobles, Clergy and peasants.
63. Feudalism	( ) Merchants and Guilds.
64. Crusades	( ) Recovery of Jerusalem
65. Revival of religion	( ) Vassals
66. Age of Commerce	( ) Armed caravans
67. New National States	( ) Growth of towns
	( ) Mohammedanism
	( ) Invasion of Tuetonic tribes
	( ) Craft Guilds

GROUP III

68. Science and Invention	( ) Marco Polo
69. Art and architecture	( ) Erasmus
70. Discovery	( ) Wycliffe
71. Literature	( ) Richelieu
72. Heresy	( ) Michael Angelo
73. Reformation	( ) Henry the Eighth
74. Counter-reformation	( ) Luther
75. Religious wars	( ) Vasco De Gama
	( ) Petrarch
	( ) Gutenberg
	( ) Algibensians
	( ) Edict of Nantes
	( ) Society of Jesus
	( ) Thirty Year's war
	( ) Galileo

DIRECTIONS: If a statement is true, underline TRUE; if false underline FALSE. If in doubt, omit the item. Do Not Guess.

76. Europe is East of Asia.	TRUE	FALSE
77. White races predominate in Europe.	TRUE	FALSE
78. The Renaissances began in Italy.	TRUE	FALSE
79. The Protestant movement had its greatest success in Europe.	TRUE	FALSE

80. Richelieu was a leader of the opposition to the French monarchy. TRUE FALSE

81. The Hugenots were Spanish sailors. TRUE FALSE

82. Cromwell was a defender of the English royal house. TRUE FALSE

83. The Puritans were called "Roundheads". TRUE FALSE

84. The "Cavaliers" were followers of Charles the Second. TRUE FALSE

85. The Habeas Corpus Act created the House of Commons. TRUE FALSE

86. The protectorate was established by William and Mary. TRUE FALSE

87. Parliament ruled during the Commonwealth. TRUE FALSE

88. Ireland is east of England. TRUE FALSE

89. Scotland is west of Ireland. TRUE FALSE

90. William and Mary were king and queen of France. TRUE FALSE

91. Charles II was beheaded. TRUE FALSE

92. The Reformation was a religious movement. TRUE FALSE

93. The Reformation helped to bring about modern religious toleration. TRUE FALSE

94. John Wycliffe was a leader of the Counter-Reformation. TRUE FALSE

95. The Renaissance encouraged men to think and act for themselves. TRUE FALSE

96. Charles I was anxious to conform to the beliefs of the Puritans. TRUE FALSE

97. The Separatists and Presbyterians both favored symplifying the church service and ritual. TRUE FALSE

98. The Jesuits belonged to the order of "grey friars". TRUE FALSE

99. Philip II was a brilliant ruler, trying to be fair in ruling his many possessions. TRUE FALSE

100. Italy was the first country to feel the spirit of the Renaissance. TRUE FALSE

101. Joan of Arc helped the French to gain national unity. TRUE FALSE

102. The Mohammedans are sometimes called Visi-goths. TRUE FALSE

103. Erasmus continued to support Luther in his work throughout his lifetime. TRUE FALSE

104. The defeat of the Spanish Armada made Spain mistress of the sea. TRUE FALSE

105. Queen Elizabeth helped to establish the Anglican Church. TRUE FALSE

AMERICAN HISTORY

DIRECTIONS: Select the best answer and place the correct number in the space at the right.

1. Long before the coming of Columbus the North America shores were visited by (1) Englishmen, (2) Phoenicians, (3) Greeks, (4) Norsemen, (5) Frenchmen. _____.

2. The event which did most to hasten the discovery of America was (1) the invention of gun powder, (2) the invention of the printing press, (3) the rise and development of central Europe, (4) the increased knowledge of geography and maritime science, (5) the fall of Constantinople and the consequent hindrance to Eastern trade. _____.

3. The century in which the great Era of Geographical Discovery began was the (1) 13th, (2) 14th, (3) 15th, (4) 16th, (5) 17th. _____.

4. The main reason for Spain's exploration and colonization of America was (1) to open up new markets, (2) to build a self-governing empire, (3) to find and exploit treasures in the New World, (4) to develop natural resources, (5) to have an outlet for her population. _____.

5. The explorer whose ship was the first to circumnavigate the globe was (1) Columbus, (2) Drake, (3) Americus Vespucius, (4) Magellan, (5) Hudson. _____.

6. The defeat of the Spanish Armada in the English Channel gave the mastery of the sea to (1) Holland, (2) England, (3) France, (4) Portugal, (5) Denmark. _____.

7. By right of discovery, exploration and settlement, France owned (1) the Atlantic Costal region, (2) the Hudson River valley, (3) the St. Lawerence valley and the Great Lakes region, (4) Florida and the Gulf._____.

8. England lay claim to the whole North American continent because of the fruitless voyage of (1) Sir Humphery Gilbert, (2) Sir Walter Raleigh, (3) John Cabot, (4) Jacques Cartier, (5) Captain John Smith. _____.

9. The first representative assembly in America met in the colony of (1) Virginia, (2) Massachusetts, (3) Pennsylvania, (4) Georgia, (5) Rhode Island. _____.

10. The Pilgrims left Holland because (1) they desired to improve their economic conditions, (2) they wished to worship God as they chose, (3) they objected to marriage with the Dutch, (4) live in the Indian country, (5) seek adventure. _____.

11. The agreement that pledged the signers to obey the government that they should establish in America was called the (1) Fundamental Orders, (2) the first written constitution, (3) Cambridge Agreement, (4) Mayflower Compact, (5) Grand Model. _____.

12. In a proprietary colony the control over the affairs rested in the hands of (1) one or more individuals, (2) King, (3) Parliament, (4) the people, (5) Councilmen selected by the people.

13. The first real constitution adopted in America was drawn up by the founders of the colony of (1) Connecticut, (2) Rhode Island, (3) New York, (4) Virginia, (5) Georgia. _____.

14. Pennsylvania was settled as a haven for the (1) Baptist, (2) Catholics, (3) Quakers, (4) Jews, (5) Mormans. _____.

15. The colony that was later named New York was first settled by the (1) Dutch, (2) English, (3) Spanish, (4) French, (5) Swedes. _____.

16. Negro slavery was first introduced into the colonies in (1) 1623, (2) 1713, (3) 1619, (4) 1824, (5) 1607. _____.

17. The most important staple crop of Virginia was (1) cotton, (2) Rice, (3) Grain, (4) Indigo, (5) Tobacco. _____.

18. The leading occupation of all English colonies was (1) fishing, (2) trade, (3) mining, (4) ship building, (5) farming. _____.

19. Colonial trade was carried chiefly over (1) turnpikes, (2) canals, (3) river and ocean routes, (4) railroads, (5) horseback trails. _____.

20. Columbus was a native of (1) France, (2) Italy, (3) Finland, (4) Norway, (5) England.

21. Those who signed the"Mayflower Compact" settled in (1) Massachusetts, (2) New York, (3) South Carolina, (4) Virginia, (5) Georgia. _____.

22. The major cause of Bacon's Rebellion was (1) social, (2) religious, (3) economic, (4) racial, (5) political._____.

23. The most important military post held by the French in North America was (1) Montreal, (2) Quebec, (3) Fort Duquesne, (4) Fort Royal, (5) Louisburg. _____.

24. Pennsylvania's earliest settlers came from (1) England, (2) Holland, (3) France, (4) Germany, (5) Spain. _____.

25. The first college established in the English Colonies was (1) Yale,(2) Harvard, (3) William and Mary, (4) Princeton, (5) Dartsmouth. _____.

DIRECTIONS: Write a word in each blank which will make the statement true.

26. The leading colony in religious toleration was _____.

27. The first permanent French settlement in America was _____.

28. The first man to explore the Mississippi river to its mouth was _____.

29. The founder of the colony of Connecticut was _____.

30. The colony founded by the Swedes was _____.

31. The first of the thirteen colonies to be made a Royal Province was _____.

32. The first representative assembly in America met in the year of _____.

33. Georgia was settled as a home for the _____.

34. The French became the enemies of the _____ Indians.

35. The founder of the colony of Rhode Island was _____.

36. Columbus sailed under the flag of _____.

37. The explorer who discovered the Mississippi River was _____.

38. The St. Lawrence Valley was first explored by _____.

39. Manhattan Island was first settled by the _____.

40. Roger Williams founded the colony of _____.

41. Oglethorpe founded the colony of _____.

42. During the French and Indian war the Iroquoise fought on the side of _____.

43. Montcalm was the commander of the _____.

44. An outstanding American officer under Braddock, during the French and Indian war was _____.

45. The battle of Quebec was won by the _____.

46. The first Puritan settlement in America was _____.

47. The English founded Jamestown in the year of _____.

48. Mexico was captured by the Spanish Captain _____.

49. The first permanent English settlement in America was _____.

50. The first permanent Spanish settlement in America was _____.

51. The Pacific Ocean was discovered by _____.

52. The Dutch surrendered New Amsterdam to the _____.

53. The French lost Canada to the _____.

54. John Cabot sailed to America under the flag of _____.

55. The chief settlement in South Carolina was _____.

56. The first Europeans in Florida were the _____.

57. The Phillipine Islands were discovered by _____.

58. The chief city of Pennsylvania was _____.

59. Middle age trade routes were broken up by the _____.

60. William Pitt was a statesman of _____.

61. The Albany Plan was proposed by _____.

62. The "Demarcation Line" was drawn by _____.

63. The Hudson River was discovered by _____.

64. The last Dutch governor of New Amsterdam was _____.

65. Bacon's rebellion was in the colony of _____.

DIRECTIONS: At the left are several words with numbers. At the right are phrases. Place in the parenthesis the number of the word on the left to which the phrase applies.

66. Atlantic Ocean	( )	Discovered Pacific Ocean
67. Virginia	( )	Sought seven cities of Cibola
68. Connecticut	( )	Proclaimed Mississippi
69. Pennsylvania	( )	First college in English colonies
70. The Carolinas	( )	Settled by Quakers
71. New York	( )	Battle ground at Quebec
72. Maryland	( )	Defeated leader at Duquesne
73. Columbus	( )	Early Massachusetts Governor
74. Amerigo Vespucci	( )	Conqueror of Peru
75. Mississippi River	( )	Discoverer of America
76. La Salle	( )	Early American Newspaper
77. Boston News Letter	( )	Sought the Fountain of Youth
78. Gen. Montcalm	( )	Religious group that settled in New England
79. Puritans	( )	"The Father of Waters"
80. Gen. Braddock	( )	Defeated leader at Quebec
81. Coronado	( )	After whom America was named
82. Harvard	( )	Helped found Maryland
83. Balboa	( )	Father of New France
84. Champlain	( )	The Old Dominion
85. Pazirrio	( )	The South Sea
86. Lord Baltimore	( )	The Fundamental Orders
87. John Winthrop	( )	The Toleration Act
88. Plains of Abraham	( )	The "Sea of Darkness"
89. Desota	( )	Mayflower Compact
90. General Wolfe	( )	The "Grand Model"
91. Pacific Ocean	( )	New Amsterdam
92. Plymouth	( )	Discoverer of Mississippi River
93. England	( )	English General

DIRECTIONS: If a statement is true underline TRUE; if false underline FALSE; if in doubt, omit the item. Do Not Guess.

94. Slavery existed in all of England's American Colonies. TRUE FALSE

95. Manufacturing made little progress in the English Colonies. TRUE FALSE

96. The "Writ of Assistance" forced citizens to assist officers to recover fugitives from justice. TRUE FALSE

97. Universal Manhood Sufferage was granted to all colonists. TRUE FALSE

98. The French depended upon fur trade for a livelihood. TRUE FALSE

99. The Church of England was the predominate church in the colonies. TRUE FALSE

100. Cortez conquered Mexico for Spain. TRUE FALSE

101. Balboa discovered the Mississippi River TRUE FALSE

102. Henry Hudson was a Dutchman sailing under the English Flag. TRUE FALSE

103. France controlled the St. Lawrence Valley in 1720. TRUE FALSE

104. The French settled North and Northwest of the English. TRUE FALSE

105. England was victor over the French in the struggle for N. A. TRUE FALSE

106. Washington took part in the war between France and England. TRUE FALSE

107. The Mississippi River empties into the Pacific Ocean. TRUE FALSE

108. Braddock was a French Officer. TRUE FALSE

109. Benjamin Franklin lived in Rhode Island. TRUE FALSE

110. Many Cavaliers lived in Virginia. TRUE FALSE

111. Pennsylvania was settled by the Catholics. TRUE FALSE

112. The St. Lawrence River empties into Lake Michigan. TRUE FALSE

113. John Smith helped to settle Maryland. TRUE FALSE

114. Magellan discovered the Pacific Ocean. TRUE FALSE

115. The first Puritan settlement was at Jamestown. TRUE FALSE

116. Drake commanded the first ship that sailed around the world. TRUE FALSE

117. On his first voyage, Columbus landed near what is now Boston. TRUE FALSE

118. The source of the Ohio River is in the Rocky Mountains. TRUE FALSE

119. La Salle explored the Pacific Coast of North America. TRUE FALSE

120. Virginia Dare was the wife of Captain John Smith. TRUE FALSE

121. Oglethorpe founded the colony of Mass. TRUE FALSE

122. The Puritans believed in religious freedom for all. TRUE FALSE

123. By Treaty of Paris, 1763, England gave up her claim to Canada. TRUE FALSE

124. Columbus sailed under the Flag of England. TRUE FALSE

125. Louisburg was later called Pittsburg. TRUE FALSE

126. Spain gave up her claim to N.A. in 1763. TRUE FALSE

127. The Connecticut Constitution was the first written constitution forming a government in America. TRUE FALSE

128. The Pilgrims came to America to seek adventure. TRUE FALSE

129. The Catholics settled in Vermont. TRUE FALSE

130. Leisler's Rebellion in the Colony of New York points out their dislike of Royal government. TRUE FALSE

131. John Winthrop doubted the advisability of exiling Roger Williams from Mass. Bay Colony. TRUE FALSE

132. Rice became the most important crop of Virginia. TRUE FALSE

133. La Salle planned to build a chain of forts along the most important rivers. TRUE FALSE

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