

SOME TESTS FOR CHECKING THE EFFICIENCY OF A
HIGH SCHOOL CURRICULUM.

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Some Tests for Checking the Efficiency of a High School Curriculum.

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For highest efficiency, modern business methods demand a strict accounting of raw and finished products, and since the field of education is being looked upon as a business enterprise, it has been suggested that an application of the commercial system be made to the mind.

Our educational system lacks those modern business methods which are so essential to efficiency-- the poorest system of accounting is utilized, scarcely any attention is made of raw material, overhead expense, waste, and finished product, and our entire system is nothing more than an antiquated and inefficient remnant of the past.

Considerable work has been done in a scientific way by Thorndike, Ayres, Simon, Rice, Cajori, Hall, and others. Considerable experimental work has likewise been done by various school men toward ascertaining certain definite educational values and their application to the school.

Thorndike and Ayres have each contributed instruments of scientific importance in the grading of handwriting. They have placed the grading of handwriting upon a scientific basis so that a grade of 80% in handwriting in Kansas means exactly the same as a grade of 80% in any other part of the world where this system is used. It is to be regretted that this system of either Ayres or Thorndike is not more generally known among grade teachers.

Binet and Simon have worked out a scheme for testing the general intelligence of children. At any certain age a pupil is supposed to have average intelligence for that age and by this test it is much easier to grade and classify pupils. A form of this test is used in the immigration office.

Curtis has developed a series of tests for the grading of pupils in arithmetic. This test classifies the pupil according to the grade in which he belongs. Norms, which represent the average ability of pupils of each grade, are taken and the pupil is placed in the grade which has a norm corresponding to the pupil's test record. These tests of Curtis not only serve as a method for classifying pupils but also serve as a check on the school system. The school which has pupils classified in the seventh grade and unable to do the test work for the fifth grade will check up results and try to standardize their work.

Florian Cajori+ has worked out a rather detailed method for measuring mathematical abilities, a scheme which is based upon mathematical theory.

All of these tests are beginnings of scientific grading and checking in our schools. None are without their faults but all are at least an attempt toward a scientific checking of our educational work. It is true that all children are not alike in their physical and mental make-up and that an error is introduced when we try to measure them with the same measuring stick, but an attempt at scientific measurement is far better than a guess or no measurement at all.

In several states of the Union plans for coordinating home and school influences are being carried out and the pupils are being given credit for their home work, which credit figures in their regular school grades. In the Galena high school this plan is being worked out to the entire satisfaction of all concerned. In New Orleans schemes are being carried out for the scientific study of "exceptional" pupils. In Chicago and Kansas City the eugenics movement is being considered, and the whole tendency seems to be toward the socializing of our secondary school system.

If we are to educate our boys and girls to the fullest extent we must modify our courses of study to fit the environment of these students. No hereditary course of study, consisting of Latin, algebra, and history, may any longer be loaded on to the pupils with the expectation that this in itself will bring results. Our system of state high school education is not for the purpose of making educational experts but for the purpose of training for better citizenship.

The home furnishes environment which counts for good or bad in the pupil's life, and if for bad the school and the church must make up this deficiency. In many of our American homes the child is given very little real encouragement and help in meeting the problems of life. Our pupils do not know how to sense the relative value of things, nor do they know how to find themselves in the great social, civic, and economic environment in which they are placed. Already some recognition is being given to this fact and a beginning is being made whereby those things which are most vital in life are being incorporated

in our high school curriculums. Innovations come slowly and with much opposition but the scientific and realistic management of the schools is sure to come out victor against the "fifteenth century" idea.

In order to rejuvenate our schools and to make them function in the community of which they are a part, it is necessary to make them genuine "culture centers". Thus will they more fully meet the issues which are insistentlly arising. We have been trying doggedly to teach the child those subjects which will most "discipline his" mind, regardless of any specific value they will have to him in after life. We of the teaching profession are too much afraid to teach the little incidental, but critically important things, in connection with the regular subject matter. The teacher is afraid to have the pupil's attention diverted in the least from the dry routine of the traditional subject matter. Professor Meriam+ takes this extreme view of the case, reverses our ordinary procedure, and makes the "real things of life" of major importance. The formal things he teaches as incidental. Professor Meriam says the real source of waste is the maladjustment between the content of the curriculum on the one hand and the needs of the pupils and the needs of the community on the other. It would be more in accordance with the economic and social ideas of our age if we should incorporate in our courses of study, possibly in an incidental way, those things which will go to make life more worth while- those things which lift us to the heavens and make us appreciate the beautiful and the sublime in life.

Since the child's progress in the school is, to a large extent

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due to the home influences and its environment, and since the home is not furnishing the intellectual stimulus, it behooves the school to make good the deficiency.

In order to find out how much general information and general culture the pupils of the Galena high school were getting from their courses of study or from their homes, or from both, I have devised as an experiment a general test, not to a very great extent based upon the regular subjects of the high school, but one which will show to what extent we are neglecting the cultural side of education. This plan of submitting a set of questions to the pupils is not a new one, but has been carried out in several schools of this country.

The plan outlined is not merely a system of tests for chronological age or educational age of pupils, not merely for individual ability of pupils-- but rather a test whereby we may check up the institution or at least the curriculum efficiency of any high school. Such a test is largely one of general information, memory, and coordination. In schools where the tests are made a regular part of the work pupils do much better than they otherwise do when the test is of unusual occurrence. The reason for this is that the pupils try to know those things which are expected of them. From my experiments I have found that when the pupil is expecting a general information test he does much better than when it comes entirely unannounced.

The following were the questions which were given in four different installments:--

History- What was the meaning of "54-40 or Fight"?

 Who said, " We have met the enemy and they are ours"?

Who was "Old Hickory"?

Who was the first president of the United States?

When did the United States acquire the territory of
which Kansas is a part?

From whom and when did we get Alaska?

What country was called the "Gift of the Nile"?

What name is intimately associated with the island of
St. Helena?

What event marks the beginning of Modern history?

What English general won the battle of Waterloo?

In what country was the battle of Waterloo fought?

When was the White House at Washington burned?

Where did Nebuchadnezzar build his hanging gardens?

Who was the greatest Greek orator?

Who was Herodotus?

Science and Discovery-

Who discovered the South Pole?

Is coal organic or inorganic?

What is the treatment for fainting?

Name a planet having rings and one having moons.

Explain the phases of the moon.

What causes the rainbow?

Who was Capt. Scott?

Give in order the colors of the rainbow.

Who invented the telephone?

Of what elements is water composed?

Who discovered radium?

How does baking powder make bread rise?

Bible-

Who said, "All men are liars"?

What man is said to have commanded the sun and moon
to stand still?

Who wrote the book of Romans?

Give a verse from the Sermon on the Mount.

In what city was Solomon's temple located?

Elementary Information-

For what is most of the lead from this district used?

How large an investment at 4% will produce a weekly
income of 50¢?

What is the normal temperature of the blood?

How many acres in a quarter section?

How many square miles in a township?

Distinguish between hydraulic and pneumatic.

How many inches in a meter?

From what is linen made?

Literature and Art-

Who wrote Silas Marner?

Name two prominent Kansas writers.

What famous painting was stolen from the Louvre?

Who wrote "Cricket on the Hearth"?

Who is Victor Hugo?

Who wrote "Ben Hur"?

Who is Maude Adams?

Who may be considered to be the greatest Russian novelist?

Who may be considered to be the greatest American novelist?

What American painter lost his life on the Titanic?

Who is Sir Joshua Reynolds?

Who wrote, "Crossing the Bar"?

Who may be considered to be the greatest English novelist?

Who is Chas. Dana Gibson?

Who wrote "Leather Stocking Tales"?

Who is Murillo?

Who wrote "Up from Slavery"?

Who is Wagner?

Identify by work or author:--

(a) "For of all sad words of tongue or pen,
The saddest are these: 'It might have been'".

(b) "A thousand, thousand slimy things
Lived on, and so did I".

Geography-

Where is the Golden Gate?

What two bodies of water are connected by the Suez canal?

Locate the Jordan river.

To what country does the Rock of Gibraltar belong?

Name two Balkan states.

Where is the Roosevelt dam?

What is the capital of India?

Where is the Victoria Falls?

Where is Juneau?

Where is the island of St. Helena?

Current Topics-

What is the cause of so much lawlessness in England at the present time?

Who is the present governor of Kansas?

What new idea is the governor of Kansas advocating that is causing national comment?

Who is the governor of New York?

What is the capital of Australia?

Who is the Chief Justice of the United States Supreme Court?

Who is the United States representative from this district?

How many amendments to the United States constitution?

Who is president of the senate?

Why did President Wilson call a special session of Congress?

Name some fact connected with each of the following:

Pujo; Poincare; Whitelaw Reid; J.P. Morgan; Col. Goethals;

David Starr Jordan.

What is the Webb law?

What ruler was assassinated in Europe recently?

Who is king of England at the present time?

Who is superintendent of public instruction of this state?

What is the second largest city of the world?

Who is ambassador to Great Britain?

Who is president of China?

To what country does Canada belong?

Who is chief of the United States Bureau of Chemistry?

How do members of the president's cabinet get their positions?

Who is Luther Burbank?

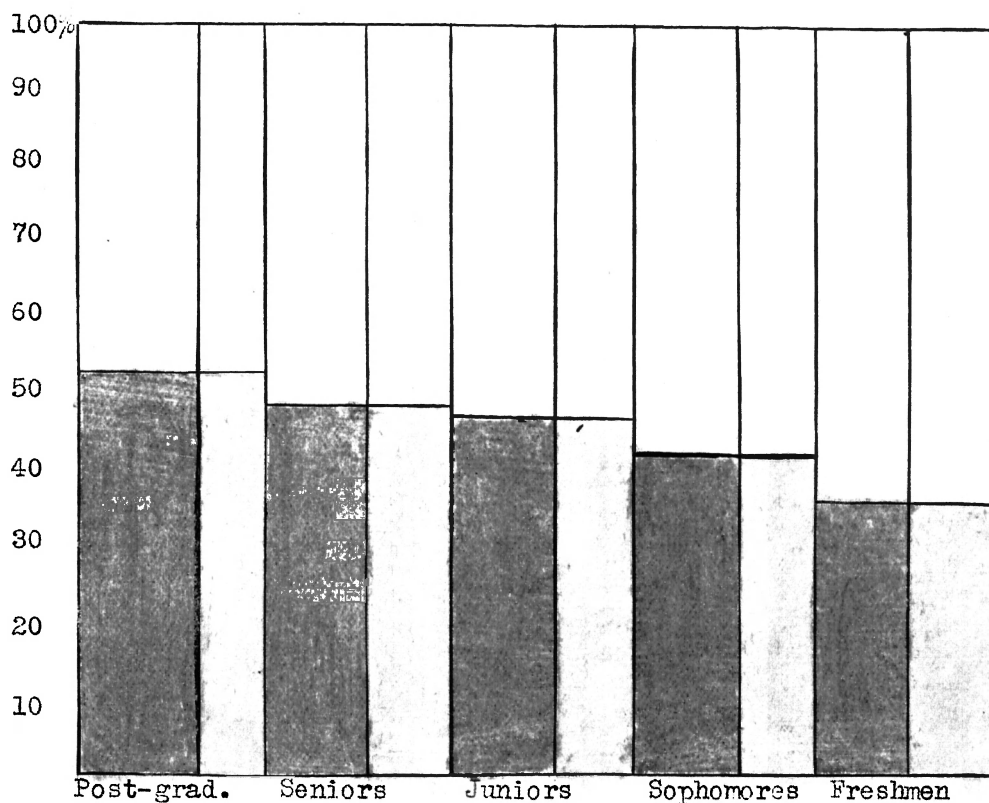
What exposition is to take place in California in 1915?

What position does William J. Bryan now hold?

Which has the greater population, United States or China?

In classifying the questions no sharp line could be drawn between some , as to whether they should be placed in one group or the other. In making out the questions I have made no attempt to ask any question which I knew the pupil had studied or even one which had been emphasized in the school work. The results which have been tabulated below have also been plotted in order to bring out more clearly any characteristics shown by the experiment.

In figure 1, I have attempted to show the relative ranking of the various classes of the high school in regard to the quantity of general information which each has. The relative widths of the graphs show the relative ranking of the boys and girls in each class. In each case the average amount of general information of the boys is greater than that of the girls. This seems to be in agreement with the experiment of Principal Yarnall+ of the German-town high school. One reason for this may be that the girls spend more time on their school work and pay less attention to the newspapers and magazines. It seems to be a fact that the best students are likely to be most deficient in general informational knowledge. One other thing which I think deserves

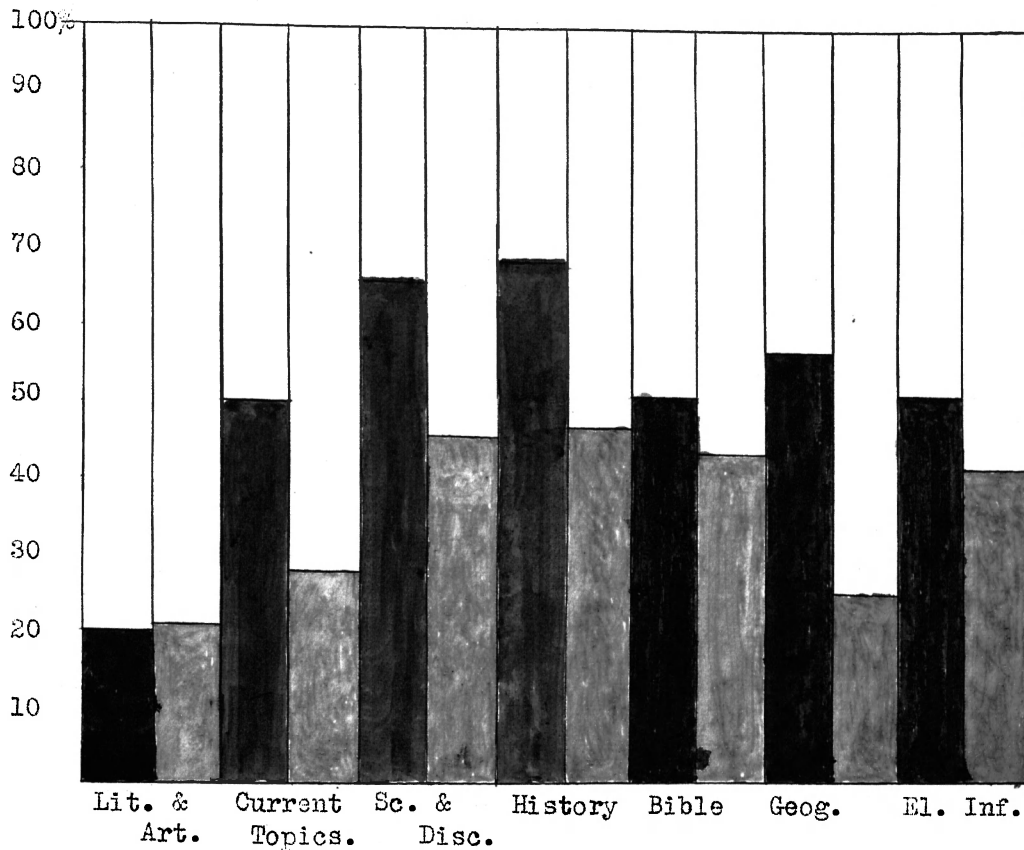


Boys	Girls
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Fig. 1. This graph represents the relative standing of the different classes of the high school, and at the same time shows the relative ranking of the boys and girls in these classes.

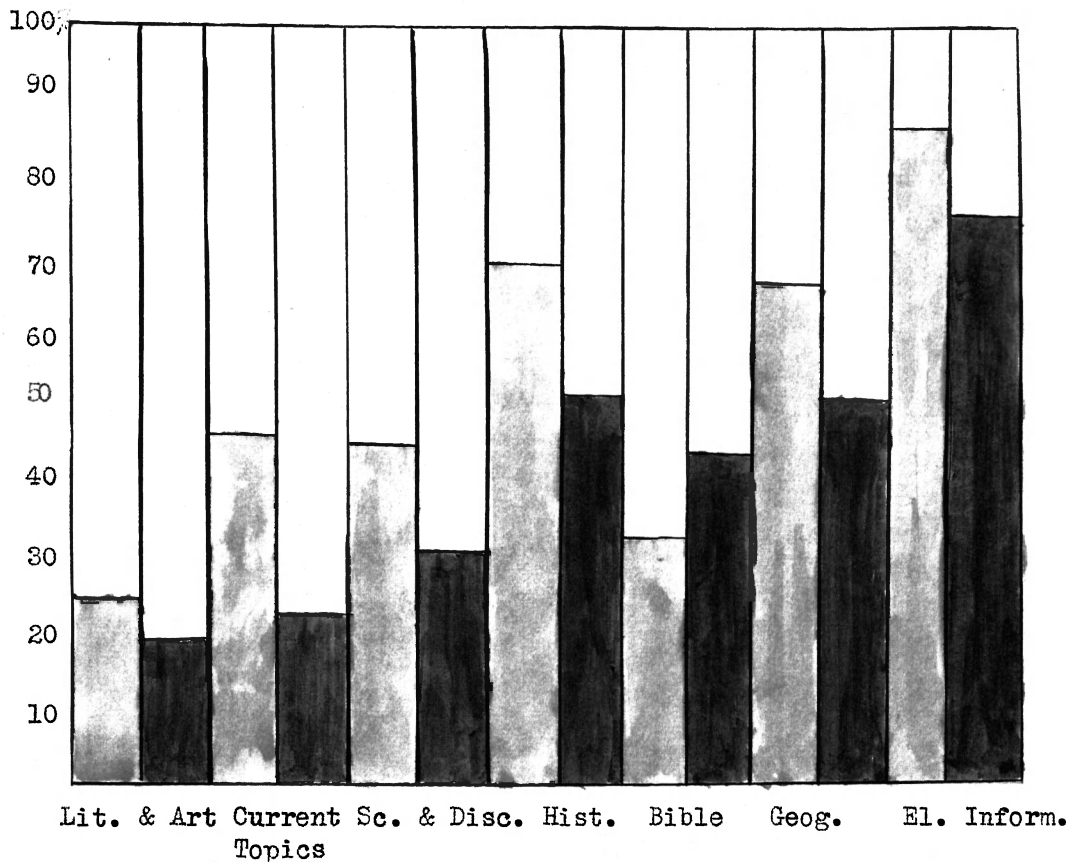
	boys	girls	average
Post-graduates	65%	35%	52.4%
Seniors	54%	46%	49%
Juniors	56%	44%	48%+
Sophomores	56%	44%	43.9%
+ Freshmen	41.2%	34.5%	37.2%



+ These percents do not represent the absolute percents of the boys and girls but the percentage of the whole.



[] Girls
 Fig. 2. This graph shows the relative standing of the boys and girls in the freshman class with reference to the different classes of information.

	boys	girls
Literature & Art	20%	20%
Current Topics	50.1%	27%
Science & Disc.	60.6%	45%
History	68.6%	45%
Bible	50%	42%
Geography	56%	24%
El. Information	50%	40%



Boys   Fig. 3. This graph shows the relative standing of the boys and girls in the sophomore class in regard to the different classes of information.

	boys	girls
Literature and Art	26%	20.5%
Current Topics	46.6%	24%
Science and Discovery	45%	31%
History	70%	52%
Bible	32%	44%
Geography	68%	50%
El. Information	85%	77%

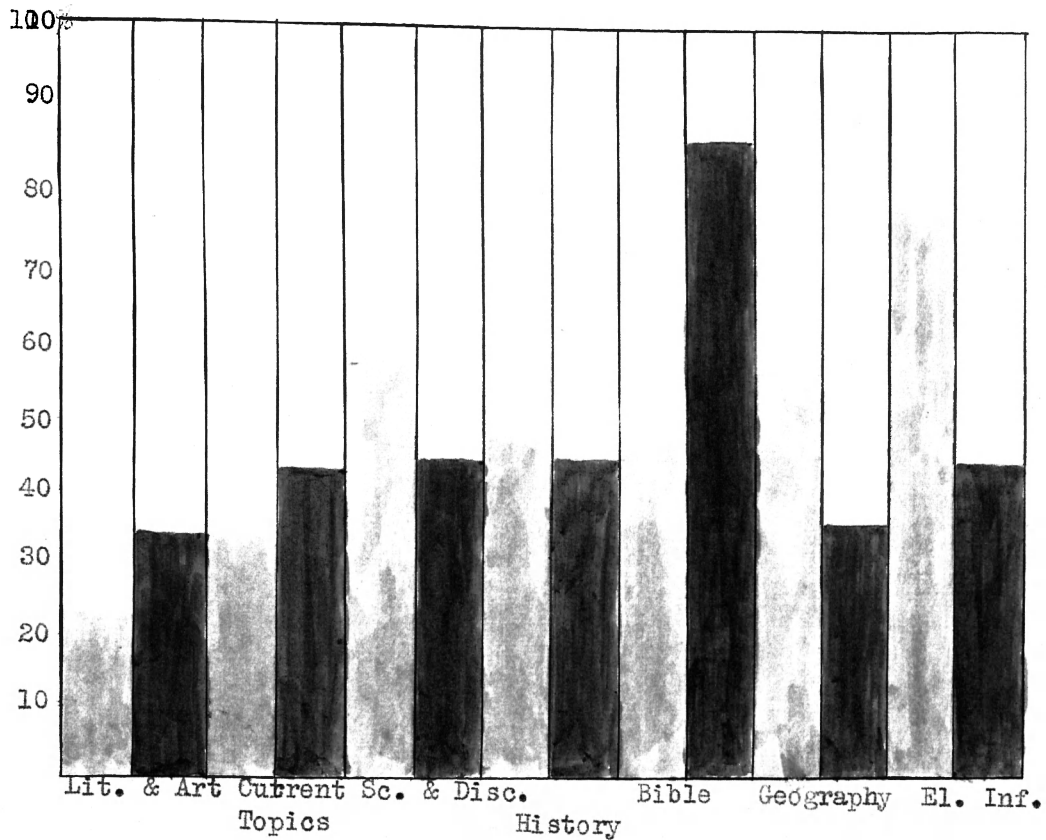


Fig. 4. This graph shows the relative

standing of the boys and girls in the junior class with reference to the different classes of information.

	boys	Girls
Literature and Art	23%	32%
Current Topics	32%	42%
Science and Discovery	60.3%	44%
History	50%	44%
Bible	50%+	86%
Geography	58%	36%
El. Information	80%	45%

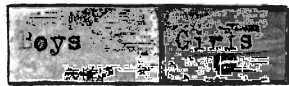
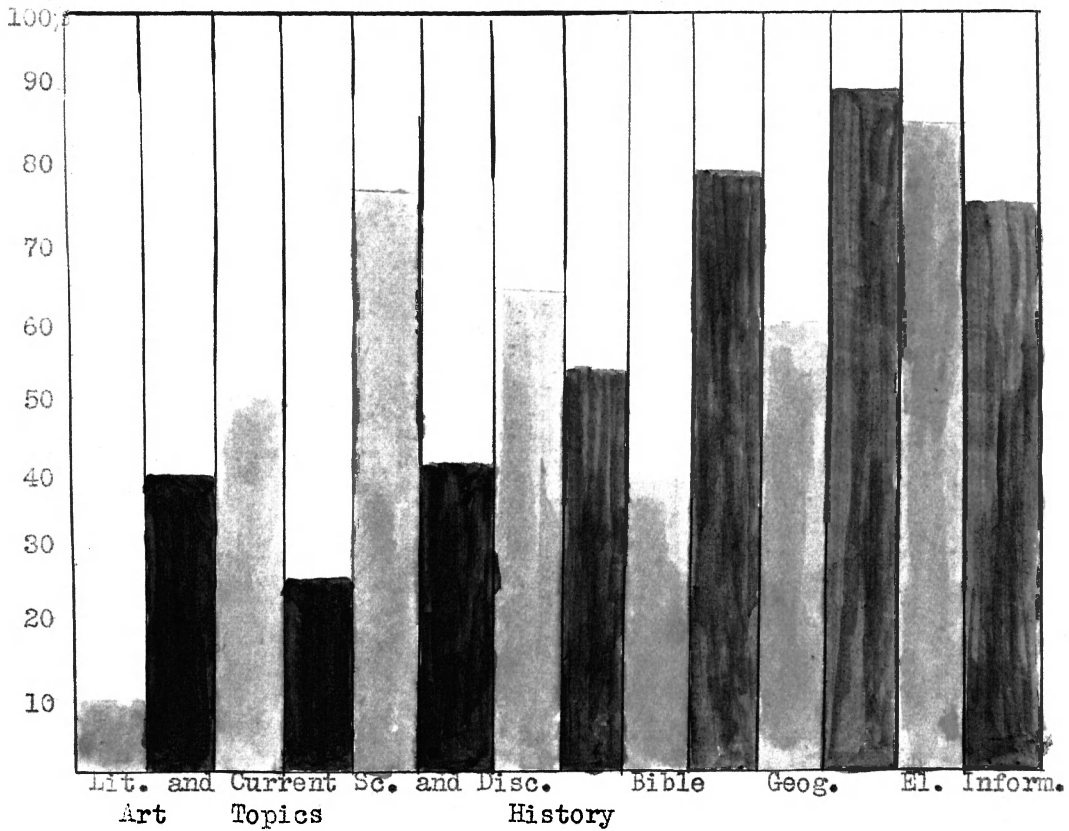
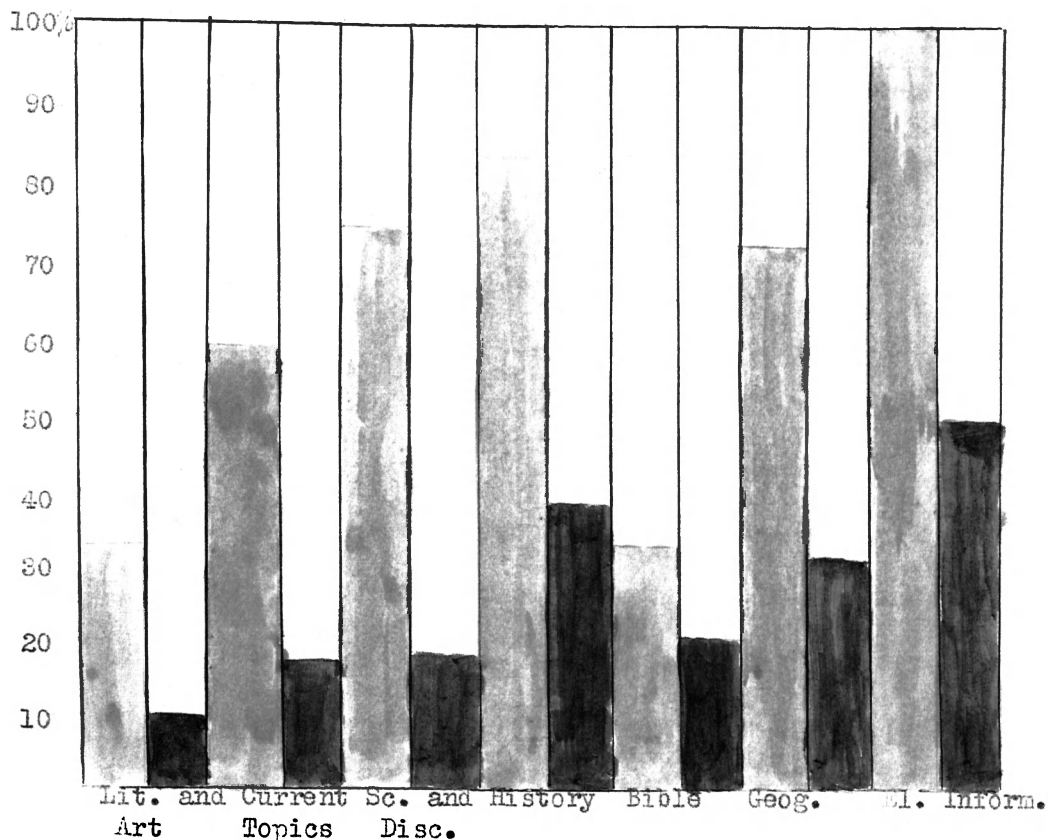
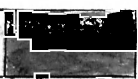


Fig. 5. This graph shows the relative

standing of the boys and girls in the senior class with respect to the different classes of information.

	boys	girls
Literature and Art	10%	40%
Current Topics	50%	26%+
Science and Discovery	77%+	41%+
History	64%	53%
Bible	40%	80%
Geography	60%	90%
El. Information	87%+	75%



Boys  Fig. 6. This graph is a representation of the post-graduate class, showing the relative standing of the boys and girls with respect to the different classes of information.

	boys	girls
Literature and Art	33%	10%
Current Topics	60%	16.6%
Science and Discovery	75%	16.6%
History	84%	40%
Bible	32%	20%
Geography	73%	30%
El. Information	100%	50%

some consideration is the relative small amount of general information for the whole school. This seems to indicate that too little emphasis is being placed upon that phase of school work. This seems to be a general condition which exists in all of our colleges and secondary schools- the amount of general information of the senior is little, if any, above that of the freshman. It will be noted from the data given that the average ranking for the post-graduates is 52.4% while the average ranking for the freshman class is 37.2%, a difference of only 15.2%. The fact that the average ranking of the girls of the post-graduates is only 35% while the average percent of the girls of the freshman class is 46%, may be explained from the small number of girls of the post-graduates. Since there were only a few girls in the post-graduate class, the data given does not show very much. Of course some of this difference can be attributed to the difference in age and experiences of the pupils. Possibly too much attention is being given to those formal studies and too little attention to those things which go to make a complete education.

Figures 2, 3, 4, 5, & 6, show the relative standing of the classes with respect to the different classifications. The boys seem to excell in history, current topics, and elementary information, while the girls are better in literature and art and bible information. In figure 6, the boys excel the girls in every department. The reason for this is , as explained previously, that the class was made up of boys who were preparing themselves for the University while the girls were preparing themselves for a business career. Possibly the reason for the boys Excelling in history, current topics, and elementary

information is that they read more and consequently coordinate better. History and current topics are quite closely associated and may be remembered by this association. The fact that the girls were better in literature and art and the bible may mean that they have studied those subjects more than the boys, although neither show any surplus knowledge along this line.

It is interesting to note that with every class above the freshman the graph for elementary information is relatively high, this possibly shows the kind of information which the pupil is receiving in our secondary schools.

In figure 7, I have tried to represent the relative standing of fifteen pupils, picked promiscuously from the pupils of both good and bad home surroundings, some good students and some poor ones. The upper curve represents the pupil's average school grade for the year in all his school subjects and the curve immediately below this one represents his average in the general informational quizzes. The experiment does not show to me that the pupils of the good homes have better grades and a larger store of general informational knowledge, nor does it show that the pupil who gets the high grades in his school work has any amount of general information. My experiment dealt with entirely too few pupils to allow me to conclude that this statement is true. I yet believe that home environment counts for more in getting general information than any amount of ordinary school training. Possibly we should pay more attention to this fact- that the high grade pupils are not the best informed- when we issue scholarships and graduating honors. In most cases the pupils who made the best quiz grades were only the ordinary student of the high school. Possibly we are "rushing" our

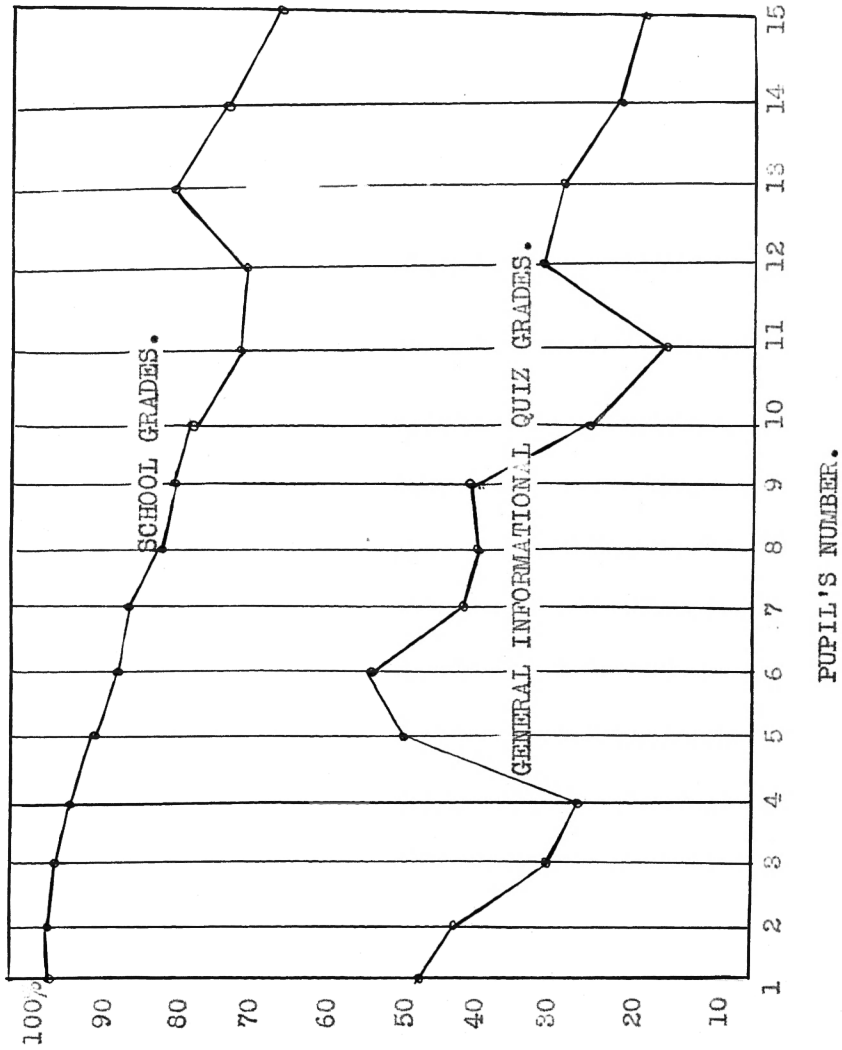


Fig. 7.

pupils to such an extent that they do not have time to devote to those outside interests, the magazine and newspaper. At any rate this point will bear further investigation.

The following data represents the general informational quiz grades and the average yearly class grades of fifteen pupils which were picked promiscuously from the whole school. The following data has been plotted on the previous page.

pupil's number	average class grade	quiz grade
1	96	48.5
2	96	42
3	95	30
4	93	25
5	90	50
6	87	54
7	86	39.7
8	84	38.7
9	83	40
10	80	25
11	72	16
12	72	31
13	82	28
14	74	23
15	70	17

The experiment is very crude and inconclusive but serves to open up a field in which there should be more refined experimental

investigation. The one thing which seems to be quite evident is that we are neglecting certain vital elements of education. We should put more emphasis upon the "real things of life rather than the formalities of life".

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Bibliography.

College Freshmen and Four General Intelligence Tests.....

Margaret Calfee----- Journal Ed. Psychology, Apr., '13.

Standards and Tests for Measuring the Efficiency of Schools or Systems
of Schools.....Geo. Strayer, Bulletin U.S. Bureau Ed. No. 521.

Standard Tests in Arithmetic....S.A. Curtiss, Journal Ed. Psy., May '11.

Incidental Instruction.... J. L. Meriam, School Review, Monograph No. 3.

The Readjustment of a Rural High School to the Needs of the Community.

H. A. Brown, Bulletin U. S. Bureau Ed., No. 492.

Some Measurements of Mental Fatigue in Adolescent Pupils in Evening Schools

W. H. Winch, Journal Ed. Psy., Jan. '10.

Graded Mental Tests...Carrie R. Squire, Journal Ed. Psy., Nov. '12.

Reliability of Grading Work in English and Mathematics.....

Dan'l Starch and Edw. C. Elliott, School Review, Vol. 20, No. 7

" " Vol. 21, No. 4.

Scale for Measuring the Merit of English Writing.....

E. L. Thorndike, Science, n.s. Vol. 33.

Research within the Fields of Education, Its Organization and Encouragement.

School Review, Monograph, No. 1.

Adolescence.....G. Stanley Hall Appleton & Co.

Binet-Simon Measuring Scale for Intelligence.... Separates.

Mental and Social Measurements.. .. E. L. Thorndike, Teacher's College.

Investigation in Handwriting.... E. L. Thorndike Separates.

Investigation in Handwriting Leonard P. Ayres Separates.

Measuring Mathematical Abilities, Florian Cajori, School Sc. & Math., Apr.'14.