

THE DOCTRINE OF FORMAL DISCIPLINE IN THE LIGHT OF EXPERIMENTAL INVESTIGATION.

(*Author's abstract*)¹

The first 60 pages of this thesis, of which no abstract is here attempted, deal with the historical development of the doctrine of formal discipline. It is pointed out that in practice formal discipline is not an issue in determining the curriculum and methods of the elementary, but rather of the secondary school, and that the experimental investigation of the problem has heretofore been for the most part limited to studies with college and university students or instructors: only recently have experiments been conducted with school children.

The present investigation deals with a single topic, that of the effect of 'training the observation,' to use the language of everyday life.

Subjects.

The subjects were all pupils in the first term of a New York City high school, and they were distributed into three classes.

Class 1 had 12 boys—20 girls.

Class 2 had 10 boys—18 girls.

Class 3 had 12 boys—14 girls.

The ages of the pupils varied from 12-17.

Class 1, average age, boys 13.7—girls 14 years.

Class 2, average age, boys 14.1—girls 13.8 years.

Class 3, average age, boys 13.8—girls 14.1 years.

The tests were given in the afternoon.

Preliminary, April 22-30, 1912.

Practice, May 15-28.

Final, June 3-11.

Practice Series.

From averages obtained from the tests of the first series, each class was divided as nearly equally as possible. In each class, as far as possible, the endeavor was made to place the pupil receiving the highest average on the side which was to receive no practice,

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while the next highest was placed in the division to be practiced. Thus among successive pairs usually there was a slight advantage on the non-practiced side, and the totals showed the non-practiced side to have the advantage at the start.

On May 15, the practice series was begun and continued for ten minutes daily until the expiration of two weeks. While half of the class were observing and describing biological material the non-practiced half were writing answers to questions on topics previously assigned for home-study from the text-book. The text-book work was assigned to all for outside work but only the non-practiced half wrote answers to questions.

The tests of the two series consisted of biological and non-biological material. The former comprised stems, flowers, leaves, seedlings: the latter, pictures, nonsense syllables of 2 letters, nonsense and geometrical figures, and two-place numbers. The biological material was observed for a certain length of time and then written descriptions were made. The non-biological material was exposed for a stated amount of time and then reproduced on paper. Ten-minute descriptions of leaves and flowers were written on ten successive school days. The biological tests were rated by allotting one credit for every descriptive noun, adjective, verb, or adverb.

The non-biological tests were rated by allowing 10 credits for every correctly placed syllable, number, figure, etc., 9 credits if misplaced one to right, left, above, or below, 8 credits if 2 to the right, left, above or below, etc. The averages of the results of each pupil's work in the eleven tests were made the basis of the division of the classes for the practice series. The tests of the practice series were rated in the same manner as the biological tests.

Computation of Results.

Averages were made for each pupil in each series from the rating given to each test as described above. Ratings were reduced to the percentage basis.

Using the data acquired by both methods, tables were made comparing the practiced and unpracticed pupils of each class in two respects—1, in regard to their ability in biological tests; 2, ability in non-biological tests.

Only the summaries of the tables are submitted.

TABLE 1.—*Total of Percentage Ratings.*

Class	Boys.	—Practiced.—		—Unpracticed.—	
		Prel.	Final.	Prel.	Final.
1	12	3143.04	3963.28	3344.63	3627.60
2	10	3121.47	3538.55	3300.55	3534.46
3	12	2879.82	*3985.30	4048.53	*3931.53
Total	34	10144.33	11487.13	10693.71	11093.59
			10144.33		10693.71
		increase	1342.80	increase	399.88
Class.	Girls.				
1	20	6249.87	6630.22	6429.35	5941.74
2	18	5683.01	6651.89	5848.47	6200.93
3	14	4119.51	*4207.26	4228.09	*4449.69
Total	52	16052.39	17489.37	16505.91	16592.36
			16052.39		16505.91
		increase	1436.98	increase	86.45

*Test 1 omitted.

Table 1 shows that in the eleven final tests, the 17 practiced boys increased 1342.8 an increase of 7.18 for each individual test, while the unpracticed boys increased only 2.13 per test. The 25 girls of the practiced half in the final test show an increase over the 26 girls of the preliminary tests of 1436.98, an increase of 5.22 per test whereas the unpracticed made an increase of only .31 per test.

TABLE 2.—*Comparison of Percentage Ratings in the Biological and Non-Biological Tests Before and After Practice.*

Class.	Boys.	—Practiced.—				—Unpracticed.—			
		Biol. Prel.	Non-Biol. Final.	Prel.	Final.	Biol. Prel.	Non-Biol. Final.	Prel.	Final.
1	6	1345.24	1614.64	1797.80	2268.64	1193.43	1064.62	2155.20	2439.24
2	5	1586.83	1555.62	1534.64	1932.93	1474.27	1697.33	1725.32	1771.13
3	6	1355.96	1803.54	2135.24	2181.76	1333.33	1496.78	2216.20	2434.75
Total	17	4288.03	4973.80	5467.68	6383.33	4001.03	4258.73	6096.72	6645.12
			4288.03		5467.68		4001.03		6096.72
			685.77		915.65		257.70		548.40
Class.	Girls.								
1	9	2555.00	2979.25	3150.12	3329.20	2641.27	2523.00	2964.28	3245.75
2	9	2560.21	2772.88	3122.80	3575.01	2429.39	2410.76	3269.68	3579.16
3	7	1434.81	1600.23	2147.64	2447.03	1542.05	1523.14	2291.28	2541.05
Total	25	6550.02	7352.36	8420.56	9351.24	6612.71	6457.50	8525.24	9365.96
			6550.02		8420.56		6459.50		8525.24
			802.34		930.68	—153.21			840.72

Table 2 shows that the 17 boys on the practiced side in the Non-Biological tests made an increase in the final series of 915.65, an average increase of 8.97 per test for each of the 6 tests, while the corresponding unpracticed half made an average increase of only 5.37 per test. The 25 girls of the practiced half in the Non-Biological tests made an increase in the final series of 930.68, an average increase of 6.2 per test for each of the 6 tests, whereas the unpracticed half made an average increase of only 5.6 per test. In the Biological tests the 17 boys made an improvement in the final series of 685.77, an increase of 8.06 per test for each of the 5 tests, whereas the unpracticed boys increased only 3.03 per test. The 25 girls of the practiced side increased in the final series to the amount of 802.34 over the preliminary, an average increase of 6.41 per test for each of the 5 tests, while the unpracticed side made an average decrease of 1.24 per test.

TABLE 3.—*Comparison of Original Ratings of Preliminary and Final Series*

Class.	Boys.	—Practiced—		—Unpracticed—	
		Increase.	Decrease.	Increase	Decrease.
1.....	12	372	.	151	.
2....	10	171	.	156	.
3....	12	201	.	219	.
	—	—		—	
Total.	34	744		526	
Class.	Girls.				
		Increase.	Decrease.	Increase	Decrease.
1.....	18	387	.	56	.
2....	18	350	.	212	.
3.....	14	160	.	28	.
	—	—		—	
Total	50	897		296	

This table was compiled by comparing partners in the preliminary and final series in exactly the same tests. For example, if a pupil was absent from a test of the preliminary or the final series that test is omitted from his other series and also from both of his partner's. Thus in 173 tests, the 17 practiced boys made an average increase of 4.3 per test, while the corresponding unpracticed boys increased 3.04. In 241 tests, the 25 practiced girls made an average increase of 3.72 per test while the unpracticed girls made an average increase of 1.22 per test.

TABLE 4—*Comparison of the Percentage Ratings of Practiced and Unpracticed Compiled in a Similar Manner to Table 3.*

Class.	Boys	Practiced		Unpracticed.	
		Increase.	Decrease.	Increase.	Decrease.
1.....	12	771.46	....	139.23	....
2.....	10	386.08	....	266.91	....
3.....	12	489.38	....	352.00	....
Total.....	34	1646.92		758.14	
Class.	Girls.				
1.....	18	608.61	...	60.83	....
2.....	18	615.84	....	270.55	....
3.....	14	411.81	...	186.66	....
Total.....	50	1636.26		518.04	

Table 4 differs from Table 1 in that in the latter occasional absences were disregarded. The 17 practiced boys in each of the 173 tests made an average increase of 9.51, while the unpracticed made an average increase of 4.38. The 25 practiced girls in each of the 241 tests made an average increase of 6.78, while the unpracticed girls made an average increase of 2.14 per test.

TABLE 5—*Total Averages of the Practiced and Unpracticed in the Preliminary Series.*

Class.	Boys.	Practiced.	Unpracticed.
		Total Average.	Total Average.
1.....	12	148.35	157.07
2.....	10	146.15	149.51
3.....	12	178.06	189.15
Total.....	34	472.56	495.73
			472.56
			23.17
Class.	Girls.		
1.....	20	298.97	311.81
2.....	18	276.90	289.48
3.....	14	210.26	224.93
Total.....	52	786.13	826.22
			786.13
			40.09

The choice of the pupils for practice was based on their averages obtained in the 11 tests of the preliminary series. Table 5 shows that the unpracticed boys were superior to the practiced by a difference in the total averages of 23.17, while the unpracticed girls were superior by 40.09 to those on the practiced side.

TABLE 6.—*Summary of Term's Ratings.*

Class.	Boys.	Practiced.	Unpracticed.
1.....	12	1537	1435
2.....	10	1354	1404
3.....	12	1675	1731
Total.....	34	4566	4570

Class.	Girls.		
1.....	20	2813	2747
2.....	18	2841	2477
3.....	14	1961	2130
Total..	52	7615	7354

This table shows the unpracticed boys to be superior by 4 credits while the practiced girls are superior by 261 credits. With 17 boys, the advantage on the unpracticed side is only .23 per pupil while the 26 practiced girls are superior over the unpracticed to the extent of 10.03 per pupil.

TABLE 7.—*Summary of All the Tables.*

Table.	Boys.						Girls.					
	Practiced			Unpracticed			Practiced			Unpracticed		
	Final.	Av.	Biol.	Av.	Non-B.	Av.	Final.	Av.	Biol.	Av.	Non-B.	Av.
I..	1342.80	7.18					399.88	2.13				
II..			685.77	8.06	915.65	8.97			257.70	3.03	648.40	5.37
III..	744.	4.3					526	3.04				
IV..	1646.92	9.51					758.14	4.38				
V..							23.17					
VI..							4.	.23				

Girls.												
I..	1436.98	5.22					86.45	.31				
II..			802.34	6.41	930.68	6.2			-155.21	-1.24	849.72	5.6
III..	897	3.72					296	1.22				
IV..	1636.26	6.78					518.04	2.14				
V..							40.09					
VI..	261.	10.03										

CONCLUSIONS.

It is evident from these general summaries and comparisons that the practiced pupils have excelled the unpracticed pupils. The question difficult to solve is "what is the cause?" No doubt growth, familiarity with procedure, benefits of class-work and study, and desire to excel have all contributed their share toward the increase, but these factors may have aided both sides equally. We have no means of telling. Then why the difference?

Judging from the division of the practiced groups, the better pupils were on the unpracticed side. While the class term ratings showed the better boys to be on the unpracticed side, the contrary

was true with the girls. The March rating, given before the preliminary tests began, showed the reversed condition. Very little significance can be attached to class marks as denoting general intelligence or superiority because so many extraneous factors enter in.

Considering table 2, we would naturally expect both practiced boys and girls to earn in the final series a bigger increase than their opponents in the biological tests: but how shall we explain their greater efficiency in the non-biological tests other than to ascribe it to the effects of the practice series?

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