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The Evolution of Linear Drawing as a Subject of Study: A Critical Study of the Cumulative Philosophies Affecting the Teaching of Drawing With Special Reference to Education in the United States.

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THE EVOLUTION OF LINEAR DRAWING AS A SUBJECT OF STUDY

A Critical Study of the Cumulative Philosophies
Affecting the Teaching of Drawing with
Special Reference to Education
in the United States

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ABSTRACT

The art of linear drawing reaches back as far as the archaeologist has been able to extend his study. The student of antiquity through a process of logic has concluded that the art of linear drawing extends back over a period longer than 25,000 years. Linear drawing has been under discussion for more than 2,000 years as an important factor in formal education. In the life of the race it has been of more than ordinary significance. Yet as far as can be ascertained, no one has gathered together the trends of thought offered from time to time in support of the teaching of drawing in formal education.

It is proposed in this study to reveal the evolution of linear drawing as a subject of study, stressing analysis of philosophical thought when and where such thought is discernible. This should result in a body of information not before assembled. It should serve as a basis for further study with a view to solving educational problems related to the teaching of drawing.

Every great period of time has made its contribution to the evolution of drawing. Even primitive man, with his crude tools and lack of paper, found a way to develop his draughtsmanship. The Egyptians became highly adept

in profile draughtsmanship, but they did not use perspective. The Greeks, like the Egyptians, confined themselves to profiles, but the Romans left evidence of a mastery of perspective. It remained, however, for the Italians of the Renaissance to perfect a mastery of perspective.

In regard to measured drawings, or engineering drawing, there is known to exist only indirect evidence that the Egyptians and the Greeks executed them. The Romans, however, left some documentary evidence that they possessed trained draughtsmen in the field of engineering.

It was Leonardo da Vinci who enlarged greatly upon the use of linear drawing. Leonardo used it in the field of engineering, in the field of invention, in the anatomical laboratory, and as a tool of thought. A little later Albrecht Dürer multiplied the use of drawing further. Dürer integrated it with mathematics and added it to the art of engraving. It was, however, Gaspard Monge, a Frenchman of the eighteenth century, who organized the branch of mathematics known as descriptive geometry, which is the scientific basis for engineering drawing.

Drawing as a subject of study in formal education, has engaged the attention of outstanding thinkers across the centuries from Aristotle to the present time. Even during our frontier, colonial period, such men as Budd, Hoar, Washington, Franklin, Rush, and Jefferson, advocated the teaching of the fine and industrial arts. Drawing, very probably, was first taught with formality in the United States in an effort to introduce the principles of Pestalozzi. This was in a private school in Philadelphia in 1809. Drawing was taught with formality in the public schools of the United States in 1821 in Boston by William Bentley Fowle. Fowle used drawing as a content study and also as a pedagogic aid in teaching other studies. Drawing was taught in the United States as a vocational study in the great experiment at New Harmony, Indiana, in 1825. The first public school textbook on drawing published in the United States, was a translation of a text used in the schools of France. It was translated by Fowle in 1827. The early textbooks on drawing were greatly influenced by the work of Monge. Drawing in textbook form has developed in close relationship to mathematics.

The early attempts to introduce drawing into the public schools were isolated and were made by individuals or small groups of individuals, who no doubt had come in contact with the writings of the great educators of the past. The vocational idea, the idea of appreciation, the industrial factor, the factor of general education, and the factor of science, even in the early day, were sufficiently present to make themselves discernible.

The cause of linear drawing as a factor in formal education persisted. But it did not advance in a vacuum; it did not advance by itself in isolated form. It advanced as a part of each of several movements. It was a part of a movement for progressive work-a-day education. It was a part of a movement for aesthetic education. It was a part of a movement for industrial education. It was a part of a movement that had for its object the relating functionally of industry and education. It was a part of a movement for visual education. It was a part of a movement for a more effective method in pedagogy. It was a part of a movement for a more effective expression of thought. It was a part of a movement to enhance closer observation. It was a part of a movement that had for its object the injection of the art element into the manufactured product thus enhancing the economic value of the manufactured product. It was a part of a movement to provide for the concept of individual differences. It was a part of a movement to provide for vocational guidance.

These movements received stimuli from different sources. Word from European countries relating industry and education, was a tremendous stimulus. The influence of Barnard and Mann was noteworthy. The Oswego Movement carried the cause of drawing forward. The Great Expositions of 1851, 1867, 1876, and 1893, were strong stimuli to the cause of all the practical and fine arts. Perhaps the strongest stimulus came from the suggestion that drawing, if taught in the public schools, would result finally in economic gains.

Public pressure in Massachusetts was great enough concerning the teaching of drawing in 1860 to cause the state legislature to legalize its teaching. Public sentiment increased. Discussion brought out pointed questions. The theory that there is a significant relationship between drawing and industry continued to take hold of the public mind. The law of 1860 only legalized the teaching of drawing in Massachusetts. Many citizens were demanding that the state legislature pass a stronger measure. As a result of this demand the State Legislature of Massachusetts enacted the law of 1870, making it mandatory that communities of ten thousand people or more provide for instruction in industrial drawing for children fifteen years of age and above. Three years later the state legislature appropriated $7500.00, which sum was expended in the initial movement which resulted finally in the establishment of a Normal Art School.

The legislative action in Massachusetts bearing on drawing as a subject of study in the public schools initiated legislative action in other states. The states of California, New York, North Carolina, Virginia, South Dakota, and Indiana, as well as the territory of Arizona, made the teaching of industrial drawing compulsory. The subject of drawing was widely discussed. There were several educational philosophies of drawing discussed, but the dominant one was that related to industry.

There was existent a strong feeling that drawing as a subject of study in the public schools was the functioning link between education and industry. The people were wanting a concrete economic gain to result from education. Vivid stories were coming from abroad, picturing the close relationship between education and industry in Europe. It was generally known that America was inferior industrially to leading European countries. Consequently, the legislation in the several states aimed at the equalization of this industrial inequality. Many people, however, were too hopeful of impossible results. The teaching of simple drawing to school children did not revolutionize industry.

Interest in linear drawing, however, continued to manifest itself with changing reasons and theories supporting its teaching in formal education. The Centennial Exposition of 1876 was responsible for initiating a nation-wide discussion of practical education. Manual training came to the schools of the United States through the influence of the Centennial Exposition of 1876. With manual training come the teaching of technical drawing.

The Kitchengarten Movement resulted in the formation of the Industrial Education Association of New York City in 1884. This latter organization instituted the New York College for the Training of Teachers, which later became the Teachers College of Columbia University. Within the Teachers College of Columbia University the Russell-Bonser Movement originated. Russell and Bonser gave drawing a definite place in elementary education, but they placed less stress on manipulative drawing and more stress on meanings and appreciation.

Paralleling the Russell-Bonser Movement was the Junior High School Movement. Drawing occupied a place in the junior high school curriculum from the advent of that institution in 1909. The philosophy underlying the junior high school demands opportunity for the adolescent youth to sample many worth-while life activities. This philosophy also demands provision for individual differences. Drawing plays its part in the curriculum of the junior high school in satisfying in part each of these two demands.

About the time of the World's Exposition, held at Chicago in 1893, there was manifest a trend of thought toward the fine arts. Industry was beginning to supply art materials to school children at a price that they could afford to pay. Inasmuch as linear drawing is a basic art, it played a part in this trend. A little later both the teaching of industrial arts and the teaching of fine arts met with sharp criticism. As a result of this, there was an effort made by leaders representing each field to integrate the fine arts with practical arts. As linear drawing is basic to both fields, it was an important factor in the proposed procedure.

During the last quarter of the nineteenth century a movement was begun that tended to place the teaching of linear drawing on a scientific basis. It consisted of a considerable number of research studies made by prominent students of education on the psychology of children's drawings. These studies revealed significant facts, chief among which was that young children experience a genetic period of drawing, which period is divided into definite stages. Modification of the educational philosophy of the teaching of drawing followed.

It became obvious that there was much to be learned about the drawing behavior of children, and that studies in individual psychology and in social psychology should be made to contribute further.

CHAPTER I

THE PROBLEM

FOREWORD.

The origin of the art of linear drawing antedated the origin of writing. Indeed, symbolic writing is the product of pictograph writing, and pictograph writing is the product of linear drawing. Students of antiquity have traced the art of drawing back over a period longer than 25,000 years. Linear drawing has been under discussion for more than 2,000 years as an important factor in formal education. Many of our outstanding thinkers have given it serious consideration. Most of the great educators of the past have given it a significant place in formal education. It has been a topic of heated educational controversy. Legislatures at different times have made its teaching mandatory.

The foregoing would indicate many centuries of thought concerning drawing as a subject of study. The foregoing would also indicate that drawing in the life of the race has been of more than ordinary significance. Yet as far as can be ascertained, no one has gathered together the trends of thought offered from time to time in support of the teaching of drawing in formal education. No one has made a study in which are cited for comparison the separate philosophies underlying the teaching of drawing.

Further, drawing as a subject of study does not rest on a firm rational philosophy which is generally accepted, as do such subjects as writing, reading, and arithmetic. Drawing as a subject taught in the public schools has not always received strong public sanction. Educational administrators have not been sufficiently sure of themselves concerning the place of drawing in the curriculum. There has been no generally understood and generally accepted educational philosophy on which the advocates of the teaching of drawing could base their contention, despite the fact that speculative philosophies had been propounded from time to time, and despite the fact that determined efforts had been made to introduce it successfully as a subject of study into the schools from time to time.

THE PROBLEM STATED.

The problem is to reveal the evolution of the thought behind the teaching of linear drawing as a subject of study. The chief objective sought, therefore, is an understanding of the thinking, of the reasoning, of the motive, of the reflection, in short, of the philosophy in the minds of the leaders who formulated movements and who conducted experiments. An adequate understanding of each philosophy revealed will necessitate a knowledge of its social and economic background. Accounts of personalities, events, and movements will serve a significant purpose at this point.

With the foregoing completed, there should be in existence a body of information not before gathered together, which information should serve as essential material to any student of education who might be desirous of attacking a problem in education in which drawing is the chief element. It is inconceivable that the rich thought and experience of the past could with reason be ignored in any effort which may be made to give drawing its proper place in the curriculum.

A corollary to this problem is the subjection of the trends of thought revealed to a critical analysis, with a view to pointing out implications of weakness or implications of strength. Another immanent possibility is the clearing up of periods of confusion of thought in the light of present-day information.

A possibility highly probable is the derivation from the study as a whole, of a number of fundamental assumptions, some of which may be made later through a process of reflection to constitute a part of an improved educational philosophy of drawing.

THE PROBLEM DELIMITED.

The problem has three delimitations. First, it is delimited as to substance. The substance with which it deals is the thought, the reasoning, the theory, the reflection, in short, the philosophy that has directed the minds of those who have vitally concerned themselves with the problems involved in the teaching of linear drawing as a subject of study in formal education. Second, it is delimited to narrations related to personalities, events, movements, and trends of thought, to narrations which will yield facts largely germane to the study. Third, the art involved is delimited to that of linear drawing. The study is not a study of the technic of linear drawing. Yet the study must have a well understood concrete foundation. Hence, enough of the evolution of drawing as a graphic art is given to leave no misunderstanding concerning the nature of the concrete foundation of the study.

THE HYPOTHESES STATED.

The hypotheses of this study were implied in the statement of the problem. They are stated here more specifically. A study of the evolution of linear drawing as a subject of study in formal education, stressing analyses of trends of educational thought that have supported its introduction into the schools and that have directed its teaching there, will serve as an essential basis for improved educational thought, and in turn, for improved educational procedure.

The foregoing may be stated in another way. The hypothesis is, that this study completed, will reveal both fallacy and truth in the educational philosophy of the past. A knowledge of both fallacy and truth, will be helpful in formulating sounder educational thought and sounder educational procedure.

A more specific hypothesis is that linear drawing has significant applications to present-day life in addition to its application in the field of aesthetics. Its place in formal education must be determined by a full consideration of all of its services to society.

GENERAL PROCEDURE.

At the outset a careful overview study of the problem was made. This was followed by the construction of a carefully worked out agenda. On the basis of the foregoing a communication was formulated, which communication embraced a clear statement of the problem together with two direct questions. (1) Has the research study proposed in this communication been made? If so, where can the report be located? (2) If the research study proposed in this communication were completed, would it be a contribution to educational literature?

A copy of this communication was addressed to each of several experienced research workers and successful authors holding positions in standard universities. The replies were prompt and illuminating. They indicated no knowledge of such a study already made and also indicated that the completion of such a study would contribute to educational literature.

Educational literature in general was then examined with a view to determining whether there is existent authority supporting the contention that a knowledge of the evolution of the thought behind a subject of study might serve efficaciously in the scientific solution of educational problems. There seems to be little question but that a knowledge of decades of human experience with any problem in education would aid in the solution of present problems.

At this point in the study a careful review was made of the literature bearing on research in education. Such a review seems to indicate that there are divergent conclusions as to what really constitutes research in education. For this reason, tenets that seem to be well founded and free from controversy have been adhered to in this study.

TYPES OF LITERATURE YIELDING SOURCE MATERIAL.

At this point a survey was made seeking the location of sources yielding reliable information. The antiquity of the art of drawing and the very nature of drawing as a form of human behavior, combined with its persistent tendency to branch out and serve society at many points, are perhaps, the causes for having to seek information concerning drawing in so many separate fields of knowledge. A study of the bibliography at the conclusion of this study would indicate that facts concerning drawing have been sought in the following fields: archaeology, anthropology, prehistory, history of art, history of writing, history of printing, history of language, history of mathematics, history of science, history of invention, history of engineering, history of philosophy, psychology, textbooks, committee reports, organization reports, government reports, legislation, catalogues of world expositions, photostats of museum specimens, reports of the National Education Association, reports of the United States Commissioner of Education, articles in old magazines, and history of education.

A complete survey was made of all addresses and reports on the subject of drawing occurring in the proceedings of the National Education Association from the founding of that organization in 1857 to the present time. A complete survey was also made of all the reports bearing on drawing and issued by the United States Commissioner of Education, extending through a period from the establishment of that office in 1867 to the present time. In addition access was attained to all issues of Barnard's "American Journal of Education" extending over a period from 1855 to 1882. Copies of the "American Journal of Education" predating Barnard's ownership were also located, and scrutinized. Copies of the "American Journal of Science" were followed back as far as 1818. The earliest technical publication located which has a bearing on drawing is that of Albrecht Dürer, which was published in 1525. The oldest textbook on drawing actually examined was that of Lamy, which was translated into English in 1710, but was written in France much before that time.

ORGANIZATION OF THE STUDY.

After the study had progressed well, it became obvious that it divided itself naturally into four lines of thought as follows: (1) a sequential account of linear drawing as it revealed itself in the process of evolution; (2) a background study of the educational philosophy of drawing as revealed in the writings of outstanding thinkers; (3) a sequential account of the attempts made to actually introduce drawing into the public schools of the United States; and (4) an account of a movement which modified educational thought concerning drawing through research studies in the psychology of children's drawing.

The foregoing four points are elaborated upon further in the following:

Chapters II and III embrace a sequential account of the evolution of linear drawing as a technical art. Most of the information in these two chapters is composed of facts already commonly accepted as true. There are two reasons for the presentation of these two chapters. First, the material in them supplies a concrete foundation for the study. Second, it is well for one who would reflect in the field of education on the subject of drawing, to have a well fixed perspective of the art itself in the order that it has revealed itself to mankind.

Chapter IV contains an analysis of the educational philosophy of a number of outstanding thinkers across the centuries, beginning with Aristotle. The reason for the presentation of this chapter is found in the fact that the educational philosophy affecting education in the schools of the United States was cumulative.

The citizens of the United States were not very prolific in originating new philosophy. The beginnings of their philosophy related to drawing, may be found in the material presented in Chapter IV.

Chapters V, VI, VII, and VIII, contain the heart of the study. These chapters give accounts of actual attempts to introduce drawing as a subject of study into the schools of the United States. Events and movements leading up to those attempts are also discussed. Analyses are made of the different philosophies supporting the several experiments. Failures and causes of failures are pointed out. Confusion of thought is clarified.

In Chapter IX there are assembled summaries of research studies made on the psychology of children's drawings. The results of psychological studies have been illuminating and have done much to modify educational thought concerning linear drawing and its place in education.

Chapter X, which is the final chapter of the study, contains a number of fundamental assumptions which emanate from the body of the study. They appear to contain bits of educational philosophy which may be used in the process of spinning a better philosophy. It is strongly conjectured that the assumptions designated shall have to be recognized in any successful attempt to place the teaching of drawing on a more firm and on a

CHAPTER II

THE EVOLUTION OF LINEAR DRAWING FROM PREHISTORIC TIME TO THE TIME OF LEONARDO DA VINCI

FOREWORD.

Chapters II and III are introductory chapters. Chapter III is a continuation of Chapter II. The time division designated is only a matter of convenience. The purpose of these two introductory chapters is to give a very brief account of linear drawing from the time of prehistoric man to about 1800 A. D. It should be obvious that anyone who handles philosophic thought which is related to drawing must have a thorough grasp of the historical perspective of drawing with the salient events, personalities, and movements, well located in the perspective.

LINEAR DRAWING A FORM OF HUMAN BEHAVIOR.

Drawing is a form of human behavior. Man is the only animal that draws. Drawing even in its simplest form is a highly involved process. There is a strong tendency in man to record what passes before his vision. Even in the savage stage this is exemplified, for the savage painted on the walls of his cave objects and scenes taken from his environment. He scratched drawings on the bark of trees, on bone, and on stone. Early, too, the savage gave good evidence of aesthetic appreciation, for he decorated his person and used plentifully rhythmical decorative design on many of his crude implements.[1] The archaeologist and the anthropologist have left no doubt concerning man's early propensity to draw. The impulse in primitive man to draw and the universality of his drawing behavior in point of time and in point of geography, appear to be two stipulations on which eminent students agree.[2]

The need of transferring thought from mind to mind occurred early in human development. Therefore, the savage made use of the best tool he possessed, namely, picture writing. This was crude and indefinite. Nevertheless he exhibited much skill and ingenuity in making his thoughts known through the medium of the line. Thus, it is evident that even at a low level in the development of man the line was used for two significant purposes, namely, to furnish aesthetic stimuli and to transfer thought.

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[1]Lubbock, Sir John. The Origin of Civilization, p. 57. D. Appleton & Co., New York, 1882.

[2]DeMorgan, Jacques. Prehistoric Man, p. 186. Kegan Paul, Trench, Trubner & Co., London, 1924; Lowie, Robert H. An Introduction to Cultural Anthropology, pp. 177-184. Farrar & Rinehart, New York, 1934.

As Chapters II and III progress, it will become evident that the line becomes more and more a useful tool in the development of writing, printing, engraving, measured drawings, perspective, mathematics, invention, industry, commerce, engineering, science, and pedagogy. In short, it will be seen that the use of the line expands, branches out, and serves directly or indirectly many social needs.

THE DEVELOPMENT OF WRITING.

Writing began with the pictorial and in its evolution moved slowly toward the symbolical.[3] A picture suggests the form or likeness of a thing. A pure symbol does not suggest contour of form or likeness.[4] It is rather a line or combination of lines which suggests a sound through mental association. Conventionalized symbols make up our alphabet. "It was only when the letter linked itself to the sounds of the human voice rather than to the images of the human eye that literature may be said to have achieved its real birth."[5] In the evolution of writing the line continued to serve as a tool,

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[3]Tylor, Edward B. Anthropology, pp. 167-169. The Macmillan Co., New York, 1904.

[4]Starr, Frederick. Human Progress, p. 194. Flood & Vincent, Meadville, Pa., 1895.

[5]Rolt-Wheeler, Francis. The Science-History of the Universe, Vol. 9, p. IX. The Current Literature Publishing Co., New York, 1915.

but it served in a slowly changing capacity.[6] In point of form the change has been from likeness to non-likeness. In point of intellect the change is from the mental image to associated recall. It may be said that the essential difference between speech and writing is that the former appeals to the ear, the latter to the eye. However, with the pure symbol there is a coordination of eye, ear, and vocal apparatus. In a very true sense it may be said that the line in symbolic form serves as an indirect stimulus to the ear.

THE ALPHABET.

The evolution of speech was epoch-making since it made social cooperation possible.[7] However, speech alone did not satisfy even primitive man, for speech would not surmount the barriers of time and space. The art of writing carried tradition forward and made accumulated culture possible. History, science, art--in fact, the whole of culture is held in the framework of lines, which lines may be interpreted into thought and translated into speech. These lines are simply drawings which to be more specific are letters and print, and which to be even more specific are pure symbols.

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[6] Thorndike, Lynn. A Short History of Civilization, pp. 37-38. F. S. Crofts & Co., New York, 1935.

[7] Ullman, B. L. Ancient Writing and Its Influence, pp. 3-5. Longmans, Green & Co., New York, 1932.

Quoting Judd:

> The Alphabet is a series of simplified drawings which ultimately came into association with sounds and lost their function of informing the eye with regard to shape of objects and took on the function of reminding the observer of names.[8]

Behind each letter of the alphabet is a tremendous amount of human history. The Phoenician alphabet probably originating in the ninth century B. C. is the foundation of our present alphabet.[9] Through centuries of change and human progress, the alphabet has come to be what Judd calls twenty-six simplified drawings or twenty-six pure linear symbols.

PRINTING.

Closely allied with the art of writing is the art of printing. Usually one thinks of printing as having begun during the time of John Gutenberg, who invented the printing press in 1439.[10] However, the fundamental idea in printing reaches back many centuries before the advent of the printing press. The transfer of form by impression is an old art. The Babylonians and Assyrians

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[8]Judd, Charles H. The Psychology of Social Institutions, p. 247. The Macmillan Co., New York, 1926.

[9]Mason, William A. A History of the Art of Writing, pp. 286-288. The Macmillan Co., New York, 1928.

[10]Smith, Adele Millicent. The Evolution of Printing and Writing Materials, p. 28. The International Press, Philadelphia, 1900.

used soft clay with which they molded designs. The clay was afterwards baked and served to transfer the impression. Wood and stone were also used for transferring of print.[11] The tardy advent of the printing press was probably due to the lack of suitable material on which to print. The invention of paper preceded the invention of the printing press.

Man has been very ingenious and determined in making records through the medium of lines. Lack of material and hardness of material seemed not to have been an entire barrier to him, for he has been known to have used stone, clay, bark, leaves, skin, metal, ivory, bone, hoof, wood, linen, papyrus, parchment, wax, and paper.

LINE ENGRAVING.

Allied closely with the art of printing is the art of engraving. Engraving very probably grew out of goldsmithing. The exact time of its invention is not known. It was probably invented a short time after the invention of the printing press, approximately 1450.[12]

The use of the line was tremendously enhanced by the advent of three epoch-making inventions, the latter two

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[11] Smith, Adele Millicent, op. cit., pp. 123-125.
[12] Graphic Arts, pp. 58-59. Booklet No. 4, 14th Edition, The Encyclopaedia Britannica, London, 1933.

of which occurred close together--the invention of paper, the invention of the printing press, and the invention of line engraving. These inventions put the line at the service of the common man. Albrecht Dürer (1471-1528) himself an engraver and an artist used these three inventions from the outset in disseminating his beautiful prints among the people. The tremendous influence of the engraver's plate is in that it may be used to print the line in every form ranging from the highly pictorial to the purely symbolical. When one views a print of Dürer's Four Horsemen, resting on his mantel, he is being served aesthetically through the medium of line engraving. When one glances at a few lines skilfully arranged in cartoon form in the morning paper, he may enjoy delightful humor or biting sarcasm. In either case it is through the medium of line engraving. Therefore, it may be seen that the whole growing field of typography is based on manifold ways of reproducing lines.

MEASURED DRAWINGS AND THE EGYPTIANS.

A measured drawing is a mechanical drawing, an industrial drawing, an engineering drawing. Such a drawing is a form of geometry. The advent of geometry can be traced back to Egyptian times. It appears that geometry originated on the Nile. Much that has happened in Egypt can be traced to the direct or indirect influence of the Nile. It appears that the land on the Nile was divided into rectangles for the purpose of facilitating the collection of taxes. Sediment left by the overflow covered up boundary lines. In some cases the overflow washed away considerable of the land. This made necessary frequently a remeasuring, a redesignating of boundary lines. Out of this human need, geometry originated. The word geometry, from the Greek, means "to measure the earth." This type of geometry, of course, was the beginning of surveying.[13]

It is only a conjecture, but a fair conjecture, that the Egyptians used some type of topographical drawing in this procedure; but literature on Egypt makes no mention of it. It appears that if there are any remnants of such drawings existent, the archaeologist has not yet brought them to the surface.

The Egyptians were also great builders. Their architecture is massive. They had engineering ability. Their mastabas and pyramids are objective evidence of their creative ability. Here again there is no evidence of engineering plans. There are no accessible engineer-

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[13]Dampier, William C. History of Science, p. 44. The Macmillan Co., New York, 1935; Holt-Wheeler, Francis, op. cit., Vol. 8, pp. 107-109; Gow, James. A Short History of Greek Mathematics, pp. 130-131. G. E. Steckert & Co., New York, 1923; Ibid., pp. 134-135; Sedgwick, W. T., Tyler, H. W. A Short History of Science, pp. 32-33. The Macmillan Co., New York 1917.

ing drawings related to Egyptian structures. The Egyptians may have used in some measure the direct method--that is, they may have planned as they proceeded with their work but found it not necessary to reduce their thoughts to drawings. Granting this to be true in a measure, yet because of the enormity of their undertaking, it is still a fair conjecture that they used engineering drawing in some form.

MEASURED DRAWINGS AND THE GREEKS.

An investigation of engineering graphics during the period of Grecian dominance reveals much the same kind of result as was obtained in an investigation of Egyptian culture. A careful examination of indices of treatises purporting to reveal the history of Grecian architecture points to little mention of methods of construction and engineering planning. Direct interrogation concerning this point, sent to authors of history of architecture, resulted in the reply that they have not written on this point because there is not sufficient objective evidence. Again, however, because of the accomplishment of the Greeks in construction, it would be reasonable to conjecture that the Greeks made use of mechanical drawing.

There is some indirect objective evidence that the Greeks made use of the graphics in the process of construction. There is on the following page a photostat of a number of Greek and Roman drawing instruments. This photostat was secured from Museo Nazionale in Neapel, Italy with the testimony that the instruments are among their specimens and are regarded as genuine. A study of the photostat will reveal that the instruments are old, broken, and corroded. Yet the mechanical principles are obvious. The material of which they were made is iron, a rather precious metal at that time. The point emphasized here is that although the engineering drawings are not extant, there is objective evidence remaining that they had the mechanics with which to execute them. The exhibit on page 22 is evidence of the ability of the Romans to construct brass as well as iron instruments.

Further it may be said that Starck made a very careful study of the evolution of drawing instruments. Starck asserts that the construction of the compass especially reaches back even farther than the Grecian period.[14] The fact that specimens of engineering drawing

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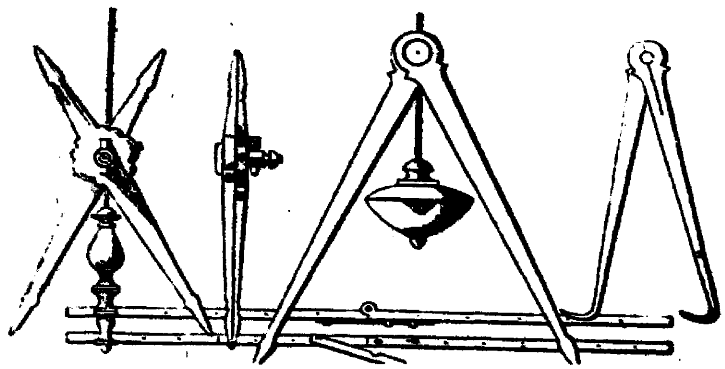
[14]Starck, Georg. Die Entwicklung der deutschen Reisszeugindustrie, p. 1. Universitätsverlag von Robert Noske in Borna-Leipzig, 1925.



Darstellung eines Zirkels auf einem Bilde
über die romischen Messwerkzeuge.

Quellenforschungen zur Geschichte der
Technik und Industrie, Berlin, Germany.

of that period are not plentiful in our museums may be due to a number of causes. They did not have the abundance of splendid paper that exists today. Invading armies may have usurped their plans, regarding them as valuable. Or they may be in the soil, yet to be brought to the surface by diligent archaeologists.

Again, Whibley,[15] a notable student of antiquity, says the Grecians made use of many mechanical means in executing lines. He mentions this, however, in connection with making designs for pottery and vases. Whibley says nothing about measured drawings. The inference is that the Greeks possessed the necessary instruments.

MEASURED DRAWINGS AND THE ROMANS (VITRUVIUS).

When one studies the Roman period he unearths more concrete evidence concerning plans of construction. There is not a preponderance of evidence, by any means, for the actual drawings do not emerge, but there are extant discussions in the Latin language of the draughtsman and his training.

The Romans were a practical people. They were not original except in the sense that they knew how to make use of the cultures of other peoples. They owed much

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[15]Whibley, Leonard. A Companion to Greek Studies, p. 341. The University Press, Cambridge, 1916.

to the Greeks. They conquered the Etruscans, a highly cultured people, and appropriated their culture and their workmen. With a big program of construction the Romans had to have workmen, engineers, draughtsmen. Hence, they began both to borrow and to train such men.

For a prima facie account of Roman procedure on this point students are indebted to Vitruvius,[16] the Roman engineer and architect. Not much is known of Vitruvius the man, but his writings, from the point of view of revealing facts, are accepted by students of Roman culture. Vitruvius wrote a chapter on the training of the architect. In this chapter he makes plain that the Romans knew draughting as a well-defined practical art.

Two selected excerpts from the writings of Vitruvius will give a sensible and rather modern viewpoint on training and education.

> So architects who without culture aim at manual skill cannot gain a prestige corresponding to their labours, while those who trust to theory and literature obviously follow a shadow and not reality. But those who have mastered both, like men equipped in full armour, soon acquire influence and attain their purpose.[17]

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[16]Vitruvius. On Architecture, pp. 3-5. Trans. by Frank Granger, William Heinemann Ltd., London, 1929.

[17]*Ibid.*, p. 7.

. . . .

> He should be a man of letters, a skilled draughtsman, a mathematician, familiar with scientific inquiry, a diligent student of philosophy, acquainted with music; not ignorant of medicine, learned in responses of jurisconsults, familiar with astronomy and astronomical calculations.[18]

MEASURED DRAWINGS AND THE EARLY CHRISTIAN PERIOD.

As this investigation is pursued it becomes more and more evident that the peoples of early times thought at least to some extent in terms of engineering drawing. Genuine specimens of their drawings in hand would be final and prima facie evidence of their existence. This evidence may be secured in time, but at present, reflection must rest on a basis of facts which are actually possessed.

As the Christian religion evolved, it became very plain to many of the leaders, as well as to many of the followers, that, although religion was vital, there were also practical needs demanding attention. One of the first organizations to manifest a lively interest in the material needs of the people was The Benedictine Order of Monks.[19] This organization devoted itself to

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[18] Vitruvius, op. cit., p. 9.

[19] Longfellow, William P. P. The Column and the Arch, p. 165. Charles Scribner's Sons, New York, 1899; The Encyclopedia of Education, p. 80. Kiddle, Henry, and Schem, Alexander J. E. Steiger, New York, 1877.

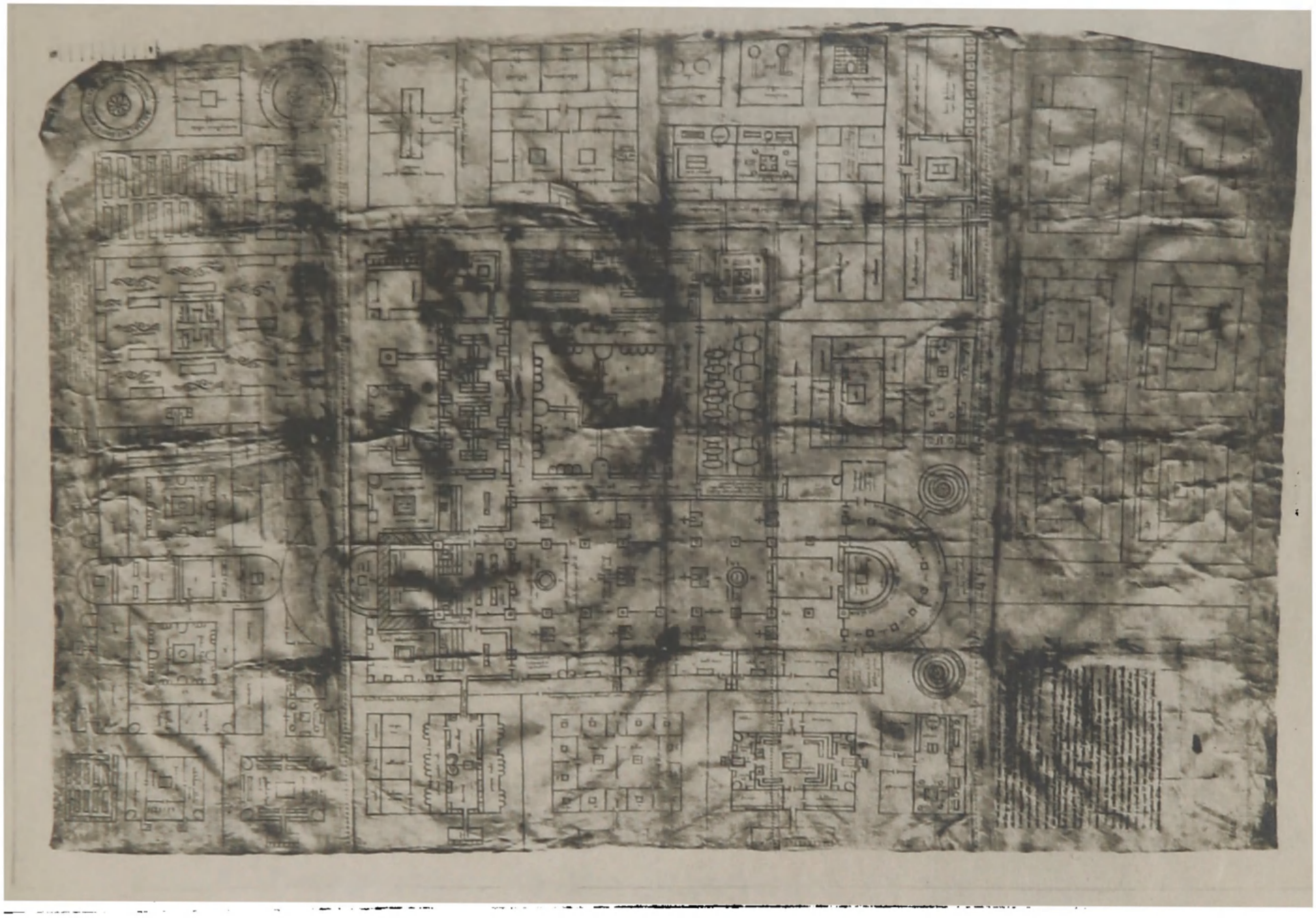
the propagation of Christianity on the one hand and to the development of practical culture on the other hand. Its demand for the performance of labor was as strenuous as its demand for adherence to religion. In fact, it taught that there was an inseparable interweaving of the two. All were expected to do manual labor--the highest leader as well as the lowly follower.

The Benedictine Order was a rapidly growing organization. This of necessity made a demand on all the practical arts of the day. It further pointed to the necessity of teaching the practical arts to its people. This the order did with a good measure of success.

The point germane in the discussion of the activities of the Benedictine Monks is that the graphics seemed not to have been neglected. The oldest architectural working drawing that has remained intact to the present day came from the Benedictines. A photostatic copy of this drawing occurs on the following page. It is dated 820 A. D. Examination under the magnifying glass shows the technic of execution as very good and sufficiently explanatory. It is a representation of the ground floor of a proposed monastery and was made on parchment.

Longfellow says concerning this drawing:

> The famous monastic plan preserved in the Benedictine abbey of St. Gall is not only the oldest architectural working drawing left to us, but a precise and authentic record of the manner of building in the ninth century, and



This is a photostat of what is reputed to be the oldest working drawing in existence. It is a floor plan for a proposed monastery dated 820 A. D. It is vouched for and is in the possession of the officials of Stiftsbibliothek, St. Gallen, Den.

For testimony as to genuineness see Appendix p. 14.

> in some ways more valuable than if it depicted a particular set of existing buildings, for it shows the ideal at which the enlightened builders of that day were aiming. It is a drawing on parchment two and one-half feet by three and one-half, dated 820, and sent to Gozpert, Abbot of St. Gall at that time, by some friend who is not identified, for guidance or suggestion in the rebuilding of his monastery which was then to be undertaken.[20]

In order to verify Longfellow's statement, a communication was sent to the Abbot of St. Gall making inquiry concerning the genuineness of the specimen. An answer accompanied by a photograph of the drawing verified Longfellow's statement. Thus, there is found concrete evidence that the graphics were being used industrially in the first part of the ninth century.

LINEAR PERSPECTIVE.

Perspective is the phenomenon of appearance. It is a convention. It is a human creation. It is built on the imperfection of the human eye. The eye does not see things as they actually are. A drawing of an object as it really is, appears distorted. A drawing of an object adjusted to the imperfections of the eye appears realistic. Hence, a drawing adjusted to the human eye is itself distorted from realism, but at the same time it serves as a stimulus which results in a realistic

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[20]Longfellow, William P. P., op. cit., p. 169.

image on the retina of the eye.[21]

A few of the axioms governing perspective are:

1. Parallel lines appear to converge as they vanish.
2. Parallel lines appear to meet at a point called a vanishing point.
3. Objects appear smaller and smaller as they are removed farther and farther from the eye.
4. Lines, horizontal, vertical, and oblique, are foreshortened.
5. Horizontal lines meet on the horizon.
6. A vital element in perspective is that it shows depth as well as width and height.[22]

The camera is an instrument by which perspective views can be produced mechanically. The lens of the camera corresponds to the pupil of the eye. The sensitive plate of the camera corresponds to the retina of the eye. The resulting photograph through the medium of the camera contains the elements of convergence, three dimensions, foreshortening, and vanishing points.

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[21] Cole, Rex V. Perspective, pp. 17-32. Seeley, Service & Co., London, 1927.

[22] Graphic Arts, op. cit., p. 8; Cole, Rex V., op. cit., pp. 33-43.

THE EGYPTIANS AND LINEAR PERSPECTIVE.

The Egyptians were adept in the realm of aesthetic graphics. Their skill and dexterity were extremely admirable. In technic and design they exemplified superior ability. In spite of all that may be said favorable to the Egyptians' ability in manipulating the line, they emulated primitive man to the extent that they did not use the perspective. They confined their drawings to the side view or profile. They appeared not to have understood perspective.[23] This statement has been debated. A careful examination of the Egyptian drawings, however, will make manifest that they adhered to the profile. Inspection of their drawings will also show that at times they felt a need for perspective, for in drawing one object behind another, they drew the object in the rear above the drawing of the object in front.[24] Of course, this procedure caused the element of distortion to enter.

Rawlinson says of the Egyptians in this connection:

> The inability to present a scene in perspective is, no doubt, one common to the Egyptian artists with other primitive designers; but it is a defect which attains in Egypt an intensity almost without a parallel elsewhere.[25]

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[23] Thorndike, Lynn, op. cit., p. 43.
[24] Rawlinson, George. History of Ancient Egypt, pp. 287-288, Vol. 1. Dodd, Mead & Co., New York, 1882.
[25] Ibid., p. 287.

The Egyptians were an intelligent people, and therefore, it would seem that some brilliant Egyptian would fall upon some semblance of perspective. Yaggy and Haines explain this failure by saying that the rules of their art were fixed by their religion, and therefore no artist was allowed to change and improve on a basis of experience.[26] Regardless of speculative theory, the fact is that in the execution of their drawings the Egyptians adhered to the profile. The exhibit on the following page gives something of the Egyptian method of draughtsmanship. It shows also that the draughtsman was well limited by rules.

THE GREEKS AND LINEAR PERSPECTIVE.

Sculpture, architecture, and drawing, as fine arts, thrived in Greece.[27] Grecian society placed a high social value on their production. Hence, the gifted were stimulated to produce, and they did produce. Specimens of sculpture and architecture still remain intact as concrete evidence of Grecian glory. Grecian drawings, however, are not so plentiful. The only class of objects that gives satisfactory information as to their drawing

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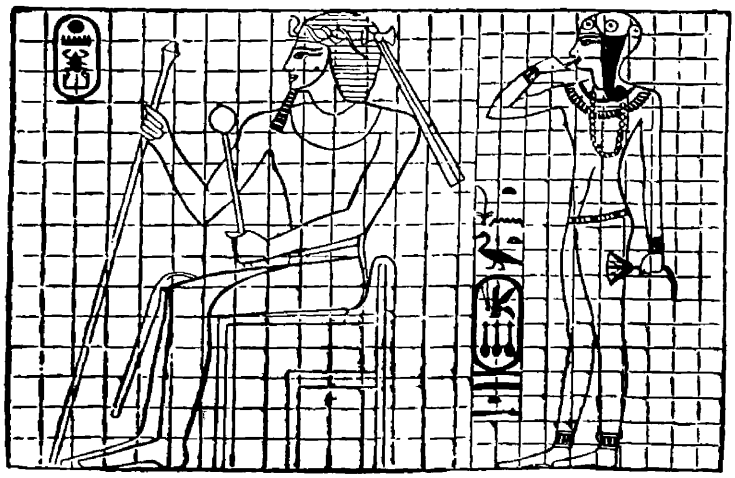
[26] Yaggy, L. W., Haines, T. L. Museum, pp. 646-647. Southwestern Publishing Co., Nashville, 1881.

[27] Gardner, E. A. The Art of Greece, p. 29. Albert and Charles Boni, New York, 1928; Tarbell, F. B. A History of Greek Art, p. 268. The Macmillan Co., New York, 1922.

note at this time, at Alexandria; but the only piece of hers known to us by name is the Battle of Issus, which three hundred years afterwards was hung up by Vespasian in the Temple of Peace at Rome. We must wonder at a woman choosing to paint the horrors and pains of a battle-piece; but, as we are not told what point of time was chosen, we may hope that it was after the battle,



METHOD OF EGYPTIAN DRAFTSMANSHIP.

when Alexander, in his tent, raised up from their knees the wife and lovely daughter of Darius, who had been found among the prisoners. As for the Egyptians, they showed no taste in painting. Their method of drawing the human figure mathematically by means of squares, which was not unsuitable in working a statue sixty feet high, checked all flights of genius; and it afterwards destroyed Greek art, when the Greek painters were idle enough to use it. We hear but little of the statues and sculptures made for Philadelphus; but we cannot help

Maspero, G.
History of Egypt,
p. 137, Vol. 10.

is the decorative vases. To these one must look if he wishes to obtain any adequate notion of the art of drawing in Greece. Much could be said of the exquisite designs drawn on the Greek vases. The significant point in this discussion, however, is that they are silhouettes, not perspectives. Like the Egyptian artists, the Greeks appeared to have found it not necessary to develop perspective.

There are some writers who think that the Greeks' interest in art was too intense to have overlooked entirely so valuable a device as perspective. Indeed, there may have been some individuals among the Greeks who saw clearly the principles of perspective. Yet an examination of Grecian drawings shows that the Greek draughtsmen did not use it.[28] Whibley, a scholarly student of Greek culture, thinks he can discern the beginnings of perspective in Greek drawings made just before the advent of decline in their civilization.[29] However much may be said concerning Grecian draughtsmen and their use of the perspective, the fact is that the use of perspective is far from being easily discerned in Grecian art.

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[28] Cole, Rex V., op. cit., p. 216.
[29] Whibley, Leonard, op. cit., pp. 331-332.

THE ROMANS AND PERSPECTIVE.

As was said before, the Romans were a practical people. Certainly they were influenced in their art by the Greeks and by the Etruscans. They reached out in every direction and made beneficial contacts. Moreover, Rome became the center for painters.[30] With such contacts, it is not strange that the Roman draughtsman learned to use perspective.[31] Unlike the Greeks, the Romans left some concrete evidence of their draughtsmanship.[32]

Although the Italians are usually given credit for early use of perspective, the Romans made much use of it. As will be seen later in this study, perspective dominated the Italian draughtsman. It is for this reason the Italians are thought of first in connection with the perspective. Moreover, the Italians were more proficient in its use than were the Romans. Nevertheless, the Romans understood and used the perspective.[33]

THE RENAISSANCE AND PERSPECTIVE.

It was pointed out that the Romans understood perspective. Very likely it had been evolving slowly in

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[30] Yaggy, L. W., Haines, T. L., op. cit., p. 664.
[31] Cole, Rex V., op. cit., p. 218.
[32] Walters, H. B. The Art of the Romans, pp. 90-91. Methuen & Co., London, 1928.
[33] Cole, Rex V., op. cit., p. 219; Blum, Andre S. A Short History of Art, pp. 49-53. B. T. Batsford, London, 1926.

the mind of man long before it became clearly overt in the product of the Roman draughtsman. However, the Romans had not become wholly obsessed with the spirit of realism; and hence, the perspective was not developed by them in its fulness. This task was left for the Italians of the Renaissance.

The decline of Grecian culture, the decline of Roman culture, the advent of Christianity with all its perplexing problems, economic depression, and lack of stable government--all contributed to disturbance and disorder during the early centuries of the Christian era. During those depressed centuries, not much could be expected in the way of intellectual advancement.

Yet the historian relates that small groups of intellectual enthusiasts scattered over the earth had never permitted the light of Greece to become entirely extinguished; had never permitted the light of Rome to become entirely extinguished. Therefore, with those lights still flickering, and at the opportune time, Petrarch led a movement for an intellectual reawakening based on the culture of antiquity. This period of reawakening is known as the Renaissance.

It was during this period that great Italian personalities emerged from the masses. It was during this period that the perspective was developed in all its fulness. Apparently for a long time there had been evolving in the mind of man a desire for realism, a desire to consider the objective world in its three dimensions. This in art meant the portrayal of depth as well as of width and of height. The Italian draughtsmen of the Renaissance rediscovered and used with skill the principles of perspective.

MASACCIO (1401-1428).

Outstanding among these geniuses was Masaccio.[34] Writers have a tendency to give Masaccio much credit for utilizing the principles of perspective, although it is well known that Giotto[35] (1276-1336), Brunelleschi (1379-1446), Uccello (1397-1475), and Francesca[36] (1418-1492) were all splendid students of perspective. Whether Masaccio should receive credit beyond that given to other good students may be debated, but certain it is that

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[34]Blum, Andre S., op. cit., pp. 129-130; Cole, Rex V., op. cit., pp. 220-222; Marle, Raimond Van. Italian School of Painting, Vol. 3, p. 611, Vol. 4, p. 243. The Hague, Martinus Nijhoff, 1927; Powers, H. H. The Art of Florence, pp. 87, 92, 95, 132. The Macmillan Co., New York, 1927; Seeley, E. L. Artists of the Italian Renaissance, pp. 115, 121, 122, Ballantyne, Hanson & Co., London, 1907.

[35]Berenson, Bernhard. The Florentine Painters of the Renaissance, pp. 1-7. G. P. Putnam's Sons, New York, 1909; Vasari, Giorgio. The Lives of Painters, Sculptors and Architects, Vol. 1, p. 77. J. M. Dent & Sons, London, 1927.

[36]Graphic Arts, op. cit., p. 7.

Masaccio was highly skilful in the execution of the perspective. Also, it must be remembered that at a period a little later, Leonardo (1452-1519), and Dürer (1471-1528), were masters par excellence in the portrayal of three dimensions--in the field of naturalism.

LEONARDO DA VINCI, THE SUPER-DRAUGHTSMAN (1452-1519).

No history of science, no history of engineering, no history of art, no history of anatomy, no history of philosophy, no history of invention, no history of hydraulics, no history of draughting, may be written adequately without mentioning prominently the name of Leonardo. It is difficult enough to understand a personality with one outstanding talent. When a multiple-genius presents himself, no one need presume to fathom him. Such a genius was Leonardo.

Quotation from Rachel A. Taylor:

> Leonardo's sciences were continually interacting; they were so much alive that they ran together, refusing to stay in compartments. They are confused chapters of human thought; and if Leonardo had written all his treatises he would have composed an encyclopaedia of Renaissance knowledge.
>
> There is hardly a modern science of which he does not consider the first steps.
>
> . . . .
>
> His draughtsmanship darts and radiates over these matters.[37]

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[37]Taylor, Rachel A. Leonardo the Florentine, p. 536. Harper Brothers Publishers, New York, 1928.

. . . .

When he draws levers and pulleys Leonardo is happy.[38]

The surest avenue to a knowledge of Leonardo is through his manuscripts and through his notebooks. In these he showed himself the philosopher by writing down tersely his thoughts. In these he showed himself the scientist by making careful notes and accurate drawings. In these he showed himself the many sided draughtsman.

Leonardo not only executed drawings, but he wrote learnedly on the subject. His discussions on perspective involving convergence, foreshortening, vanishing points, light, and shade, are on a par with similar discussions in our present-day textbooks.[39] In understanding and execution of perspective, he was the equal, if not the superior, of Masaccio and of Dürer.

As has been indicated in the foregoing, Leonardo had many vital interests. The significant point to emphasize in this connection is that drawing was a very important accessory in each activity that contributed to his genius. Leonardo exemplified a consuming interest

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[38] Taylor, Rachel A., op. cit., p. 537.
[39] Leonardo da Vinci's Note-Books, pp. 210-219. Trans. by Edward McCurdy. Empire State Book Co., New York, 1935.

in the field of mechanics, secondary perhaps, only to his passion for the fine arts.[40] Indeed, he has been called the father of mechanical engineering.[41] As evidenced by his notebook, in this connection he not only used linear sketching as a method of recording, but he used it as a tool of thought. The photostat of his drawing instruments occurring on the following page points to his use of mechanical drawing. Usher said: "With him graphic record became a consuming passion."[42]

In our present day laboratory work in science, whether in carrying out of research study or in the teaching procedure, linear drawing is an indispensable tool. This linear device is not new. Leonardo used it back in the fifteenth century sketching not only in the field of mechanics, but also in the field of anatomy. His 750 anatomical sketches afford clear evidence of his genius in this field of work.[43]

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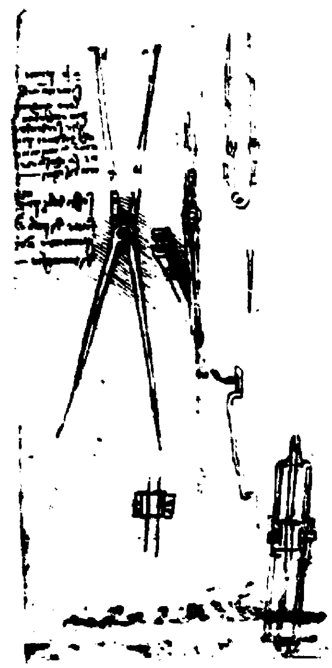
[40] Fisher, Arabella B. A Short History of Natural Science, p. 58. D. Appleton & Co., New York, 1890; Sedgewick, W. T., and Tyler, H. W., op. cit., pp. 228, 234, 252.

[41] Usher, Abbott P. A History of Mechanical Inventions, pp. 175, 185, 186. McGraw-Hill Book Co., New York, 1929.

[42] Ibid., p. 177.

[43] Wolf, A. A History of Science, p. 408. George Allen & Unwin, Ltd., London, 1935; McMurrich, J. Playfair. Leonardo da Vinci The Anatomist, pp. 82-92. Carnegie Institute of Washington, 1930.



Proportional-Zirkel. Handzeichnung des beruhmten Malers und Ingenieurs Leonardo da Vinci um 1500.

Quellenforschungen zur Geschichte der Technik und Industrie, Berlin, Germany.

Leonardo knew drawing in all its phases as it had come down to him from the past. Especially did he know drawing and its relation to aesthetics. Perhaps, his contribution to drawing was in emphasizing its uses in addition to its service in the field of aesthetics. Leonardo used drawing as a great aid to science in general. He used it as a means of experimentation; he used it as a tool of thought; he used it as a stimulus to thought; he used it as a great industrial agent; he used it to make records; he used it as a language. Hence, a study of Leonardo and his draughtsmanship points to the desirability of considering drawing in its manifold uses. Any consideration of drawing limited only to the aesthetics will fall short for drawing has a wider significance. Indeed, there is no reason for limiting its application to aesthetics. The point is that a comprehensive study of drawing must embrace every point at which it is significant to man. Leonardo, master of drawing in the field of aesthetics, has pointed out other fields in which drawing may play a vital part.

Summary

1. Drawing is a form of human behavior with savage man as well as with civilized man. There appears to be in man on every level of development a strong tendency to use the line in recording what passes before his vision and in supplying aesthetic stimuli.

2. Pictograph writing was the first kind of script used. The evolution was from the pictorial to the symbolic, resulting finally in a conventionalized alphabet. This movement was from the visual image toward the auditory image. The line continued to serve as the stimulus regardless of the stage of development. Writing made it possible to rapidly accumulate culture and carry it forward.

3. Geometry originated on the Nile, growing out of practical needs. It is known only through conjecture that the Egyptians made engineering drawings. There is some objective evidence existent that the Greeks and Romans made and used engineering drawings because they have left drawing instruments which are in possession of present-day museums.

4. Neither the Egyptians nor the Greeks used perspective. The Romans used it slightly. The Italians developed it to its maximum use.

5. Leonardo da Vinci multiplied the use of the line. He used it in invention, in the laboratory, as a tool of thought, as a stimulus to thought, as an industrial agent, as a means of making records, as a language and as a supplement to language.

CHAPTER III

THE EVOLUTION OF DRAWING FROM THE RENAISSANCE TO THE COLONIAL PERIOD

In the last chapter it was pointed out that Leonardo, the artist-genius, (1452-1519) ushered in a new era--an era of scientific advancement, an era of invention. It is coincidental that Dürer, another artist-genius (1471-1528) born a little later but contemporary with Leonardo, became a noted mathematician.[1] His work as a painter and engraver is well known in the field of art; but it was in his treatises on geometry, fortification, and human proportion, that he showed his mathematical ability.

The point to be emphasized here is that linear drawing was interwoven with, and was an integral part of each major activity of Leonardo. In fact, it would be difficult to visualize his doing what he did, without a concomitant ability to use the line. As was pointed out in a previous chapter, Leonardo had a passion for the graphics. Surely posterity would be the poorer if it were not for the sketches left in Leonardo's notebook.

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[1] Cajori, Florian. A History of Elementary Mathematics, pp. 221, 248, 249, 266. The Macmillan Co., New York, 1917.

When Leonardo's written notes are not sufficiently explicit, his drawings tell the story.

Another point to be emphasized is that concerning the mathematical endeavors of Dürer. It should be noticed that all of his treatises significantly involve the use of the line. He worked in the fields of geometry,[2] fortification,[3] and human proportion[4]--three closely allied fields. As was said in the case of Leonardo, it would be difficult to visualize Dürer's doing what he did without an accompanying ability to master the use of the line.

Quoting Cajori:

> To Albrecht Dürer belongs the honour of having shown how regular and semi-regular solids can be constructed out of paper by marking off the bounding polygons, all in one piece, and then folding along the connected edges.[5]

The mathematical work of Dürer is sometimes cited as the groundwork for the accomplishment of Gaspard Monge in the eighteenth century. Monge reduced to

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[2]Dürer, Albrecht. Underweysung der messung mit dem zirckel und richtscheyt in Linien, ebnen, vnnd gantzen corporen, Nürnberg, 1525. (See Smith, David E. History of Mathematics, Vol. 1, p. 326. Ginn & Co., New York, 1923.)

[3]Dürer, Albrecht. Ethliche vnderricht zu befestigung der Stett, Schloss und flecken, Nürnberg, 1527. (See Smith, David E., op. cit., Vol. 1, p. 326.)

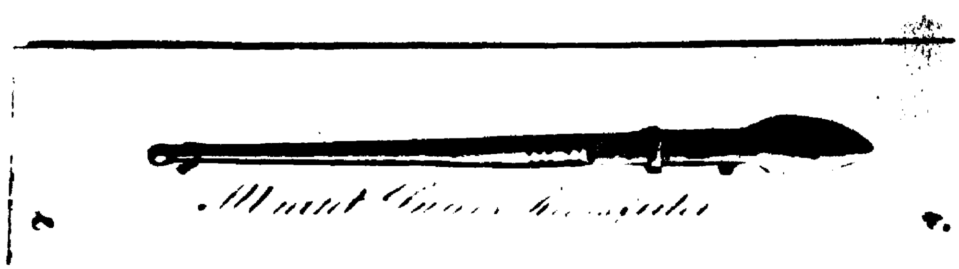
[4]Dürer, Albrecht. Hierin sind begriffen vier Bucher von menschlicher Proportion, Nürnberg, 1528. (See Smith, David E., op. cit., Vol. 1, p. 326.)

[5]Cajori, Florian, op. cit., p. 249.

scientific principles the form of mathematics underlying orthographic projection, which itself is a basic form of drawing for scientific engineering. The work of Monge is tremendously significant to the subject of drawing and, therefore, will be discussed in some detail a little later.

The reader should note that the use of the line did not develop in a vacuum. Neither did it develop only the field of aesthetics. It evolved with and because of other developments. It was one element of a multiple movement forward. It moved along with general science, with mathematics, with invention, with industry. In short, as accumulative culture enlarged, the scope of drawing enlarged as an integral and necessary part of that culture.

There is a feeling among artists of aesthetic interests only that the use of mechanics limits one's freedom and makes less possible the rendition of the flights of one's imagination. How true this statement may be, is a matter yet to be determined. Certain, it is that both Leonardo and Dürer used instruments and drew mechanically. Photostats of Leonardo's drawing instruments have already been shown. On the following page is a photostat of Dürer's drawing pen which is deposited in the Germanic Museum as a treasure in memory of the German genius.



„Einer der altesten heute noch erhaltenen Messinggegenstände ist die berühmte Reiszfeder von Albrecht Dürer. Sie wurde hinter einer Wandtäfelung im Nürnberger Dürerhause gefunden und ist heute im Germanischen Museum in Nürnberg aufbewahrt."

For testimony as to genuineness see Appendix pp. 13, 16.

THE DEVELOPMENT OF THE DRAWING TOOL INDUSTRY AS AN INDEX TO THE DEVELOPMENT OF TECHNICAL DRAWING.

In the field of technic, inventions are tremendously significant because, when an invention is perfected, it relates itself to and influences so many other fields.[6] For example, no one will ever be able to estimate the influence of printing on human progress.

A few early inventions of importance are as follows:

1302	Mariner's Compass	Flavio Gioja[7]
1439	Printing	Gutenberg[8]
1480	Water Mills and River Locks	Leonardo[9]
1560	Camera	Baptiste Porta[10]
1609	Telescope	Galileo[11]
1644	Barometer	Toricelli[12]
1650	Air-Pump	Guericke[13]
1661	Microscope	Malpighi[14]
1765	Steam Engine	Watt.[15]

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[6] Thorndike, Lynn. A Short History of Civilization. Chapters 24 and 28. F. S. Crofts & Co., New York, 1935.

[7] Fisher, Arabella B. A Short History of Natural Science, pp. 53-55. D. Appleton & Co., 1890.

[8] Ibid., pp. 54-55.

[9] Ibid., p. 58.

[10] Ibid., pp. 72-73.

[11] Ibid., pp. 85-86.

[12] Ibid., pp. 114-117.

[13] Ibid., pp. 119-120.

[14] Ibid., pp. 134-135.

[15] Ibid., pp. 242-247.

The foregoing is only partly representative of the progress in the field of physics. There were many advances during the same period in chemistry, in biology, and in geography. Out of all of this came varied demands of industry and of manufacture. Modern manufacture cannot proceed without the service of technical drawing.[16] Technical drawing cannot be executed without precision instruments. Therefore, out of, and along with general progress, grew up a new industry; namely, the drawing tool industry.

It is known that as an industry, the manufacture of drawing tools began at least 500 years ago. It thrived from early days in the city of Nürnberg, Germany. Indeed, Nürnberg has enjoyed a monopoly of this industry, and has shipped her drawing tools to all parts of the world. During the great war, both Japan and the United States attempted to manufacture drawing tools without great success. This industry is rooted deeply in Nürnberg, and it is difficult to compete satisfactorily with workmen who have had five centuries of background.

Starck made a careful research study of the evolution of the drawing tool industry for the University of

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[16] Bulletin 1922, No. 48, U. S. Bureau of Education, Washington, D. C., p. V.

Leipzig. Starck had access to the archives of the city of Nürnberg. The records in the archives reached back to the fourteenth century. Out of this study Starck brought to the surface interesting and significant facts. Quoting Starck:

> Die alteste Reiszzeugindustrie in Deutschland ist diejenige in Nürnberg. Die Zirkelschmiede werden in den Burger und Meisterbuchern der Stadt Nürnberg in Jahre 1442 erstmalig erwahnt.[17]

The fact that Leonardo and Dürer, both of whom lived in the fifteenth century, possessed and used drawing instruments would confirm Starck's finding. On page 51 is a photostat of three compasses made by Schiszler in Augsburg in 1580. This photostat was received from the Germanic Museum, Nürnberg, Germany, with the testimony that the compasses are deposited there and are genuine in the opinion of the officials. An examination of the photostat of Schiszler's compasses under a magnifying glass would indicate that compasses of that early day were well advanced. Also on pages 52 and 53 are photostats of compasses received from The Technical Research Bureau of Berlin, Germany. These are compasses once possessed by the great inventor of the sixteenth century. Besson was a technician of

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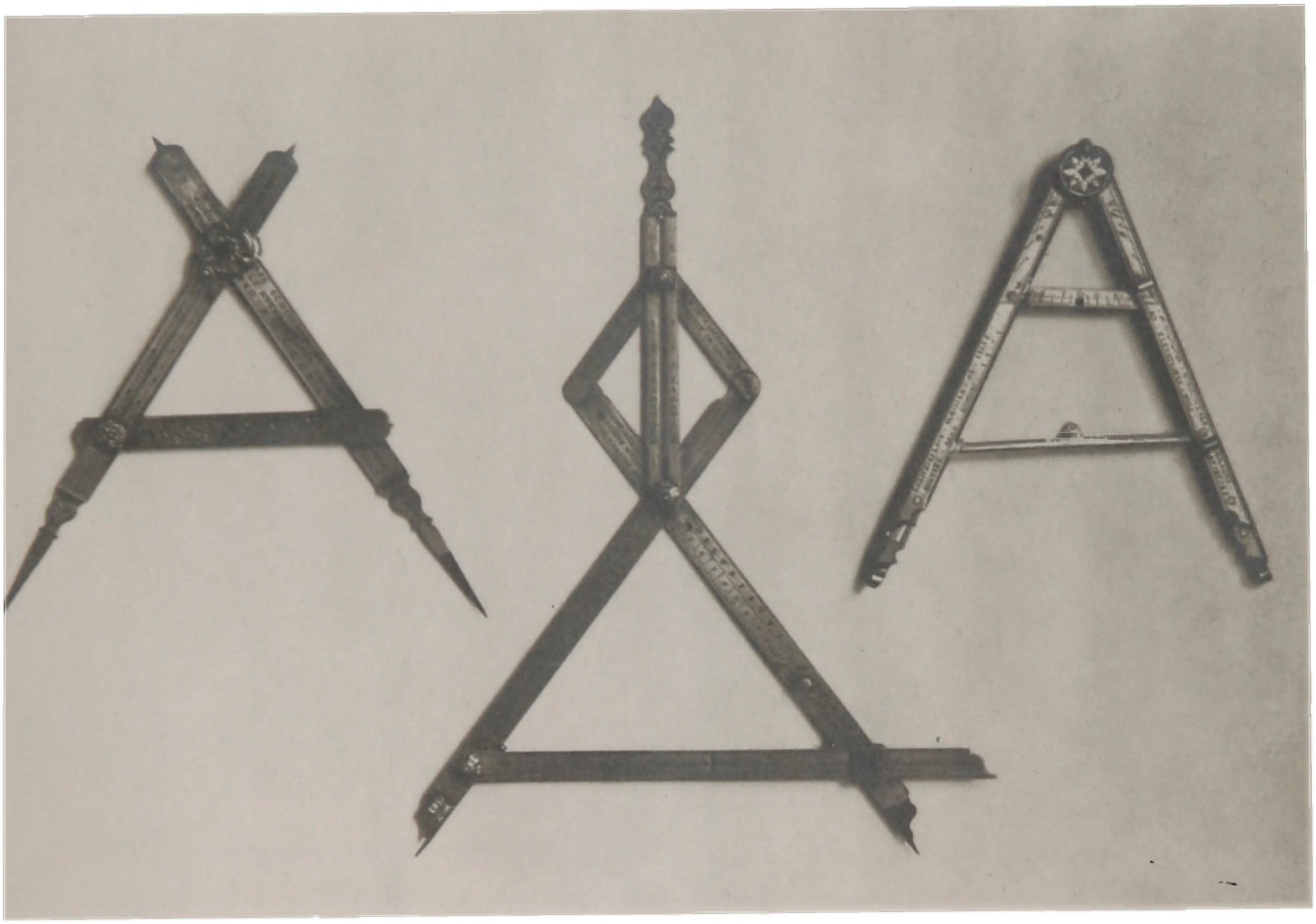
[17] Starck, Georg. Die Entwicklung der deutschen Reiszzeugindustrie, p. 53. Universitätsverlag von Robert Noske in Borna-Leipzig, 1925.



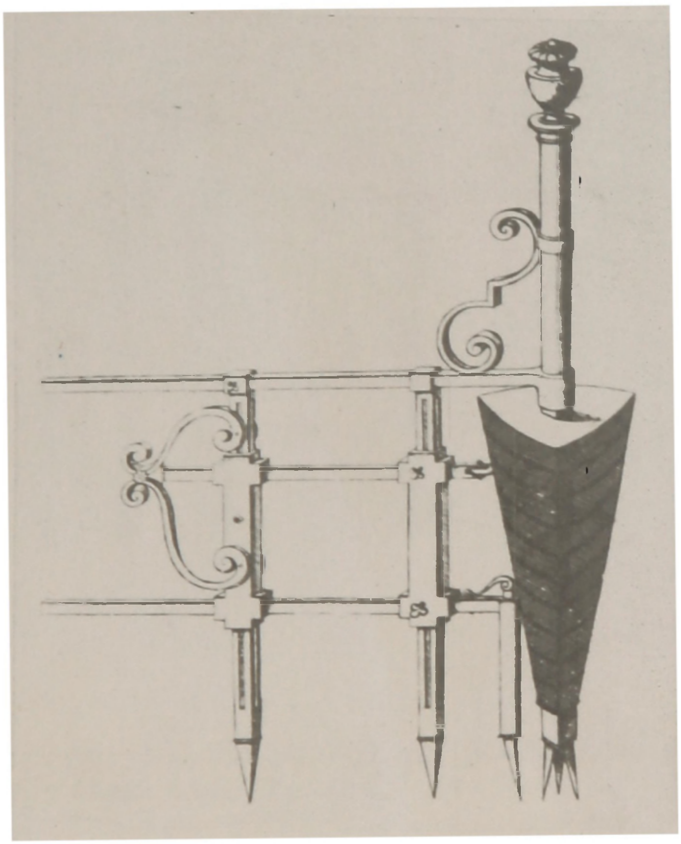
Herrn Orville A. Jeurney, Louisiana, U.S.A.

Dr.He/G. Nürnberg, 15. Februar 1937.

Die Zirkel und Reißzeuge des Germanischen Museums sind veröffentlicht von Gustav v. Bezold im Anzeiger des Germanischen Nationalmuseums, Jahrgg. 1898, S. 100. Neuere Fotografien besitzen wir davon nicht; es sind zu diesen Stücken nur noch einige Arbeiten von Christoph Schißler in Augsburg (1580) dazu gekommen, die sehr schön gearbeitet sind, technisch aber keine Neuerungen darstellen. Auf Wunsch können wir Jhnen Neuaufnahmen anfertigen lassen zum Preise von 3.- RM im Format 13 x 18 und 5.- RM im Format 18 x 24.

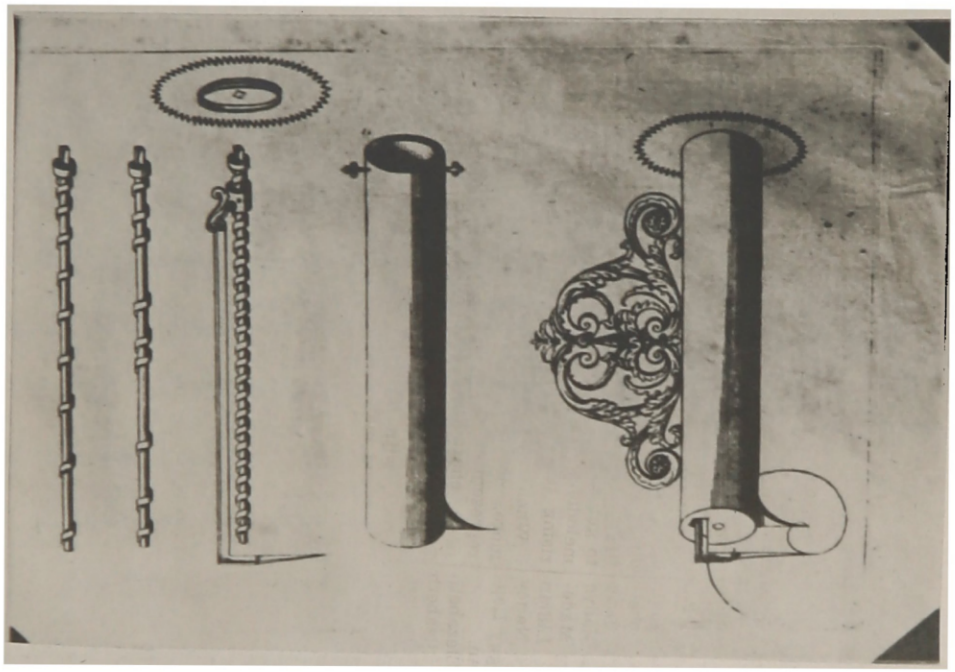
Mit vorzüglicher Hochachtung!
Die Direktion
des Germanischen Nationalmuseums:

I. A. [signature]



Kurvenzirkel nach Entwurfen von dem Ingenieur
J. Besson um 1565. Links ein Ellipsenzirkel.
Reckts ein Zirkel mit auswechselbaren Körpern,
die als Kegel mit flachen oder gewölbten Seit-
en gestaltet sind.

Quellenforschungen zur Geschichte der Technik
und Industrie, Berlin, Germany.



Spiral-Linienzirkel um 1565. Entwurf
von dem Ingenieur J. Besson.

Quellenforschungen zur Geschichte der
Technik und Industrie, Berlin, Germany.

great repute. His three-shared plough, indeed, represented advanced thinking for his day. His screw-cutting lathe, and his dissertation on the power of steam, secured a place of honor for him in the field of scientific advancement.[18] Of course, the significant point in this discussion is the interdependence of the graphic arts and general technical advancement.

Referring again to Starck's[19] research study on the evolution of the drawing tool industry, it may be noticed that Nürnberg employed eighty-five compass smiths as early as 1590. This number grew not rapidly, but on the whole continually, up to 1900, when there existed twenty-eight factories.

In following out the evolution of drawing there is difficulty encountered in locating the drawings themselves. Especially is it difficult even to place one's hands on the engineering drawings of the early centuries of modern times. Drawings on paper are very perishable. Libraries of earlier days were not so numerous, nor were they so well organized as they are today. Therefore,

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[18] Wolf, A. A History of Science, pp. 456, 538, 540, 544. George Allen & Unwin Ltd., London, 1935; Usher, Abbott P. A History of Mechanical Inventions, pp. 323-324. McGraw-Hill Book Co., New York, 1929; Thorndike, Lynn, op. cit., p. 473.

[19] Starck, Georg, op. cit., pp. 59-61.

evidence of a less perishable nature is acceptable. At this point the museums are very helpful, for they contain as specimens drawing instruments representative of periods from Grecian times onward. At this point facts concerning the evolution of the drawing tool industry are very helpful too. It is reasonably safe to conjecture that the enlarged use of technical drawings paralleled closely the enlarged manufacture of precision instruments. Generally speaking, manufacturers produce only to supply an existing market. Therefore, an enlarged manufacture of drawing tools is a splendid index to an enlarged use of technical drawing.

THE EVOLUTION OF DRAWING AS RELATED TO MATHEMATICS.

It has been said several times in this study both directly and by inference that no one thing develops by itself in a single compartment. There is rather an interrelation, an interdependence, an interweaving of forces. This is especially true when considering drawing with each of the several forms of geometry. It is impossible to consider geometry aside from drawing, and it is impossible to consider drawing aside from geometry. There is a large overlapping of the two.

Up to this point in this study the terms technical drawing, mechanical drawing, industrial drawing, have been mentioned, but an abundance of such types of drawing have not existed. In a previous chapter a photostat of what is presumed to be the oldest existing architectural working drawing was presented. All of the technical drawings considered up to this point, were based on what might be described as a common sense foundation. That is, the principles used were rather axiomatic. It remained for a French mathematician of the eighteenth century to place technical drawing on an advanced and purely mathematical basis.

GASPARD MONGE (1746-1818).

Present day engineering drawing is a scientific art. It has been subjected to the most scrutinizing minds and little guesswork is left in its execution. It is known, as stated above, under several work-a-day headings such as mechanical drawing, industrial drawing, working drawing, and orthographic projection. Each of these is a phase of mathematics known as descriptive geometry.

It was Monge,[20] the French mathematical genius, who first saw and systematized the principles governing exact graphic representations of magnitudes. Monge organized these principles, and hence, the birth of descriptive geometry, opening up new avenues of progress. Monge was a professor at the Normal School in Paris until he was transferred to a newly established polytechnic school. He later accompanied Napoleon on the Egyptian campaign. Practical mathematics of that day were mostly applicable to military needs; therefore, Monge thought a good deal in terms of fortification. Before the advent of descriptive geometry, long arithmetical computations were necessary in making plans of fortification. That gifted mathematician and engineer substituted geometric methods for arithmetical methods, and this led to the creation of descriptive geometry as a distinct branch of science.

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[20] Cajori, Florian, op. cit., p. 257; Smith, David E. History of Mathematics, Vol. 2, pp. 331-332. Ginn & Co., New York, 1925; Dampier, William C. A History of Science, p. 309. The Macmillan Co., New York, 1929; Sedgewick, W. T. and Tyler, H. W. A Short History of Science, pp. 282, 335. The Macmillan Co., New York, 1917; Smith, David E. A Source Book in Mathematics, pp. 315, 426, 492, 494. McGraw-Hill Book Co., New York, 1929; Smith, David E., op. cit., Vol. 1, p. 490; Fink, Karl. History of Mathematics, pp. 176, 178, 247, 248, 267, 277. Kegan Paul, Trench, Trubner & Co., Ltd., London, 1910.

Monge's work was considered so valuable to military operations that it was held secret.[21] He was compelled to wait many years before he was allowed to publish his first dissertation in descriptive geometry,[22] which was published in 1799.

Others soon concerned themselves with this phase of mathematics. Monge's successor[23] as professor of descriptive geometry published a book in 1822.[24] However, a year earlier, in 1821, Claude Crozet, a Frenchman brought to America to teach descriptive geometry at the United States Military Academy located at West Point, published a treatise adapted to the needs of a military academy.[25] This was the first publication in America on the subject and was taught for the first time at the above mentioned institution. Hardly a dozen professors in America even knew there existed such a subject in the year 1800, and very few more knew about it in 1825. As Monge was the father of descriptive

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[21] Smith, David E., op. cit., Vol. 1, p. 491.

[22] Monge, Gaspard. Geometrie descriptive. Paris, 1799. (See Fink, Karl. History of Mathematics, p. 247. Kegan Paul, Trench, Trubner & Co., Ltd., London, 1910.)

[23] Hachette, Jean Nicola Pierre. Treatise on Descriptive Geometry, Paris, 1822. (See "Journal of Engineering Education" Vol. 19, No. 5, January, 1929, p. 502.)

[24] Journal of Engineering Education, Vol. 19, No. 5, January, 1929, p. 502.

[25] Ibid., p. 504. One copy of Crozet's publication in possession of Louisiana State University.

geometry in Europe, Crozet was called the father of this new subject in America. Other publications followed. Sopwith wrote a very scholarly dissertation on isometric drawing in 1838.[26] In 1860 appeared a very complete and standard treatise entitled <u>Orthographic Projection</u> which was adapted to American needs.[27] This volume helped to popularize the subject with general education in arts and science schools as well as in military schools. It should be noted that descriptive geometry found its way first into military schools. In fact, it was born in a military school. Then it found its way quickly into schools of engineering. Later, it found its way slowly into general education.[28]

In according so much honor to Monge there should occur a slight note of reservation lest others highly deserving be entirely neglected. Seeds of thought leading to Monge's discovery were planted by earlier students of mathematics. Among these students Dürer[29]

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[26]Sopwith, T. <u>Treatise on Isometric Drawing</u>. John Weale, London, 1838. One copy in possession of Louisiana State University.

[27]Warren, S. Edward. <u>Orthographic Projections of Descriptive Geometry</u>. John Wiley, New York, 1860. One copy in possession of Louisiana State University.

[28]Journal of Engineering Education, Vol. 19, No. 5, January, 1929, pp. 505-506.

[29]Cajori, Florian, <u>op. cit</u>., p. 249.

should not be forgotten. Lamy[30] made a substantial contribution in 1710. Amedée François Frezier,[31] a practical engineer, out of his experience with stone cutting and with architecture, laid part of the foundation for descriptive geometry in 1738. John H. Lambert,[32] a prolific writer, published his Freye Perspective in 1759. Therefore, while Monge has received much deserved distinction, there is a good possibility that others contributed at least indirectly to his significant creation.

At an early date several significant publications were put on the market. Bowles[33] published a textbook on drawing in England. This publication ran through six editions, having been used a great deal in America as well as in England. Natte[34] gave the world his publication in 1805, and Cresswell[35] followed with another in 1811. Warren's publication on orthographic projection in 1860 has already been mentioned.

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[30]Lamy, B. Perspective Made Easie, 1710. Copy in possession of University of Illinois.

[31]Smith, David E., op. cit., Vol. 1, p. 472.

[32]Fink, Karl, op. cit., pp. 259-260.

[33]Bowles, Carington. Artist's Assistant in Drawing. Carington Bowles Map Print Ware House, London, 1783, Copy in Possession of Louisiana State University.

[34]Natte's Practical Geometry or Introduction to Perspective, 1805. One copy in possession of University of Illinois.

[35]Cresswell, D. Elements of Linear Perspective, 1811. One copy in possession of University of Illinois.

THE CONCEPT OF INDIRECTION AS RELATED TO DRAWING.

The concept of indirection is not a new concept although it has come more and more into use only as our social order has become more and more scientific. Monge's science of descriptive geometry gave this concept a widening impetus to an extent almost incalculable. The science of mechanical engineering, out of which has grown much of our modern industry, is based to a large extent on the principles of measuring magnitudes through the medium of linear projection.

In the conscious manipulation of our physical environment there are two great methods which, perhaps, include all other methods. One is the direct method. The other is the indirect method. Primitive man uses largely the direct method. Civilized man makes large use of the indirect method.

The Indian squaw cuts directly into the skins out of which she makes her wigwam. Little or no intervening preparation takes place. The product is primitive and in keeping with the method used. Continued adherence to the direct method is certain to keep a people on a primitive basis. Going to an extreme illustration of the indirect method, the construction of a modern ocean going vessel should serve well. Eminent engineers gave years of graphic meditation to the planning of that magnificent though ill-fated ocean going steamer, the "Lusitania," before an ounce of material was purchased for its construction. The "Lusitania" was a linear ship before it became a material ship. It was an engineering triumph in points of size and detail, and is highly representative of the principles of indirection.

Indirection means thought. It means careful picturing and re-picturing in the mind. It is a mind process. Since thought is fleeting, it has to be crystallized. It has to be held. It has to be transferred from mind to mind if it is to be most useful. The receptacle that holds thought for us is language, and in the present discussion, it is graphic language that is being considered. Without the graphic language, indirection especially in the structural world, would function little.

Symbolic language is extremely refined and is very flexible, and therefore, is widely used. Graphic language is less flexible, but it is very definite in its expression. For this reason, in cases where two minds must come to a common understanding, graphic language is highly useful. In modern life our courts of justice would be even more cluttered with people seeking redress because of misunderstandings, were it not for the definiteness of graphic language.

THE LINE SUPERSEDES THE MODEL AT THE U. S. PATENT OFFICE.

Another result of the Monge triumph is the elimination of the model.[36] In the beginnings of things people tend to deal with the concrete. Hence, in the field of representation at the beginning, people became accustomed to making small imitations of things or miniatures of things in order to convey their ideas. This practice continued for many centuries. Its most obvious point of manifestation was in the patent offices of foreign countries as well as in the patent office of the United States. The patent office serves as a clearing house for inventors who desire protection against encroachment upon their inventions. In order to protect an inventor, a clear understanding of his invention must be possessed by the officials at the patent office. The English language is inadequate to the demands of this purpose. Therefore, models were used to supplement descriptions of patents in question. Models are very cumbersome in a patent office to which applications for patent rights are directed in such

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[36] United States Department of Commerce, Patent Office Rules of Practice in the United States Patent Office, Revised October 1, 1936, pp. 13-14. Government Printing Office, Washington, D. C.

large numbers. A quotation from Anthony is germane at this point:

> At the beginning of the 20th century nearly 160,000 models had been stored for reference in the Patent Office at Washington, requiring about two acres of shelving and representing labor worth millions of dollars. This collection of mechanisms constituted a portion of the reference library of the Patent Office and was believed necessary because of the supposed inadequacy of the English and the graphic language, but today the department has found it necessary to suspend the reception of models and confines the inventor to the use of English and graphics.[37]

Thus it is evident that graphics have been so well developed that it is possible to indicate the three dimensions of a mechanical situation on one plane however complex the situation may be. That the patent office now relies largely on descriptive geometry to clarify inventions is concrete evidence of this.

THE DISCOVERY OF BLUE PRINT PAPER.

Different lines of advancement interrelate and augment each other. This may be said to be very true when the relation of drawing to blue printing is considered. The blue print process was discovered in 1840. It is a rather inexpensive method of duplicating drawings. Consequently, it worked in splendidly with the

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[37]Anthony, Gardner C. An Introduction to the Graphic Language, p. 79. D. C. Heath & Co., New York, 1922.

rapidly growing demand for more and more drawings in all forms of commercial, industrial and scientific endeavor.[38]

A United States Government study evinces a startling fact relative to the tremendous use of drawing in our modern work-a-day life. In the construction of one building, the New York Public Library, more than 20,000 blue prints were used. For the construction of an ordinary type of steam engine more than 1000 blue prints are used.[39] With these few facts as a basis for our thinking, it is not difficult to understand why the drawing tool industry has grown. It is an easy matter to see why the paper and the blue print industries have thrived. One can understand the reason for making recently two nation wide surveys of materials used in making lines.[40]

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[38]Berard, S. J. and Waters, E. C. The Elements of Machine Design, p. 314. D. Van Nostrand Co., 1924; Encyclopaedia Britannica, 14th Edition, Vol. 3, p. 756.

[39]Bulletin, 1922, No. 48. U. S. Bureau of Education, Washington, D. C., p. V.

[40]Wallace, Donald K. A Nation Wide Survey of the Marking Device Industry, U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce, Washington, D. C., 1932; Wallace, Donald K. A Nation Wide Survey of Blue Print and Allied Industries. U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce, Washington, D. C., 1933.

Summary

1. Two outstanding geniuses, Leonardo da Vinci and Albrecht Dürer, related definitely the graphic arts to science, to mathematics, to invention, to the laboratory, to industry, and to commerce. Dürer's work in the field of mathematics probably laid the groundwork for the accomplishment of Gaspard Monge.

2. As far as is known there are no technical drawings in existence dating back farther than the ninth century. In fact there is only one engineering drawing in preservation that is believed to have come from the ninth century. There are, however, deposited in museums specimens of drawing instruments that were made in Grecian and Roman times. The existence of these instruments points indirectly to the execution of engineering drawings in ancient times.

3. Claude Crozet, a Frenchman, brought to America to teach drawing at the United States Military Academy, West Point, wrote, perhaps, the first book published on drawing in the United States. By 1860 a number of publications were on the market. The subject was taken up rapidly by schools of engineering, but slowly by arts and science schools.

CHAPTER IV

AN ANALYSIS OF THE EDUCATIONAL PHILOSOPHY OF DRAWING BASED ON DIRECT QUOTATIONS FROM OUTSTANDING THINKERS

ARISTOTLE TO DEWEY

The universal interest in drawing is at no point more forcefully attested than in the fact that it has attracted and has engaged the serious consideration of eminent thinkers across the centuries. Scientists, statesmen, philosophers, inventors, educators, historians, dictators, and industrialists have scrutinized it and have commented concerning it. Such an array of intellect points with directness to the human significance of this graphic art.

ARISTOTLE 384-322 B. C.

Aristotle, the eminent student of the Grecian times, reduced all education to four customary subjects; namely, (1) reading and writing, (2) gymnastics, (3) music, (4) drawing. These four subjects should be interpreted rather broadly to include much of what properly comes under the concept of education.

The reader should think of the four foregoing subjects as comprising liberal education as contrasted with illiberal education or education for menial service to society. Drawing is on the border line between liberal and illiberal education because at one moment it may be cultural or aesthetic and at another moment practical.

It is not strange that drawing received a major place in Greek education because accomplishment in the field of art, at that time, received high social appraisal. There are few if any stronger stimuli to human effort than high social commendation for superior success. This is, perhaps, what Charles H. Judd was thinking of when he told the American educator that if the arts are to secure a firm foothold in the curriculum of the public schools, there must first be initiated a more rapidly developing appreciation for their place in life.

Aristotle gave drawing a place as one of the four usual subjects. He described the effects of its teaching as utilitarian, aesthetic, and productive of general culture. As a tool of instruction he thought it would intensify observation and aid in teaching other subjects of study more effectively.

QUOTATION--ARISTOTLE

> The branches of study at present established fall into both classes, as was said before. There are perhaps four customary subjects of education, reading and writing, gymnastics, music, and fourth with some people, drawing; reading and writing and

drawing being taught as being useful for the purposes of life and very serviceable, and gymnastics as contributing to manly courage; but as to music, here one might raise a question.[1]

. . . .

Hence our predecessors included music in education not as a necessity (for there is nothing necessary about it), nor as useful (in the way in which reading and writing are useful for business and for household management and for acquiring learning and for many pursuits of civil life, while drawing also seems to be useful in making us better judges of the works of artists), nor yet again as we pursue gymnastics, for the sake of health and strength (for we do not see either of these things produced as a result of music);[2].......

. . . .

And it is also clear that some of the useful subjects as well ought to be studied by the young not only because of their utility, like the study of reading and writing, but also because they may lead on to many other branches of knowledge; and similarly they should study drawing not in order that they may not go wrong in their private purchases and may avoid being cheated in buying and selling furniture, but rather because this study makes a man observant of bodily beauty; and to seek for utility everywhere is entirely unsuited to men that are greatsouled and free.[3]

VITRUVIUS ABOUT 40 B. C. TO ABOUT 25 A. D.

Vitruvius was a Roman engineer and architect who lived in the time of Augustus. Not a great deal is known concerning details of his life. He was probably active

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[1]Aristotle. The Politics, p. 639. With an English Translation by H. Rackham. William Hienemann, London, 1932.
[2]Ibid., pp. 641-643.
[3]Ibid., p. 645.

during the last quarter of the century immediately preceding the Christian era, and his activities probably extended well into the Christian era. He was noted for his writings on architecture.

The Romans left drawings and paintings; but they did not leave working drawings or engineering drawings. At least the archaeologist has not unearthed any as yet. Consequently the writings of Vitruvius are the most dependable evidence existent concerning the Roman architect and his training. In his dissertation on architecture Vitruvius devoted an entire chapter to the training of the Roman architect. In this training he included the art of draughtsmanship. This point is germane here because it is evidence that draughtsmanship was a well-developed, useful art in Roman times. Of course, the educational philosophy of Vitruvius is colored by the needs of the architect and engineer; nevertheless Vitruvius makes it plain that a good architect needs to know much outside of the field of architecture. Vitruvius would make his draughtsmen expert in the graphics, but he would also have them possess a knowledge of mathematics, science, philosophy, music, medicine, law, and astronomy as practical cultural accessories to the ability to draw.

QUOTATION - VITRUVIUS

> He should be a man of letters, a skilful draughtsman, a mathematician, familiar with scientific inquiries, a diligent student of philosophy, acquainted with music; not ignorant of medicine, learned in the responses of jurisconsults, familiar with astronomy and astronomical calculations.
>
> The reasons why this should be so are these. An architect must be a man of letters that he may keep a record of useful precedents. By his skill in draughtsmanship he will find it easy by coloured drawings to represent the effect desired.[4]

. . . .

> For an architect ought to be and can be no critic like Aristarchus, yet not without culture; no musician like Aristoxenus, yet not without knowledge of music; no painter like Apelles, yet not unskilled with his pencil.[5]

SIR THOMAS ELYOT 1490-1546.

Vives, the great Spaniard and contemporary of Elyot, wrote in 1523 a treatise in which he advocated the use of the mother-tongue. This treatise stimulated Elyot to the point of putting Vives' advocacy into practice. Homer wrote in Greek. Virgil wrote in Latin. Dante wrote in Italian. Chaucer wrote in English. Therefore Elyot attempted to demonstrate that the principles of education could be enunciated through the medium of

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[4]Vitruvius. On Architecture, Vol. 1, p. 9. Edited from the Harleian Manuscript 2767 and Trans. by Frank Granger. William Heinemann, Ltd., London, 1931.
[5]Ibid., p. 19.

English, which at that time was a form of old English. Elyot wrote The Boke Named The Governour in 1531, which is reputed to be the first book written in the English language on the subject of education.

The pertinence of Elyot's book is that he pointed out problems in education that are encountered even in this present day yet unsolved. Elyot advocated even four centuries ago many of the educational procedures that ultra-conservatives today call "fads."

It should be remembered that Vives was the precursor of Elyot in thought as he was also the precursor of Comenius. Therefore Elyot wrote much in advance of his time. In evaluating Elyot's educational philosophy it should also be remembered that he was writing on education largely for the prince, not for the peasant. Consequently, when Elyot advocated education through the medium of the crafts, through the arts, through play, through drawing, he was thinking of education in terms of natural laws, and not in terms of social preference. Therefore, Elyot's book bears two signal distinctions. First, it was the first book on education published in the English language, and second, its author, perhaps due to stimulation from Vives, thought in terms that were at least incipiently scientific.

Even in that early day Elyot was thinking in terms of leisure time and designated drawing as a profitable amusement. Elyot regarded drawing as a natural activity for children to indulge in, and specified participation in it as worth-while for both prince and peasant.

QUOTATION - ELYOT

If the childe be of nature inclined, (as many haue ben), to paint with a penne, or to fourme images in stone or tree: he shulde nat be therfrom withdrawn, or nature be rebuked, whiche is to hym beniuolent: but puttyng one to him, whiche is in that crafte, wherein he deliteth, moste excellent, in vacant tymes from other more serious lernynge, he shulde be, in the moste pure wise, enstructed in painting or keruinge.

And nowe, perchance, some enuious reder wyll hereof apprehende occasion to scorne me, sayenge that I haue well hyed me, to make of a noble man a mason or peynter. And yet, if either ambition or voluptuouse idelnes wolde haue suffered that reder to haue sene histories, he shuld haue founden excellent princis, as well in payntyng as in keruynge, equall to noble artificers: suche were Claudius, Titus, the sonne of Vespasian, Hadriane, both Antonines, and diuers other emperours and noble princes: whose warkes of longe tyme remayned in Rome and other cities, in suche places where all men mought beholde them: as monuments of their excellent wittes and vertuous occupation in eschewynge of idelnes.

And nat without a necessary cause princis were in their childhode so instructed: for it serued them afterwarde for deuysynge of engynes for the warre: or for making them better that be all redy deuysed. For, as Vitruuius (which writeth of buyldynge to the emperour Augustus) sayth, All turmentes of warre, whiche we cal ordinance, were first inuented by kinges or gouernours of hostes, or if they were deuised by other, they were by them made moche better. Also, by the feate of portraiture or payntyng, a capitaine may discriue the countray of his aduersary, wherby he shall eschue the daungerous passages with his hoste or nauie: also perceyue the placis of aduauntage, the forme of embataylynge of his ennemies: the situation of his campe, for his mooste suertie: the strength or weakenes of the towne or fortresse whiche he intendeth to assaulte. And that whiche is mooste specially to be considered, in visiting his owne dominions, he shal sette them out in figure, in such wise that at his eie shal appere to hym where he shall employ his study and treasure, as well for the saulfgarde of his countray, as for the commodite and honour therof, hauyng at al tymes in his sight the suertie and feblenes, aduauncement and hyndrance, of the same. And what pleasure and also utilite is it to a man whiche intendeth to edifie, hymselfe to expresse the figure of the warke that he purposeth, accordyng as he hath conceyued it in his owne fantasie? wherin, by often amendyng and correctyng, he finally shall so perfecte the warke unto his purpose, that there shall neither ensue any repentance, nor in the employment of his money he shall be by other deceiued. More ouer the feate of portraiture shall be an allectiue to euery other studie or exercise. For the witte therto disposed shall alway couaite congruent mater, wherin it may be occupied. And whan he happeneth to rede or here any fable or historie, forthwith he apprehendeth it more desirously, and retaineth it better, than any other that lacketh the sayd feate: by reason that he hath founde mater apte to his fantasie. Finally, euery thinge that portraiture may comprehende will be to him delectable to rede or here. And where the liuely spirite, and that whiche is called the grace of the thyng, is perfectly expressed, that thinge more persuadeth and stereth the beholder, and soner istructeth hym, than the declaration in writynge or speakynge doth the reder or hearer. Experience we haue therof in lernynge of geometry, astronomie, and cosmogrophie, called in englisshe the discription of the worlde. In which studies I dare affirme a man shal more profite, in one wike, by figures and chartis, well and perfectly made, than he shall by the only reding or heryng the rules of that science by the space of halfe a yere at the lest; wherfore the late writers deserue no small commendation whiche added to the autors of those sciences apt and propre figures.[6]

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[6]Elyot, Sir Thomas. <u>The Boke Named The Governour</u>, pp. 28-30. (First published in 1531.) J. M. Dent & Co., London; E. P. Dutton & Co., New York, 1907.

JOHN AMOS COMENIUS 1592-1670.

Comenius, like Elyot, had read the writings of Vives, the great Spaniard. Vives, although having lived nearly a century before the time of Comenius, saw the necessity of dealing a great deal with the objective world round about, especially in the field of elementary education. Comenius caught the vision from the writings of Vives, but he outdid Vives in reflecting and elaborating with a tremendous amount of writing. The Great Didactic is a monumental work, but it is only one of Comenius' contributions.

Comenius wrote so much and from so many viewpoints that the question might well be raised whether he really reflected deeply on every detail suggested to his reader. However, there is one point related to drawing on which there is no question concerning the meaning which Comenius had in mind. It is in connection with the drawing accompanying and supplementing the printed matter. Here the drawing is not executed by the pupil, but is supplied by the author of the book.

It is at this point that Comenius may justly be given the title of father of visual education. Comenius wrote, perhaps, the first picture book for children entitled the Orbis Pictus.[7] It is a book of printed matter with drawings exemplifying the meaning of the printed matter.

It should be remembered that writing has been traced in this study from the pure pictorial through the less and less pictorial to the pure symbol. The completion of this evolution together with the invention of the printing press was hailed as an incomparable educational innovation. Indeed, it was a step forward with an influence the depth of which no one can fathom. In 1657 Comenius published his Orbis Pictus, which meant a return again to the pictorial supplementing the printed matter. The return to the pictorial was hailed as a great educational innovation.

This appears to be in part a reversion from the pure symbol to the pictorial. An explanation at this point is necessary. The truth is the invention of paper and the invention of printing made the book accessible to children. Teachers learned to rely on the book almost entirely. The schools became bookish; that is, they confined instruction largely to the pure symbol. Children, and especially young children, lack sufficient experience to read real meanings into pure symbols. For

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[7]Comenius, John Amos. The Orbis Pictus, 1657. Trans. by Charles Hoole, 1658. C. W. Bardeen, Publisher, Syracuse, New York, 1887.

this reason children do not learn effectively if their instruction is confined to books alone. Vives saw this. Elyot saw it. Comenius saw it and proposed to do something about it. Comenius endeavored to objectify the meaning of the printed page by supplying drawings having largely the same meaning as that embraced in the printed symbols. Comenius made a large appeal to the eye. Comenius understood exactly what people today understand who are fathering visual education. However, Comenius did not stop at this point in his thinking. He suggested making an appeal to the motor, to the muscle, or to what students have learned to call the sixth sense. Here of course, the child would not only observe the drawing as suggested in the Orbis Pictus, but would also make a drawing with his own muscles.

The evolution of the line as an instrument for conveying meanings may be shown as follows:

1. Pure pictorial as used by primitive man.
2. Part pictorial and part symbolic, designating change.
3. Less pictorial and more symbolic, designating more change.
4. Pure symbolic.
5. Pure symbolic, supplemented by the pictorial made by author or teacher.

6. Pure symbolic, supplemented by author's drawing and also supplemented by drawing on part of the child.

QUOTATION - COMENIUS

> The fourth, fifth, and sixth years will and ought to be full of labors and architectural efforts; for too much sitting still or slowly walking about on the part of a child is not a good sign; to be always running or doing something is a sure sign of a sound body and vigorous intellect; therefore, whatever attracts their attention, that ought not to be denied, but rather be given them; that which is done should be properly done, and with a view to future usefulness.
>
> Children in this maternal school ought also, in their fourth and fifth year, to be exercised in drawing and writing, according as their inclination may be noticed or excited, supplying them with chalk (poorer persons may use a piece of charcoal), with which they may at their will make dots, lines, hooks, or round O's, of which the method may be easily shown, either as an exercise or amusement. In this way they will accustom the hand to the use of the chalk, and to form letters, and they will understand what a dot is, and what a little line, which will afterwards greatly abridge the labors of the teachers.[8]

JOHN LOCKE 1632-1704

If one studies analytically the philosophy of the great educators of the sixteenth, seventeenth, and eighteenth centuries, he is certain to find one thought

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[8]Comenius, John Amos. School of Infancy, p. 46. Trans. by W. S. Monroe, D. C. Heath & Co., Boston, 1896.

that persists generally. It is the conviction that the pure symbol in the printed book does not have sufficient meaning for children because they have not had an adequate amount of experience with real things, with the objective world and its forces, physical and social. There exists a theory that the printed symbol has meaning only in the proportion that the reader brings to it a richness of experience, informative and reflective.

Drawing was grasped as a ready instrument by the great educators to correct and supplement the insufficiency of the printed symbol. Drawing is not reality, but it is an approach to reality; it is suggestive of reality. Drawing, because of its adaptability and non-spatiality, is a ready tool for use on paper.

Locke was out of sympathy with education that did not contribute to the legitimate demands of life. His advocacy of trade education even for the gentlemen, may appear extreme. Locke was not an extreme utilitarian; he saw plainly that education was not possible in a vacuum. Drawing demands visualization which in turn demands reference to realities. It is this reference to reality which dovetails with the philosophy of Locke.

QUOTATION - LOCKE

> When he can write well and quick, I think it may be convenient not only to continue the Exercise of his Hand in Writing, but also to improve the Use of it farther in Drawing; a Thing very useful to a Gentleman in several Occasions; but especially if he travel, as that which helps a Man often to express, in a few Lines well put together, what a whole Sheet of Paper in Writing would not be able to represent and make intelligible. How many Buildings may a Man see, how many Machines and Habits meet with, the Ideas whereof would be easily retain'd and communicated by a little Skill in Drawing; which being committed to Words, are in danger to be lost, or at best but ill retained in the most exact Descriptions? I do not mean that I would have your Son a perfect Painter; to be that to any tolerable Degree, will require more Time than a young Gentleman can spare from his other Improvements of greater Moment. But so much Insight into Perspective and Skill in Drawing, as will enable him to represent tolerably on Paper any thing he sees, except Faces, may, I think, be got in a little time, especially if he have a Genius to it; but where that is wanting, unless it be in things absolutely necessary, it is better to let him pass them by quietly, than to vex him about them to no Purpose: And therefore in this, as in all other things not absolutely necessary, the Rule holds, Nil invita Minerva.[9]

BENJAMIN FRANKLIN 1706-1790

Franklin, the poor boy, the printer, the statesman, the diplomat, rose from obscurity to international prominence. He did it without the aid of formal education, secondary or college. Yet he was a staunch advocate of formal education for the American youth, and he

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[9]Locke, John. Some Thoughts Concerning Education, pp. 240-241. Tenth Edition. A. Bettesworth and C. Hitch, London, 1738.

used his great talent and wide influence to initiate and secure universal public education. Franklin would not ordinarily be classed as an educator, yet in discourse in which he gave vent to opinions on educational problems, he indicated that he was thinking straight and saw far beyond his time. Franklin advocated both cultural and practical education. Franklin saw, as did his friend Benjamin Rush, that they were living in a frontier country and moving west. The need of a type of education that would help build up was obvious to him. Therefore, it is only in line with Franklin's general philosophy of education when he points out drawing as a subject with which the school should properly concern itself. Franklin regarded linear drawing as an aid to art, to language, to industry, to thought, and to general education, for either an aristocrat or a mechanic.

QUOTATION - FRANKLIN

> As to their STUDIES, it would be well if they could be taught every Thing that is useful, and every Thing that is ornamental: But Art is long, and their Time is short. It is therefore propos'd that they learn those Things that are likely to be most useful and most ornamental. Regard being had to the several Professions for which they are intended.

All should be taught to write a fair Hand, and swift, as that is useful to All. And with it may be learnt something of Drawing, by Imitation of Prints, and some of the first Principles of Perspective.

Drawing is a kind of Universal Language, Understood by all Nations. A Man may often express his Ideas, even to his own Countrymen, more clearly with a Lead Pencil, or Bit of Chalk, than with his Tongue. And many can understand a Figure, that do not comprehend a description in Words, tho' ever so properly chosen. All Boys have an early Inclination to this Improvement, and begin to make Figures of Animals, Ships, Machines, Etc. as soon as they can use a Pen: But for want of a little Instruction at that Time, generally are discouraged, and quit the Pursuit.

Drawing is no less useful to a Mechanic than to a Gentleman. Several Handicrafts seem to require it; as the Carpenter's, Shipwright's, Engraver's, Painter's, Carver's, Cabinet-maker's, Gardiner's, and other Businesses. By a little Skill of this kind, the Workman may perfect his own idea of the Thing to be done, before he begins to work; and show a Draft for the Encouragement and Satisfaction of his Employer.[10]

JEAN JACQUES ROUSSEAU 1712-1778

Rousseau went much farther than did either Comenius or Locke in questioning the effectiveness of the book in the education of children. He denounced the use of the book with young children in any form, and advocated going to nature for instruction on the one hand and following the natural interests of the child on the other hand. Rousseau denounced with vehemence artificiality

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[10] Franklin, Benjamin. Proposals Relating to the Education of Youth in Pennsylvania, pp. 11-12. 1749. University of Pennsylvania Press, Philadelphia.

of any kind in education. He held more strenuously to the theory of reality than did any of the eminent educators who wrote before his time. Rousseau emphasized training in accuracy of the eye, development of dexterity, training in habit of visualization, drawing from nature only, drawing for amusement, and drawing for aesthetic appreciation.

QUOTATION ROUSSEAU

DRAWING

> All children, being natural imitators, try to draw. I would have my pupil cultivate this art, not exactly for the sake of the art itself, but to render the eye true and the hand flexible. In general, it matters little whether he understands this or that exercise, provided he acquires the mental insight, and the manual skill furnished by the exercise. I should take care, therefore, not to give him a drawingmaster, who would give him only copies to imitate, and would make him draw from drawings only. He shall have no teacher but nature, no models but real things. He shall have before his eyes the originals, and not the paper which represents them. He shall draw a house from a real house, a tree from a tree, a human figure from the man himself. In this way he will accustom himself to observe bodies and their appearances, and not mistake for accurate imitations those that are false and conventional. I should even object to his drawing anything from memory, until by frequent observations the exact forms of the objects had clearly imprinted themselves on his imagination, lest, substituting odd and fantastic shapes for the real things, he might lose the knowledge of proportion and a taste for the beauties of nature. I know very well that he will go on daubing for a long time without making anything worth noticing, and will be long in mastering elegance of outline, and in acquiring the deft stroke of a skilled draughtsman. He may

> never learn to discern picturesque effects, or draw with superior skill. On the other hand, he will have a more correct eye, a truer hand, a knowledge of the real relations of size and shape in animals, plants, and natural bodies, and practical experience of the illusions of perspective. This is precisely what I intend; not so much that he shall imitate objects as that he shall know them. I would rather have him show me an acanthus than a finished drawing of the foliation of a capital.[11]

THOMAS JEFFERSON 1743-1826

Jefferson possessed a clear grasp of the national significance of education. With Jefferson, the subject of education was almost a passion and especially as he saw it in its relation to citizenship. In a letter to Washington in 1786 he wrote:

> It is an axiom in my mind that our liberty can never be safe, but in the hands of the people themselves, and that too, of a people with a certain degree of instruction.

Jefferson was a statesman interested in the upbuilding and preservation of democracy in America. Moreover, Jefferson was a great statesman with a magnificent intellect who perceived education in its manifoldness. He saw its relation to culture. He saw its relation to commerce, trade, and industry. He saw citizenship, culture, commerce, trade, industry, and education, as one interwoven, interrelated fabric. On

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[11] Rousseau, Jean Jacques. Emile: or, Concerning Education, pp. 103-104. Trans. by Eleanor Worthington. D. C. Heath & Co., Boston, 1909.

educational problems Jefferson had a fine balance. This is illustrated in his plan for a trade school. Although the father of a state university himself, he saw the need of, and endeavored to put into practice, an organization known as a "school of technical philosophy."

Anderson said:

> Another eminent American of the revolutionary period whose writings reflect the tendencies of seventeenth and eighteenth century educational thought in Europe is Thomas Jefferson. While his great contemporary, Franklin, endeavored to interrelate more closely industrial and general education and to utilize industrial subjects for purposes of liberal culture, Jefferson proposed to systematize and to subject to school methods much of the vocational education of the craftsman. He planned to establish a "school of technical philosophy" as a part of a people's university.[12]

QUOTATION - JEFFERSON

> The ornaments too, and the amusements of life, are entitled to their portion of attention. These, for a female, are dancing, drawing, and music. .... Drawing is thought less of in this country than in Europe. It is an innocent and engaging amusement, often useful, and a qualification not to be neglected in one who is to become a mother and an instructor.[13]

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[12]Anderson, Lewis F. History of Manual and Industrial School Education, p. 32. D. Appleton & Co., New York, 1926.

[13]Jefferson, Thomas. The Writings of Thomas Jefferson, Vol. XV, p. 167. The Thomas Jefferson Memorial Association of the U. S., Washington, D. C., 1904.

> I have been quite anxious to get a good drawing master in the military or landscape line for the University. It is a branch of male education most highly and justly valued on the Continent of Europe.[14]

> The upper circular room of the rotunda shall be reserved for a library.
>
> One of its larger elliptical rooms on its middle floor shall be used for annual examinations, for lectures to such schools as are too numerous for their ordinary school room, and for religious worship, under the regulations allowed to be prescribed by law. The other rooms on the same floor may be used by schools of instruction in drawing, music, or any other of the innocent and ornamental accomplishments of life; but under such instructors only as shall be approved and licensed by the faculty.[15]

> The use of tools too in the manual arts is worthy of encouragement, by facilitating to such as choose it, an admission into the neighboring workshops. To these should be added the arts which embellish life, dancing, music, and drawing; the last more especially, as an important part of military education. These innocent arts furnish amusement and happiness to those who, having time on their hands, might less inoffensively employ it. Needing, at the same time no regular incorporation with the institution, they may be left to accessory teachers, who will be paid by the individuals employing them, the University only providing proper apartments for their exercise.[16]

JEFFERSON'S SCHOOL OF TECHNICAL PHILOSOPHY

> To such a school (were to come)... the mariner, carpenter, shipwright, pumpmaker, clockmaker,

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[14]Honeywell, Roy J. The Educational Work of Thomas Jefferson, p. 126. Harvard University Press, Cambridge, 1931.

[15]Ibid., p. 275. Appendix M. Regulations Adopted by the Board of Visitors of the University of Virginia, October 4, 1824.

[16]Ibid., pp. 256-257. Appendix M. Report of the Commissioners Appointed to Fix the Site of the University of Virginia, etc.

> mechanist, optician, metallurgist, founder, cutler, druggist, brewer, vintner, distiller, dyer, painter, bleacher, soapmaker, etc., ... to learn as much as shall be necessary to pursue their art understandingly of the sciences of geometry, mechanics, statics, hydrostatics, hydraulics, hydrodynamics.[17]

JOHANN HEINRICH PESTALOZZI 1746-1827

Pestalozzi had access to the writings of Comenius, Locke, and Rousseau. Those writings influenced considerably his educational thinking and his efforts in educational experimentation. Pestalozzi not only accepted the theory of sense perception, but regarded it as very basic in elementary education. Pestalozzi was especially influenced by the writings of Rousseau from whom he very likely received at least the inception of his zeal for knowledge of natural laws.

In his thinking Pestalozzi arrived at a three point plan for elementary education: (1) language, (2) form, (3) number. It is under the heading education as a study of form that Pestalozzi placed drawing. In fact he thought of drawing as synonymous with form. He defined drawing as a linear definition of form.

Pestalozzi had a strong desire to simplify education. This led him into the process of mechanizing

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[17]Anderson, Lewis F., op. cit., p. 32.

education. He hoped to organize a pedagogical machine so well set up that any teacher could run it. He based the possible realization of such a machine upon the discovery of the laws of nature.

Therefore, Pestalozzi endeavored to organize an A B C procedure for teaching drawing that would be entirely in keeping with the laws of nature and so infallible that, if followed, it would lead definitely to the desired end result of drawing. Consequently, he suggested starting with the simplest element, namely, a straight line, which should be studied, extending in different arbitrary directions by itself and free from complicated applications. Then the straight line should be studied in each of its classifications, namely, horizontal line, vertical line, oblique line. Then the parallelism of lines should be studied, followed by a study of each class of angles, right, acute, obtuse. Out of this should grow the study of the square, of the oblong, of the triangle, and of the circle, etc.

Pestalozzi reasoned that if the child were subjected to the procedure indicated above he would be supplied with mental concepts of form which he might use as tools for thinking in terms of form, which he might use as tools for estimating proportions of form, and which he might use as tools for estimating measurements of form.

QUOTATION - PESTALOZZI

Drawing is a linear definition of the form, of which the outline and surface are rightly and exactly defined by complete measurement.[18]

. . . .

But drawing as a help toward the end of instruction, making ideas clear, is essentially bound up with the measurement of forms. When to a child an object is given to draw, he can never use his art as he should, that is as a means of rising through vague sense-impression to clear ideas in all his education, until he can represent the proportions of the form, and express himself about them; nor can his art have that real value that it might and should have, were it in harmony with the great purpose of education.[19]

. . . .

THE ART OF DRAWING

is the power of representing to oneself the sense-impression made by any object, its outline and the characteristics contained within the outline, by means of similar lines, and of being able to imitate these lines accurately.

This art will become beyond comparison easier by the new method, because in every way it appears to be only an easy application of the forms that have not only been observed by the child already, but by practice in imitating have developed in him a real power of measuring.

This is done in this way. As soon as the child draws readily and correctly the horizontal line, with which the A B C of Anschauung begins, out of the whole chaos of objects seen and shown we try to find him figures whose outline is only the application of the familiar horizontal line, or at least offers only an imperceptible deviation from it.

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[18]Pestalozzi, Johann Heinrich. How Gertrude Teaches Her Children, p. 186. 1801. Trans. by Lucy E. Holland and Frances C. Turner. C. W. Bardeen, Publisher, Syracuse, New York, 1898.

[19]Ibid., p. 189.

Then we go on to the vertical line, then to the right angle, and so on. As the child by easy application of these forms becomes stronger, we gradually vary the figures. The results of these measures (which agree with the natural physical mechanical laws) on the art of drawing are as remarkable as those of the A B C of Anschauung upon the art of measuring. While in this way the children before they proceed farther bring to perfection every drawing, even the first-beginning drawing, a consciousness of the result of perfected power is already developed in them, in the first steps of this art; and with this consciousness are also developed an effort towards perfection and a perseverance towards completion, which the hurly-burly caused by the folly and disorder of our unpsychological men and methods of art-education never attempts or can attempt.

The foundation of progress in children so taught is not only in the hand; it is founded on the intrinsic powers of human nature. The exercise-books of measure-forms then give the sequence of means by which this effort, used with psychological art and within physical-mechanical laws, raises the child step by step to the point on which we have already touched, when having the measure-forms actually before him becomes gradually superfluous, and when of the guiding lines in art none remains but art itself.[20]

. . . .

THE ART OF WRITING

Nature herself has subordinated this art to that of drawing; and all methods by which drawing is developed and brought to perfection in children must then be naturally and specially dependent upon the art of measuring.

The art of writing can as little as drawing be begun and pursued without preceding developing exercises in measured lines, not only because it is a special kind of linear drawing and suffers no arbitrary deviation from the fixed direction of its forms, but also because if it is made easy

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[20]Pestalozzi, Johann Heinrich, _op. cit._, pp. 195-196.

to the child before drawing, it must necessarily spoil the hand (for drawing), by stiffening it in particular directions before the universal flexibility for all the forms which drawing requires has been sufficiently and firmly established. Still more should drawing precede writing because it makes the right forming of the letters incomparably easier, and saves the great waste of time spent in making again and again crooked (and incorrect) forms. The child enjoys this advantage in his whole education; from the very beginning of the art he is made conscious of its power of perfection; and therefore from the first moment of learning to write, it creates the will to add nothing inharmonious, incorrect, and imperfect to the first steps already brought to a certain degree of accuracy, precision, and perfection.[21]

. . . .

Writing is only a kind of linear drawing applied to certain arbitrary forms, and must be subject to the general laws of linear drawing. Nature confirms this principle. The child is able to make the elements of linear drawing his own, two years before he is in a position to guide well that delicate instrument, the pen. Therefore I teach the children to draw before thinking of writing, and by this means they form the letters more perfectly than they would otherwise do at this age.[22]

NAPOLEON 1769-1821

France included drawing in the general scheme of education, recognizing its value earlier than other European countries. Napoleon, like dictators of the present day, concerned himself vitally with national education. He visualized the significance of drawing

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[21] Pestalozzi, Johann Heinrich, op. cit., pp. 196-197.
[22] Ibid., p. 329.

to military operations. For this reason he gave great impetus to drawing in the schools of France.[23]

In 1803 he organized the school at Compeigne and three years later, transferred it to Chalon-sur-Marne in larger quarters because of its rapidly increasing attendance. The course in this school included the elements of geometry and drawing, descriptive geometry applied to crafts, drawing and tinting applied to machines, and application of principles of mechanics for gifted boys. Later Napoleon issued an order to the bureau of instruction to prepare a drawing book for the national schools of France. This book was prepared by Louis Benjamin Francoeur, and later influenced the teaching of drawing in America. In fact it was translated by an American teacher of drawing, William Bentley Fowle in Boston in 1827.

QUOTATION - NAPOLEON. UTTERED AFTER A TOUR OF FRANCE AND BEFORE HE CAUSED THE TEACHING OF DRAWING TO BE INTENSIFIED

> I have found everywhere workmen distinguished in their craft, having great dexterity in execution, but hardly one who can make a drawing of the

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[23]Bennett, Charles A. Manual and Industrial Education up to 1870, pp. 275-278. Manual Arts Press, Peoria, Ill., 1926; Anderson, Lewis F., op. cit. pp. 120-132.

> simplest type of machine or could express his ideas by a sketch or memorandum. It is a gap in the French industry; I will fill it up.[24]

JOHANN FRIEDRICH HERBART 1776-1841

Pestalozzi devised a three point system of education, namely, (1) language, (2) form, and (3) number. Herbart devised a two point system of education, namely, (1) number, and (2) form.[25] Pestalozzi tried to systematize his education on a basis of natural law. Herbart also tried to devise a rigid system, and would leave nothing to chance. He thought of drawing as an aid in carrying out what he called apperception. The concept of apperception was an important theory in his thinking.

Herbart would use drawing to restore the original image on the retina of the eye. Imagination modifies the original sense perception. Memory drawing according to Herbart, will cause a restoration of the original impression on the retina. This in turn would reinforce apperception.

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[24] L'Enseignment en France, Vol. 1, p. 271. Exposition of 1900, Paris. Trans. by Bennett, Charles A. History of Manual and Industrial Education Up To 1870. p. 276. Manual Arts Press, Peoria, Ill., 1926.

[25] Painter, F. V. N. A History of Education, p. 319. D. Appleton & Co., New York, 1907.

QUOTATION - HERBART

> Sense perception, this indispensable, this firmest, broadest bridge between man and nature, certainly deserves, as far as it is capable of being cultivated by any art, to have dedicated to it one chief line of pedagogical endeavor.... It would be the highest pride of the drawing teacher as well as the teacher who in cultivating the sense-perception if they could unite in bringing out by their training the desired accuracy and facility in the apperception of Nature...... The forms that Nature presents are by the eye apperceived in one way, by the imagination in another..... Drawing and perspective teach imagination to go back and to restore the visual plane destroyed by it.[26]

FRIEDRICH FROEBEL 1782-1852.

Herbart placed great emphasis upon the teacher in his educational philosophy. Froebel, on the contrary, placed even more emphasis upon the child. Froebel's educational process starts with the spontaneous activity of the child. The activity must be actuated from within. Learning results consciously and unconsciously to the child. The kindergarten was born out of this idea of playful, spontaneous activity resulting in learning. The child, however, must not be conscious of the serious end result. The play element must dominate.

The principle of activity holds good on all levels of learning. However, Froebel applied it only to the kindergarten.

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[26]Herbart, Johann Friedrich. A B C of Sense-Perception. pp. 260-261, 267. D. Appleton & Co., New York, 1905.

Drawing is an activity, physical and mental. It is of necessity a coordinated mental-physical activity. This gives it an added educational value. Froebel, therefore, places much stress on the educative value of drawing.

QUOTATION - FROEBEL

> The attentive mother, the thoughtful father, the sympathetic family (without any of them having ever drawn, without an artist among them), may lead the child growing into boyhood to draw with tolerable accuracy a straight line, a diagonal or diameter, even rectangular objects in vertical position (e. g., mirrors, windows, and many other things), with some degree of resemblance.
>
> It is not only conducive but necessary to the development and strengthening of the child's power and skill that parents should, without being pedantic or too exacting, connect the child's actions with suitable language, e. g., "Now I draw a table, a mirror; now I draw the diagonal of the slate, of the board."
>
> This enhances the inner and the outer power, increases knowledge, awakens the judgment and reflection, which avoids so many blunders, and which, in a natural way, can not be aroused too soon. For the word and the drawing are always mutually explanatory and complementary; for neither one is, by itself, exhaustive and sufficient with reference to the object represented. The drawing properly stands between the word and the thing, shares certain qualities with each of them, and is, therefore, so valuable in the development of the child. The true drawing has this in common with the thing, that it seeks to represent it in form and outline; like the word, however, it never is the thing itself, but only an image of the thing. The word and the drawing are again clearly opposed in their nature; for the drawing is dead, while the word lives; the drawing is visible, as the word is audible. The word and the drawing, therefore, belong together inseparably, as light and shadow, night and day, soul and body do. The faculty of

drawing is, therefore, as much innate in the child, in man, as is the faculty of speech, and demands its development and cultivation as imperatively as the latter; experience shows this clearly in the child's love for drawing, in the child's instinctive desire for drawing.[27]

HORACE MANN 1796-1859

Mann was the first state secretary of education for the state of Massachusetts. This means that he was the first state secretary of education in the United States.

Mann was a strong advocate of the teaching of drawing in the public schools. On this matter he was probably influenced from three viewpoints. First, he was a good student of education and could see for himself the value of drawing. Second, he studied the schools of Europe at first hand, and his observations there strengthened his belief in the educational value of drawing. Third, Mann married Mary T. Peabody who was a teacher of drawing, and also the author of The Primer of Reading of Drawing. Mann's sister-in-law, Elizabeth P. Peabody, was a kindergarten teacher and also a teacher of drawing. She was the author of A Method of Teaching Linear Drawing. In Mann's famous Seventh Report, he elaborated on his conception of drawing as an educational factor.

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[27]Froebel, Friedrich. The Education of Man, pp. 78-79. Trans. by W. N. Hailmann. D. Appleton & Co., New York, 1910.

QUOTATION - MANN

WRITING AND DRAWING

Such excellent hand-writing as I saw in the Prussian schools I never saw before. I can hardly express myself too strongly on this point. In Great Britain, France, or in our own country, I have never seen any schools worthy to be compared with theirs in this respect. .... This excellence must be referred in a great degree, to the universal practice of learning to draw contemporaneously with learning to write...... Now, the objects contemplated in drawing, from their nature, attract attention more readily, impress the mind more deeply, and, of course, will be more accurately copied, than those in writing.. And when the eye has been trained to observe, to distinguish, and to imitate, in the first exercise, it applies its habits with great advantage to the second........

For the master-architect, for the engraver, the engineer, the pattern-designer, the draughtsman, moulder, machine-builder, or head mechanic of any kind, all acknowledge that this art is essential and indispensable. But there is no department of business or condition in life where the accomplishment would not be of utility. Every man should be able to plot a field, to sketch a road or a river, to draw the outlines of a simple machine, a piece of household furniture or a farming utensil, and to delineate the internal arrangement or construction of a house.

But to be able to represent by lines and shadows what no words can depict is only a minor part of the benefit of learning to draw. The study of this art develops the talent of observing even more than that of delineating. Although a man may have but comparatively few occasions to picture forth what he has observed, yet the habit of observation should be cultivated by every rational being. The skillful delineator is not only able to describe far better what he has seen, but he sees twice as many things in the world as he would otherwise do..............

With the inventive genius of our people, the art of drawing would be eminently useful. They would turn it to better account than any other people in the world. We now perform far the greater part of our labor by machinery. With the high wages prevalent amongst us, if such were not the case, our whole community would be impoverished.... But whatever may be said of the importance of this art, as it regards the community at large, its value to a school-teacher can hardly be estimated..... And in teaching navigation, surveying, trigonometry, geometry &c.; in describing the mechanical powers; in optics, in astronomy, in the various branches of natural philosophy, and especially in physiology,--the teacher who has a command of this art will teach incomparably better and incomparably faster than if he were ignorant of it. I never saw a teacher in a German school make use of a ruler, or any other mechanical aid, in drawing the nicest or most complicated figures.[28]

HENRY BARNARD 1811-1900

Barnard was a contemporary of Mann. Mann and Barnard gave education great impetus in America. Mann was the great leader of the awakening period. Barnard was the great scholar of the awakening period. Like Mann, Barnard studied the schools of Europe at first hand. He was much impressed with the effects of the teaching of drawing in European schools. When he became secretary of education in the state of Connecticut, he made a strong effort to introduce the teaching of drawing into the schools of that state.

Later Barnard became the first United States Commissioner of Education. In this capacity he continued

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[28]Mann, Horace. Seventh Annual Report, pp. 327-332. After return from a trip abroad, 1843. Horace B. Fuller, Boston, 1868.

to advocate the teaching of drawing in the public schools.

QUOTATION - BARNARD

> Pictorial art.--Nor is it only by means of natural objects that the sense of sight contributes to the exercise and discipline of the perceptive intellect. Art, too, renders here a rich tribute to the resources of education. Models and pictures, and the humblest attempts to produce these, as repetitions of the mental impressions received from nature, give inexpressible delight to the susceptible and imitative spirit of childhood. Their effect is invaluable, in training the perceptive faculties to the keenest, closest, long-sustained action, without the sense of weariness or fatigue; and their inspiring and refreshing influence gives vivacity and force to the whole mind. The clear perception, fixed attention, watchful observation, and active exertion, which they both require and cherish, particularly when the child is permitted to attempt to produce imitative efforts of his own, in drawing or modelling, meet so successfully the craving of the young spirit for action and endeavor, that they become powerful aids to mental development. The working hand is thus brought to the aid of the active eye, as a test, at the same time, of its correctness of vision, which is proved by the degree of truthfulness in the delineation. This productive method of exercising the perceptive and executive faculties, yields to the child the peculiar delight of having achieved something palpable, as a proof of power, and is meanwhile, working in his mind the silent effect which is to appear, in due season, in the symmetry and gracefulness of his handwriting, and the neatness of whatever he attempts, whether in plan or execution.[29]
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> . . . .

[29]Barnard, Henry. Education, the School, and the Teacher, in American Literature. Second Edition, p. 30. Brown & Gross, Hartford, 1876.

Drawing, as an Imitative Art.--The imitative tendency of the young, leading, as it does, to the perfecting of utterance, as an exercise in which practice begets skill, extends its influence, by the law of analogy, far and wide, over every branch of art which involves expression as a result. Nor is there one of all these branches which does not, by the habitual practice of it, under the same law, serve to discipline and perfect the power of expression in every other.

The feelings, the imagination, the conceptive power, the taste, and even the critical judgment of the young mind, are all called into as active exercise, in every earnest attempt to draw in outline, to shade, or to color the form of any external object, as in any endeavor to describe it by tongue or pen. Indeed, the extreme fixedness of attention demanded for exact and faithful delineation by the pencil, ensures a yet higher degree of mental activity, than does any other form of descriptive execution, and contributes more effectually to the development of graphic power of expression in language, than can any direct exercise in speech or writing; because the same powers are exerted in the one case as in the other, but with much more care and closeness of application.[30]

. . . .

Lessons in Drawing: Common Mistake.--Many parents and teachers never bestow a thought on the true character or proper uses of art, as a means of mental culture, or as a practical accomplishment, but labor under the false notion that a little dabbling in it, under a very ordinary instructor, is at least something gained toward refinement of taste and graceful habit. There can not be a greater error committed in education than this. Every attempt to copy an imperfect model, brings down the tone of taste, and does something to hinder the attainment of excellence. Neglect is wholesome, when compared with perversion or with false instruction.[31]

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[30]Barnard, Henry, op. cit., p. 65.
[31]Ibid., p. 91.

THOMAS H. HUXLEY 1825-1895

Huxley was an eminent English biologist contemporary with Darwin and in a sense a protagonist of Darwin. Huxley's only professional contact with education was as a member of the London School Board from 1870 to 1872. During this period he made war on the over-taxing of the memory of children. Huxley emphasized the value of teaching physical education, domestic science, physical science, and drawing.

QUOTATION - HUXLEY

> But, you will say, all this is fault-finding; let us hear what you have in the way of positive suggestion. Then I am bound to tell you that, if I could make a clean sweep of everything--I am very glad I cannot because I might, and probably should, make mistakes,--but if I could make a clean sweep of everything and start afresh, I should, in the first place, secure that training of the young in reading and writing, and in the habit of attention and observation, both to that which is told them, and that which they see, which everybody agrees to. But in addition to that, I should make it absolutely necessary for everybody, for a longer or shorter period, to learn to draw. Now, you may say, there are some people who cannot draw, however much they may be taught. I deny that *in toto*, because I never yet met with anybody who could not learn to write. Writing is a form of drawing; therefore if you give the same attention and trouble to drawing as you do to writing, depend upon it, there is nobody who can not be made to draw, more or less well. Do not misapprehend me. I do not say for one moment you would make an artistic draughtsman. Artists are not made; they grow. You may improve the natural faculty in that direction, but you cannot make it; but you can teach simple drawing,

> and you will find it an implement of learning of extreme value. I do not think its value can be exaggerated, because it gives you the means of training the young in attention and accuracy, which are the two things in which all mankind are more deficient than in any other mental quality whatever. The whole of my life has been spent in trying to give my proper attention to things and to be accurate, and I have not succeeded as well as I could wish; and other people, I am afraid, are not much more fortunate. You cannot begin this habit too early, and I consider there is nothing of so great a value as the habit of drawing, to secure those two desirable ends.[32]

CHARLES W. ELIOT 1834-1926

Eliot was an eminent university president, a great American educator, and a great American citizen. His mind was such that he attacked educational problems ranging from the kindergarten to the graduate school. He was a strong advocate of the theory of sense-perception. Out of this grew his belief in drawing as a valuable educational factor. He once said that in reviewing the whole Harvard University curriculum, he found only one subject whose teaching and learning could not be made more effective by the use of drawing.

Eliot regarded the absence of drawing as one of the glaring deficiencies of the school program. He advocated the teaching of both freehand and mechanical drawing in every secondary school. Like Comenius, Eliot

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[32] Huxley, Thomas H. Science and Education, Essays, pp. 182-184. D. Appleton & Co., New York, 1894.

thought of drawing as a forceful supplement to language. He regarded drawing as fundamentally essential to the arts and trades. Eliot also saw the possibility of using drawing for the proper consumption of leisure time.

QUOTATION - ELIOT

> The changes which ought to be made immediately in the programmes of American secondary schools, in order to correct the glaring deficiencies of the present programmes, are chiefly the introduction of more hand-, ear-, and eye-work, such as drawing, carpentry, turning, music, sewing, and cooking; and the giving of much more time to the sciences of observation--chemistry, physics, biology, and geography--not political, but geographical and ethnographical geography..... Drawing, both freehand and mechanical, should be given ample time in every secondary school programme, because it is an admirable mode of expression which supplements language and is often to be preferred to it, lies at the foundation of excellence in many arts and trades, affords simultaneously good training for both eye and hand, and gives much enjoyment throughout life to the possessor of even a moderate amount of skill.
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> .....By many teachers and educational administrators music and drawing are still regarded as fads or trivial accomplishments not worthy to rank as substantial educational material; whereas they are important features in the outfit of every human being who means to be cultivated, efficient, and rationally happy. In consequence, many native Americans have grown up without musical faculty and without any power to draw or sketch, and so without the high capacity for enjoyment, and for giving joy, which even a moderate acquaintance with these arts imparts.[33]

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[33]Eliot, Charles W. A Late Harvest; Miscellaneous Papers Written between Eighty and Ninety, pp. 100-101. The Atlantic Monthly Press, Boston, 1924.

JOHN DEWEY 1859-

Dewey is one of the most prolific educational thinkers of the present day. His writings have not only colored the thinking of educators in America, but also have influenced educational thought in Europe. Dewey believes a better and better society can be constructed through the agency of education. Especially with young children Dewey emphasizes the need of manual activity and the manipulation of the environment. This has brought him to the advocacy of teaching drawing along with the other arts.

Dewey would draw no line of demarcation between the useful and the fine arts. To the extent that drawing arouses aesthetic emotion it should be considered a fine art. To the extent that it serves industry it is a practical art. Dewey thinks of drawing as an art which is indispensable to the continuance of present day community life. It is the teaching of drawing from the social viewpoint that Dewey would emphasize.

QUOTATION - DEWEY

> At the outset, there is no sharp demarcation of useful, or industrial, arts and fine arts..... As engaging the emotions and the imagination, they have the qualities which give the fine arts their quality. As demanding method or skill, the adaptation of tools to materials with constantly increasing perfection, they involve the element of technique indispensable to artistic production.... As experiences they have both an artistic and an aesthetic quality. When they emerge into activities which are tested by their product and when the

socially serviceable value of the product is emphasized, they pass into useful or industrial arts. When they develop in the direction of an enhanced appreciation of the immediate qualities which appeal to taste, they grow into fine arts.

. . . .

This enhancement of the qualities which make any ordinary experience appealing, appropriable--capable of full assimilation--and enjoyable, constitutes the prime function of literature, music, drawing, painting, etc., in education. They are not the exclusive agencies of appreciation in the most general sense of that word; but they are the chief agencies of an intensified, enhanced appreciation. As such, they are not only intrinsically and directly enjoyable, but they serve a purpose beyond themselves. They have the office, in increased degree, of all appreciation in fixing taste, in forming standards for the worth of later experience.....[34]

. . . .

Elementary education has already included within itself (for a variety of reasons) such activities as gardening, cooking, sewing and weaving, constructive work in paper, leather, wood, metal, care of animals, excursions, singing, story telling, dramatizations, drawing, painting, designing, sand molding, clay modeling, plays and games, etc. These modes of activities are not psychological merely; they do not simply appeal to and express the more native and spontaneous impulses of children; they also present important social processes; they typify occupations that are indispensable to the continued existence of community life. Moreover, as processes they condition intelligent study of social products.

Probably the main motives for introducing these activities into the primary curriculum have been psychological and utilitarian, rather than any conscious perception of their value as social types. ... It remains to utilize them systematically as

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[34]Dewey, John. Democracy and Education; an Introduction to the Philosophy of Education, pp. 278-279. The Macmillan Co., New York, 1916.

> foundation stones for the other studies by teaching them as representatives of these social activities which are fundamental to the knowledge and modes of skill embodied in these other studies.[35]

EDWARD L. THORNDIKE 1874--

Thorndike is an experimental psychologist. He has been especially prominent in the field of measurements. Thorndike is an eminent leader in what is known as the scientific movement in education. Early in Thorndike's career he constructed a measuring scale for scoring children's drawings. He has given close attention to the subject of drawing and its place in the school.

Thorndike emphasized the need of motivation in the teaching of drawing. Thorndike would correlate the teaching of drawing especially on the elementary level with fact-telling in connection with maps, plans, science, history, language and construction. In Thorndike's thinking the element of ornamentation should not be introduced until the child has something real which he wants to make appear more pleasing. Hence, the Pestalozzian method of teaching drawing does not meet with Thorndike's approbation.

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[35]Dewey, John. Course of Study, Theory of; (in) A Cyclopedia of Education, Vol. 2, p. 221. The Macmillan Co., New York, 1911.

QUOTATION - THORNDIKE

The promising arrangement of a course in drawing in the elementary school is then to begin with the 'natural,' fact-telling drawing; to develop it along such lines as drawing maps, plans, illustrations of the facts learned in elementary science, history and the like; and to introduce representative drawing by first showing the need for it,--as when the story of objects, one back of another at various distances, needs perspective drawing to tell it well, or when the story that this is a disk and that a ball needs shading to tell it well. The artistic drawing or creation of beauty with the pencil would begin with simple designs to decorate real objects which the pupils wished to have beautiful. Each element of technique would be taught similarly when the effective telling of the story made the need for added technique realizable.

The traditional arrangement in drawing neglected or even went dead against interest and nature forcing the pupil to copy cubes, cylinders, cups and saucers in representative drawing at the very beginning, compelling exactness of outline when what the children cared to tell with the pencil did not in the least require it, putting illustrative, schematic and mechanical drawing after instead of before, representative and decorative drawing, and teaching each thing in technique before--often long before--the pupil felt any need for it. As a result, children who might have become fair draughtsmen with a permanent interest in the use of a pencil, drew painfully sad-looking chairs, buttercups and vases while they were in school and nothing at all thereafter.[36]

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[36] Thorndike, Edward L. Education; a First Book, pp. 149-153. The Macmillan Co., New York, 1912.

Summary

The foregoing samples of thought evaluating linear drawing as a subject of study encompass a time scope of more than 2000 years. The samples exhibited are random samples as there was no coordinating force at work except the chance reading by subsequent thinkers of writings of former thinkers. A study of the direct quotations indicates a large amount of agreement in thought. Drawing as a pedagogic tool for effective teaching in general is given as an outstanding reason for relating it to education. The use of drawing in consuming leisure time stands out in the minds of many who have given it educational consideration. Drawing as a univeral means of expression has been commented on frequently. Drawing as a utilitarian subject basic to the crafts, to the trades, and to industry in general has received significant commendation as a factor in education. Drawing as an aid in developing aesthetic appreciation has been given frequent recognition. That drawing is a psychological stimulus to the major activities of the mind is generally accepted as true.

Cross sections of duplicate thinking are exemplified in the following scopograph:

1. Drawing may be used to consume leisure time.

Barnard	Froebel
Comenius	Huxley
Dewey	Jefferson
Elyot	Rousseau
	8

2. Drawing is a forceful pedagogic aid.

Aristotle	Elyot
Barnard	Froebel
Comenius	Pestalozzi
	6

3. Drawing is a forceful and universal means of expression.

Barnard	Huxley
Franklin	Napoleon
Froebel	Thorndike
	6

4. Drawing may be a utilitarian subject and is basic to the crafts and trades.

Aristotle	Franklin
Comenius	Froebel
Dewey	Huxley
	6

5. Drawing helps to develop dexterity.

Barnard	Froebel
Comenius	Rousseau
	4

6. Drawing clarifies reading matter.

Comenius	Froebel
Elyot	Pestalozzi
	4

7. Drawing aids in developing aesthetic appreciation.

Barnard	Froebel
Dewey	Rousseau
	4

8. Drawing stimulates the imagination, the thought process, and reflection.

Barnard
Comenius
Froebel
Rousseau

4

9. Drawing forces close observation.

Aristotle
Froebel
Huxley

3

10. Young children draw of their own initiative.

Elyot
Froebel
Rousseau

3

11. Drawing aids in the development of accuracy, and in the coordination of hand and eye.

Barnard
Huxley
Rousseau

3

12. Drawing is very essential to military operations.

Elyot
Jefferson
Napoleon

3

13. Drawing often corrects and strengthens judgment.

Barnard
Froebel
Herbart

3

14. Children should be taught to draw from nature.

Herbart
Rousseau

2

15. Drawing is needed in specific professions.

Franklin
Vitruvius
2

16. It is false to presume that every kind of drawing even if poorly directed, is productive of good.

Barnard
Thorndike
2

17. Drawing aids in teaching relationships.

Froebel
Rousseau
2

18. Instruction in drawing is needed by the prince as well as by the peasant.

Elyot
Franklin
2

19. Everybody should learn to draw.

Huxley
Jefferson
2

20. There should be no memory drawing in early years.

Pestalozzi
Rousseau
2

21. Drawing offers another physical activity.

Comenius
1

22. Drawing may be used to enhance general culture.

Aristotle
1

23. Drawing may be used to develop patrons of art.

Aristotle
1

24. Mechanical and freehand drawing should be given ample time in every secondary school program.

Huxley
1

25. The proper teaching of drawing involves the operation of natural psychological laws, namely, a process from the simplest element gradually to the more and more complex.

Pestalozzi
1

26. Drawing aids inventive genius.

Froebel
1

27. Drawing enlarges upon experience.

Comenius
1

28. Drawing is not a fad.

Huxley
1

29. In the elementary school drawing should begin with fact-telling in connection with maps, plans, science, history, language, and construction.

Thorndike
1

30. Matter can be spaced off only with lines.

Froebel
1

31. Object drawing should be the only method permissible.

Rousseau
1

32. The value coming from the teaching of drawing effectively can not be exaggerated.

Huxley
1

CHAPTER V

THE CONTRIBUTION OF THE COLONIAL PERIOD TO DRAWING AS A SUBJECT OF STUDY

This chapter could in one sense be called a chapter of negation. A close investigation, however, reveals that the colonial period was far from being entirely devoid of its contribution to the evolution of drawing. Much that it contributed was intangible; that is, during this period there was initiated a philosophy, a philosophy especially related to education, which influenced later developments. Actual instruction in drawing during the colonial period was largely if not entirely a matter of private enterprise.

THE ENVIRONMENT OF THE EARLY COLONISTS ADVERSE TO ALL ARTS.

It must be remembered that the early colonists were a pioneer people--a pioneer people in the most extreme sense. They had migrated to a country of potential wealth, but the realization of that wealth incurred hard labor and trying hardships. Their attention and their efforts had to be directed to the primary needs of life. They had little time for the aesthetics and their simple life did not demand highly technical procedure. Therefore, no fine art was a necessity to their existence. Of course, some of the early settlers had a background of refinement which they had brought with them from Europe, but this refinement had to remain static until they could build up a material reserve to secure their primary needs. The children of the first settlers lacked in some measure even the background of culture that the original settlers had brought with them from Europe. The environment of the first generation of offspring was, indeed, frontier.

THE PURITANS AND THEIR OPPOSITION TO THE ARTS.

The Puritans did not look kindly upon the royalty of Europe, nor were they friendly toward the Papacy. Much art was in possession of the royalty and in possession of the Catholic Church. This association did not enhance their good will toward the arts.[1] The theology of the Puritans was also severe. These forces, with perhaps other forces, caused them to leave the interior of their churches devoid of all the works of the painter, and of the artisan. Two centuries of this attitude on

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[1]Report of the United States Commissioner of Education, Art and Industry, Vol. I, 1885, pp. XXXIII--XXXV, Government Printing Office, Washington, D. C.; American State Papers, Documents of the Congress of the United States, Vol. II, 1834, 16th Congress, 2nd Session, p. 623. Government Printing Office, Washington, D. C.

the part of the Puritans easily accounts for much of the opposition to the arts.[2]

It is perhaps unfair and even historically inaccurate to ascribe to the Puritans alone all opposition to the arts. Even to this day the different sects of the Protestant branch of the Christian Church often look with disfavor at the stage, at certain types of literature, at nude sculpture, and at the dance. Although the Catholic Church is the repository of much art, the Catholic Church is very skeptical and very sensitive concerning the influence of art.

The fine arts emanated from pagan Greece. The Fathers of the Church encountered much difficulty in harmonizing Grecian practices with Christianity. Saint Thomas Aquinas[3] lived in the thirteenth century A. D. Although more than twelve centuries had elapsed as a period of harmonization, yet his great contribution was in harmonizing Grecian thought and Christian philosophy.

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[2]Art Education, Bureau of Education, p. 20. Bulletin, 1923, No. 13. Washington, D. C.; Winsor, Justin. The Memorial History of Boston, Vol. 4, p. 383. James R. Osgood & Co., 1881.

[3]Dampier, William C. A History of Science, pp. 92-97. The Macmillan Co., New York, 1929; Rader, Melvin M. A Modern Book of Esthetics, p. 205. Henry Holt & Co., New York, 1935; Wolf, A. A History of Science, Technology and Philosophy, p. 2. George Allen & Unwin, Ltd., London, 1935.

It appears then that the influences of the arts were questioned from the beginning of Christianity. The inception of skepticism on the part of the Catholic Church emanates from the fact that the fine arts were an integrated part of the culture of pagan Greece. The inception of opposition to the arts on the part of the Protestant Churches grew out of the possibility of using the arts as a degrading force. The Puritans, who were also Protestants, associated the arts with forces back in Europe with which they were out of harmony. Intelligent people know now that the arts are a tremendous force in society. They may be used for destruction, or they may be used for upbuilding. Hence, they must be understood; they must be controlled.

Drawing is a basic art. Although its use is not confined to the fine arts, it is a fair conjecture that it was to some extent impeded during colonial times by the same forces that opposed art in general.

INCIPIENT EDUCATIONAL PHILOSOPHY OF THE COLONIAL PERIOD HAVING A BEARING LATER ON THE TEACHING OF DRAWING.

It should be remembered that there was a fine grade of common sense exercised among the people of the colonies. There were a goodly number of men who were thinking beyond their time, and who were actually endeavoring to import the best educational thought available to the colonies. One of the best illustrations of this is the invitation extended in 1654 to Comenius to become president of Harvard College.

Quotation from Cotton Mather's Magnalia:

> That brave old man, Johannes Amos Comenius, the fame of whose worth hath been trumpetted as far as more than three languages (whereof every one is indebted unto his Janua) could carry it, was indeed agreed withal, by our Mr. Winthrop in his travels through the low countries, to come over into New England, and illuminate this Colledge and country, in the quality of President, which was now become vacant. But the solicitations of the Swedish Ambassador diverting him another way, that incomparable Moravian became not an American. This was on the resignation of President Dunster, in 1654.[4]

Comenius did not come to Harvard College. Nevertheless, Harvard in its early days had progressive presidents. As early as 1672 President Hoar planned for a workshop at Harvard College, that his college might serve society more effectively. It is, therefore, evident that even a college president administering the affairs of so highly classical a school as was Harvard College caught the trend of the new educational philosophy, and understood, at least in a measure, the changing needs of society.[5]

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[4]Cotton Mather's Magnalia, Vol. II, p. 14. London, 1702.

[5]Ibid., pp. 14-15; Three Centuries of Harvard 1636-1936, p. 41, Cambridge, Harvard University Press, 1936; American Education Society, Vol. III, pp. 264-265. Perkins and Marvin, Boston, May 31, 1831; Anderson Lewis F. History of Manual and Industrial Education, pp. 27-28, 136. D. Appleton & Co., New York, 1926.

It is noteworthy that as early as 1685 the Quaker, Thomas Budd, published his dissertation entitled "Good Order Established in Pennsylvania and New Jersey in America." Budd advanced some very progressive plans for education in America. The scope of his compulsory education was so broad that it included even the American Indian. Budd thought in terms of the needs of life. Language, science, arts, crafts, industrial drawings, and citizenship, were core subjects in his curriculum.[6] Budd's plans were not considered seriously for application at that time. Nevertheless, the seeds of his philosophy were disseminated.

Four great Americans, Washington, Franklin, Rush, and Jefferson, did much to infuse into colonial thought a progressive educational philosophy. Washington's message to Congress in 1790 advising the establishment of a national university is illustrative of one of his many interests in education. The fact that Washington left in his will a monetary provision for his proposed national university, manifested his sincerity concerning

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[6]Morris, George P. "Industrial Training Two Centuries Ago," Popular Science Monthly, Vol. 31, May-October, 1887, pp. 608-612; Budd, Thomas. "Good Order Established in Pennsylvania and New Jersey in America," 1685. The Historical Magazine, Vol. VI, September, 1862, pp. 265-272. A Reprint. Charles B. Richardson & Co., New York.

the need of such an institution.[7] Franklin used his great talent and his broad influence in behalf of the educational interests of the youth of his day.[8] Rush was a forceful writer, and with his pen he advocated an education that would fit the times.[9] Jefferson was intensely concerned for an education that would fit for citizenship in a democracy.[10] Those eminent Americans had practical reasons for advocating drawing as a subject which should be taught to children. Washington was a surveyor and used drawing in that profession. Franklin was a printer and saw the need of drawing from that viewpoint. Rush was a progressive educator and therefore saw the need of teaching drawing to children from the viewpoint of the educator. Jefferson was a student of education and was interested in landscaping. He saw the need of drawing from those two viewpoints.

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[7]Documents, Legislative and Executive, of the Congress of the United States, 4th Congress, 2nd Session, December 21, 1796, No. 91, pp. 153-154, Washington, D. C.; Washington, George. The Will of George Washington, in the Writings of George Washington, Vol. 14, p. 278. G. S. Putnam's Sons, New York, 1893.

[8]Franklin, Benjamin. Proposals Relating to the Education of the Youth in Pennsylvania, pp. 11-12. University of Pennsylvania, 1749. Reprinted by University of Pennsylvania.

[9]Rush, Benjamin. A Plan for Establishing Public Schools in Pennsylvania, and for Conducting Education Agreeably to a Republican form of Government. University of Pennsylvania 1786, pp. 1-50. Reprinted by Thomas and Samuel F. Bradford, Philadelphia, 1798.

[10]Honeywell, Roy J. The Educational Works of Thomas Jefferson, pp. 126, 256, 275. Harvard University Press, Cambridge, 1931.

Franklin and Jefferson had spent much time in France; therefore, their educational thinking was colored by educational procedure in France. Their advocacy of a practical education for the American youth was probably influenced by French practice. At the request of Jefferson, Dupont de Nemours, a Frenchman, devised a plan for national education in the United States. He published his plan in 1800. The plan contains much of the Rousseau philosophy especially as it deals with elementary education. This brought Jefferson into contact with the Rousseau philosophy in education.[11]

SIGNIFICANCE OF FOREGOING DISCUSSION TO DRAWING.

When in a subsequent chapter public demand for the teaching of drawing is discussed, it should be remembered that this demand did not rise out of a vacuum, nor did it arise spontaneously. Rather it should be remembered that it resulted from a trend of thought and a trend of events. Hoar and Budd transported seeds of philosophy from England. Franklin and Jefferson brought seeds of philosophy from France. Domestic conditions dictated a philosophy of their own. Hence, withal a composite philosophy was in the making.

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[11] Dupont de Nemours. On National Education in the United States of America. Paris, 1800. Trans. by B. G. Dupont, University of Delaware Press, 1923.

TWO OUTSTANDING RESEARCH STUDIES ON EDUCATION DURING COLONIAL TIMES IN AMERICA.

Seybolt conducted two painstaking studies related to education in America during colonial times. He took his material largely from newspaper advertisements contemporary with the times. Seybolt found evidence of a demand for drawing as early as 1727. By 1748 mention of drawing in advertisements was frequent. Drawing and painting especially for young ladies engaged increasing attention of colonial schoolmasters.[12]

By 1800 there was existent good evidence of instruction in drawing of a practical and engineering type. The publications related to drawing and published in Europe, were finding their way to America. The private schoolmasters were seeing the need and application of practical drawing to colonial life.[13] This small movement may be regarded as the precursor to an uncompromising demand for the teaching of industrial drawing in the public school a half a century later.

PUBLICATIONS INDICATIVE OF THE DIRECTION OF NEW THOUGHT AS RELATED TO THE USE OF THE LINE.

Dürer wrote one of the early books related to drawing, a fact which shows clearly that the student of

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[12] Seybolt, Robert F. The Private Schools of Colonial Boston, pp. 13, 24, 25, 26, 33, 38, 48, 84, 88, 89. Harvard University Press, Cambridge, 1935.

[13] Seybolt, Robert F. The Evening School in Colonial America, pp. 28-29. Bulletin No. 14, Bureau of Educational Research, University of Illinois, 1925.

drawing was beginning to direct his thought along mathematical lines. Dürer's construction of a regular pentagon with compass and rule was noteworthy. His development of surface areas was also noteworthy.[14]

Lamy published as early as 1710 a book on mechanical perspective.[15] The subject of perspective was developed by the Italians during the Renaissance and for the most part was used in the field of aesthetics. Lamy aimed to give the subject a wider application. Lamy's text although written more than two centuries ago, compares well with the present day texts on the same subject in points of clarity and pedagogy.

Monge[16] earned the distinction of having placed mechanical drawing, engineering drawing, and working drawing, on a scientific, and mathematical basis. His publication was epoch making from the standpoint of the help it gave to invention and from the standpoint of the help it gave to engineering.

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[14] Dürer, Albrecht. Underweysung der messung mit dem zirckel und richtscheyt in Linien, eben, vnnd Gantzen corporen, Nurnberg, 1525. (See Smith, David E. History of Mathematics, Vol. 1, p. 326. Ginn & Co., New York, 1923.)

[15] Lamy, B. Perspective Made Easie, 1710. One copy in possession of University of Illinois.

[16] Monge, Gaspard. Geometrie descriptive. J. Klostermann, Paris, 1811. One copy in possession of University of Illinois.

Bowles published a varied textbook in 1783. Evidently authors of that early day as well as authors of the present time, adjusted their publications to the demands of the market, as Bowles arranged the instructions in his book to the needs of each of seven arts. The point germane to this study is that Bowles' book was a concrete recognition of a growing social demand for instruction in the graphics both practical and "polite." The fact that the book went through six editions is indicative of the response to the service it rendered.[17] The publications of Dürer, Lamy, and Monge definitely related the progress of drawing to mathematics. Early textbooks on drawing in the hands of colonial schoolmasters conducting private schools, probably influenced colonial instruction in drawing more than any other one factor.

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[17]Bowles, Carington. Artist's Assistant in Drawing. Carington Bowles Map Print Ware House, London, 1783. One copy in possession of Louisiana State University.

Summary

1. The colonists did not need to develop the art of drawing to an extreme degree because their frontier life did not demand the aid of technical procedure. In addition to a lack of pressing need for the art of drawing there was opposition to the arts in general on religious grounds. This opposition originated in Europe and was transported to America.

2. Notwithstanding the fact that the situation during the colonial period was not extremely conducive to the development of art, yet prominent leaders of that time advocated the teaching of drawing to children. Books on drawing were imported from Europe. Private schools taught both "polite" and practical drawing.

3. Much progressive education in general was advocated during the colonial period. Leaders who traveled abroad, brought back with them a knowledge of educational procedure used in other countries. Jefferson and Franklin brought educational philosophy from France. Hoar and Budd were impressed by the educational thought in vogue in England. Advocacy of instruction in drawing appears always to be related to advocacy of progressive education in general. Although it may not be said that drawing as a subject of study

thrived during the colonial period, it may be said that there was sufficient educational discussion related to drawing, to bridge cumulative thought over to the nineteenth century.

CHAPTER VI

EDUCATIONAL PHILOSOPHIES UNDERLYING ACTUAL EARLY ATTEMPTS TO ESTABLISH DRAWING AS A SUBJECT OF STUDY IN THE SCHOOLS OF THE UNITED STATES

Whenever a new subject is introduced into the school program, it must possess sponsorship. The way into the curriculum is not easy. Believers in the worth of old subjects are very jealous; they do not encourage competition. On the contrary, they offer strong resistance. This is the history of curriculum modification.

The late former United States Commissioner of Education E. E. Brown once said, "The man who inaugurates a new movement in human history is one who gives expression to what many have been thinking more or less clearly." It would be well, therefore, at the outset of this chapter to classify those who cite new thought in education and are willing to give sponsorship to it.

Sponsorship for curriculum modification may be classified as follows:

1. A large group of citizens outside the teaching profession who are sincerely interested in the welfare of children.

2. A small but forceful group of citizens outside the teaching profession who are sincerely interested in the welfare of children.

3. A large group of teachers that is forceful by virtue of its number.

4. A small but forceful group of teachers.

5. A group of citizens who are interested in attaining an economic end through the process of education.

6. A group of citizens desirous of experimenting with the process of education.

7. A benefactor who is willing to give a large sum of money to the cause of education.

8. A research bureau that has discovered new truth in education and points out that truth to all groups interested in education.

It should be interesting, as this chapter and succeeding chapters progress, to note the sponsorship of each attempt at the introduction of drawing into the school program. It should also be interesting to note the educational philosophy underlying each effort to make drawing a subject of study; and further it should be interesting to note the cause of failure or the cause of success in each effort.

JOSEPH NEEF (1770-1854) WILLIAM MACLURE (1763-1840) ROBERT OWEN (1771-1858)

The history of early education in America is replete with proof that foreign influences were constantly at work. The early advent of instruction in drawing was well wrapped up in the Pestalozzianism of Europe. As is well known the educational theory of Pestalozzi is based on three points, namely, (1) language, (2) form, and (3) number. Form involves much drawing. Therefore the coming of Pestalozzianism meant the coming of instruction in drawing.

Instruction in keeping with the theory of Pestalozzi made its entrance into the United States in a very direct way as early as 1809. Neef[1] and Maclure[2] were directly instrumental in first bringing Pestalozzianism to the United States. Owen[3] was also interested in the educational theory of Pestalozzi; but his special interest was in establishing a Utopia in America.

Maclure was given to traveling much abroad, because he was intensely interested in social problems. Fellenberg's school and Pestalozzi's school interested him.

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[1]Neef, Joseph. A Plan and Method of Education, pp. 4-5. Philadelphia, 1808. Printed for the Author; "Joseph Neef," Barnard's American Journal of Education, Vol. 12, 1866, p. 639; Ibid., Vol. 30, 1885, p. 564; "Pestalozzianism in America," Education, Vol. 14, April, 1894, pp. 449-461.

[2]Maclure, William. "An Epitome of the Improved Pestalozzian System," The American Journal of Science, Vol. 10, 1826, pp. 146-151.

[3]"Robert Owen's Establishment at New Harmony, Indiana," The American Journal of Science, Vol. 10, 1826, pp. 165-169; Ibid., Vol. 11, 1826, pp. 189-192; "Mr. Owen's School at New Harmony, Indiana," American Journal of Education, Vol. 1, 1826, pp. 377-378; "Robert Owen and Factory Population;" Barnard's American Journal of Education, Vol. 26, 1876, pp. 403-416.

He visited them often for the purpose of observation, and he became especially interested in the educational theory of Pestalozzi. Neef was a disciple of Pestalozzi. Maclure induced Neef to migrate to America for the purpose of establishing a Pestalozzian school. In 1809 America's first Pestalozzian school was started by Neef in Philadelphia. This school was apparently a success for the whole period during which it operated in Philadelphia.

Just as Elyot wrote the first pedagogical treatise of consequence published in the English language, so Neef wrote the first strictly pedagogical work of note published in the United States.[4] Neef's treatise was published in 1808 in the English language under the title, Plan and Method of Education. This publication in point of circulation was a success and did much to publicize the educational theory of Pestalozzi.

THE UTOPIA OF NEW HARMONY, INDIANA.

Maclure was a forceful personality. He was a many-sided man in that he was a scientist, a humanitarian, a capitalist, and an educator.[5] With another humanitarian

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[4]Maclure, William. "Neef's Writing on Pestalozzianism," The American Journal of Science, Vol. 10, 1826, p. 151; Neef, Joseph, op. cit., pp. 1-168.

[5]Morton, Samuel G. "A Memoir of William Maclure." The American Journal of Science, Vol. 47, April, 1844, pp. 1-17.

named Owen who was mentioned above, Maclure associated himself in 1825 in a venture to establish a Utopian community known as New Harmony, Indiana.[6] This was no small venture for that early day. Maclure and Owen, each invested a large fortune in the project.

The object of the venture was to build up a self-sustaining social structure through a process of education. Pestalozzianism was to have its place in the educational procedure. For this reason Neef was employed as a teacher at New Harmony.

Maclure had in mind substantiating the Pestalozzian educational theory so convincingly through actual application at New Harmony, that it would radiate to every community in the United States. Maclure, however, had visioned even further educational plans. The sustaining economic factor was to be integrated with the whole educational procedure. Maclure believed in paralleling the general education evincing from the Pestalozzian procedure with a purely vocational education that would result in sufficient salable concrete products to pay the cost of education.[7]

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[6]"Robert Owen and Factory Population," Barnard's American Journal of Education, Vol. 26, 1876, pp. 403-416.

[7]The New Harmony Gazette, New Harmony, Indiana, 1827, p. 353; Maclure, William. Opinions on Various Subjects, pp. 87-89. Vol. 1, New Harmony, Indiana, Printed at The School Press, 1831.

The leaders became involved in serious disagreement which condition caused the New Harmony project to be abandoned. Although the attempt at New Harmony did not result in success, the Pestalozzian method in education was given much publicity because of the large amount of money involved and because of the substantial character of the men who led the movement.

THE EDUCATIONAL PHILOSOPHY OF JOSEPH NEEF AND OF WILLIAM MACLURE AS APPLIED TO DRAWING.

In Neef's educational thinking he was very largely an adherent of Pestalozzi. Both Neef and his father had been actively associated with Pestalozzi and his educational enterprise. In transferring Pestalozzianism to American soil, it was necessary to make some adjustments; but Neef, nevertheless, remained Pestalozzian in thought. Consequently, drawing was taught in Neef's school at Philadelphia and also at New Harmony in keeping with the tenets of Pestalozzi.

As stated above, Maclure had studied both Pestalozzi's school and Fellenberg's school in operation. He was sympathetic especially with the democracy exhibited by Pestalozzianism, but he was very critical of the dictatorialness in evidence in the Fellenberg school. Maclure, however, was very favorably impressed with the vocational education idea that permeated Fellenberg's school.

Consequently, Maclure endeavored in the experiment at New Harmony to dovetail the vocational education idea of Fellenberg with Pestalozzianism. At New Harmony much was made of the arts and crafts on a life contact basis. In the educational procedure there an attempt was made to produce for life's needs. Consequently, the drawing allied with the arts and crafts was purely vocational.

Thus, it is evident that in one of the first great educational experiments in the United States drawing was used as a pedagogic aid in general education (Pestalozzianism), and drawing was also used in a purely vocational procedure (Fellenbergism). The reader should note that there has been no discussion here of the aesthetic. However, had the experiment at New Harmony continued indefinitely, it is reasonable to conjecture that the development of the aesthetic appreciation would have received due attention after the primary needs of life had been made secure.

The writer has had access to all the issues of The New Harmony Gazette, a weekly paper printed at New Harmony, Indiana from October 1, 1825 to October 22, 1828. This period embraced the principal part of the New

Harmony experiment. The New Harmony Gazette has all the characteristics of a carefully edited publication. A perusal of its issues gives objective evidence that education was of vital concern to that community. In fact the coherence and the continuance of the community depended upon the success of its many-sided educational experiment.

Owen, Maclure, and Neef, were the three personalities dominating the educational thought at New Harmony. Owen's peculiar contribution was the establishment of an infant school. Maclure's educational philosophy was attached to the belief that productive vocational education could be integrated with general education in such a way as to pay the cost of all education. Neef was the representative of Pestalozzianism. The ambitious little community claimed the first infant school to be established in America, the first industrial school of any type to be made a part of a free public school system, the second attempt to use the Pestalozzian system of instruction in the United States, and the first free school system to offer equal educational advantages to both sexes.

Drawing, then, as a subject of study had two points of relation to the New Harmony experiments. First, it was a pedagogic aid in general education as advocated by Neef. Second, it was an industrial aid to the vocational education as advocated by Maclure.

WILLIAM BENTLEY FOWLE (1795-1865)

A short time before Maclure and Owen began to operate what they conceived to be progressive education in the small community of New Harmony, Indiana, Fowle of Boston began to break with traditional education. Fowle was a noted educational journalist and author of the first half of the nineteenth century. As an author he wrote more than thirty school books for pupil use.[8] His thought was also engaged in the problem of school method especially in connection with the monitorial system. Fowle made a significant contribution for his day in giving to the public his Manual of Mutual Instructions, which included directions for an improved system in the monitorial school.[9]

The evidence at hand indicates that drawing was first taught in the public schools of Massachusetts in 1821, when Fowle attempted to introduce it into the schools of Boston.[10] While Fowle was a member of the school committee, a headmaster of one of the boys'

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[8] Barnard's American Journal of Education, Vol. 10, 1861, pp. 597-610.

[9] Fowle, William B. Manual of Mutual Instructions. Waite, Greene, & Co., Boston, 1826.

[10] Barnard's American Journal of Education, loc. cit.; Report of the United States Commissioner of Education, Monograph on Education, No. 14, 1900, pp. 5-6. United States Government Printing Office, Washington, D. C.

schools in the city became sick, and Fowle volunteered to take charge temporarily. Fowle who was vigorous and enthusiastic made a success of his undertaking. Upon subsequent death of the former headmaster, Fowle decided to make teaching his life work and therefore took permanent charge of the school.

Fowle was able and progressive. He attempted many innovations in the school of which he became headmaster. He soon added drawing as an integral part of the school work. Linear drawing and its application to geometry were made a regular exercise. He introduced blackboards which were used daily for the drawing of maps. Physical science, music, and needlework for girls, soon became a part of the curriculum in Fowle's school. Miss Dorothy Dix, who later became a noted philanthropist, taught as an assistant in Fowle's school. Thus, withal there exists another bit of evidence pointing to the development of a forward-looking type of education.[11]

Fowle[12] was rendering his community a splendid service, but the public was not generally appreciative. It

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[11] Report of the United States Commissioner of Education. Art and Industry, Vol. 1, p. 5, 1885. United States Government Printing Office, Washington, D. C.; Report of the United States Commissioner of Education, Monograph No. 14, 1900, pp. 5-6. United States Government Printing Office, Washington, D.C.

[12] Report of the United States Commissioner of Education Vol. 2. 1898-1899, p. 2286. United States Government Printing Office, Washington, D. C.

did not understand. His innovations caused much adverse comment, and in 1823 he was removed from his position. Nevertheless, Fowle's work was regarded by many as a success. Evidence of this is found in the fact that a group of private citizens built and equipped a school house and called Fowle to take charge.

In 1827 a book entitled L'enseignement du dessin lineaire, written by Louis Benjamin Francoeur, fell into the hands of Fowle. This was the book that resulted from Napoleon's edict to the Bureau of Education to prepare a publication on drawing for the schools of France. Fowle translated this book under the title The Eye and the Hand. It was not a literal translation; Fowle adapted it to the needs of the schools of America as he understood those needs. It was a book of mechanical drawing dealing largely in geometry. The market responded to three editions in three years, which response would indicate that it met with more than medium success.[13]

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[13] Report of the United States Commissioner of Education, Vol. 2, 1898-1899, p. 2286, United States Government Printing Office, Washington, D. C.; Report of the United States Commissioner of Education, Art and Industry, Vol. 1, p. 6, 1885. United States Printing Office, Washington, D. C.; Fowle, William B. The Teacher's Institute, pp. 82-86. A. S. Barnes & Co., New York, 1846.

FOWLE'S EDUCATIONAL PHILOSOPHY AS APPLIED TO DRAWING.

Fowle's use of blackboard drawing in connection with the teaching of geography would indicate that he was thinking of drawing as an aid to the effective teaching of other subjects. The fact that the teaching of linear drawing as related to geometry was a regular exercise in Fowle's school would indicate that Fowle was thinking of drawing as related to mathematics. The title Fowle selected for his book, however, points to a conjecture that he was thinking more of significant educational end results than of merely the acquisition by the pupil of subject content.

Fowle's theory then, may be summed up by saying that he thought of drawing as a significant pedagogic aid and that he also thought of drawing as having valuable content of and in itself.

AMOS BRONSON ALCOTT (1799-1888)

Alcott was an advanced educational thinker and an advanced educational practitioner of the nineteenth century.[14] He taught in Boston and in Philadelphia as well as in a number of smaller communities at different times during his early life. His tenure of office was

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[14] Winsor, Justin. Memorial History of Boston, Vol. 3, p. 657, Vol. 4, p. 326. James R. Osgood & Co., Boston, 1881.

not secure in a position supported by the public at that time because the public mind was not ready for his advanced methods.

In 1834 Alcott moved from Philadelphia to Boston where he opened his unique private school in the Masonic Temple. This he conducted for a period of five years, during which time he was free to apply his advanced methods. Associated with him in this school was the famous teacher and writer, Miss Peabody. It is from Miss Peabody's writings that is secured the most reliable account of Alcott's principles of education. Miss Peabody kept an actual daily record of much that she observed in the Temple School. Therefore, she was in a position to discuss Alcott's educational procedure with accuracy.[15]

Alcott either knowingly or unknowingly advocated and applied many of the educational principles advocated by Pestalozzi. He looked upon early education of a child essentially as a matter of activity, both mental and physical, which would mean self education in the last

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[15]Peabody, Elizabeth P. Record of a School, pp. 181-196. James Munroe & Co., Boston, 1835; Monroe, Paul. A Cyclopedia of Education, Vol. 1, pp. 83-84. The Macmillan Co., New York, 1928; Monroe, Will S. History of Pestalozzian Movement in the United States, pp. 147, 149, 154. C. W. Bardeen, Syracuse, New York, 1907.

analysis. Alcott concerned himself greatly with the moral and spiritual culture of the child, as well as with the mental and physical development. He thought of childhood as possessing a threefold nature, (1) the spiritual faculty, (2) the imaginative faculty, (3) the rational faculty. Under these he listed the various school activities and subjects and then distributed them throughout the week in a well-balanced program. Drawing was used to develop the imaginative faculty. In drawing Alcott went farther than did Pestalozzi. Pestalozzi's instruction in drawing was based upon an analysis of form and was allied closely with geometry. Alcott's instruction in drawing led out into the field of the aesthetics and sought freedom of expression. It might be noted here in connection with this thought that Alcott was a leader in schoolroom decoration. His Temple School was noted for its refined and carefully arranged interior. Alcott was mindful of the force of environment.

ALCOTT'S EDUCATIONAL PHILOSOPHY AS APPLIED TO DRAWING.

The philosophy lying back of Alcott's instruction in drawing was the development of the imagination, instruction in geometry, development of expressiveness, and the development of aesthetic appreciation. It is thus clear that Alcott sighted large objectives to be attained through the medium of the imagination, and with drawing as the instrument. Alcott's theory differed from that of Pestalozzi in that Alcott desired to free the pupil from the limitations of geometry.

THE NORMAL SCHOOLS.

The normal schools were ushered into existence under the eminent leadership of Clinton, Mann, Carter, and Barnard. Massachusetts was the first state to legislate favorably on normal schools. During the years 1839-1840 three state normal schools were put into operation by the state of Massachusetts. Each of these three initial state normal schools listed drawing as a regular study from the beginning.

Barnard has left us the most authoritative history of the advent of the normal school written twelve years after the first state normal school was established. Barnard listed the subjects taught in each one of the new institutions during the first year of its existence. Drawing was listed in each case as a regular subject of study.[16]

Barnard does not give the philosophy underlying the teaching of drawing in the first group of state normal

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[16] Barnard, Henry. Normal Schools, Vol. I, p. 69. Hartford, Conn., 1851.

schools. Mann was the highest educational official in the state and a dominating personality. He was a forceful advocate of the teaching of drawing in the public schools. It is, therefore, fair to conjecture that the philosophy underlying the teaching of drawing in the first group of normal schools was the philosophy of Mann. Mann advocated the teaching of drawing as a vital pedagogic aid, as a means of developing aesthetics appreciation, and as a tool basic to modern industry.

Barnard also gives a report on the normal school of Philadelphia organized in 1848. Here again drawing is listed in the program of studies.[17] Considering the ultra-conservatism of that day concerning education, it would appear that the normal school officials were rather courageous. Yet nearly a whole century has elapsed since the advent of the first normal school and drawing is still struggling for a place in the curriculum on a firm and rational basis.

REMBRANDT PEALE (1778-1860)

Peale, a noted painter, and son of a noted painter, Charles Wilson Peale, introduced drawing into the Philadelphia high school in 1840. Peale was known by

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[17] Barnard, Henry, op. cit., pp. 254-255.

eminent artists abroad as well as by the most renowned artists in America. This is made evident in his own publication, entitled Notes On Italy, which in fact is notes on many European points of interest.[18]

Peale did not teach for financial reasons. In fact he received little monetary remuneration for his services as a teacher. Peale had two dominant ambitions in life: one was to paint a renowned portrait of George Washington;[19] the other was to devise and introduce into the public schools a system of teaching drawing which should be "as cheap, as elementary, and as common as reading and writing."[20]

As a teacher he pursued his work with vigor. He outlined a carefully thought out course of study and secured commendable results from his pupils. He prepared a book entitled Graphics which served the schools of Philadelphia for several years. His work received high appraisal. He offered to extend the work down into the grades without remuneration for his services. Opposition to his offer was rather persistent. The public mind of Philadelphia was not quite ready for Peale's

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[18] Peale, Rembrandt. Notes On Italy. Carey and Lea, Philadelphia, 1831.

[19] Report of the United States Commissioner of Education. Art and Industry, pp. 15-16. Vol. 1, 1885. United States Government Printing Office, Washington, D.C.

[20] Peale, Rembrandt, op. cit., pp. 7-8.

educational innovation. In 1844 he relinquished his teaching project. His efforts, however, were not lost, for he laid a foundation for the future of drawing in the public schools of Philadelphia.

PEALE'S EDUCATIONAL PHILOSOPHY AS APPLIED TO DRAWING.

Peale believed that children could learn to draw on the average with as much facility as they learn to read and write. He believed in drawing from good copies first to insure good technic. He knew that educationally co-ordination of hand and eye is generally essential. Being an artist himself he knew of the absolute necessity of dexterity in freehand drawing in his own work. He also saw that ability to sketch readily was an asset in expressiveness to anybody.[21]

In short Peale's theory was that the normal pupil can learn and should learn to draw with readiness and with reasonably good technic.

ELIZABETH PALMER PEABODY (1804-1894)

Miss Peabody was an eminent teacher and writer of the nineteenth century. Among the women of her time as a thinker and as a doer, she ranked very high. She was

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[21]Peale, Rembrandt, op. cit., p. 16.

associated with and was highly esteemed by Barnard, Mann, Alcott, Philbrick, and Hawthorne.[22]

Miss Peabody was always in the front educationally, advocating what she thought would make boys and girls better boys and better girls and ultimately better men and better women. To this end among many interests she had two dominant interests; namely, kindergarten education for preschool children as advocated by Froebel, and the establishment of drawing as a regular study in the public schools.

Miss Peabody[23] established a kindergarten in Boston as early as 1860. Fearing that she was not adequately informed concerning Froebel's educational philosophy, she journeyed to Europe, where she studied kindergarten education at first hand. She returned with renewed enthusiasm and was largely responsible for giving the kindergarten procedure its initial hold in America.

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[22] Wheelock, Lucy, "Miss Peabody and The Kindergarten." Education, Vol. 15, Sept.-June, 1894-1895, pp. 27-31; Sheldon, William E. Miss Elizabeth Palmer Peabody, pp. 231-233. Proceedings and Addresses, National Education Association, 1894; Winsor, Justin, op. cit., Vol. 4, p. 329.

[23] Peabody, Elizabeth P. Education in the Home, the Kindergarten, and the Primary School, p. V. Swan Sonnenschein, Lowrey & Co., London, 1887.

Her zeal for the teaching of drawing to all children continued to grow. During the year 1838-1839 she taught drawing in the Boston Franklin School, to fifty pupils gratuitously. During the year 1841-1842 she was engaged in preparing one hundred teachers to teach drawing. She prepared and published A Method of Teaching Linear Drawing. Her sister Mary T. Peabody also was a teacher of drawing, who prepared and published The Primer Of Reading Of Drawing.[24] It is coincidental that three strong personalities closely associated, Miss Peabody, Mary T. Peabody (Mrs. Horace Mann) and Mann, exerted tremendous influence in the direction of introducing the teaching of drawing into the public schools.

ELIZABETH PALMER PEABODY'S EDUCATIONAL PHILOSOPHY AS APPLIED TO DRAWING.

Miss Peabody's educational philosophy was well wrapped up in Froebel's educational philosophy. Drawing as an activity is an essential part of Froebel's kindergarten procedure. Consequently, the two educational interests stated above, which concerned Miss Peabody were not entirely separate interests, but were more or less integrated. The point of differentiation from Froebelism

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[24] Report of the United States Commissioner of Education, Art and Industry, Vol. I, p. 13, 1885. United States Government Printing Office, Washington, D.C.; Barnard's American Journal of Education, Vol. 30, 1880, p. 10.

with Miss Peabody was in that she carried the principles involved in teaching drawing to educational levels above the level of the preschool.

The Froebel philosophy concerning the teaching of drawing (and the philosophy held largely by Miss Peabody) was to apply drawing as an activity at many points as a pedagogic aid, thus:[25]

1. Drawing as an amusement.
2. Drawing to stimulate thought, observation and imagination.
3. Drawing to correct understanding and judgment.
4. Drawing to stimulate reflection.
5. Drawing to aid in understanding space relationships.
6. Drawing to develop skill and dexterity.

J. W. BOWERS.

In 1846 Bowers was appointed to teach penmanship and drawing in the public high schools of Cincinnati. The evidence at hand would indicate that he was the

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[25]Froebel, Friedrich. The Education of Man, pp. 75-79. Trans. by W. N. Hailmann. D. Appleton & Co., New York, 1910.

first teacher to give instruction in drawing in the public schools of that city. In 1847 W. B. Shattuck was appointed teacher in charge of drawing. In the same year the teaching of drawing was extended down into the grades. The teachers of drawing made substantial progress in Cincinnati. They made substantial progress because the teaching of drawing met there with social sanction. Why it met with social sanction is significant to the student of education.

In 1838 Calvin E. Stowe returned from Germany, where he had made a close study of the German system of education. In 1839 he made a detailed report of his study to the State Legislature of Ohio.[26] The State Legislature of Ohio ordered Stowe's report published and circulated broadly. A copy was mailed to each school district in Ohio.[27] The State Legislatures of Pennsylvania, Michigan, Massachusetts, North Carolina and Virginia each had it republished and circulated widely. This report was very influential for the reason that it was an

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[26] Barnard, Henry. National Education in Europe, pp. 49-80. Case, Tiffany, & Co., Hartford, Conn., 1854.

[27] Barnard, Henry. Memoirs of Teachers, Educators, Part I, p. 346. F. C. Brownell, New York, 1859; Stowe, Calvin E. Report on Elementary Education in Europe to the State Legislature of Ohio. Reprinted by Order of the House of Representatives, Columbus, 1839.

excellent report and for the reason that it received careful consideration by many people.

It happened that there were many people in Cincinnati of German extraction who appreciated the German methods in education. It also happened that there were resident in Cincinnati many highly skilled craftsmen who appreciated the practical turn of the German methods in education. The teaching of drawing was emphasized in Stowe's report. This report was a significant factor in securing social sanction for the teaching of drawing in Cincinnati.

A vital point to be noted here by the student of education is that the teaching of drawing was made continuous in Cincinnati on a basis of social sanction. The student of education should also recall that Fowle and Alcott of Boston, Minifie of Baltimore, and Peale of Philadelphia each failed to secure for the teaching of drawing a secure place in the curriculum because each failed to secure general social sanction for the introduction of the subject into the curriculum.

STOWE'S EDUCATIONAL PHILOSOPHY AS APPLIED TO DRAWING AND AS DERIVED FROM HIS STUDY IN GERMANY.

> For this the pupils have already been prepared by the exercises in ornamental writing, in the previous part of the course. They have already acquired that accuracy of sight and steadiness of hand which are among the most essential requisites to

> drawing well. The first exercises are in drawing lines, and the most simple mathematical figures, such as the square, the cube, the triangle, the parallelogram; generally from wooden models, placed at some little distance on a shelf, before the class. From this they proceed to architectural figures, such as doors, windows, columns, facades. Then the figures of animals, such as a horse, a cow, an elephant; first from other pictures, and then from Nature. A plant, a rose, or some flower is placed upon a shelf, and the class make a picture of it. From this they proceed to landscape painting, historical painting, and the higher branches of the art, according to their time and capacity. All learn enough of drawing to use it in the common business of life, such as plotting a field, laying out a canal, or drawing the plan of a building; and many attain to a high degree of excellence.[28]

The foregoing quotation regarding the teaching of drawing is strongly Pestalozzian. It also touches upon the aesthetic and does not neglect practicality.

WILLIAM MINIFIE.

The commissioners in charge of public education in the city of Baltimore became favorably impressed with the educative value of drawing as a school subject during the last decade of the first half of the nineteenth century. Accordingly in 1848 they employed Minifie to teach drawing in the high school. Minifie was an able man, who had practiced and had made a success of architecture as a profession.[29]

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[28]Barnard, Henry. National Education in Europe, p. 59. Second Edition, Case, Tiffany, & Co., Hartford, Conn., 1854. Report by Calvin E. Stowe to the General Assembly of Ohio, December, 1839 on Primary Schools of Germany.

[29]Report of the United States Commissioner of Education, Vol. 2, 1898-1899, pp. 2288-2289. United States

Minifie did a vigorous piece of educational work. He taught drawing as a science. Of course, he had the practitioner's viewpoint because of his professional experience, but withal he was giving his pupils vigorous, intelligent instruction. Unfortunately a member of the school committee had a friend whom he desired to place in the position held by Minifie. This led to Minifie's dismissal, which proved very injurious to the high school which he served.[30]

Minifie's outstanding contribution to the teaching of drawing was the publication of a textbook in 1849 entitled Geometrical Drawing, published by D. Van Nostrand and Company.[31] This was a carefully prepared publication dealing largely with the principles related to descriptive geometry. This book was transported to England and was used in the government school in South Kensington. It is related that it influenced greatly Walter Smith, who was a student at South Kensington and who later performed a notable educational service as supervisor of drawing in the state of Massachusetts. Minifie later became a

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[30] Report of the United States Commissioner of Education, Monograph on Education, No. 14, 1900, pp. 6-7. United States Government Printing Office, Washington, D. C.

[31] Minifie, William. Geometrical Drawing, D. Van Nostrand and Co., New York, 1849.

professor of design at the Maryland Institute, during which encumbency he delivered many lectures on the place of drawing in the schools.

MINIFIE'S EDUCATIONAL PHILOSOPHY APPLIED TO DRAWING.

Minifie had the viewpoint of a professional architect. He also had a grasp of the science of descriptive geometry which was discovered by the Frenchman, Monge, as pointed out in a previous chapter. Two points, probably, embrace Minifie's theory of drawing in education; namely, descriptive geometry as the basis of mechanical drawing, and drawing as having a vocational or professional implication.

JOHN DUDLEY PHILBRICK (1818-1886) ASSISTED BY WILLIAM NEWTON BARTHOLOMEW (1822-1907)

Philbrick[32] served as superintendent of schools in the city of Boston for a period of eighteen years, 1856-1874. Those were the years during which Boston and the whole state of Massachusetts went rapidly forward in the matter of teaching drawing in the public schools. Philbrick was a forceful personality in the movement. As early as in 1864 drawing was made a regular study in the schools of Boston. It should be noted that Boston antedated the law of 1870 by six years.

[32]Report of the United States Commissioner of Education, Art and Industry, Vol. I, p. 234, 1885. United States Government Printing Office, Washington, D. C.

The attention of the educators generally throughout the country was directed toward Massachusetts. Philbrick had been successful in establishing drawing as a study in the schools of Boston. The state legislature had made the teaching of drawing mandatory in the public schools. Smith had been brought from England to supervise the teaching of drawing in the state. The state legislature had established a normal art school.

Consequently, there was a general demand for information concerning the teaching of drawing. In response to this demand the United States Commissioner of Education made the first significant report coming from the Bureau of Education on the teaching of drawing.[33] The purpose of this report was to give an inventory of what Massachusetts had done as well as to note much that had been done in foreign countries. The report was widely read and influenced greatly the trend of thought in other states.

EDUCATIONAL PHILOSOPHY OF PHILBRICK AND BARTHOLOMEW AS APPLIED TO DRAWING.

Bartholomew was a specialist in drawing. He served as a technical adviser to Philbrick in working out

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[33]United States Bureau of Education, Washington, D. C. Circular of Education, No. 2, 1874, pp. 1-56. Government Printing Office, Washington, D. C.

educational policies for the schools of Boston. The aim of the Boston school officials in the teaching of drawing was to develop in the pupil an appreciation for the aesthetic and to develop in the pupil the ability to observe accurately and to sketch readily. Philbrick and Bartholomew had in mind the making of drawing a study in general education comparable to geography or to history. The teaching of drawing was to make its contribution to general education just as the teaching of history, for example, makes its contribution to general education. It would appear that one of the educational contributions that Philbrick and Bartholomew had especially in mind to result from the teaching of drawing was the development of the aesthetic sense.[34] It should be noted in the discussion in the chapter immediately following that the aims set up in the schools of Boston did not meet entirely with social sanction throughout the state.

THE EDUCATIONAL PHILOSOPHY UNDERLYING THE TEACHING OF DRAWING AS REFLECTED BY THE EARLY TEXTBOOKS ON DRAWING.

The printing press had been in existence sufficiently long to have established the book as the most

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[34]Report of the United States Commissioner of Education. Monograph on Education, No. 14, 1900, pp. 30-31. United States Government Printing Office, Washington, D. C.

important instrument of formal education. The textbook in the early schools of the United States constituted the totality of the course of study more nearly than it does today. Consequently, if the contents of the early textbooks are revealed, then one has a very definite knowledge of what was really being taught when those textbooks were used. Moreover, with a knowledge of the contents of the textbooks, one can discern in a measure the motives underlying the teaching.

Upon examination of the items in Column 5 of Table I, it is discernible that the early textbooks on drawing were charged heavily with mathematics and mechanical drawing. Items 9, 12, 13, and 16 of Table I are in part exceptions to this last statement. Smith was a teacher of fine arts in a private art school, and he wrote a book to be used in teaching fine arts, but there is no evidence at hand that the book was ever used in the public schools. The Peabody sisters were interested in the lower levels of elementary education and their publications on drawing were heavily charged with pedagogy. Bartholomew was a painter of some note as well as a prominent teacher; for this reason he was interested in propagating the fine arts in the public schools. He was successful to some extent in Boston, but it was designated at an earlier point in this chapter that his theories were

TABLE I

SUMMARY OF EARLY TEXTBOOKS RELATED
TO DRAWING AND PREVIOUSLY REFERRED TO

1	2	3	4	5
Author	Title	Location	Date of Publication	Character
1. Dürer, Albrecht	Underweysung der messung mit dem zirckel und richtscheyt in Linein, ebnen, vnnd gantzen corporen, Nürnberg.	Nürnberg	1525	Mathematical
2. Lamy, B.	Perspective Made Easie	University of Illinois	1710	Mechanical Drawing
3. Bowles, Carington	Artist's Assistant In Drawing	Louisiana State University	1783	Mechanical Drawing and Fine Arts
4. Monge, Gaspard	Geometrie descriptive	Paris	1799	First Edition Descriptive Geometry
5. Natte	Practical Geometry or Introduction to Perspective	University of Illinois	1805	Mathematics and Mechanical Drawing

TABLE I (Continued)

1	2	3	4	5
Author	Title	Location	Date of Publication	Character
6. Cresswell, D.	Elements of Linear Perspective	University of Illinois	1811	Mathematics and Mechanical Perspective
7. Crozet, Claude	Treatise on Descriptive Geometry	Louisiana State University	1821	Orthographic Projection
8. Hachette, Jean Nicola Pierre	Treatise on Descriptive Geometry	Paris	1822	Descriptive Geometry
9. Smith, John Ruben	The Juvenil Drawing Book	New York	1822	Fine Arts
10. Fowle, William B.	The Eye and The Hand	Boston	1827	Mathematics and Mechanical Drawing
11. Sopwith, T.	Treatise on Isometric	Louisiana State University	1838	Mathematics and Drawing
12. Peabody, Elizabeth P.	Teaching Linear Drawing	Boston	1840	Froebelism

TABLE I (Continued)

1 Author	2 Title	3 Location	4 Date of Publication	5 Character
13. Peabody, Mary T.	The Primer of Reading and Drawing	Boston	1840	Pedagogical
14. Minifie, William	A Text Book of Geometrical Drawing	New York	1849	Mathematics and Mechanical Drawing
15. Warren, S. Edward	Orthographic Projection of Descriptive Geometry	Louisiana State University	1860	Orthographic Drawing
16. Bartholomew, William N.	Drawing Book No. 1	New York	1871	Fine Arts

not accepted widely throughout the state of Massachusetts. This point is being emphasized for the reason that contrary to current thought, his theories did not serve as the chief motive for legislation on the subject later.

In items 10 and 14 of Table I there are designated two textbooks written by teachers. It was Fowle who attempted first to teach drawing with formality in the public schools of Boston. Fowle's publication paralleled largely the book which resulted from Napoleon's edict to the French Bureau of Education to prepare a book on drawing for the schools of France. Being such, Fowle's publication was largely mathematical. Minifie's text on drawing, written twenty-two years after the publication of Fowle's text, is quite similar to Fowle's text in point of content. Minifie, as pointed out before, had been a successful architect who adopted teaching as a profession. His publication was, therefore, as might be expected, a text with a procedure leading to preparation for service in a draughting office.

Reflection on the items in Table I points to a tenable conclusion that Fowle's texts and Minifie's text as well as most of the others designated in the table, are products coming in direct lineage from the publication that Monge made in 1799.

Summary

The material in Table II should serve as a brief summary of the early attempt to introduce drawing as a subject of study into education in the United States. The items in Column 1 of Table II indicate that the efforts were isolated and made by an individual or small group of individuals on their own initiative. The dates in Column 2 of Table II are sufficiently close together to indicate that the efforts to teach drawing to children in the United States, were persistent and increasing. The items in Column 3 of the same table show that the experiments were conducted in the east with the exception of the great experiment at New Harmony, Indiana. The philosophy of Pestalozzi was a strong determinant in early attempts to teach drawing to children in the United States as indicated in Column 4 of the same table. The vocational idea, the idea of appreciation, the industrial factor, the factor of general education, and the factor of science, even in those early days, were sufficiently present to make themselves discernible. As indicated in Column 5 of the same table the early experiments were not highly successful except in the sense that they initiated the movement.

TABLE II

EARLY ATTEMPTS IN UNITED STATES TO TEACH DRAWING AND THE EDUCATIONAL PHILOSOPHY UNDERLYING EACH ATTEMPT

1	2	3	4	5
Movement	Date	Location	Philosophy	Result
1. Movement of Neef and Maclure	1809 to 1814	Philadelphia	Pestalozzianism	A success in Philadelphia. A failure when moved to smaller community.
2. William Bentley Fowle	1821	Boston	Drawing as a pedagogic aid in teaching other subjects. Mechanical drawing as a worth-while subject of and in itself.	Failed to secure social sanction
3. New Harmony experiment financed by William Maclure and Robert Owen	1825 to 1826	New Harmony, Indiana	Pestalozzianism Fellenbergism	Leaders disagreed. Project abandoned.
4. Masonic Temple School. Amos Bronson Alcott	1834 to 1839	Boston	Drawing as a pedagogic aid and drawing to develop aesthetics appreciation. Some Pestalozzian principles used.	Not a great success. Alcott even on a private school basis was too far in advance of his time.

TABLE II (Continued)

1 Movement	2 Date	3 Location	4 Philosophy	5 Result
5. First Group of Normal Schools	1839 to 1840	Massachusetts	Drawing as pedagogic aid. Drawings related to aesthetics. Drawing as an art basic to industry.	Normal schools have continued to include drawing in their program of studies. But have not constructed a rational philosophy for placing drawing in the curriculum of the public schools.
6. Rembrandt Peale	1840	Philadelphia	Drawing as a part of general education for every normal child.	Educationally he seemed to have been successful. From the standpoint of social sanction he was not entirely successful.
7. Elizabeth Palmer Peabody	1830 to 1870	Boston	Froebelism	Miss Peabody was successful.
8. Movement in Cincinnati	1846	Cincinnati	Drawing as a pedagogic aid. Drawing as an aid to aesthetics training. Drawing as basic to industry.	Attempt was successful. General social sanction was secured.

TABLE II (Continued)

1 Movement	2 Date	3 Location	4 Philosophy	5 Result
9. Baltimore William Minifie first teacher of drawing in public schools.	1848	Baltimore	Vocational preparation for mechanical drawing based on descriptive geometry.	Educationally Minifie was successful. Entry of politics gave Baltimore a temporary set-back.
10. Boston, Philbrick and Bartholomew	1856 to 1874	Boston	Drawing as a part of general education. Aesthetic element stressed.	Successful in city of Boston but philosophy not accepted by the whole state.

CHAPTER VII

INFLUENCES LEADING TO LEGISLATION DIRECTLY AFFECTING DRAWING AS A SUBJECT OF STUDY IN THE PUBLIC SCHOOLS

Law is the crystallization of public sentiment growing out of reflection and emanating from human experience. Public sentiment concerning significant educational problems does not usually arise spontaneously. Often it accrues very slowly and over a long period of time. Legislative bodies do not pass laws without reason; whenever a law is enacted, it is sponsored by some social group.

The legal acts affecting drawing as a public school study were the result of a slowly growing sentiment. In fact this sentiment had its roots in foreign soil and reached back many centuries. It was pointed out in a previous chapter that Pestalozzianism and Fellenbergism were transplanted in American soil. It is one of the purposes of this chapter to relate how the teaching of drawing, allied with an economic factor, was transported to American education.

As this study progresses it becomes increasingly evident that more and more people demand a form of education that fits for work-a-day life. This growing demand has persisted both in Europe and in America. The teaching of drawing has been an integral part of this growing movement both in Europe and in America.

FOREIGN EVENTS THAT AFFECTED AMERICAN THOUGHT ON EDUCATION.

The Society for the Encouragement of Arts, Manufactures and Commerce was in existence in London as early as 1755. This organization recognized the need of drawing in industry, and endeavored to encourage children under sixteen years of age to draw. The society offered prizes as incentives for excellence in drawing. The prizes together with public recognition, were awarded at stated times throughout the year.[1] As early as 1830 the English Parliament appointed a committee whose function it was to devise a thorough method of diffusing a knowledge of design for industry. In response to this committee's report the English government established a normal art school in 1837.[2]

It was pointed out in a previous chapter that Napoleon practically issued an edict which in effect made the teaching of drawing a required subject in the schools of France. France has been for several centuries

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[1]Bennett, Charles A. History of Manual and Industrial Education Up To 1870, p. 382. Manual Arts Press, Peoria, Ill., 1926.

[2]Ibid., p. 385.

and is today vitally concerned with technical education, with trade education, and with art education.

Drawing was a required subject of study in the schools of Bavaria in 1811.[3] Early in the nineteenth century Prussia had the teaching of drawing well established in her elementary education.[4] In fact it was Prussia's success in teaching drawing that incited the English government to establish a normal art school in 1837. The interest in the teaching of drawing in Germany generally was very intense. As early as 1840 Berlin was carrying on in her schools an experiment related to the teaching of drawing, with a view to making the teaching more effective.[5] The truth is that Germany, as well as France and England, was very apprehensive concerning the relation of the teaching of drawing in her schools to her industrial and economic status.

The reader's attention is called pointedly to the economic and industrial notes sounded in the foregoing discussion. Legislation in America favorable to the teaching of drawing in the public schools will be

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[3]Monroe, Paul. A Cyclopedia of Education, Vol. 2, p. 366. The Macmillan Co., New York, 1928.
[4]Ibid., Vol. I, p. 225.
[5]Report of the United States Commissioner of Education, Vol. 2, 1898-1899, p. 2287. Government Printing Office, Washington, D. C.

discussed later in this chapter. Then it will be evident that the sound of the economic note had crossed the waters and had permeated the atmosphere especially of manufacturing communities in the United States.

AMERICA APPREHENSIVE CONCERNING TECHNICAL EDUCATION.

While the major countries of Europe were being very serious and very active concerning the place of drawing as a study in their schools, America was not inert. Americans during the Revolutionary War and during the War of 1812 were very conscious of their shortcomings in point of technical knowledge.[6] The emergency of those serious events impressed on them a sense of their dependence upon England.

America, however, possessed men of both vision and action who saw the need of diffusion of technical knowledge during the time of peace. An astute American of Dutch extraction decided actually to do something about the improvement of facilities for the propagation of technical education. Stephen Van Rensselaer, a graduate of Harvard University and a wealthy man of his time, established in 1824 at Troy, New York, what is at present known as the Rensselaer Polytechnic Institute.[7]

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[6] Report of the National Engineering Societies, p. 3. The Carnegie Foundation for the Advancement of Teaching, Bulletin No. 11, 1909.

[7] Ibid., pp. 4-5, 9, 15; American Journal of Education, Vol. I, 1826, pp. 634-635. Waite, Greene & Co., Boston.

Indeed, America possessed many men during the first half of the nineteenth century who were thinking sincerely and seriously concerning the need of practical education. In the year of 1838 The United States Government received a large sum of money by reason of a bequest in the will of James Smithson who specified in his will the need of the diffusion of knowledge.[8] The present Smithsonian Institution at Washington, D. C. is the result of the movement initiated by the bequest in Smithson's will. This institution has done much to advance the cause of the practical arts.

In 1847 by reason of a large gift in money by Abbott Lawrence, Harvard University established a school of engineering.[9] In the same year Yale University advertised practical courses in engineering.[10] In 1857 the State of Michigan established a college of practical arts.[11] In 1861 The Massachusetts Institute of Technology was founded.[12] In 1862 The United States Congress passed

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[8] The Will of James Smithson. Eighth Annual Report of The Board of Regents of the Smithsonian Institution, 1854, pp. 102-103. Washington, D. C.

[9] Report of United States Commissioner of Education, Bulletin, 1919, No. 30, p. 39. Government Printing Office, Washington, D. C.

[10] Ibid., p. 39.

[11] Ibid., pp. 40-41.

[12] Ibid., p. 39.

the Morrill Act establishing the Land Grant Colleges.[13] No evidence is needed in proof of the statement that the foregoing events enhanced the teaching of engineering drawing.

THE INFLUENCE OF HORACE MANN.

Frequent mention in a previous chapter has already been made of Mann and his advocacy of the teaching of drawing in the public schools. In his famous Seventh Annual Report to the State Board of Education of Massachusetts, made just after his study of schools abroad, he discoursed voluminously on drawing from the pedagogic viewpoint. In another report made in 1848 to the state board of education he discoursed forcibly on the relation of education to the production of wealth. It was in this report that he sounded the economic note pointing out the relation between education, poverty, and wealth. He concluded this report with the sentence, "For the creation of wealth, then,--for the existence of a wealthy nation,--intelligence is the grand condition."[14]

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[13] Report of the National Engineering Societies. The Carnegie Foundation for the Advancement of Teaching, p. 6. Bulletin No. 11, New York City; Report of the United States Commissioner of Education. Bulletin, 1924, No. 30, pp. 9-10. Government Printing Office, Washington, D. C.; Federal Aid for Vocational Education. The Carnegie Foundation for the Advancement of Teaching, pp. 3-59. Bulletin No. 10, New York City.

[14] Mann, Horace. Tenth Report to the State Board of Education, 1848, pp. 663-686. Horace B. Fuller, Boston, 1868.

Mann was a tremendously influential personality. His reports were regarded as classics, and they were given large consideration. The legislation on drawing that followed his services was doubtless in a considerable measure due to his efforts.

THE INFLUENCE OF HENRY BARNARD.

The career of Barnard paralleled well in point of time and in point of service the career of Mann. They served in similar positions; they were both progressive; they agreed well in thought on educational problems. Mann was the superior of the two as a revivalist; Barnard was the superior of the two as a scholar. They were both persistent advocates of the teaching of drawing in the public schools. Barnard held many positions as office holder, as writer, and as editor. In each case he lent the force of his position unrelentingly to the advocacy of drawing as a subject of study in the public schools.

As State Superintendent of the Schools of Rhode Island (1843-1849) Barnard advocated drawing as a subject of study.[15] As State Superintendent of the Schools

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[15]Report of the United States Commissioner of Education, Bulletin, 1919, No. 8, pp. 53-67. Government Printing Office, Washington, D. C.

of Connecticut (1850-1855) he made a determined effort to introduce the teaching of drawing into the schools of that state, but without great success.[16] The columns of his "American Journal of Education" (1855-1882) were always open to a discussion of drawing as a proper school study.[17] As United States Commissioner of Education (1867-1870) his office incorporated in annual reports many references to the teaching of drawing.[18] As a personality influencing the trend of thought related to the teaching of drawing, Barnard, perhaps, had only one peer in America, namely, Mann.

THE INFLUENCE OF THE OSWEGO MOVEMENT.

The Oswego Movement was a revivification of the Pestalozzian movement in America. It was made clear in a previous chapter that Neef and Maclure had made a serious and costly effort to establish and to practice the Pestalozzian principles of education in the United States. Neef and Maclure made their effort in the early part of the nineteenth century during which time it was

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[16] Op. cit., pp. 68-83; Cubberly, Ellwood P. Public Education in the United States, pp. 428-429. Houghton Mifflin Co., Boston, 1934.

[17] Report of the United States Commissioner of Education, Bulletin, 1919, No. 8, pp. 84-93.

[18] Ibid., pp. 104-113.

difficult to secure public sanction for new educational practices.

The Oswego Movement was fathered by Sheldon, (1823-1897), who felt keenly the need of better methods of instruction and better-trained teachers. Out of this movement precipitated in 1861 the Oswego Normal School, located at Oswego, New York.[19] Sheldon brought from Europe to America striking personalities who gave publicity to the movement and who aided considerably in propagating clearer ideas of Pestalozzi's educational methods. Margaret E. M. Jones of The Home and Colonial School Society, London, was persuaded to teach for a year at Oswego Normal School. Krüsi, who was reared and trained in the atmosphere of Pestalozzi's school, was employed to teach permanently at Oswego Normal School. Miss Jones taught and wrote especially on perception of color.[20] Krusi taught and wrote especially on drawing as a pedagogic aid.[21]

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[19] Sheldon, Edward A. A Manual of Elementary Instruction. pp. 5-10. Charles Scribner Sons, New York, 1869.

[20] Ibid., pp. 45-71.

[21] Ibid., pp. 425-460.

The Oswego Movement is germane in this study in that Sheldon adopted and propagated Pestalozzi's principles concerning drawing. Since the movement as a whole received nation-wide publicity, the element of drawing received attention along with other considerations. The Oswego Movement exerted not a small influence on American education. Ned H. Dearborn has made a doctorate study of the movement. In his report Dearborn listed twenty-three states, each employing one or more Oswego graduates as early as 1866. Canada and Japan were also listed as recipients of Oswego graduates. In addition to this, students of education journeyed to Oswego to study at first hand Sheldon's school in operation.[22]

STRONG RESISTANCE TO PROGRESSIVE EDUCATION.

From the array of influences favorable to progressive education discussed in the foregoing, it might appear that advocates of practical education had the right of way, but such was not the case. Indeed, there was a definite, persistent trend forward; but when and where large public support and public sanction were necessary, difficulties presented themselves.

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[22]Dearborn, Ned H. The Oswego Movement in American Education, p. 20. Contribution No. 183, Teachers College, Columbia University, 1925.

It may not be amiss to relate a point in proof thereof. The traditional faculty of both Yale and Harvard refused to recognize the new school of engineering installed at each institution in 1847. The students electing engineering courses were not assigned assembly seats. They were not allowed to live at the regular dormitory. They were taught by a separate faculty. Their graduation was at a time and under conditions separate from the graduation from traditional courses. In short, they were regarded as inferior students.[23] The relating of this incident gives some conception of social resistance to the modifications of traditional procedure in education. In the light of the contribution of engineering education to modern society, it is difficult to appreciate the traditional college professor of 1847.

THE GREAT EXHIBITION OF 1851 HELD AT LONDON.

It appears to be the unanimous opinion of commentators that The Great Exhibition of 1851 was of tremendous significance both to the cause of industry and to the cause of education. An official catalogue of the exhibition, distributed on the opening day, contains the following statements:

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[23] Report of the United States Commissioner of Education, Bulletin, 1919, No. 30, p. 39. Government Printing Office, Washington, D. C.

> The Activity of the present day chiefly develops itself in commercial industry, and it is in accordance with the spirit of the age that the nations of the world have now collected together their choicest productions.[24]
>
> . . . .
>
> Whilst formerly the greatest mental energies strove at universal knowledge, and that knowledge was confined to the few, now they are directed to the specialties and in these again even to the minutest points; but the knowledge acquired becomes at once the property of the community at large.[25]
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> . . . .
>
> The exhibition of 1851 is to give us a true test and a living picture of the point of development at which the whole of mankind has arrived in this great task, and a new starting point from which all nations will be able to direct their further exertions.[26]
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> . . . .

In a report from the United States Commissioners to the Paris Exhibition of 1867, is given the following statement:

> Among the most instructive developments of modern civilization are the international exhibitions which, commencing in London in 1851, under the inspiration and auspices of the late sagacious and public spirited Prince Albert, have been succeeded by more and more extended and comprehensive ones, closing in the universal exposition held at Paris during the summer of 1867.[27]

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[24] The Great Exhibition. Official Catalogue, p. 1, Vol. 1, W. Clowes and Sons, Printers, 1851, London.

[25] Ibid., p. 4.

[26] Ibid., p. 4.

[27] Report of the United States Commissioner to the Paris Exposition of 1867, p. 3. Government Printing Office, Washington, D. C., 1870.

THE INTERNATIONAL EXPOSITION AS A MEASURE OF EDUCATION.

The international expositions have come to be a measure of the advancement of mankind in industry and in science. The juries of experts appointed by the officials conducting the various expositions give their verdicts in permanently bound volumes. The contents of those volumes are of particular importance to the educator because the measure of any nation's industrial importance at the international exposition is considered the measure of the efficiency of its educational procedure at home.

ENGLAND AND GERMANY APPREHENSIVE CONCERNING THE COMMERCIAL "SCARE."

England had been hopeful of exhibiting her industrial superiority to the world; but the juries gave both England and Germany an adverse verdict. This incited both England and Germany to action. They turned to their schools for the solution of their problems. The English Parliament appropriated a large sum of money to encourage the study of art and science among the people. Many museums were established. Industrial arts schools were encouraged. Drawing became a more prevalent study in her schools.[28]

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[28] The Cyclopedia of Education, Kiddle, Henry and Schem, Alexander J. p. 50. E. Steiger, London, 1877; Smith, Walter. Art Education, pp. 15-16. James R. Osgood & Co., Boston, 1873; Report of the United States Commissioner of Education. Circular of Information, No. 2, 1874, p. 11. Government Printing Office, Washington, D. C.

In 1852 South Kensington was established. This became a center for the diffusion of knowledge. Today the schools of England look to South Kensington for inspiration and guidance concerning questions related to drawing and design.[29] The English government permits a large measure of local control in education, but it is tremendously apprehensive concerning the relation between education and industry. The Great Exhibition of 1851 taught England a lasting lesson.

THE SCHOOLMASTERS OF ENGLAND BEGAN TO FEEL THEIR RESPONSIBILITY FOR ENGLAND'S INDUSTRIAL EMBARRASSMENT.

England was a highly commercial nation. A commercial nation cannot afford to be far surpassed by competing nations. The English people were stirred. The schoolmasters began to feel their responsibility. Leaders among them, saw the need of breaking away from traditional moorings. Their first manifestation of action was in the form of an experiment. They set up an experiment in a number of schools with a view to determining whether the average pupil can learn to draw.[30]

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[29] Perry, Walter S. The Conditions Underlying Art Education in European and American Schools, p. 765. Proceedings and Addresses, National Education Association, 1891; Report of the United States Commissioner of Education, Circular of Information, No. 2, 1874. pp. 12-15. Government Printing Office, Washington, D. C.

[30] The Cyclopedia of Education, op. cit., p. 237; Smith, Walter, op. cit., pp. 8-9.

In 1852 the schoolmasters made public their finding, namely, that all normal children can learn to draw. In public convention they addressed the citizenship of England with considerable emphasis concerning this finding. As a result, the teaching of drawing gained a more prevalent place in general education in England; but the larger and more significant result was in that impetus was given to the modification of the educational thinking on the part of the English schoolmaster.[31]

THE PARIS EXPOSITION OF 1867.

The great nations of the world had again gathered together their choicest products. This was a decade and a half after the great London Exposition. England was represented at Paris. The juries gave their verdicts.

Smith, a product of South Kensington and an eminent scholar commented thus: "At the Paris Exposition of 1867 England stood among the foremost, and in some branches of manufacture distanced the most artistic nations."[32] This feat of the English people in a period of sixteen years is objective evidence of what can be

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[31] Smith, Walter, op. cit., p. 9.
[32] Ibid., p. 15.

done through the medium of education. It makes one think of the quotation from Mann already given in this chapter to the effect that in the production of wealth, "intelligence is the grand condition."

The great advance made by the English from 1851 to 1867 alarmed the French. The government of France immediately turned attention to its schools. A commission was appointed to study the situation. Some educational adjustments followed.[33] The leaders of education in France may prefer to advertise their lycée to the world, but in the background they have given for many decades serious attention to the relation between industry and education.

DRAWING A FOCAL POINT OF ATTACK.

The American student of education should take sharp cognizance of the fact that European people thought educationally in terms of economics and in terms of industry. They believed in the existence of an actual relationship between the production of wealth and the procedure in education. The student of education should also note that linear drawing is basic to the execution of material fine arts and is also basic to the execution of modern industry. It serves significantly these two

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[33] The Cyclopedia of Education, op. cit., pp. 50-51.

great fields of human endeavor. For this reason the teaching of drawing is a focal activity when related to the production of refined products in modern industry. When modification of production is attempted, either in the direction of aesthetics or in the direction of more efficient production, linear drawing is a necessary tool. For this reason, when there is an attempt made to modify industry through education, linear drawing becomes the point of attack. Therefore, it is not surprising that when the state of Massachusetts attempted to relate education and industry through legislation, it legislated on the subject of drawing.

AMERICA BECAME ALARMED.

It has been pointed out already in this study that the American people had been continually conscious of their educational shortcomings. They were conscious especially of their dependence upon Europe for skilled labor, for technical knowledge, and for art. In The Great Exhibition of 1851 the United States rated even lower than did England.[34] For more than a quarter of a century Mann and Barnard had kept Americans informed

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[34] Report of the United States Commissioner of Education, Circular of Information No. 2, 1874, p. 11. Government Printing Office, Washington, D. C.; Smith, Walter, op. cit., p. 15.

concerning what was going on educationally in Europe. The leaders in the United States had learned about the outcome of The Great Exhibition of 1851. They had also learned of the increased efforts of England, Germany, and France industrially and educationally. Both businessmen and educators in America began to advocate educational action in America similar to the action already taken in many European countries.

MASSACHUSETTS LEGALIZED THE TEACHING OF DRAWING IN THE PUBLIC SCHOOLS IN 1860.

Massachusetts was becoming more and more a manufacturing state. American products had to compete with the products of Europe in the home market as well as in European markets. The leaders of industry in Massachusetts were cognizant of the efforts being made by nations in Europe to improve their products through the education of their people. Events in the United States had been pointing to the emulation of European countries relative to industrial education. Consequently, as the first move, in 1860 the State Legislature of Massachusetts passed a law legalizing the teaching of drawing. The law made the teaching of drawing in the public schools permissive. It was not mandatory. A transcript of the law is given on the following page.

MASSACHUSETTS

GENERAL STATUTES

1860

Chapter 38

Page 215

Section I. In every town there shall be kept, for at least six months in each year, at the expense of said town, by a teacher or teachers of competent ability and good morals, a sufficient number of schools for the instruction of all the children who may legally attend public school therein, in orthography, reading, writing, English grammar, geography, arithmetic, the history of the United States, and good behavior. Algebra, vocal music, drawing, physiology and hygiene, shall be taught by lectures or otherwise in all the public schools in which the school committee deem it expedient.[35]

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[35]Taken from the Session Acts of The Massachusetts State Legislature for the session of 1860.

ADVOCACY OF THE TEACHING OF DRAWING CONTINUED TO ACCRUE.

The enactment of the law of 1860 caused educators to comment freely on the value of drawing as a subject of study. In the following quotation taken from the city school report of Boston for the year 1866, the teaching of drawing is advocated on the basis of discipline, culture, and industry.

> While we rejoice at the proficiency which has been acquired in music, we think that drawing is worthy of far more attention than is now given to it, not as an ornamental branch of education, superfluous unless as a matter of show, but as a most desirable discipline both for the eye and the hand, essential to the best culture of the perceptive faculties, identified with habits of pure taste, and in many respects of the greatest practical advantage, not only at the time of youthful study, but through the whole of the maturer life. There is hardly an artisan who would not be a better workman, if he know how to handle a pencil; and neither a merchant nor a professional man, would be the less qualified for his duties, if he knew how to draw a plan, or sketch a landscape.
>
> If we go back into the earlier days of classical antiquity, we find there, the value of such instruction recognized. Pamphilus, the Macedonian, a proficient in the higher branches of learning, introduced the rule that drawing should be taught to children through all the schools of Greece. While we are sending aid to the struggling Greeks, let us remember the example of the land of Phidias and Praxiteles in the days of its glory. That home of art cherished the love of the beautiful, even among children. Thus the fragments of its broken temples, and the minutest relics which have come down to us, wrought by Grecian hands, are counted as treasures, through every nation, to this day.

> In our own time, Prussia, with a population of fifteen millions, teaches drawing in all her schools. If we passed, in our earlier remarks, the condition of the educational system in that country, it was because so much has been said and written upon that subject, that the facts are already familiar.[36]

In 1870 Warren Johnson, State Superintendent of the Common Schools of Maine, made a plea for the teaching of drawing in Maine on the basis that Maine because of its natural resources was destined to become a manufacturing state.

> The natural features of Maine plainly indicate that her field of activities lies chiefly in the industrial pursuits. Her climatic conditions; her vast reservoirs of power; the cheapness and proximity of building materials; the accessibility to the chief water powers; all indicate what Maine ought to be--a manufacturing state. The schoolroom work should contribute to success in this direction. The course of study and the methods of instruction should be such as to develop and direct strongly the inventive and constructive faculties of the mind, especially training the eye to the nicest observations, and the hand to the most delicate manipulations. Probably no branch contributes more directly to the latter results than drawing in its several branches..........
>
> To direct attention of teachers and educators towards this subject the services of Prof. John H. Woodman, Chandler Scientific School, Dartmouth College, were secured last fall in a few of our county institutes.........
>
> In view of the ultimate necessity of drawing to perfect mechanical skill, and its undoubted influence in developing appreciation of the beautiful, I would recommend an enabling act, by which towns desiring may provide for instruction in drawing

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[36] Annual Report of the School Committee of the City of Boston, 1866, pp. 107-108. Alfred Mudge & Sons, Printers, Boston, 1867.

for any persons over 15 years of age, by evening schools or otherwise, either by additional taxation or by appropriation from the schools' money.[37]

CITIZENS PETITIONED THE STATE LEGISLATURE OF MASSACHUSETTS TO MAKE THE TEACHING OF DRAWING MANDATORY.

The law of 1860 was not satisfactory because it permitted the teaching of drawing to remain discretionary with the individual communities. Lively discussion continued. Public meetings were held at which leaders spoke, and general discussion took place. In June, 1869, a group of citizens petitioned the State Legislature of Massachusetts to direct the Massachusetts State Board of Education to submit a plan that would provide ways and means for general instruction in drawing throughout the state. The legislature requested the board of education to investigate the matter.[38] In due time the board of education reported to the legislature deploring the fact that foreign countries had so far surpassed the United States in the teaching of the arts. A plan for the teaching of drawing was also reported. On May 16, 1870,

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[37] Report of the United States Commissioner of Education, Art and Industry, p. 297, Vol. 1, 1885. Government Printing Office, Washington, D. C.

[38] Report of the Commissioner of Education Made to the Secretary of the Interior for the Year 1870, p. 167. Government Printing Office, Washington, D. C.

the State Legislature of Massachusetts passed a law making it mandatory that communities having a population of more than 10,000 people provide means for instruction in industrial or mechanical drawing to persons over fifteen years of age.[39] A transcript of this law occurs on the following page.

WALTER SMITH OF ENGLAND.

In pursuance of the Act of 1870, Smith, Art Master, London, late headmaster of the Leeds School of Arts and Science and Training School for Art Teachers, was invited both by the city of Boston and by the State of Massachusetts to come from England and introduce the new study into the schools of the city and of the commonwealth. Consequently, upon acceptance of the invitation he was made both City Director and State Director of Drawing. Smith was an able man, and was unremitting in his efforts to serve efficiently in his new position. Although a foreigner, Smith performed a service that will always be considered outstanding in the history of education in the United States.[40]

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[39] Op. cit., p. 167.

[40] Report of the United States Commissioner of Education, Circular of Information, No. 2, 1874, p. 17. Government Printing Office, Washington, D. C.

ACTS AND RESOLVES

Passed by the General Court of Massachusetts, in the year 1870.

AN ACT relating to free instruction in drawing
Be it enacted, & c., as follows:

Chap. 248
Drawing to be taught in the public schools

Section 1. The first section of chapter thirty-eight of the General Statutes is hereby amended so as to include drawing among the branches of learning which are by said section required to be taught in the public schools.

Industrial and mechanical drawing taught to persons over fifteen years of age.

Section 2. Any city or town may, and every city and town having more than ten thousand inhabitants, shall annually make provision for giving free instruction in industrial or mechanical drawing to persons over fifteen years of age, either in day or evening schools, under the direction of the school committee.

Section 3. This act shall take effect upon its passage.

Approved May 16, 1870.[41]

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[41] Taken from Sessions Acts of the Massachusetts State Legislature for the session 1870.

LEGISLATURE OF THE STATE OF MASSACHUSETTS ESTABLISHED AN ART NORMAL SCHOOL.

Upon his arrival in the United States, Smith saw at once that little could be done for Massachusetts relative to teaching drawing without trained teachers. Consequently, his first major effort was to establish a teacher training institution. The normal school, however, had been a mooted subject in the United States ever since Clinton first mentioned it to the State Legislature of New York in 1825. The normal school had always met with bitter opposition in the United States. Hence, the State Legislature of Massachusetts refused to respond favorably to Smith's request. Smith, however, continued to expound on the need of such an institution. With the aid of industrialists who were intensely concerned with the whole movement, Smith prevailed upon the legislature again. In 1873 the legislature did not exactly establish in that year a permanent normal art school, but it appropriated $7500 to be expended for teacher training at the discretion of the Massachusetts State Board of Education.[42] A transcript of the act is given on the following page.

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[42]Report of the United States Commissioner of Education, Circular of Information, No. 2, 1874, p. 17. Government Printing Office, Washington, D. C.

ACTS OF MASSACHUSETTS STATE LEGISLATURE - 1873

CHAPTER 47

Resolve In Relation To State Normal Art-School.

Resolved, That there be allowed and paid out of the treasury, the sum of seventy-five hundred dollars for the expenses of a state normal art school, the same to be expended under the direction of the board of education.[43]

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[43]Taken from Session Acts of the Massachusetts State Legislature for the Session of 1873.

THE STATE OF CALIFORNIA EMULATED THE STATE OF MASSACHUSETTS IN 1872.

The discussion of the advisability of teaching drawing in the public schools had not been confined to Massachusetts. Indeed, by this time it had become a nation-wide topic for educational discussion. It is interesting to note that the first state to legislate on the subject after Massachusetts was one on the Pacific coast. The state of California legislated drawing as a compulsory subject of study into the public schools of that state in 1872. A transcript of the act may be found on the following page. It should be noted that the term used in the act is "industrial drawing."

THE STATE OF NEW YORK LEGISLATED DRAWING AS A SUBJECT OF STUDY INTO THE PUBLIC SCHOOLS IN 1875.

The Legislature of the State of New York made the teaching of drawing mandatory in the state normal schools and in the city schools. In the district schools the matter remained discretionary with the Superintendent of Public Instruction. Note that in the act the term "industrial or freehand drawing," is used. A copy of the act is given on page 192.

1872 Session Acts

State of California

Section 1665

Instruction must be given in the following branches in the several grades in which each may be required, viz: Reading, writing, orthography, arithmetic, geography, grammar, history of the United States, physiology, natural philosophy, natural history, vocal music, and <u>industrial</u> drawing.[44]

NOTE: The term "industrial drawing" was changed to "drawing" in 1901. In 1925 the term "drawing" was changed to the term "art."

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[44] Taken from the Session Acts of the California State Legislature for the session of 1872.

LAWS OF THE STATE OF NEW YORK,

Passed at the Ninety-Eight Session of the Legislature.

Begun January 5 and ended May 22, 1875.

Chap. 322

AN ACT relating to free instruction in drawing.

Passed May 14, 1875; three-fifths being present.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

Drawing instruction in.

Section 1. In each of the state normal schools the course of study shall embrace instruction in industrial or free hand drawing.

Section 2. The board of education of each city in this State shall cause free instruction to be given in industrial or free hand drawing in at least one department of the schools under their charge.

Union free schools, drawing in,

Section 3. The board of education of each union school free school district incorporated by special act of the Legislature, shall cause free instruction to be given in industrial or free hand drawing in the schools under their charge, unless excused therefrom by the Superintendent of public instruction.

Section 4. This act shall take effect October first, eighteen hundred and seventy-five.[45]

[45] Taken from Session Acts of the New York State Legislature for session of 1875.

DRAWING CONTINUED TO BE A MUCH DISCUSSED SUBJECT IN SCHOOL REPORTS.

In a report issued by the city schools of Boston in 1875, the teaching of drawing was advocated as a vocational subject, thus:

> In truth, the systematic instruction in Drawing, which is yet in its infancy in America, may be considered one of the most intelligent and important additions to the practical education of the workingclasses, whose children constitute so large a majority of our public pupils, which has been attempted in the history of education. The bane of society has always been in the mass of people who are destitute of any industrial skill. Our schools have furnished the heads tolerably, but have left the hands comparatively powerless, and hence have steadily sent into the active world multitudes who were sufficiently educated to be dissatisfied with their social stations, but who have had no capability of using their knowledge in improved forms of labor which should at once appease their reasonable ambitions, and make them contented with being honest work-people.[46]

Two years later, in a report of the city schools of Boston, the teaching of drawing was evaluated as equivalent to the teaching of reading, writing, and arithmetic. The quotation referred to follows:

> 1. Reading, because it is the means of teaching and acquiring knowledge.
> 2. Writing, because it is the means of expressing knowledge.
> 3. Arithmetic, because it is the means of computing knowledge and values; and,

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[46]Annual Report of the School Committee of the City of Boston, 1875, p. 26. Rochwell and Churchill, City Printers.

> 4. Drawing, because it is the language of form in every branch of industry, from the most simple to the most complex.
>
> "A boy or girl who can draw," said Mr. Cullyer, "has acquired one qualification for nine-tenths of the occupations into which all labor is divided." These words sufficiently set forth the importance of Drawing as a study and fix its claims upon public support.[47]

A report for 1877 of the city schools of Erie, Pa., advocates the teaching of drawing for psychological reasons, thus:

> The kind of drawing made a legal study in several states, and largely introduced into schools during the last six or eight years, is by no means a "fancy study," but of all studies it is the most practical as an educational force.
>
> The old style drawing in schools consisted principally of picture making from copies. The new is an intellectual study inducing thought, ingenuity, and invention in the line of art as applied to industrial pursuits. The influence of this branch is manifold; it especially develops: (1) observation; (2) forethought; (3) painstaking; (4) taste; (5) imagination, memory of forms; (6) power to discriminate--judgment; (7) ease and precision in the movements of the hand. No profession, calling, or business can be brought to mind that does not call for such mental and physical culture. As drawing is opposed to carelessness, haste, bad forms and clumsy execution, it is a valuable aid in teaching writing.[48]

The state of Iowa is far inland and non-industrial. Even in this state the State Superintendent of Public

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[47] Annual Report of the School Committee of the City of Boston, 1877, p. 232. Rockwell and Churchill, City Printers.

[48] Report of the United States Commissioner of Education, Art and Industry, p. 377, Vol. 1, 1885. Government Printing Office, Washington, D. C.

Instruction heartily endorsed the teaching of drawing in the district schools. A quotation from a report for the year 1881 is as follows:

> A new feature of our work is that of drawing, taught by Prof. W. N. Hull, of the State Normal School. His system of drawing is simple and very practical. Our teachers were very much interested in it and we anticipate good results from it. I am fully convinced of its value in our district schools. Without it, an important link is omitted in our educational system. I think the legislature should be urged to add it to the branches now required by law to be taught.[49]

In the report of the common schools of the city of Cincinnati for the year 1882, an attempt was made to set down definite reasons for the teaching of drawing. The reasons given were pedagogic, technical, psychological, and aesthetic. A descriptive quotation follows:

> 1. Drawing in public schools should be cultivated only so far as it tends towards the general aims of education, viz.: The complete and harmonious development of all the powers and abilities of the pupil.
> 2. School drawing proposes to help educate the child by means of drawing, and does not look upon drawing as the aim of the child's education.
> 3. Technical schools include different branches of drawing for distinct and special pursuits. School drawing is restricted to the elements, which may be made subservient to the interests of the many.
> 4. The special aims of school drawing are: First, the quickening of the powers of observation; Second, the training of the eye; Third, the development of manual dexterity; Fourth, the cultivation of taste.
> 5. Elementary school drawing should be based upon the free-hand drawing of geometrical forms.

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[49]*Op. cit.*, p. 341.

6. Drawing from the object should not be attempted in elementary grades. It properly belongs to the upper grades, where it should take its place conjointly with geometrical drawing, designing, perspective, and the study of historic ornament.[50]

THE TERRITORY OF ARIZONA MADE THE TEACHING OF DRAWING LEGAL IN 1885.

Arizona was yet a territory and very sparsely populated. Nevertheless, Arizona had a territorial law as early as 1885 making the teaching of drawing legal. A copy of the law is given on the following page. A perusal of the law will indicate that the term "industrial drawing" continues to occur.

THE STATES OF NORTH CAROLINA, VIRGINIA, SOUTH DAKOTA, AND INDIANA, LEGISLATED DRAWING INTO THE COURSE OF STUDY.

The states of North Carolina, Virginia, and South Dakota each passed a law including drawing in the required list of subjects to be taught. Drawing also occurred in a list of high school subjects required by the Act of 1907 in Indiana. It should be noted that in the last four laws mentioned, the term "drawing" was used instead of the term "industrial drawing," which term was used in the laws quoted previously. This may

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[50]Annual Report of the Common Schools of Cincinnati, 1882, pp. 81-83. W. B. Carpenter & Co., Printers.

TERRITORIAL LAWS OF 1885

STATE OF ARIZONA

Sec. 81. Instruction must be given in the following branches, viz: Reading, Writing, Orthography, Arithmetic, Geography, Grammar, History of the United States, Elements of Physiology. Elements of Bookkeeping, Industrial Drawing, and such other studies as the Territorial Board of Education may perscribe, but no such other studies can be pursued to the neglect or exclusion of the studies enumerated.[51]

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[51] Secured by letter from H. E. Hendrix, State Superintendent of Public Instruction, 1937, Phoenix.

be indicative of a slight change in educational thought regarding the objectives of the teaching of drawing. Copies of the four state laws in question, may be found on pages 199, 200, 201, and 202, respectively.

TYPES OF DRAWING USED IN THE SCHOOLS AS A RESULT OF THE FOREGOING INFLUENCES AND LEGISLATION.

It should be remembered that in the preceding chapter the textbooks were noted chronologically as they appeared in public. It should also be remembered that most of them were charged heavily with the item of mathematics. Fowle's text was largely a translation of a descriptive geometry written by a Frenchman, named Francoeur. Minifie was an architect who wrote a splendid text from the architect's viewpoint. The publication of Monge on descriptive geometry, published in 1799, seems to have influenced tremendously many of the early publications on drawing.

Crozet, Sopwith, and Warren were early authors of texts on drawing. Each wrote from the mathematical and practical viewpoint. Inspection of the early textbooks on drawing would indicate a practical, mechanical trend.

Smith was the dominant authority on questions related to the teaching of drawing, not only for Massachusetts but also for the whole of the United States during

STATE OF NORTH CAROLINA

ACT 1901

CHAPTER 4

The branches taught in the public schools shall be orthography, defining, writing, drawing, arithmetic, geography, grammar, language, Constitution of the State, History of the United States, including the Constitution of the United States, physiology, hygiene, nature and effect of alcoholic drinks and narcotics, elements of civil government, elements of agriculture, theory and practice of teaching, and such other branches as the State Board of Education may direct.[52]

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[52]Secured by letter from L. H. Jobe, Director of Publications, State Department of Education, 1937, Raleigh.

ACTS AND JOINT RESOLUTIONS

Passed by the General Assembly of the

STATE OF VIRGINIA

During the Extra Session of 1902-3-4.

Chapter 309.--AN ACT to amend and re-enact chapter 66 of the Code of Virginia, relating to public free schools for counties and to the literary fund.

Approved December 28, 1903.

Section 1497. What to be taught in schools.--In every public free school shall be taught orthography, reading, writing, arithmetic, grammer, geography, physiology and hygiene, civil government, drawing, history of the United States and history of Virginia. In teaching physiology and hygiene approved text-books shall be used, plainly setting forth the effects of alcohol and other narcotics on the human system, and such effects shall be as fully and thoroughly taught as are other branches of the said last-named subjects.[53]

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[53] Taken from Session Acts of Virginia State Legislature for extra sessions of 1902-3-4.

SECTION 138

Article VI

STATE OF SOUTH DAKOTA

ACT 1907

Branches to be Taught. Instruction shall be given in the common schools of the state in the following branches, in the several grades in which each may be required, viz: Reading, writing, orthography, arithmetic, geography, primary language and English grammar, history of the United States, history of South Dakota, physiology, and hygiene, with special instruction as to the nature of alcoholic drinks and narcotics and their effects upon the human system, civil government and drawing.[54]

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[54] Secured by letter from J. F. Hines, State Superintendent of Public Instruction, 1937, Pierre.

LAWS OF THE STATE OF INDIANA

Passed at the sixty-fifth regular session

of the

General Assembly

Begun on the Tenth Day of January, A. D. 1907.

Chapter 191.

AN ACT In relation to high schools.

(S. 248. Approved March 9, 1907)

HIGH SCHOOL STUDIES

Section 2. The following enumerated studies shall be taught in all commissioned high schools throughout the state, together with such additional studies as any local board of education may elect to have taught in its high school: Provided, That such additions shall be subject to revision of the state board of education. Mathematics: Commercial arithmetic, algebra, geometry. History: United States, ancient, medieval or modern. Geography: Commercial or physical, physical. English: Composition, rhetoric. Literature: English, American. Language (foreign): Latin or German. Science: Biology physics or chemistry. Civil government: General, State. Drawing. Music.[55]

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[55]Taken from Session Acts of the Indiana State Legislature for session of 1907.

the decade from 1870 to 1880. Smith's publication[56] on education was considered authoritative. His reports to the Board of Education of the State of Massachusetts were also considered guides for other states interested in the teaching of drawing.

A knowledge, then, of what Smith actually introduced into the schools of Massachusetts would enable one to visualize the situation for the whole country. Smith was trained in the fine arts. One would, therefore, naturally suppose that he would emphasize the teaching of the fine arts. Smith did emphasize the teaching of the fine arts in reports; but he sensed and followed the dominant note in Massachusetts, which was industry. He, therefore, introduced into the public schools what they chose to call, "industrial drawing." Smith transported from England to America not England's system of teaching fine arts, but England's drawing related to industrial arts. An examination of official examination papers occurring in one of Smith's reports, will indicate something of the contents of the courses taught. On page 205 is a photostat of examination questions for three tests, one on perspective, one on architecture, and one on geometry. On page 206 is a photostatic copy

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[56]Smith, Walter, op. cit.

of a test paper in the theory of perspective. It is not a test in the execution of linear drawing. It is rather a discussion test. On pages 207 and 208 are photostatic copies of two examination papers, one containing directions for an examination in memory drawing, and the other having directions for an examination in object drawing. A perusal of these examination papers makes it evident that there is no reference to emotional experience, and therefore, the examinations cannot be measures of ability in the fine arts. With the examination questions as a basis, there is strong evidence that the type of drawing Smith introduced into the schools of Massachusetts, was related to mathematics, engineering, industry and freehand sketching. In fact Smith simply obeyed the law. The law specified the teaching of "industrial drawing."

GREAT CONFUSION OF EDUCATIONAL THOUGHT EXISTED.

Massachusetts had launched out on a new field of educational endeavor. The fact that she brought Smith to America is good evidence that she felt insecure in her new efforts. Smith possessed the best knowledge of his day; but the best knowledge of the day was extremely inadequate concerning the psychology of drawing, concerning art as an emotional experience, and concerning

PERSPECTIVE.

FEBRUARY, 1868.

These problems are to be worked to a scale of one-half inch to the foot, the distance of the spectator from the picture being in each case thirteen feet, and the ground-plane five feet below the eye.

1. A right cylinder ten feet long and six feet in diameter lies upon its side on the ground-plane. The visible base is in a vertical plane at an angle of 45° with the picture, towards the left hand, and touches the ground-plane three feet within the picture, and two feet on the left of the spectator. Give its perspective representation.
2. A plane making an angle of 30° with the ground-plane intersects it in a line inclined towards the left hand, at an angle of 45° with the picture-plane. This line intersects the picture at a point, A, one foot to the right of the spectator. Find a point, B, upon the intersecting line of the oblique plane with the ground-plane, four feet from point A; and another point, C, ten feet from point A, upon this line. The line BC is one edge of a cube resting upon the inclined plane. Give a perspective representation of the solid.
3. A line upon the ground plane touches the base-line of the picture at a point, A, two feet to the right of the line of direction, and inclines towards the left hand at an angle of 45° with the picture: find a point, B, upon this line, two feet from point A, and another point, C, eight feet from point A. The line BC is one edge of a solid wedge, the base of which rests upon the ground-plane, and is square. Three sides of the solid are vertical, and its upper surface makes an angle of 60° with the ground-plane from the line BC. Complete its perspective representation without the use of plan or elevation, and give the vanishing line of the oblique plane.

Two hours allowed.

ELEMENTARY ARCHITECTURE.

FEBRUARY, 1868.

In all cases add the names of the parts. Scale at pleasure, but always to be sent up with the drawings.

1. Show by drawings the various joints made use of in wood-work.
2. Show by drawings the meaning of the following terms: wall-plate, pole-plate, tie beam, principal rafter, common rafter, purlins, strut, and king-post.
3. Show also the meaning of the following: bridging and binding joists, girder, and ceiling joist.
4. Give a sectional plan, elevation, and vertical section of a four-panelled door, showing details of framework.
5. Give a sectional plan, elevation, and vertical section of a window-frame arranged for sashes.

Four hours allowed.

GEOMETRY.

FEBRUARY, 1868.

1. Find a third and fourth proportional to two right lines of respectively three inches and two inches in length.
2. Construct a regular pentagon of one and one-half inches side, and an equilateral triangle containing the same area.
3. Give a general method of inscribing a regular polygon within a circle, applying it to a nonagon in a circle of one and one-half inches radius.
4. Give a general method of constructing a polygon upon a given line, applying it to a heptagon of one and one-half inches side.
5. Within the last polygon (fig. 4) place another heptagon, having sides of one inch parallel to the sides of the first polygon, and having the same centre.
6. Describe a circle of three inches diameter, and without it a second circle of one inch diameter, the circumference of which will be one-half inch from the first circle at its nearest point. Describe a third circle of three-quarters of an inch radius, which shall be tangential to these two.
7. The transverse diameter of an ellipse is five inches long, its conjugate diameter being equal to four-sixths of the length of the transverse. Draw the curve of the ellipse by means of intersecting arcs of circles.
8. Two similar triangles have bases of two inches, and one and one-half inches length, respectively. Construct a similar triangle of equal area to these two.
9. Draw a cinquefoil of tengential arcs of circles of one-half inch radius.
10. Construct a triangle, the base of which is one inch long, the altitude two inches, and one side of which is three inches long.

Two hours allowed.

Smith, Walter
First State Supervisor of Drawing,
Report to State Board of Education,
Boston, Mass., 1873.

APPENDIX III.

EXAMINATION PAPERS.

The examples of examination papers given here are illustrations of the graded system of the English Science and Art Department, in the Art Section. The standard for each grade is considerably lower than that at present applied, the papers being all of dates previous to 1870. It is therefore more applicable to this country, where the subject has not been taught so long as in England. The grades adopted — first, second, and third — are convenient and simple. The first grade should apply to all school children up to fifteen years of age; the second to all above that age, to students of night classes, and the teachers of the common schools; the third to professional teachers of art, or professional artists, architects, or engineers. Of the third grade there are six groups or certificates granted in England; the specimens here given being the first or most elementary group.

EXAMINATIONS BY THE ENGLISH SCIENCE AND ART DEPARTMENT.

Specimens of the examination papers for the first certificate of third grade, — the elementary certificate, — which must be held by masters or mistresses of schools of art. In addition to these papers, the examination includes also a chalk-drawing, in two hours, from a cast of foliage, and a drawing of models in a group, in two hours, the subject for 1868 being a chair leaning backwards upon a machine, in which toothed wheels were visible.

PERSPECTIVE THEORY.

FEBRUARY, 1868.

1. What is the difference between orthographic and perspective projection?
2. Upon what laws in optics are the principles of perspective founded?
3. Give reasons for or against any change by curvature or otherwise in long horizontal or vertical lines parallel to the picture.
4. In order to be able to measure right lines in a given plane, what conditions are necessarily predetermined?
5. By how many methods could you determine the geometric lengths of lines in horizontal planes, the necessary conditions being given?
6. What is the relation of a vanishing plane to the eye?
7. Is the perspective representation of a circle upon an oblique plane invariably a perfect ellipse?
8. Is the distance of the spectator from the picture arbitrarily fixed, or would any change of distance necessarily tend to render the drawing inaccurate?
9. Under what circumstances must a horizontal line be represented by a vertical one?
10. Explain the use of proportional measuring points.

Two hours allowed.

SPECIMEN OF SECOND-GRADE

EXAMINATION PAPER, MEMORY DRAWING

UPON THE BLACKBOARD, AND UPON THE SHEET OF PAPER FURNISHED.

Time allowed, to be settled by the Examiner, according to the difficulty of the subject chosen. [Usual time, fifteen minutes for each.]

DIRECTIONS.—Choose from the subjoined list any two subjects you can draw from memory.

1. A Chair (corner in front).
2. A Chair (side in front).
3. A Tea-kettle.
4. A Branch of Maple.
5. A Pitcher.
6. The Letter M (Roman character).
7. A Round Table.
8. A Barrel.
9. Street Lamp.
10. A Boat.
11. An Animal.
12. A House.

The pencil-drawing to fill the space beneath. The blackboard-drawing to be two feet high.

WRITE 1. Your name at full length.
2. Your age last birthday.
3. The school where you learn drawing.

Smith, Walter
First State Supervisor of Drawing,
Report to State Board of Education,
Boston, Mass., 1873.

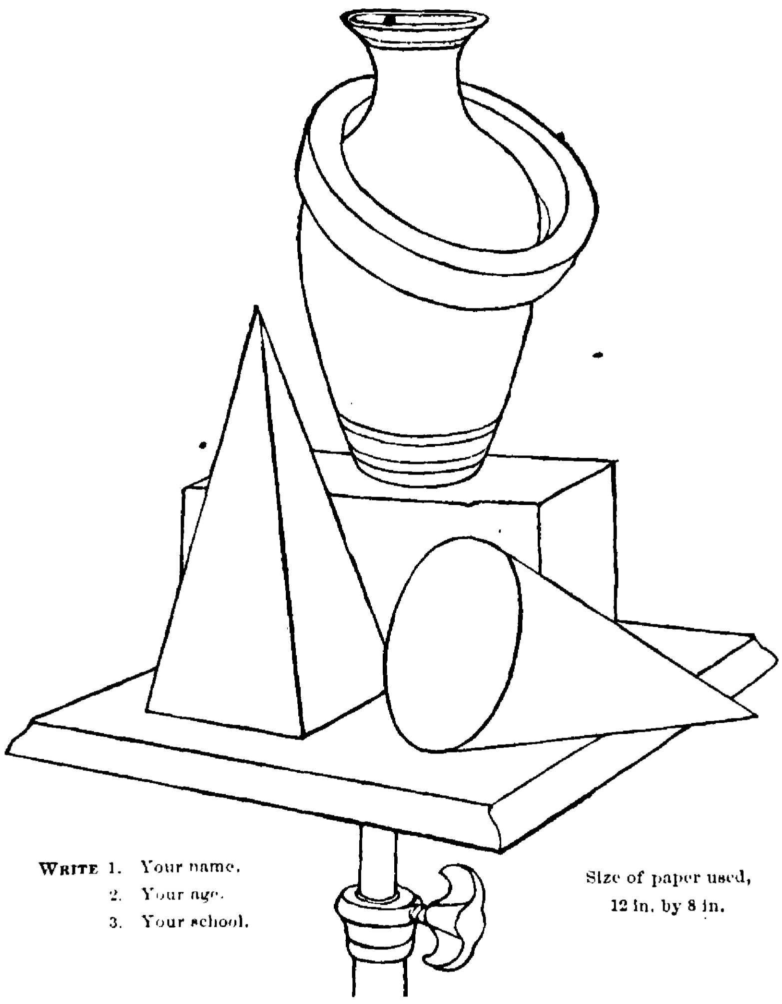
SPECIMEN OF

GROUP PLACED FOR MODEL-DRAWING.

FOR SECOND-GRADE EXAMINATION.

TIME ALLOWED, ONE HOUR.

To be drawn as large as the paper will allow.



WRITE 1. Your name.
2. Your age.
3. Your school.

Size of paper used,
12 in. by 8 in.

Smith, Walter
First State Supervisor of Drawing,
Report to State Board of Education,
Boston, Mass., 1873.

methods of effective teaching. Smith brought the English methods to the United States; but the English were also suffering from a lack of adequate knowledge, despite the fact that they had made much progress.

There were groups who had fixed attitudes toward the introduction of drawing as a subject of study into the public schools; and there were groups who had imaginary objectives set out for accomplishment as a result of the teaching of drawing. The ultra-traditionalists would not accept drawing as a proper subject of study at all. The traditionalists who were convinced that discipline and culture would result from the teaching of drawing were willing to accept it with reservations. The advocate of the teaching of fine arts, who saw as the results of its teaching the rapid development of good taste and general aesthetic appreciation, accepted it with enthusiasm. The educationists who thought it would enhance visualization, stimulate the imagination, quicken thought, develop dexterity, and develop appreciation, accepted it as a forceful teaching agency. The industrialists saw it as basic to all arts, crafts, and trades. The technician saw it as a necessity to the trained scientist or to the trained engineer. The economist saw it as giving added monetary value to the manufactured products.

The industrialist and the economist had two objectives in common which they hoped would result from the teaching of drawing. One objective was the facilitation of production by virtue of having all work and processes planned in linear form, which form would be understood by all workmen as a result of their school training. The mechanical drawing taught in school really tended in a large measure to realize this objective.

The other objective in the mind of the industrialist and in the mind of the economist was deep seated, was far reaching, and was difficult of accomplishment. This objective, in short, was the injection of the element of good taste, the element of fine arts, the aesthetic element, into the manufactured product. This objective was eagerly sought in the United States for very good reasons. The American manufacturer had to compete with the European manufacturer in the world's market. The European people had had a long period of art training behind them. They had developed what is called art consciousness. Their art consciousness manifested itself in their manufactured products. For this reason crude products could not compete favorably in the European markets. America was young and crude. She had not developed art consciousness. It was hoped that the general teaching of drawing would diffuse an appreciation of the beautiful which in turn would find its way into the manufactured product.

There is another thought closely integrated in this discussion. As inferred in the foregoing, every manufactured article has three elements of value: first, the raw material; second, the labor of production; third, the art-character. The third element is the product of the wits, but it often has a tremendous value.[57] George J. Cox, in his introduction to a publication written by Sallie B. Tannahill,[58] said that it had been estimated with a good degree of accuracy that the exports of nations vary in value from five cents a pound to three dollars a pound in accordance with the presence, or the absence, of the art element. This point has been rather submerged in this whole discussion, but it is the point that was most vital in the thinking of the more intelligent industrialist and in the thinking of the economist. It was hoped that the American people as a result of school training could profit in a monetary way through the use of their wits.

CONFUSION CLARIFIED IN THE LIGHT OF PRESENT DAY THOUGHT.

In clarifying the educational thought clustered around the law of 1870, and emanating from that source

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[57] Report of the United States Commissioner of Education, Circular of Information, No. 2, 1874, p. 23. Government Printing Office, Washington, D. C.

[58] Tannahill, Sallie B. Fine Arts, p. IX. Bureau of Publications, Teachers College, Columbia University, New York, 1932.

for more than two decades, one must keep clearly in mind the several objectives which different groups of citizens had in mind as end results for the teaching of drawing.

(1) the industrialists who were not thinking clearly, but who had heard of the marvelous things the schools were doing in England to aid the manufacturer, demanded the teaching of drawing because they had a vague feeling that magic results would come therefrom.

(2) Many industrialists saw the close relationship existing in modern industry between mechanical drawing and production. They realized that even a reading knowledge of mechanical drawing on the part of their workmen, would aid in speeding up production, and withal would inject one more element of intelligence into industry.

(3) A smaller and more intelligent group of industrialists with the economic viewpoint, saw more deeply into the situation. They saw clearly that in order even to begin to compete favorably in European markets the American product would have to possess the element of good taste, the element of refinement, the aesthetic element. They further saw that the aesthetic factor, well integrated in a manufactured product, gave that product a

monetary value in addition to and aside from the value of material and labor required to produce the product.

(4) The history of technical education indicates that the ability to draw has always been considered a part of the equipment of a trained technician. Consequently, there has been no contention on this point. Schools of engineering have included drawing in their curricula from the beginning.

(5) The advocates of the teaching of "art for arts' sake" saw drawing as basic to all visual arts. They advocated the teaching of drawing because of what they thought it would lead to. They sought pure culture; they were not interested in practical application.

(6) The educationists, especially the leaders--Mann, Barnard, Philbrick, Smith--visualized the teaching of drawing from all the foregoing mentioned points of view. They saw the teaching of drawing as related to industry as productive of wealth, as essential to the technician, and as productive of culture. Especially did they regard the teaching of drawing as a powerful pedagogic aid, stimulating the imagination, objectifying thought, clarifying meaning, developing dexterity, enhancing good taste, and broadening appreciation.

The different groups in Massachusetts were eminently correct on one point, namely, that the teaching of drawing was related to every one of the educational objectives which the different groups enumerated; but they were eminently incorrect in presuming that all those results could be attained in a short time through the teaching of two or three simple types of drawing. The several results that they would attain required much scientific knowledge related to education which they did not possess. The elevating of public aesthetic taste requires decades of time. It involves some knowledge of the emotions. It involves knowledge of both individual and social psychology. They had cited splendid and worth-while objectives, but they were not in possession of the knowledge requisite to their accomplishment.

The Massachusetts experiment, however, was not a failure except in that it failed to accomplish the impossible. The teaching of freehand object drawing, freehand memory drawing, and elementary mechanical drawing, was a success. Moreover the experiment pointed the way to ends that could be attained, but only at a more distant time.

FAIRNESS TO WALTER SMITH.

Smith contributed to education in the United States a splendid service. He introduced the teaching of drawing into the public schools of Massachusetts as wisely as it could have been done at that time. He had in mind as did Philbrick and other leaders of the time, the introduction of other procedures later, procedures that would lead to the more deeply seated and far reaching educational ends.

The people of Massachusetts, however, were restless. They wanted more direct and immediate results. Smith had encountered opposition in Massachusetts from the beginning of his service there. Opposition had not decreased. In response to an invitation to fill an important position in his native land, he returned to England.

Summary

1. Sentiment for the teaching of drawing to children had been growing for many decades in Europe before the people of America began to feel the need of such instruction for their children. Economic and industrial expansion in America made it obvious that several forms of technical instruction were necessary if people were to take advantage of their potential commercial possibilities. Glowing reports from major countries in Europe relative to the teaching of drawing in European schools fired many Americans with a desire to do likewise in American schools.

2. Mann, Barnard, and Sheldon exerted tremendous influence in favor of teaching drawing in the public schools of the United States. Advocacy of the teaching of drawing was allied with the advocacy of progressive education in general.

3. The Great Exhibition of 1851, and the Paris Exposition of 1867 aroused much international interest in the teaching of drawing to children. Countries which scored low in competitive contests at the great expositions turned to their schools for help. Demands were made especially for improvement in the teaching of drawing. Industrialists and educators in America learned of the

movement in European schools and demanded that similar procedure take place in American schools. There was an increasing feeling that economic competition could be met only by giving sufficient consideration to educational procedure. In all of this the focal point of attack seemed to be in the teaching of drawing.

4. The movement favorable to the teaching of drawing continued to grow in America. As a result the State of Massachusetts legalized the teaching of drawing in the public school in 1860. Ten years later the same state made the teaching of drawing under certain conditions mandatory in her public schools. The states of California, Virginia, South Dakota, Indiana, and the territory of Arizona followed with legislation making drawing as a subject of study a required branch of instruction under certain conditions.

5. England had been concerning herself very seriously with the teaching of drawing in her schools. This fact led to the employment of an Englishman, Walter Smith, by the State of Massachusetts to supervise the teaching of drawing under the provision of the law of 1870. Smith encountered a difficult problem in the form of a shortage of teachers capable of teaching drawing. To alleviate this shortage he caused the Massachusetts State Legislature to establish the Normal Art School in 1873.

6. Smith served for a decade giving splendid service. There were, however, many opinions concerning the results that should follow the teaching of drawing. Many of the demands were impossible of accomplishment. Confusion of thought existed. The position Smith held was not especially agreeable. He, therefore, accepted an invitation to fill a responsible position in his native country.

CHAPTER VIII

OTHER EVENTS AND MOVEMENTS AFFECTING THE PLACE OF DRAWING AS A SUBJECT OF STUDY IN THE CURRICULUM

BRIEF REVIEW.

It is evident from what has been thus far brought to the surface in this study that for centuries there has been in operation a continual, though at times an ineffective demand for a procedure in education that would answer the needs of people in work-a-day life. Omitting for the moment the European situation, and thinking only of what has happened in America, it is obvious that the people of colonial times were far from being oblivious of the need of effective education. The people living during the period of the Revolutionary War found themselves keenly in need of technical knowledge. Again during the period of the War of 1812 that need was strongly impressed upon the people of that time. With the process of urbanization in operation, and with rapid and abrupt modernization of industry continuing, many people in the United States saw clearly the need of continual readjustment of educational procedure to meet a changing industry, a changing commerce, a growing population within, and a growing immigration from without.

In answering modern needs through the medium of education, much of the thinking of industrialists and much of the thinking of educators centered on drawing as a subject of study. They regarded drawing so strongly as a focal point of attack that direct state legislation was effected in several states, making the teaching of drawing mandatory. As far as an effort in this study could bring the facts to light, few other subjects have been individually and separately legislated into the curriculum.

It was explained in a previous chapter why drawing was regarded as a focal subject. It was pointed out that drawing is basic to industry either for facilitating production or for improving artistic taste and appreciation, which improved taste and appreciation might find its way into the manufactured product. It was also pointed out that drawing is necessary to science, invention, engineering, mathematics, and pedagogy.

Drawing has many points of contact in the major fields of human endeavor. As this study progresses further, it shall become evident that the degree of stress on each of the several points varies from period to period in accordance with occurring events and new movements.

THE CENTENNIAL EXPOSITION OF 1876.

England had its Great World's Fair[1] of 1851, which aroused the English government and English people to earnest and serious educational action. France had its Great Paris Exposition[2] of 1867, which caused France to reevaluate its educational objectives and modify its educational procedure. In celebrating its one hundred years of existence as a nation, the United States invited the nations of the earth each to assemble their choicest products in Philadelphia in 1876.[3] Many of the nations responded, and thus another great exposition took place, which proved to be both enlightening and stimulating.

It will be remembered that the United States, largely because of its youth, scored low in the Exposition of 1851 at London and again at the Exposition of Paris in 1867. Competing in the world's activities, however, made the young American republic apprehensive and alert. It aroused its leaders to action. Its educators learned to look keenly for enlightenment.

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[1] Official Catalogue of Great Exhibition of 1851, Vol. 1, pp. 1-35. Spicer Brothers, and W. Clowes and Sons, Printers, London, 1851.

[2] Report of the United States Commissioners to the Paris Exposition of 1867, Vol. I, pp. 1-6. Government Printing Office, Washington, D. C., 1870.

[3] International Exhibition of 1876, Philadelphia, Vol. II, pp. 27-38. Government Printing Office, Washington, D. C.

The Centennial Exposition served to arouse heated educational discussion which discussion continued for nearly two decades. The chief value of this discussion was that it caused many educators to desist from their tendency to adhere too strongly to traditional thought in education. Even a cursory persual of the reports of the National Education Association from 1876 to 1890 will make known the frequency of educational combat between ultra-conservatives and progressives in education. This was, indeed, a turbulent transition period in educational thought.

Many abstract and intangible educational values could be pointed out as coming from the proceedings of the Centennial Exposition; but the one certain concrete contribution of this exposition was the Russian System or what is more commonly known as manual training. Victor Della Vos,[4] director of the Imperial Technical School at Moscow, exhibited a formal course in mechanic arts. John D. Runkle,[5] President of the Massachusetts Institute of Technology, examined Vos' exhibit and

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[4]Report of the United States Commissioner of Education, Vol. 1, 1903, p. 1021. Government Printing Office, Washington, D. C.

[5]Ibid., p. 1021; Ham, C. H. Manual Training, p. 332, Harper & Brothers, New York, 1886; Report of the United States Commissioner of Education, 1887-1888, pp. 857-858. Government Printing Office, Washington, D. C.

became enthusiastic concerning it. He not only introduced this course into his school of engineering, but he took it to the educators in control of the public schools. A sufficient number of citizens and public school officials were caught up with the idea to give it great impetus. Consequently, manual training thrived in the public schools from about 1880 to 1900.

KINDS OF DRAWING ALLIED WITH MANUAL TRAINING.

Manual training was a form of mechanic arts. It came from the school of engineering directly to the public schools. It was not modified much if any, in the transition; consequently, it brought with it engineering drawing and shop sketching.[6] Therefore, it is clear that the drawing coming to the public school curriculum through the medium of manual training had a utilitarian motive behind it.[7]

All efforts to connect up a fine arts movement with the manual training movement is futile. In a report of the United States Commissioner of Education it is stated that Calvin M. Woodward, foremost advocate

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[6] *Op. cit.*, pp. 838, 861, 880, 882, and 885.

[7] Report of The United States Commissioner, Vol. 2, 1904, pp. 2097-2108. Government Printing Office, Washington, D. C.

of manual training and founder of the first manual training school in the United States, had never made any claim for manual training on the ground that it gave training in fine arts.[8] Indeed, the results of manual training were so adverse to the cause of fine arts in England as well as in America that Morris and Ruskin started a movement known as the Arts and Crafts Movement, designed especially to counteract the ill effects of manual training to the cause of fine arts.[9]

TEACHERS COLLEGE, COLUMBIA UNIVERSITY.

Through the efforts of Miss Peabody and a little later through the efforts of Harris, Froebel's kindergarten philosophy was well introduced to the educators of the United States. Growing out of the Kindergarten Movement was the Kitchengarten Movement. The Kitchengarten Movement differed from the Kindergarten Movement in that it stressed play activity for vocational ends.[10]

The Industrial Education Association of New York City was a product of the Kitchengarten Movement. It

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[8]Report of the United States Commissioner of Education, Monograph No. 14, 1900, pp. 38-40. Government Printing Office, Washington, D. C.
[9]The Year Book, p. 495. The University of London, 1936.
[10]Brander, Matthews. History of Columbia University, pp. 409-410. Columbia University Press, New York, 1904.

was organized in 1884. Out of The Industrial Education Association grew the New York College for Training Teachers. This college was designed to train teachers for industrial work. In 1892 the New York College for Training Teachers became the Teachers College of Columbia University.[11]

Thus, it is obvious that the Teachers College of Columbia University has its roots imbedded deeply in the philosophy of industrial education. It continues to propagate a modified form of the philosophy in which it was conceived. Indeed, this institution maintains a professional school of education and a separate school of practical arts, each with its own faculty.[12]

The Teachers College of Columbia University has influenced tremendously the teaching of both the fine arts and the practical arts in the public schools. In fact, the school of practical arts, itself, fosters the

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[11]Keppel, Frederick P. Columbia, p. 128. Oxford University Press, New York, 1914; Report of the United States Commissioner of Education, 1886-1887, pp. 790-791. Government Printing Office, Washington, D. C.; Anderson, Lewis F. History of Manual and Industrial Education, pp. 155-156. D. Appleton & Co., New York, 1926; Bennett, Charles A. History of Manual and Industrial Education 1870-1917, pp. 467-469. Manual Arts Press, Peoria, Ill., 1937; Payne, Arthur F. Methods of Teaching Industrial Subjects, pp. 17-19. McGraw-Hill Book Co., Inc., New York, 1926.

[12]Keppel, Frederick P. op. cit., p. 129.

teaching of fine arts. The point germane in this discussion is that the Teachers College of Columbia University has propagated the teaching of drawing as a fine art, as a practical art, and as a pedagogic aid. The officials of this institution have maintained open minds, and in point of drawing as a subject of study, they have sought to use it wherever it serves a worthwhile human purpose.

THE RUSSELL-BONSER MOVEMENT.

The Russell-Bonser Movement was really a modified continuation of the Columbia Teachers College Manual Training Movement. James E. Russell, now dean Emeritus, was then dean of the Teachers College, Columbia University, and the late Frederick G. Bonser was a professor of education in the same institution. The movement took the form of opposition to manual training as it was being advocated and taught within the teachers college itself.[13]

In the seventies the average educator in the United States was yet extremely conservative and traditional. A large number of educators refused to accept manual training as a proper subject of study when it was first

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[13]Russell, James E. "An Appreciation of Frederick Gordon Bonser," Teachers College Record, Vol. 33, Oct.-May, 1931-1932, pp. 10-12.

advocated. Indeed, it was opposed vigorously and heatedly by not a few ultra-traditionalists.[14] This put the proponents of manual training on the defensive. They became anxious to pacify, and in doing this they set up several objectives for the subject. It was pointed out as a cultural subject for those who believed largely in cultural education. It was designated as productive of formal discipline for those who believed in formal discipline. It was a form of technical education for those who were seeking technical education. It was a form of vocational education for those who saw a great need for vocational education.[15]

The objective fact is that manual training consisted of a series of very formal exercises logically arranged,[16] and to be executed by the pupil with great precision and accuracy. Each exercise was an end in itself. It was put to no actual use. When completed it was either stored up or destroyed.

It was to this multiplicity of doubtful objectives and to the production of worthless end products that

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[14] Bennett, Charles A., op. cit., pp. 360-370.
[15] Anderson, Lewis F., op. cit., pp. 161-164.
[16] Bennett, Charles A., op. cit., pp. 17-18.

both Russell and Bonser objected.[17] In objecting, they did not destroy. On the contrary, they constructed an educational philosophy that has been strongly directive, especially in elementary education. They pointed out that technical education and vocational education do not belong to the field of elementary education. They limited elementary education to the first six years of school life. The work of the first six years of school was to be fundamental, the same for all regardless of sex or future occupation.[18] There was to be a common denominator of experience to be possessed by all children.[19]

Russell and Bonser[20] considered drawing, manual training, domestic science, and domestic art as instrumental in giving a part of a common denominator of experience. These four activities were considered here as aids to understanding and appreciation. Skill in manipulation was not emphasized here. The purpose of manipulation was to help the mind to grasp the meaning

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[17] Bonser, Frederick G. and Mossman, Lois C. Industrial Arts for Elementary Schools, p. 479. The Macmillan Co., New York, 1934.

[18] Russell, James E. and Bonser, Frederick G. Industrial Education, p. 5. Teachers College, Columbia University, New York City, 1912.

[19] Ibid., p. 44.

[20] Ibid., p. 30.

of industrial activities. It was to clarify ideas and appreciate meanings, feelings, difficulties, and excellencies, and not to make mechanics, cooks, and draughtsmen.[21]

The result of the Russell-Bonser Movement was, then, to enlarge upon the use of drawing as a pedagogic aid rather than to designate it as an end in itself. Now this thought is not new. Russell and Bonser, however, gave it added impetus, added explanation. In fact they designated it as a fundamental value in their philosophy of elementary education.

There is another vital thought in the philosophy of Russell and Bonser as related to each of the industrial arts. They specified an art as a content subject as well as a method subject. They reduced, in their reasoning, the emphasis on skill and accuracy and precision of execution, and enlarged the emphasis upon knowledge of the art and its contribution to man, and its relation to other arts and other human activities. In short, Russell and Bonser would give drawing as one of the arts an added social treatment and a diminished technical treatment.[22]

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[21] Russell, James E. and Bonser, Frederick G., op. cit., pp. 30-31.

[22] Bonser, Frederick G. and Mossman, Lois C., op. cit., p. 483.

Russell and Bonser were not insensible of the motor values in the learning process, but they did not consider these values sufficient to justify any one of the industrial arts.[23] They regarded each art as having a body of thought and experience sufficiently important to human well-being to justify acquainting all children with its content.[24] According to Russell and Bonser, then, in elementary education, drawing would have to contain a body of thought and experience as well as to require skill of execution in order to justify itself. This, of course, means the organization of subject matter around motor execution. It means the teaching of drawing as well as each of the other arts with the social viewpoint dominating. This is the point at which John Dewey's writings influenced the thinking of Bonser and perhaps the thinking of Russell.

Now, it may be said with a fair degree of certainty that the thinking of Russell and Bonser has passed out of the realm of transcendental philosophy and may

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[23] Russell, James E. and Bonser, Frederick G., op. cit., p. 49.
[24] Ibid., pp. 27-41.

be classified as pragmatic philosophy. This is especially true with reference to the education in the primary grades as is testified in the writings of Dobbs,[25] Wilson,[26] Morgan,[27] Mathias,[28] Sargent,[29] Woodbury and Perkins.[30]

THE PLACE OF DRAWING IN THE JUNIOR HIGH SCHOOL MOVEMENT.

The junior high school was largely the product of two convergent movements. The first was administrative in nature. There was an obvious growing need for better administrative coördination between the secondary school and the elementary school. Related to this situation there was an obvious need of economy of time in education, the attainment of which economy would demand a modification of educational procedure on the college level, on the secondary level, and on the elementary level. The second movement was scientific in nature. The findings of science were pointing to the

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[25] Dobbs, Ella Victoria. Primary Hand Work. The Macmillan Co., New York, 1914.
[26] Wilson, Della Ford. Primary Industrial Arts. Manual Arts Press, Peoria, Ill., 1926.
[27] Morgan, Adelene B. Elements of Art and Decoration. The Bruce Publishing Co., Milwaukee, Wis.
[28] Mathias, Margaret E. The Beginnings of Art in the Public Schools. Charles Scribner's Sons, New York, 1924.
[29] Sargent, Walter. Fine and Industrial Arts in the Elementary School. Ginn & Co., New York, 1912.
[30] Woodbury, Charles H. and Perkins, Elizabeth W. The Art of Seeing. Charles Scribner's Sons, New York, 1925.

need of specific educational treatment for the adolescent period.

In 1888 President Charles W. Eliot made a notable address before the Department of Superintendence of the National Education Association. In that address he made a plea for a shortened and enriched program.[31] In 1892 Eliot made another address on practically the same subject and before an assembly of the National Education Association.[32] In the same year the National Education Association appointed the famous Committee of Ten, of which Eliot was chairman. This committee made several notable recommendations, among which was the extension of the teaching of high school subjects down into the grades.[33]

During the years 1901-1904 the Chicago Movement under the leadership of Harper included several recommendations for enriching the curriculum of the grammar grades.[34] In 1907 The Committee on Junior High Schools made its report to the National Education Association. This committee made a plea recommending strongly that six years

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[31] Eliot, Charles W. Can the School Programmes Be Shortened and Enriched? pp. 151-170. Educational Reform. The Century Co., New York, 1909; Report of the United States Commissioner of Education, 1887-1888, pp. 197-199, 654. Government Printing Office, Washington, D. C.

[32] Proceedings and Addresses, National Education Association, 1892, pp. 617-625.

[33] Report of the Committee of Ten on Secondary School Studies, p. 16. The American Book Co., New York, 1894.

[34] The Junior High School Movement, p. 5. Allyn and Bacon, Boston, 1930.

be devoted to elementary education and that six years be devoted to secondary education.[35]

In this study at this point the place of drawing as a subject of study in the junior high school curriculum is the chief consideration. Drawing owes its foothold in the junior high school course of study more for biological, psychological and social reasons than for reasons related to administration.

During the last quarter of the nineteenth century Hall and James exerted great influence in initiating the child study movement. James gave his stimulating publication[36] to the public in 1890. About a decade and a half later Hall gave to the public an epoch making publication on the subject of adolescence.[37] Later, Thorndike,[38] and Terman[39] made substantial contributions. Other related publications appeared. Out of all of this

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[35] Report of the Committee on Junior High Schools, pp. 3-8. Proceedings and Addresses, National Education Association, 1907. Reprinted by I. E. Brown, St. Paris, Ohio, 1932.

[36] James, William. The Principles of Psychology, Henry Holt & Co., New York, 1890.

[37] Hall, G. Stanley. Adolescence, D. Appleton & Co., New York, 2 Vols., 1904.

[38] Thorndike, Edward L. Educational Psychology, 3 Vols. Teachers College, Columbia University, New York City, 1913.

[39] Terman, Lewis M. The Measurement of Intelligence. Houghton Mifflin Co., New York, 1916.

was established the belief that the pupils of the traditional seventh, eighth, and ninth grades, were very much in need of an institution adjusted to their biological, psychological, and social requirements. The first actual attempt at the establishment of such an institution was the junior high school organized at Berkely, California in 1909.

The educational philosophy of the junior high school is based on the peculiar needs of the pupil during the early adolescent period. One outstanding need of this period is opportunity for sampling many worth-while, legitimate human activities. It is at this point and out of this reasoning that drawing secured a place in the junior high school course of study. The junior high school years have been considered a finding period. A pupil can find himself in no better way than by actual participation in many activities. Therefore, a legitimate junior high school affords the pupil opportunity for multiple-activity experience. Hence, drawing has had a place in the junior high school curriculum from the outset as an important human activity.

The results of a careful examination of professional literature occurring periodically through the years since the birth of that institution indicate that both the fine arts and the industrial arts have had a favorable place in the thinking of the students who have made careful studies of the junior high school. Koos and Briggs were among the first group of students who ventured out with publications on the new institution. Briggs gave a large place to the concept of individual differences in his publication on the junior high school. In giving favorable consideration to the concept of individual differences, he of necessity had to arrange for a large number of activities.[40] Briggs selected a large number of activities from the field of industrial arts. In this selection drawing played a prominent part.[41]

Edgerton published in 1922 the results of a study on the industrial activities common in the junior high schools. Of 379 junior high schools studied, he found institutions operating from one to sixteen industrial activities. The average number of industrial activities per institution was approximately nine. Drawing as a subject of study played its part. It should be noted that the decided trend of the industrial arts manifested

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[40] Briggs, Thomas H. The Junior High School. pp. 133-154. Houghton Mifflin Co., New York, 1920.

[41] Ibid., pp. 37-39, 45, 171-174, 190-191.

itself early, as this study was made only thirteen years after the advent of the first junior high school.[42]

Johnston,[43] Newlon, Pickell, and Van Denberg,[44] were also among the early writers on the subject of the junior high school. Each recognized the need of providing for individual differences, and each advocated partial provision through the medium of industrial arts. Touton and Struthers were authors of a book written later on the subject of the junior high school. They discussed the need for provision for individual differences. In providing for individual differences they emphasized the medium of the fine arts.[45] Koos, who was an early writer on the subject, published another book on the junior high school a little later. In this book he also applied much stress to the concept of individual differences and to the need of teaching fine and industrial arts as a partial provision therefor.[46]

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[42]Edgerton, A. H. Industrial-Arts and Prevocational Education in Intermediate and Junior High Schools, p. 17. The Bruce Publishing Co., Milwaukee, 1922.

[43]Johnston, Charles Hughes, and Newlon, Jesse H., and Pickell, Frank G. Junior-Senior High School Administration, pp. 23, 74, 75, 214, 383-385. Charles Scribner's Sons, New York, 1922.

[44]Van Denburg, Joseph K. The Junior High School Idea, pp. 63-64, 187. Henry Holt & Co., New York, 1922.

[45]Touton, Frank C. and Struthers, Alice B. Junior High School Procedure, pp. 245, 350, 367-368, 370-372, 373-375, 387-392. Ginn & Co., New York, 1926.

[46]Koos, Leonard V. The Junior High School, pp. 275-286, 310-315, 395-399. Ginn & Co., Boston, 1927.

A survey of the writings of the leaders in the field of the junior high school makes it appear that the theory of individual differences is a vital concept. The results of a similar survey point to the need of teaching many of the fine and practical arts not only for provision for individual differences; but also for providing for vocation, for guidance, for appreciation, and for culture.

PHILOSOPHY UNDERLYING THE TEACHING OF DRAWING IN THE JUNIOR HIGH SCHOOL.

Drawing as one of the fine arts and drawing as one of the practical arts has maintained a place in the curriculum of the junior high school since the advent of that institution in 1909. That one of its functions is to serve in part as a provision for individual differences is certain. Closely related to this function is its use in the field of guidance. The junior high school is a very inclusive institution. The leaders who formulated its underlying philosophy did not omit aesthetic appreciation, industrial intelligence, and enriching experience as proper objectives resulting from the teaching of drawing.

Drawing as a fine art fits as well in with the philosophy of the junior high school as does drawing as a practical art. Nevertheless, the fact is that industrial drawing has taken the ascendency in the junior high school. The type of drawing, which had its inception in the contribution of Monge in 1799, has tended continually to hold a place in education. The nature of the junior high school organization has given drawing as an industrial art an important place in that institution.

THE WORLD'S COLUMBIAN EXPOSITION 1893.

By authority of the United States Government of America the Columbian Exposition was held in Chicago in 1893 in commemoration of the discovery of America by Christopher Columbus.[47] This exposition, like the Great Fair held at London in 1851, like the Paris Exposition of 1867, and like the Centennial Exposition in 1876, served as a great clearing house to designate and to measure the world's progress along the major lines of human endeavor.[48] World's Expositions of magnitude have come to serve as driven stakes fixing

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[47] Official Guide of The World's Columbian Exposition, pp. 27-38. The Columbian Guide Co., Chicago, 1893; The World's Columbian Exposition, pp. 11-39. Historical Publishing Co., Philadelphia, 1893; Report of the President of the Board of Directors of The Columbian Exposition, pp. 155-166, 209-248. Rand, McNally & Co., Chicago, 1898.

[48] Report of the United States Commissioner of Education, Monograph on Education No. 14, 1900, pp. 21, 30, 50. Government Printing Office, Washington, D. C.

the direction of the several lines along which human progress is moving.

Reports on the educational exhibits displayed at the Columbian Exposition indicate that that event was a turning point relative to degrees of emphasis which should be placed on the several objectives of public school art.[49] It should be remembered, as already pointed out in this study, that there was a strong demand extant for the teaching of industrial drawing in the public schools in 1860 and again in 1870 as manifested by the laws passed by Massachusetts' State Legislatures of those years. Evidently a change of thought had been in process. The testimony coming through the witnesses of the Columbian Exposition would indicate a trend of educational thought favorable to giving more emphasis to aesthetic appreciation as one of the proper objectives of the teaching of public school art.[50]

Color in public school drawing began to manifest itself a little before the occurrence of the Columbian Exposition.[51] This item has been pointed out as

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[49] Whitford, W. G. "Brief History of Art Education in The United States," Elementary School Journal, October, 1923, pp. 111-114.

[50] Smith, J. B. "Trends of Thought in Art Education," School Review, Vol. 41, April, 1933, pp. 267-268.

[51] Whitford, W. G., _op. cit._, p. 113; Hicks, Mary Dana. _Color in Public Schools_, pp. 906-915. _Proceedings and Addresses_, National Education Association, 1894.

indicative of an educational trend toward an aesthetic objective in public school arts. The explanation at this point is not so much in a trend of thought. The explanation is rather in commercial and industrial development. Industry about that time had progressed to a point at which it could supply paints, oils, crayons, and water colors at a cost sufficiently low to make them available to school children.

The Prang Educational Company was among the first of the commercial organizations to specialize in supplying the public schools with drawing materials.[52] This company brought the item of color to the attention of many school officials through advertisement and salesmanship. The fact that the Prang Educational Company, among others of the kind, is still thriving would indicate that the schools have continued to use color as a medium of expression.

The broadening and the enriching of the curriculum of the public schools has been phenomenal. It was pointed out in the discussion of the junior high school that one of the underlying principles of that institution

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[52] Locke, Josephine C. The Mission of Color, p. 801. Proceedings and Addresses, National Education Association, 1890.

was the offering of a multiplicity of activities. The emphasis on other activities, however, must not be construed as a corresponding retardation of linear drawing. Drawing holds a key position both in the visual fine arts and in the industrial arts.

Quotations from reports written by prominent writers and published about the time of the Columbian Exposition, give a true glimpse of the educational philosophy of drawing held by many at that time.

> The science of drawing or of outline, is the essence of painting and of all the fine arts, and the root of all sciences.[53]
>
> . . . .
>
> The painter only can be truly accomplished who has a knowledge of all the other liberal arts, also of all the other manual trades in the world; so much so, that I sometimes think that there is only one art amongst men--that of drawing--from which all other human arts proceed, or of which they form a part.
>
> All drawing is not art, but all art necessarily involves drawing. As the importance of drawing becomes better understood by the public, art education is more rightly valued.[54]
>
> Drawing is a universal language. The public at large does not realize its omnipresence in everyday affairs. The clothes a man puts on in the morning were made from drawings or patterns.

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[53] Moore, Annie R. O. The Self Correcting System of Drawing, p. 500. Proceedings of the International Congress of Education of the World's Columbian Exposition, National Education Association, 1893.

[54] Report of Committee on Drawing, Walter S. Perry, Chairman, p. 694. Proceedings and Addresses, National Education Association, 1896.

The keys and small coins in his pockets were made from drawings. The chair in which he sits eating his breakfast was made according to drawings; so were the carpets and wall paper, the table and objects upon it. The stove on which his breakfast was prepared, the system of water pipes that bring him his drinking water, the staircase he descends to get to the street, the railroad station, the car on which he rides down town, the illustrations in the newspapers which he reads on the way, and the printing press which duplicated them--all involve skillful drawing somewhere and by somebody, in order that they might exist for his convenience and pleasure.

Drawing is a great help in developing perceptive power.

. . . .

The power and habit of observing accurately mark one of the fundamental differences between the incapable man and the man of power.[55]

. . . .

Drawing is a powerful help to thought by furnishing a means of thought-expression. Expression is necessary to complete thought.

. . . .

Drawing is the very best available means for developing aesthetic feeling and creative imagination. -------.

. . . .

Scientific drawing is an expression of facts just as they are found in reality. Artistic drawing expresses the idealization of what is real. "The idealization of what is real" does not mean the fantastic substitution of something unreal in the place of sensible existence. It means the seeing of the ideally perfect things or relation of things behind the imperfect thing or relation.[56]

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[55] _Op. cit._, p. 695.
[56] _Ibid._, p. 696.

. . . .

> While superintendents and teachers are trying to solve the question as to what kind of manual training they ought to introduce in their schools, in what grades it ought to be taught and what methods should be followed, whether it be called whittling or sewing, blacksmithing or cooking, metal working or sloyd, one fact stands unassailed --drawing is the foundation of all manual training.[57]

From the foregoing typical quotations taken from reports and papers written about the time the Columbian Exhibition was held, it may be safely assumed that the importance of drawing was not retarded in the thinking of students of education. As has already been made clear in this study, Leonardo introduced drawing into the anatomical laboratory and into mechanical engineering in the fifteenth century. A little later Dürer used it in the field of higher mathematics. Later Monge organized it into a branch of mathematics. All the fields of engineering have since utilized it. Modern industry is fundamentally dependent upon it. It is being used as an important agent in the field of psychological testing. Thus it is plain that drawing has increasingly permeated every major field of human endeavor. Significant as this fact is, it would appear that drawing as a subject of study should not take a minor place in the thinking of students of education.

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[57]Miller, John C. Drawing--Its Relation to Manual Training and The Industrial Arts, p. 872. Proceedings and Addresses, National Education Association, 1894.

Writers on education have used The Columbian Exposition as an anchor-date or as a turning point designating therefrom increased emphasis especially on the fine arts. Reports from the United States Commissioner of Education and from the Proceedings of the National Education Association of this decade indicate not elimination or retardation of worth-while activities, but rather an effort at functional coordination of related activities. This was a period during which correlation in education was emphasized. The arts were not excluded from this consideration. One sentence in the address of Bonnie E. Snow at the Detroit meeting in 1901, is explanatory. "The joint meeting of the Art and Manual Training Departments of the National Education Association held in this room yesterday afternoon is itself a sign of the times."[58] Miss Snow was referring to an effort being made to coordinate functionally fine and industrial arts. The Proceedings and Addresses of the National Education Association of that period are well supplied with reports and addresses designed, not to reduce the several arts in number, but to integrate them. In this process of integration drawing played a

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[58] Snow, Bonnie E. An Address, p. 685. Proceedings and Addresses, National Education Association, 1901.

significant part because of its relationship to each of the other arts.[59]

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[59] Tadd, J. Liberty. Art Education and Manual Training, pp. 900-906. Proceedings and Addresses, National Education Association, 1894; Addicott, James E. Correlation of Manual Training with Other Branches of Study, pp. 923-928. Proceedings and Addresses, National Education Association, 1899; Fenollosa, Ernest F. Possibilities of Art Education in Relation to Manual Training, pp. 564-570. Proceedings and Addresses, National Education Association, National Education Association, 1902; Ibid., pp. 571-579.

Summary

1. Drawing as a school study has served as a focal subject for serious consideration. Many who would facilitate production in industry would do it through the teaching of drawing. Many who would inject good taste into the manufactured product would do it through the teaching of drawing. Many who would develop aesthetic appreciation in the individual would do it through the teaching of drawing. Stress on the teaching of drawing and reasons for the teaching of drawing have varied from period to period.

2. World's expositions have come to serve as anchor-dates and as clearing houses for measuring human progress along major lines. The Centennial Exposition of 1876 served to arouse heated educational discussion which continued for nearly two decades. The chief value emanating from this discussion was in that it broke many of the traditional ties in education which were retarding educational progress. The period from 1876 to 1890 might be termed a very significant transition period in education.

3. One of the definite contributions of the Centennial Exposition of 1876 to American education was the Russian System or what is more commonly known as manual

training. With the coming of manual training to the public schools came the teaching of mechanical drawing and the teaching of freehand drawing.

4. The Kitchengarten Movement grew out of the Kindergarten Movement. The Industrial Education Association of New York City grew out of the Kitchengarten Movement. The organization of the New York College for Training Teachers was the result of the work performed by the Industrial Education Association of New York City. The New York College for Training Teachers became the Teachers College of Columbia University. The Teachers College of Columbia University is an influential institution and it has propagated the teaching of drawing at every point at which drawing will serve a human need. The Russell-Bonser Movement was born in the Teachers College of Columbia University. Russell and Bonser advocated the teaching of drawing as a content subject as well as a method subject. They would treat drawing from the social viewpoint more than from the technical viewpoint.

5. Drawing has held a place in the curriculum of the junior high school because that institution is built in part on the principle of a multiplicity of offerings. Drawing is a worth-while human activity and therefore it

is a worth-while curriculum offering. Drawing also owes its place in the junior high school to the necessity of making provision for the concept of individual differences. The need of development of aesthetic appreciation and the need of development of industrial intelligence are also reasons given for placing drawing in the curriculum of the junior high school.

6. About the time the Columbian Exposition was held at Chicago, there was some evidence manifested that the schools were beginning to place more emphasis on the aesthetic. The reports occurring in the _Proceedings and Addresses of the National Education Association_ of that period indicate that an effort was being made to integrate functionally the several fine and industrial arts. Inasmuch as drawing is basic to the visual arts, both fine and industrial, its scope of usefulness was enlarged rather than diminished.

CHAPTER IX

PSYCHOLOGY OF DRAWING

FOREWORD.

The purpose of this chapter is to point out some of the notable objective studies that have been made on the psychology of children's drawings and to record some of the significant findings of each study designated. The writings and the influence of such men as William James and G. Stanley Hall led to a period of intensive child study that continued during the greater part of the last quarter of the nineteenth century and extended well into the first quarter of the twentieth century. This cycle of interest in the psychology of children's drawings was very significant because it manifested itself in several European countries as well as in America.

DRAWING A FORM OF HUMAN BEHAVIOR.

As has been pointed out before, the act of drawing requires a high order of mental procedure as well as motor coordination, and for this reason, is an activity necessarily confined to man. Evidence points to its universality, for there is an abundance of specimens in museums, the existence of which is known to have antedated written history.[1] Moreover, studies of prehistoric primitive man, as well as studies of present-day primitive man, give further evidence of the universal disposition of the human being to draw. Therefore, when the psychologist sets out to study children's drawings, he is investigating a form of human behavior that reaches back as far as the archaeologist has been able to extend his studies.

INFANCY.

The normal infant possesses at the moment of birth a nervous system in an organism that has been developed through the process of maturation.[2] This organism is endowed with nervous energy and with muscular energy which, when in operation, functions through what the psychologist calls drives. The embryologist does not know whether immediately after birth the drives are actuated by internal or external stimulation.[3]

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[1] Flaccus, Louis W. The Spirit and Substance of Art, pp. 33-36. F. S. Crofts & Co., New York, 1926; DeMorgan, Jacques. Prehistoric Man, pp. 186-187. Kegan Paul, Trench, Trubner & Co., Ltd., London, 1924; Thorndike, Lynn. A Short History of Civilization, p. 17. F. S. Crofts & Co., New York, 1935.

[2] Woodworth, Robert S. Psychology, pp. 198-204. Henry Holt & Co., New York, 1929; Murphy, Gardner. General Psychology, p. 31. Harper & Brothers, New York, 1933.

[3] Baldwin, James M. Mental Life in the Child and Race, p. 81. The Macmillan Co., 1900; Woodworth, Robert S., op. cit., p. 241.

Certain it is, however, movement is the infant's natural response to all influences. Movement at first, however, is highly unorganized, but nevertheless, is very essential, for it is through movement that motor capacity is developed and additional nervous connections are made. Unorganized movement is the basis for all organized movement. It is through this wide range of random movements and through a long period of infancy that the human being is afforded a development superior to that of all other animals.

As the normal child advances in age, his movements become less and less random and more and more controlled. This whole process leads through trial and error, with the help of society round about, to beginnings in speech, to reasonably accurate reaching and grasping with the hand, to creeping, and finally to the difficult process of walking.

Now when a two year old child is given a piece of crayon, he grasps the crayon and is soon occupied at the business of making lines. Out of this comes motor satisfaction. Line making, however, calls for a new set up in nerve connections, a new set of muscles, or a new set of movements in the muscles already partly developed. Hence, at the beginning of line making the movements are random. The result is what is usually called scribbling, but scribbling may be designated as the first stage of drawing. At this stage there is a lack of coordination between perception and muscular control. The child at this point is not concerned with drawing as a method of communication but rather as an outlet by means of which he gives motor expression to subjective states.[4] It is a form of play with motor satisfaction.

The child learns to put more and more meaning into his scribbling. He learns that society round about him is able to interpret what he draws. The child is therefore encouraged to emphasize the communicative aspect of drawings. Drawing thus slowly becomes a means of expression and a means of communication.[5]

ROBERT S. WOODWORTH.[6]

Woodworth gives four steps in explaining the beginnings of imagination, which steps may help in understanding how the child proceeds from the scribbling stage to the stage of communication. The steps are: (1) manual skill, (2) constructiveness, (3) make believe, (4) story telling.[7]

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[4]Garrison, S. C. and Garrison, K. C. The Psychology of Elementary School Subjects, pp. 492-493. Johnson Publishing Co., Dallas, 1929.
[5]Ibid., pp. 492-493.
[6]Woodworth, Robert S., op. cit.
[7]Ibid., p. 464.

The scribbling stage corresponds to Woodworth's manual skill, or motor stage. In this stage there is lack of coordination of the perceptive and the motor, yet the child is experiencing. This is a stage of manipulation, and Woodworth[8] says exploration goes right along with manipulation. He further says exploration and manipulation are dependable motives.[9] If he is right, then the scribbling stage is a significant stage in spite of the fact that the motor activity lacks coordination with perception.

Woodworth's second stage is that of construction, or invention.[10] The exploration in the latter part of first stage and in the initial part of the second stage, secures for the individual a store of facts. Invention in stage two modifies or rearranges these facts. The element of insight also enters this stage along with the element of invention. Psychologists do not fully understand insight although it has been scrutinized in the laboratory. Murphy says insight manifests itself early in human development.[11] Perrin and Klein define insight thus:

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[8] Woodworth, Robert S., op. cit., p. 242.
[9] Ibid., p. 258.
[10] Ibid., pp. 463-464.
[11] Murphy, Gardner. General Psychology, p. 386. Harper & Brothers, New York, 1933.

> By insight is meant that the organism sees into the principle of the problem. It perceives the relation between existing difficulties and the means that must be employed in order to overcome those difficulties.[12]

Hence, it would appear that the second stage involves intellectual activity of a high order; but it should be remembered that only the inception of this complex mental activity is identified. For this reason the results of a child's efforts are crude when compared with the results of similar activities of the adult.

The third stage suggested by Woodworth is a stage in which the imagination is very active. Substitution satisfies the child very well for reality. Drawing fits well in this stage as drawing is only a suggestion for reality.

Story-telling is the fourth type of manipulation in Woodworth's reasoning. The child desires to tell something, and in so doing he has a tendency to give his insight and imagination free play. This tendency to communicate dovetails well with his inclination to draw. The desire to communicate appears to be a natural motive for drawing.

It must be emphasized that Woodworth is thinking of imagination as a mental activity permeating each of

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[12] Perrin, Fleming A. C. and Klein, David B. Psychology. p. 248. Henry Holt & Co., New York, 1926.

his four steps of procedure with the four stages closely interrelated. There is no sharp dividing line between any two stages. It will be seen a little later in this discussion that Woodworth's reasoning approaches the actual findings of research. Therefore, a review of several objective studies on the psychology of drawing should be appropriate at this point.

CORRADO RICCI.[13]

One of the first studies of significance was made in 1887 by Ricci concerning the drawings of Italian children. More than twelve hundred drawings were collected in the elementary schools of Modena, Italy, and in the elementary schools of Bologna, Italy, by Raffael Belluzzi. A collection of children's drawings was also donated by Adolpho Venturi, a noted art critic. Ricci does not give the specific ages of the children who made the drawings. They were, however, of elementary school age.

Ricci supervised a careful analysis of the twelve hundred drawings. In this analysis he noticed that

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[13] Ricci, Corrado. "L'Arte dei Bambini," Bologna, 1887. Trans. by Louise Maitland in Pedagogical Seminary. Vol. 3, 1894, pp. 302-307.

children in their initial desire for linear representation in more than ninety per cent of the cases drew a man. Ricci also noticed the frequency of a smoking pipe in the drawings of a man. It was evident to Ricci also that a child ordinarily draws a man with two legs, with two arms, and with two eyes, whether such details are visible or not, from the viewpoint drawn.

In explaining this Ricci reasoned that children draw what they know to be true, rather than what is visible from a specific viewpoint. Children draw from memory. A man sitting in a boat has two legs, and therefore, in drawing a man in this position, the child indicates two legs, even though the sides of the boat prevent his seeing the two legs. In the case of the prevalence of the pipe in the children's drawings, Ricci says children draw consciously only objects in their environment. Evidently the pipe-smoking habit was very prevalent in Modena, Italy.

A summary of Ricci's findings are as follows:

1. A child has a strong tendency to make his first representative drawings that of a man.

2. Young children draw from memory.

3. Young children are literal in their drawings rather than artistic.

4. Young children know nothing about perspective. They draw profiles like primitive man does.

5. Children are often impressed with the need of representing a specific detail, such as a pipe in a man's mouth or buttons on a woman's dress.

6. Young children have little sense of proportion.

7. Young children have no sense of aesthetics.

8. Children who have the best memories and who learn quickest make the best drawings.

9. Usually the children who make the best drawings make the best records in other studies.

GEORG KERSCHENSTEINER.[14]

A research study of very large magnitude was made by Kerschensteiner of Munich, Germany, in 1903. Kerschensteiner attempted to discover the entire course of development of drawing from the first schema to the ultimate representation of space, in the case of children ranging from six years to fourteen years of age. Accordingly 96,000 drawings from 7000 children in the schools of Munich were assembled. It was found that 2500 of those children possessed special aptitude in

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[14]Kerschensteiner, Georg. Die Entwickelung der zeichnerischen Begabung. Munich, 1905. Trans. in Psychology of Drawing by F. C. Ayer, Warwick & York, Baltimore, 1916, pp. 28, 36, 64, 74, 77, 82.

drawing, and therefore, they were given another test more difficult, involving action. Kerschensteiner secured a life history of each child that was tested in so far as the school officials were in possession of such facts. The normal children were asked to draw both from memory and from nature.

Not being satisfied with his study, Kerschensteiner later collected 100,000 drawings including drawings from idiots as well as drawings from normal children. Later, 52,000 additional drawings including the elements of ornament and perspective were collected at Kerschensteiner's request. It is, therefore, plain that Kerschensteiner had an enormous amount of material to study.

Some of Kerschensteiner's findings are:

1. Great talent for graphic expression is positively correlated with intellectual endowment.

2. With the average child there are five stages in development of drawing:

(a) Pre-experimental.

(b) Schema.

(c) Beginning appreciation of line and form.

(d) Representation according to experience.

(e) Representation according to tridimensional form.

3. The child draws what he knows. He draws his mental image.

4. First attempts at visual representation still contains schematic features.

5. The form of representation is determined by the appearance of the object, and is drawn in outline.

6. The final stage, if attained, embraces light, shade, perspective, foreshortening.

7. Each stage designates fairly well the intellectual level reached.

HERMAN T. LUKENS.[15]

Lukens based a study of children's drawings on 3400 specimens made by children of ages ranging from two years to sixteen years. Several extended collections of drawings of individual children were also obtained and proved very valuable. The chief points studied, were:

1. Pictorial evolution of the human figure.
2. The child's mental attitude toward:
   (a) Drawing.
   (b) Appreciation of pictures.
   (c) Content of children's minds.

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[15] Lukens, Herman T. "A Study of Children's Drawings in the Early Years." Pedagogical Seminary, Vol. 4, 1896-97, pp. 79-110.

(d) What children draw to please themselves.

Some conclusions from Luken's study are:

1. Development of drawing shows same stages as development of speech.

(a) Automatic and aimless scribble.

(b) Imitation of movements of others.

(c) Understands pictures but does not draw.

(d) Copies from others.

(e) Uses picture-writing.

(f) Learns technic of drawing.

2. Children naturally draw "out of their own heads" and not from the object.

3. Children like pictures with a connected story.

4. Drawing supplements language in tests of contents of children's minds.

5. Children draw objects that they like.

6. Children draw by "fits and starts."

7. Children show very little interest in decoration before eleven years of age.

8. Drawing is a normal means of expression coming before writing as advocated by Pestalozzi.

9. By no means should opportunity to draw be deferred to the ninth year.

10. Free expression in drawing is likely to cease when the self-conscious period is reached.

Lukens incorporated in his study a parallelism between the development of speech and the development of drawing. It is reproduced below.

SPEECH	DRAWING
I. Automatic cries and reflex or impulsive sounds.	I. Automatic and aimless scribble.
II. Imitation of sound but without meaning; child babbles back when addressed.	II. Scribbling localizations and imitation of movements of other person's hands.
III. Understands words, but does not yet speak beyond such words as "mamma," "papa," "no," etc.	III. Understands pictures, but does not yet draw beyond the simplest localization of features by scribbling.
IV. Repeats words as mere sounds when they are said to him. (Brief stage and of little importance.)	IV. Copies from others to see how to get the right effect in the use of lines.
V. Uses words to express his thoughts.	V. Picture-writing, illustrated stories, scenes, etc.
VI. Studies Grammar and Rhetoric.	VI. Studies technique of drawing; perspective, proportion, shading, etc.[16]

Lukens is well in agreement with other students of child development; namely, that in the case of graphic

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[16] "The Learning of Language," Pedagogical Seminary, Vol. 3, 1894, p. 427.

activities as well as in the case of mental, verbal, and motor activities, the child starts with random movements which he learns to control more and more. It is through the gradual increase in power to control and to utilize the random movements, that the child succeeds in adapting himself to his physical world and to his social world.

FREDERICK BURK.[17]

Burk attempted to make a contribution to the cause of drawing by reviewing thoroughly the literature on the research studies of others. His underlying purpose in this study was to show the advantage of the genetic over the logical in the formation of a course of study in drawing. Although he was writing in 1902, he made a forceful plea for what is known today as progressive education. He opposed imposing very much on the child from without. He indicated plainly that he was out of sympathy in his educational thinking with formal geometric procedures advocated by Sheldon and others.

The two opposing views may be stated briefly. (1) The child's thinking power develops in the same logical

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[17]Burk, Frederick. "The Genetic Versus the Logical Order in Drawing." Pedagogical Seminary, Vol. 9, 1902, pp. 296-323.

order in which adults do their thinking. (2) The child develops his thinking in a different order--the genetic.

It would appear from all evidence at hand that when children draw what they want to draw their preference is indicated in the following order:

1. Human figures.
2. Animals.
3. Plants.
4. Houses.
5. Mechanical inventions.
6. Still life.
7. Geometric design.
8. Ornament.

From the foregoing it is seen that the human figure which comes last in the logical order, comes first in the genetic order. Geometric design is appreciated only by children well advanced in the graphic art. Children, like primitive people, prefer to draw things in their immediate environment. Indeed, there is no possibility of a child drawing consciously anything wholly outside of his experience.

Burk gives in the following a concise review of the controversy--the logical versus the genetic.

THE LOGICAL ORDER	THE GENETIC ORDER
The child's mind is a <u>tabula rasa</u> upon which anything considered by the educator desirable may be written at the will of the educator. It is the business of the educator to select and write the knowledge most desirable and in an order determined by a logical analysis of the subject.	The mind of a child shows, in some fields at least, which have been investigated, distinct generic tendencies to select certain material and methods for its education and reject other material and methods. It is the business of the educator to make use of these generic tendencies as interests and to subordinate instruction to them.
Childhood should be shortened to its lowest possible limits and as rapidly as possible the child should be induced to put away childish things.	Investigations point to the probability that the child who is most the child, as a child, will be most the man; therefore let childhood ripen in children.
The child is a little adult. If we take cross sections of the human mind at various levels from birth to adult life we shall find that the ways of thinking are identical in kind and character.	The child is not a little adult. Investigation indicates that he grows in spots. Cross sections show changes, in kind, in the ways of thinking though these successive layers show causal relations, one with another, just as, while the bud is not a leaf, yet there is a causal relation between the two, and healthy and mature functioning of the bud is essential to the best activity of the leaf.
The steps by which a child learns a body of knowledge or training as, for example, accurately to represent in drawing, are identical with the processes by which a full grown man logically thinks them.	In certain essential respects, at least, there is evidence to show that the steps by which a child learns to represent in drawing are radically different from the processes by which a full grown adult thinks them.

The determining principle in forming a course of study in drawing should be that of the synthetic combination of the parts obtained by analysis of the subject matter concerned, in a logical way, according to inherent relations existing between these parts.	The determining principle in forming a course of study in drawing must be that of the child's generic tendencies or interests, modified by individual interests. Investigation indicates that these interests require an order of instruction more nearly the reverse of the logical order than identical with it.
These parts thus obtained by analysis will be the abstract geometrical samples of form divorced from all matter or distracting ideas and these the child should be taught to recombine and finally he may be led to natural objects in which both matter and form appear.	The child's generic interest shows that he should commence drawing with man and the things that men do or have about them--the human figure, the house he lives in, animals he sees or fears. Matter and form are therefore inseparable in childhood and the progress is toward a separation; hence, abstract geometric forms will come last, not first.
The child should be taught fully and completely the mechanism of how to draw before he is allowed to draw from his own ideas.	The child should be allowed to draw from ideas and in doing so, and under the influence of the interested excited mechanism should appear as a subordinate factor.[18]

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[18] Burk, Frederick, <u>op. cit</u>., pp. 321-322.

H. G. CHILDS.[19]

In the year 1914 Childs attempted to measure achievement in drawing using the Thorndike Scale, which had recently been constructed for that purpose. Thorndike determined through an extensive study of drawings made by children of a specific age, the average quality of drawing that might reasonably be expected of a child of that age. In this attempt, the drawing was limited to one type of drawing, for example, a landscape. Pictorial representation was the quality mostly considered. The element of aesthetics was entirely omitted from consideration. The Thorndike Scale was finally supplemented to meet a varied condition.

Childs studied the drawings of 2177 children in the state of Indiana with the aid of seventeen judges. The grades included, were from 1 to 12 inclusive.

This study revealed:

1. That the Thorndike scale is too inflexible even with the supplement.

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[19]Childs, H. G. "Measurements of Drawing Ability of Two Thousand One Hundred and Seventy-Seven Children in Indiana City School System by a Supplemented Thorndike Scale." Journal of Educational Psychology, Vol. 6, January, 1915, pp. 391-408.

2. The abilities of children to draw accord well with the normal curve.

3. Despite the weaknesses of the scale it possesses a decided advantage over subjective judgment.

4. Good teaching and supervision result in higher scores. One school studied, had no supervision of drawing, thus, allowing a comparison.

5. Our tables of distribution and curves show that the average child develops more ability in drawing before entering school at the age of six or seven years than he does in the entire eight years of his elementary school course.[20]

6. There is a question as to whether lengthening periods of instruction materially aids progress. The pupils having a shorter period of instruction seemed to have done as well as the pupils having a longer period.

7. There is some evidence that child development in drawing is such, that the school must: "Strike while the iron is hot."

STELLA AGNES McCARTY.[21]

McCarty published in 1924 the results of a study of children's drawing. This investigation was made

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[20] Childs, H. G., op. cit., p. 407.

[21] McCarty, Stella A. Children's Drawings. Williams & Wilkins Co., Baltimore, 1924.

through the Child Study Committee of the International Kindergarten Union. It embraces only the kindergarten-primary group. It is an attempt to apply scientific measurement to the lower levels of interests and achievements. The public schools of twenty-six cities, broadly scattered in point of location, cooperated. The two chief points investigated were trends of interests of children as manifested through drawing, and abilities of children in drawing. It was necessary to construct a scale, as no scale on the market measured well the capabilities of the lower strata of achievement. The directions to the officials of the cooperating cities were very specific concerning points to be investigated, procedure to follow, and materials to use. Color was eliminated. It was a study of the linear drawing. There were 31,239 drawings received by the investigators. Each drawing was accompanied by data written on the back, concerning the child who made the drawing. The ages ranged from four to eight inclusive.

McCarty stated in her preliminary discussion that, when the Child Study Committee undertook to select for intensive investigation some phase of spontaneous activity of young children, it was natural that their choice should be drawing. She described drawing as one of the earliest instruments for expression of ideas in early childhood. She also described drawing as the most universal mode of human expression, other than oral language and gesture.

The definite directions sent to the cooperating school officials are somewhat descriptive of the investigation. A copy of the directions is, therefore, given herewith.

> We are desirous of making some very definite investigations with regard to children's drawings. As the first step we wish to know what subjects children of ages from four to eight inclusive choose for their spontaneous drawings.
>
> Will you assist us by carrying out the following instructions?
>
> 1. Give each child or have him procure for himself, wax crayon in brown or black, and drawing paper 6 x 9 inches.
>
> 2. Say, 'I want you each to make me a picture today. You may draw anything you wish. Do not let any one know what you are going to draw. When you are finished, bring it to me, and see if I can tell what it is. Draw anything you want to.' Give no further directions or guidance, or criticism, except to repeat if necessary the above directions.
>
> 3. Write on the back of each drawing the sex and age of the child in years and months, and the name of the object, or objects, represented.[22]

The investigators found upon close examination of the drawings that about thirty-five different objects or groups of objects were represented among the drawings.

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[22] McCarty, Stella A., op. cit., p. 9.

It was not feasible to make thirty-five measuring scales. Therefore, it was decided to select three types of drawing; namely, the human figure, the house, and the landscape, making it necessary to devise only three measuring scales for each age group. Of course, this reduced the number of drawings considered--from 31,239 to 21,683. In constructing the measuring scale and in doing the actual measuring as many as seventy-five trained people participated.

After this part of the study was completed, the second part was immediately attacked. The second part had to do with the relation of drawing ability to intelligence. Schools in Baltimore, Boston, Chicago, Cincinnati, Denver, Detroit, Grand Rapids, New York City, Pasadena, Richmond, Va., and Ypsilanti, agreed to cooperate. In conducting this part of the study, co-operating school officials were asked to confine the drawings made by the children to the three types that could be measured by the scales already constructed by the committee making the study. The cooperating school officials were also asked to secure the I. Q. of each child as measured by the Stanford Revision of the Binet-Simon Test. Consequently the committee had in its possession a record of the I. Q. of each child presenting his effort, in addition to his age, his sex, and name of object drawn. Then the committee established a "drawing quotient" for each child participating, in order to compare his drawing ability with his intelligence.

Some of the chief findings in this study are:

1. Children choose to draw the human figure more frequently than any other form and the adult more frequently than the child. The order of frequency is:

(a) Human Being.
(b) Houses.
(c) Trees.
(d) Furniture.
(e) Vehicles.
(f) Parts of Houses.
(g) Animals.
(h) Toys.
(i) Flowers.
(j) Sun, Sky.
(k) Birds.
(l) Miscellaneous.

The foregoing is very important in this study because the committee set out to make a study of children's interests as manifested through their drawings. This study revealed that 17% of the children chose the human form with the next highest frequency, that of the house occupying 14% of the children's choices. The frequency of the human form in this study is much below the frequency obtained in other studies. Lukens obtained a preference of 44%.[23] Maitland obtained a preference of 45%.[23] Ivanoff in Switzerland obtained a preference of 95%.[23] Ricci in Italy obtained a preference of 90%.[24] It appears that foreign children choose to draw the human form with a much greater frequency than do American children. Yet the predominance of preference with all children as revealed by available studies, is the human form.

This study together with other studies, establishes the trend of children's interests in drawing. However, no study divulges the reasons for the trend. McCarty suggests as a possible explanation the present tendency to emphasize the social and industrial relationships in early education and to approach the natural science by way of its social reference.

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[23] McCarty, Stella A., op. cit., p. 12.
[24] Ricci, Corrado, op. cit., p. 307.

2. Interest in design and geometrical form is not characteristic of the early years.

3. In the evolution of drawing technic, four well defined stages have been recognized:

(a) Scribbling.

(b) Scribbling with meaning to the child.

(c) Schema.

(d) Representation.

4. Sex difference is not much, but constant and in favor of the boys.

5. In technical ability there is definite progress from year to year.

6. Children scatter in abilities to draw approaching the normal curve.

7. There is a positive correlation between ability to draw and general intelligence.

Ricci, Kerschensteiner, Ayer, Goodenough, Terman, Brill, and Williams, agree with this last finding as already pointed out in this chapter. Hall was also in strong agreement on this point.[25] In this study, however, the committee found some in the upper 25% in intelligence ranking in the lower 25% in drawing. The committee also found some in the upper 25% in drawing ranking in the lower 25% in intelligence. The number of cases was not

[25]Hall, G. Stanley. Educational Problems, Vol. 2, p. 493. D. Appleton & Co., New York, 1911.

sufficiently large, however, to change the major finding. Nevertheless, variations point to the fact that there are elements in the situation not accounted for.

FLORENCE L. GOODENOUGH.[26]

As stated in a previous chapter, linear drawing has been traced back as far as there is any record or evidence of man's behavior. In so vast a scope of time it has served mankind at many points, yet the number of its uses tends to increase. Present-day man has evolved another function for this human graphic behavior; namely, that of measuring intellectual capability.

In 1926 Goodenough[26] published her test for measuring intelligence. Goodenough conceived the thought from her study of research investigations that drawings of children represent well-defined stages in the development of the child, and that the quality of a drawing of a specific stage is indicative of the measure of intelligence of that stage. The test is well described in her own publication, thus:

> 1. It utilizes nothing but the child's single drawing of a man.
> 2. It is accordingly non-verbal.
> 3. It requires no more than ten minutes for testing an entire class, plus about two minutes per child for scoring.

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[26]Goodenough, Florence L. Measurement of Intelligence by Drawings. World Book Co., Chicago, 1926.

4. It is useful chiefly for children from mental age four to mental age ten.

5. Its reliability for a single unselected age group in this range lies between .80 and .90.[27]

The Goodenough test has been designated by Terman as a notable achievement. Its non-verbality, its economy of time, its economy of material, and its results as compared with other tests, should make it a valuable instrument in school administration. Although it may not be said that the Goodenough test has been used widely in the schools, it has been scrutinized very thoroughly with the result that it contains a measure of validity and reliability.

Brill of Ohio State University made a careful study of the Goodenough test and summarized his research thus:

> The abbreviated Goodenough score appears to be a valid and reliable measure of intelligence, or whatever is measured by the original Goodenough score.[28]

Williams of the University of California conducted another check-up study of the Goodenough Test by comparing its results with the results of the Stanford Binet Revision Test. Williams has this to report:

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[27] Goodenough, Florence L., op. cit., p. X.

[28] Brill, Moshe. "The Reliability of the 'Goodenough Draw A Man Test' and the Validity and Reliability of an Abbreviated Scoring Method." Journal of Educational Psychology. Vol. 26, December, 1935, p. 708.

> Further evidence is furnished to substantiate previously published conclusions that the test is comparable in validity, reliability and objectivity to other mental ability tests for young children.[29]

The point being made here is that the Goodenough Intelligence Test has received scholarly recognition; but the special point being emphasized is that another significant use of linear drawing has been added to its already large number of uses.

WALTER SARGENT AND ELIZABETH E. MILLER.[30]

Sargent and Miller used the training school of the University of Chicago as a laboratory in which they studied children's drawings, and school art in general, over a period of several years. The late Walter Sargent may with deserved distinction be placed in a small group of men who have influenced tremendously art education in the public schools. Miller cooperated with him as an able assistant. Their publication setting forth the findings of their investigations is worthy of the close consideration of any student of elementary education.

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[29] Williams, J. H. "Validity and Reliability of the Goodenough Intelligence Test." School and Society, Vol. 41, May, 1935, p. 656.

[30] Sargent, Walter and Miller, Elizabeth E. How Children Learn to Draw. Ginn & Co., New York, 1926.

The findings of Sargent and Miller are incorporated in their discussions. Some of their significant conclusions are as follows:

1. The desire to tell something is the natural motive in children's drawings.

2. All normal children can learn to draw.

3. Progress in ability to draw is not general but specific.

4. Children accumulate a graphic language.

5. Training in perceptual experience aids in learning to draw.

6. Children profit through drill in memory drawing.

7. Seeing others draw is a strong stimulus to draw.

8. Children learn to draw by seeing other children draw.

9. Children learn to draw by studying drawings and pictures made by others.

HARRIET M. JOHNSON.[31]

Johnson has reported some important observations that were made in her nursery school, an experimental

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[31] Johnson, Harriet M. Children in the Nursery School, pp. 182-211. The John Day Co., New York, 1928.

school for children of preschool age. This nursery school is associated with the Bureau of Educational Experiments. It is conducted by scientifically-trained officials. The object of the school is to accumulate objective information about children of preschool age. Her publication has gone through five editions, indicating something of the importance of the research reports.

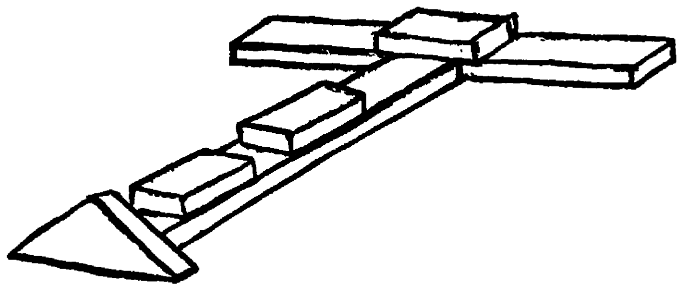
The whole child and many of his manifestations of behavior are reported and discussed by the author. Of course, the behavior of the preschool child in the field of graphics is the point of interest in this discussion. In Johnson's nursery school she observed the behavior of the child in his manipulation of blocks to result in what she freely calls line drawing. One might question the correctness of calling a design that was made out of blocks a form of linear drawing. However, in the design that was made of blocks, there can be no question concerning the concomitant insight manifested by the child. This insight would be identical whether the design was made of blocks or made with crayon.

Johnson makes it plain that the children were not taught to construct with the blocks. Neither was it even suggested to them. The blocks were made easily accessible to the children. The children of their own impulse created the patterns.

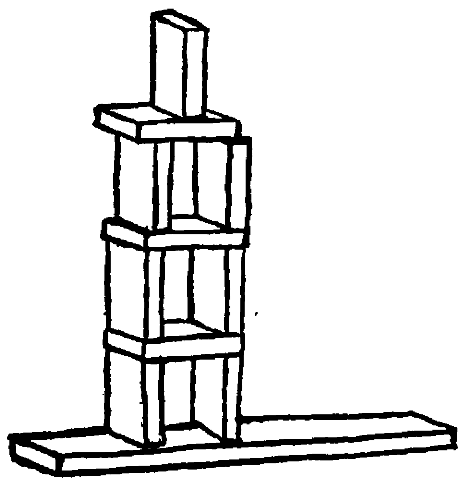
On page 280 there is a photostatic exhibit of Donald's (35 months) work. The blocks lent themselves well to the construction of the airplane, and hence, there is no question about the clearness of Donald's memory image. His smoke stack also shows that he was carrying forward past experience. The element of inventiveness should not be overlooked at this point.

On page 281 there is a photostat of a structure that was made by Karl (36 months). Karl shows plainly that he was exhibiting a type of behavior higher than that representative of mere motor manipulation. It should also be noted that Karl made three separate structures which are closely related.

Caroline (36 months) in a photostat of her exhibit on page 282 shows clearly a sense of order, balance, and symmetry. On the same page Dora (37 months) in a photostat of her exhibit displays a pattern made of cubes and dominoes. Dora named it a "bathtub" and the name was not far fetched. Dora indicates in this exhibit some control of balance, symmetry, and even likeness. Dora had doubtless observed a bathtub and held its chief characteristics in mind. Johnson and her assistants made it a point to keep accurate written gather and sift the evidence given during children's play.

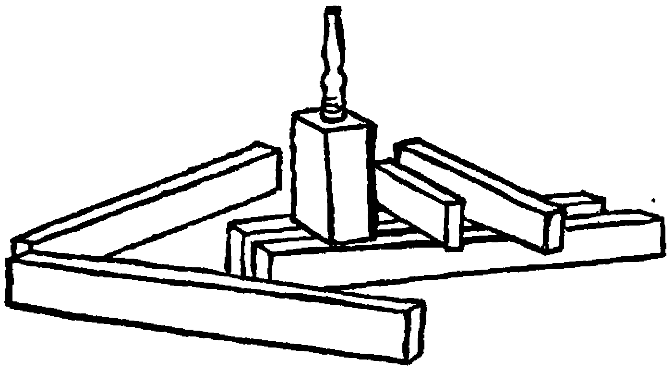


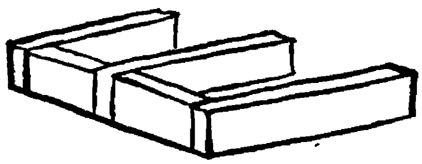
At 35 months Donald very rapidly and with no hesitation laid this arrangement which he named at once—"airplane."



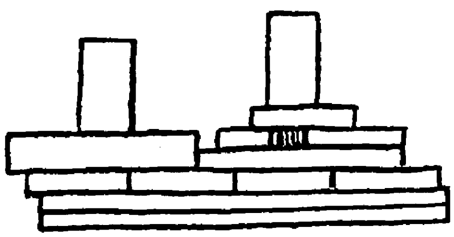
Seagoing craft may take any form. Donald at 35 months called these three constructions boats. "A 'moke 'tack up on top."

Johnson, Harriet M.
Children In The Nursery School,
Bureau of Educational Experiments,
The John Day Company,
New York, 1934.





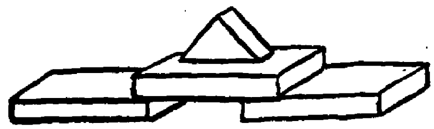
When Karl was three he began building boats with pointed bows. The dock and boat were never brought together, so the discrepancy in size between them was not apparent to him.



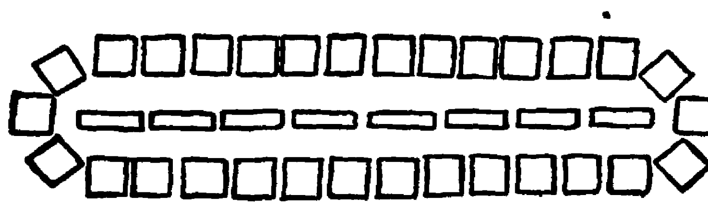
More smoke stacks and a window, arranged for in the construction.

Johnson, Harriet M.
Children In The Nursery School,
Bureau of Educational Experiments,
The John Day Company,
New York, 1934.

Note the alternation in placing—first on one side, then the other. Made by Karl at 31 months.



One of Caroline's patterns at 36 months. She made fewer of the evenly balanced structures than Peggy and more massive stacks.



Constructed of cubes and dominoes and named a bath tub. Dora—37 months.

There is quite evidently something in the rhythm of a balanced construction that is satisfying and it seems to be form that takes precedence of the representative structure that is named and used in a play scheme.

Materials of different sorts are often combined in making a balanced arrangement. In the illustration kiddy kars are used with paving blocks by a child of 31 months.

Johnson, Harriet M.
Children In The Nursery School,
Bureau of Educational Experiments,
The John Day Company,
New York, 1934.

records and sketches. Therefore, her findings may be regarded as reliable. A few of her conclusions related to this discussion are:

1. The stages in manipulating blocks parallel the stages in making lines with crayon.

(a) Disorder.

(b) Slight element of order.

(c) Larger element of order.

(d) Design with meaning.

2. The following elements manifest themselves as early as 35 months of age and probably earlier.

(a) Sense of order.

(b) Sense of similarity.

(c) Insight.

(d) Invention.

FRED C. AYER.[32]

One of the few books representing an outright publication on the psychology of drawing was placed on the market by Ayer in 1916. Ayer attacked the problem in two ways. First he reviewed most of the research studies already published. Then he performed laboratory

[32] Ayer, Fred C. The Psychology of Drawing. Warwick & York, Inc., Baltimore, 1916.

experiments. The experiments were related to the teaching of science in the science laboratory with drawing as a part of the teaching procedure. Ayer desired to determine objectively if drawing is effective in the teaching of a science, and if so, what kind of drawing is most effective. There were five experiments performed.

Experiment I. To evaluate the correlation between ability in representative drawing and ability in description and analytical drawing. Fifty-one students in first year high school general science were the subjects.

Experiment II. To evaluate the correlation between achievement in school drawing and achievement in other school subjects. One hundred and forty-one normal school students were the subjects.

Experiment III. To determine the correlation between retention and representative drawing, description and analytical drawing. The fifty-one first year high school students used in the first experiment were the subjects.

Experiment IV. To determine the direction of attention during drawing and description. Forty-eight university graduate students were subjects. Introspection was used in this experiment. All the subjects had had training in psychology.

Experiment V. To determine the effect of analytical observation upon ability in representative drawing. Sixteen graduate students were subjects.

A scoring method was devised for evaluating each drawing. Each drawing was given a numerical value through the cooperative work of ten judges. Each drawing was compared with every other drawing in the same group which process resulted in a score and a ranking for each drawing.

An understanding of Ayer's findings necessitates knowing the meaning of each of three terms. A representative drawing is an outline of one view of an object. It is an imitation of that view. An analytical or a diagrammatical drawing is a drawing which shows relationships between parts of the object. The term description in this connection means verbal description.

Ayer's findings are as follows:

1. There is no correlation between ability in representative drawing and ability in description.

2. Achievement in drawing is highly correlated with achievement in other school subjects.

3. There is no correlation between skill in representative drawing and subsequent retention of the essential characteristics of the object drawn.

4. There is noticeable correlation between ability in description and retention.

5. There is marked correlation between analytical drawing and subsequent retention.

6. Analytical observation improves the ability to make a representative drawing.

7. Drill in drawing from memory strengthens retention.

8. Drawing must be adapted to the use to which it is put.

9. Representative drawing to be effective in the laboratory should be supplemented by description, memory drawing and analytical drawing.

10. A psychological analysis of drawing shows that the process of graphical expression is subject to the influence of three interrelated factors:

(a) A Preconceived purpose.

(b) Ability to see.

(c) Ability to represent.

(1) Visual imagery.

(2) Reflection.

(3) Memory devices.

(4) Hand control.

(5) Principles of drawing.

(6) Synthetic capacity.

CHARLES H. JUDD.[33]

Judd in each of two of his publications on psychology gives serious attention to the subject of drawing. Judd agrees with the findings of the research studies designated in this discussion in point of the impulse of children to draw and the similarity between children's drawings and the drawings of primitive man; but Judd directs his thinking toward drawing as a social institution. He thinks of it in terms of social psychology, and he attempts to explain on a basis of sociology why the place of drawing in the curriculum of the public schools has been so unstable.

Some of Judd's findings are as follows:

1. The skills in drawing must be determined by a study of the psychology of the individual.

2. Continuance of the drawing behavior and appreciation of drawing must be determined by a study of social psychology.

3. A study of both individual psychology and social psychology is needed in solving the problems of drawing.

4. Drawing will not be a continued activity unless it is sufficiently appreciated by the group.

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[33] Judd, Charles H. The Psychology of Social Institutions. Chapter 7. The Macmillan Co., New York, 1926; Judd, Charles H. The Psychology of Secondary Education. pp. 270-283. Ginn & Co., New York, 1927.

5. Much of our present-day drawing is accumulated culture.

6. Conventional drawing is an invention and hence is not wholly innate.

7. Drawing that continues must answer a social need.

HELGA ENG.[34]

A more recent study, and in a sense an outstanding study of the psychology of children's drawings, was made by Eng in Germany. Eng made a splendid case study of the drawings made by her niece Margaret. Margaret was under daily observation of Eng from the time of her first stroke at ten months of age to the time of her more elaborate drawings at eight years of age. Eng submits one hundred and eleven drawings in the order of their execution by Margaret. Each drawing is supplied with the number of years, months, and days, Margaret had lived up to the day she made the drawing.

As a case study of drawing, this is one of the best. Its weakness as a study is that it is limited to one individual. However, this weakness is overcome in part by the fact that Eng observed the drawings of

[34]Eng, Helga. The Psychology of Children's Drawings. Trans. by H. Stafford Hatfield. Kegan Paul, Trench Trubner & Co., London, 1931.

other children although not so closely and not so consecutively. Moreover, Eng familiarized herself with many of the research studies of other students of children's drawings.

Margaret had no brothers or sisters and was not influenced by the drawings of playmates. Margaret was given no instruction in drawing. Occasionally, however, a drawing was made in her presence. No one asked her to draw. No one talked to her about her drawing. In short, during the first three years she was allowed to work out her own drawings. All that was done for her was to see that paper and pencil were accessible. She had ample opportunity to look at pictures. Margaret did not know during the first three years that she was being observed and that her drawings were being collected.

Eng's findings tended to corroborate many of the findings of the other studies reported in this chapter. Some of her conclusions are given herewith.

1. Margaret made her first mark with the pencil at ten months.

2. Her early drawings exhibited the scribbling stage.

3. The first evidence of entering the schematic or formalized stage was observed at one year ten months. She attempted to draw her mama.

4. She chose to use color first at six years two months.

5. At seven years ten months the element of perspective began to enter slightly.

6. The child draws from memory but there is probably more in the child's memory than he can draw.

7. Imitation is a very strong stimulus in inciting children to draw.

8. Mental pictures of the child must crystallize into knowledge in order to acquire such clear outlines that they can be placed on paper.

9. The child does not need all details in his drawing because his strong imagination furnishes them. He needs only the stimulus.

10. When the child reaches the stage known as automatism there is likely to be a cessation of spontaneity in his drawings.

11. The child encounters difficulty with perspective because perspective requires abstract thinking.

12. Perspective is not likely to be mastered by children less than fifteen years of age.

13. One of the weakest points in children's drawings is synthesis.

14. Two persisting weak points in children's drawings are proportion and action.

15. Narrative drawings appear earlier than decorative drawings.

16. Margaret exhibited slight evidence of decorative drawing at four years six months.

17. There is a parallelism existing in children between their development in drawing and their development in speech.

NORMAN C. MEIER.[35]

A number of studies treating different phases of the psychology of art have been made recently at the University of Iowa under the general direction of Meier. Meier's studies dealt with a number of arts. His findings touch the psychology of linear drawing only incidentally. The purpose here is to note pertinent findings that are related to linear drawing and that occur in reports of studies made recently by Meier and his assistants.

1. Experimental evidence, beyond the possibility of chance, showed that at the preschool level balance in

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[35]Meier, Norman C. Studies in the Psychology of Art. University of Iowa Studies in Psychology, No. 19 and 28. Psychological Review Co., Princeton, N. J., 1933 and 1936.

design is preferred to unbalance. This finding came out of a test involving block manipulation.[36] (Johnson made a similar observation in her nursery experimental school).

2. A high degree of relationship between general intelligence and artistic ability does not seem to exist. (A range from the kindergarten to adulthood was tested). There is a distinction involved here between ability to draw and artistic ability. It will be remembered that the results of other studies showed a high correlation between general intelligence and ability to draw. Ability to draw here means ability to express thought with lines. The emotional element need not be present in a large measure in giving expression to thought through the medium of the line.[37]

3. A knowledge of the principles of art with practice in their application will produce significant increase in aesthetic judgment.[38] (Children of second, third, fourth, and fifth grades tested).

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[36] Daniels, Parmely C. Discrimination of Compositional Balance at the Pre-School Level, p. 9. University of Iowa Studies in Psychology, No. 28. Psychological Review Co., Princeton, N. J., 1933.

[37] Tiebout, Carolyn and Meier, Norman C. Artistic Ability and General Intelligence, pp. 121-123. University of Iowa Studies in Psychology, No. 19. Psychological Review Co., Princeton, N. J., 1936.

[38] Voss, Mildred D. A Study of Conditions Affecting the Functioning of the Art Appreciation Process at the Child Level, pp. 19-20. University of Iowa Studies in Psychology, No. 19. Psychological Review Co., Princeton, N. J., 1936.

4. The level of art ability may be changed appreciably under especially favorable conditions. This is true even when the initial level is low.[39] (Children of second, third, fourth, and fifth grades tested).

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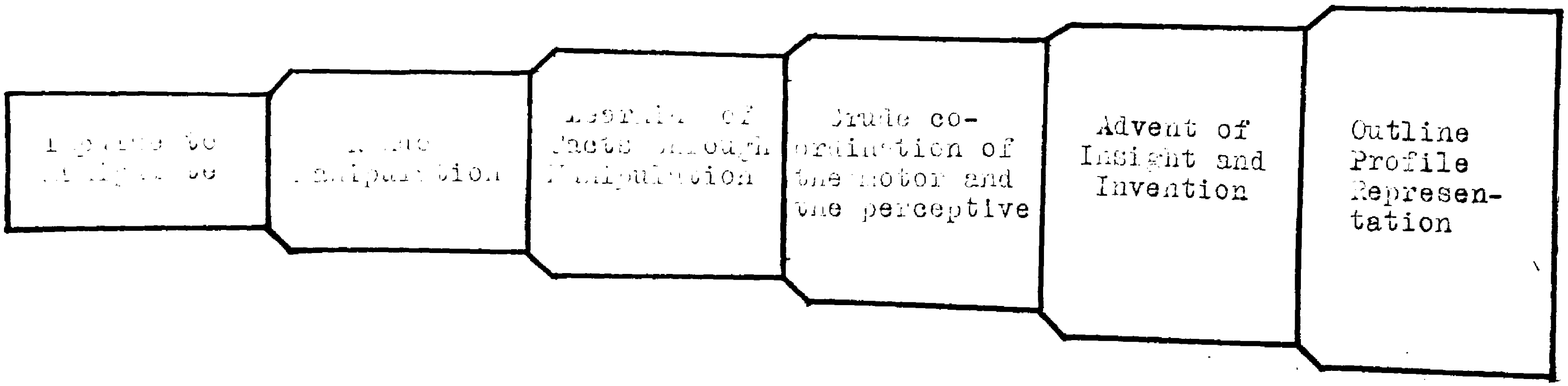
[39]Saunders, Aulus W. The Stability of Artistic Aptitude at the Childhood Level, pp. 151-152. University of Iowa Studies in Psychology, No. 19. Psychological Review Co., Princeton, N. J., 1936.

CHART I

Progressive Steps In The

Early Stages Of Children's

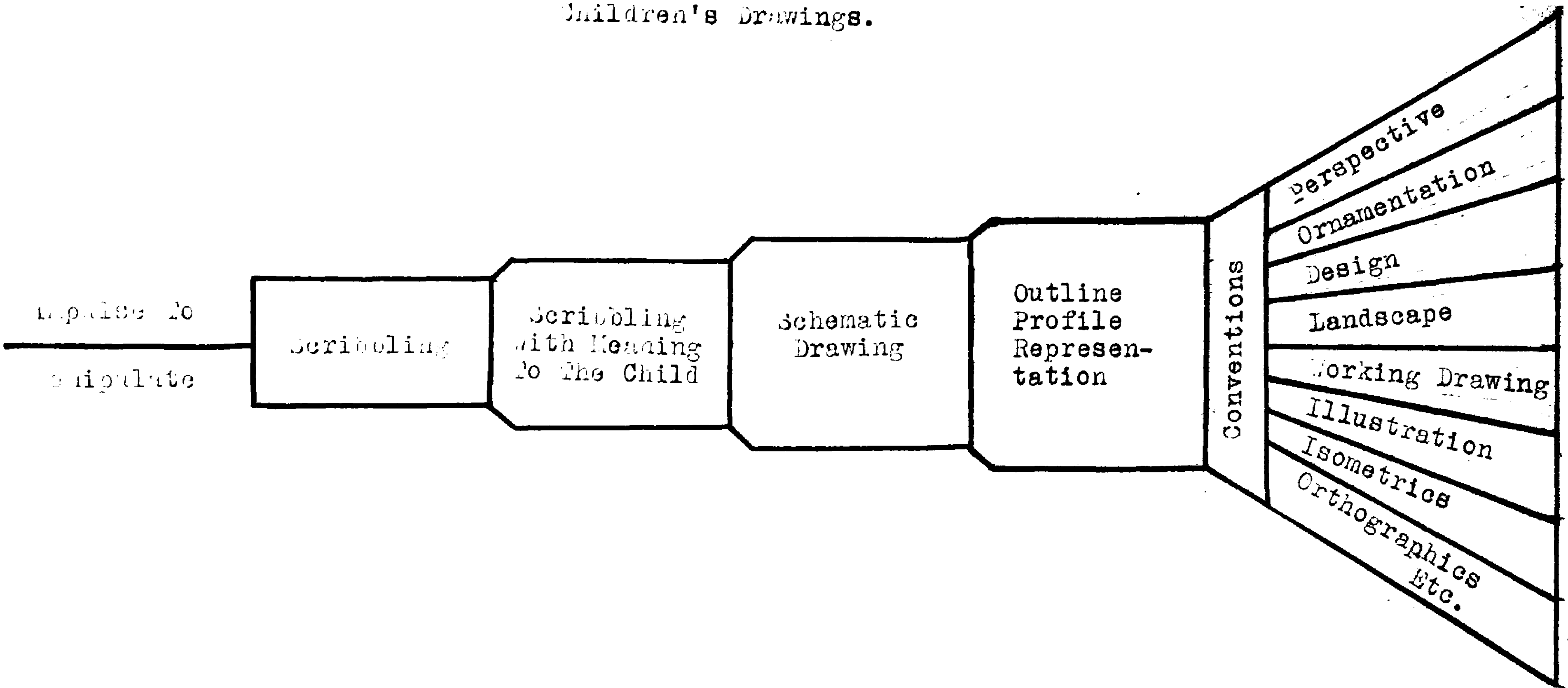
Drawing Behavior



GRAPH II

Developmental Stages Of

Children's Drawings.



SUMMARY OF PSYCHOLOGICAL EVIDENCE TAKEN FROM REVIEW OF RESEARCH STUDIES REPORTED IN THIS CHAPTER.

The name after each statement means that the findings of the study of that research student concur with the designated point.

1. Children draw from memory even when the object is before them.

   1. Ricci.
   2. Kerschensteiner.
   3. Lukens.
   4. Sargent.
   5. Eng.

2. Children at first have little or no aesthetic sense.

   1. Ricci.
   2. Lukens.
   3. McCarty.
   4. Kerschensteiner.

3. Those who draw best learn more readily the true integrity of the things they draw.

   1. Ricci.

4. Generally speaking the brightest children produce the better drawings.

   1. Ricci.
   2. Kerschensteiner.
   3. Ayer.
   4. McCarty.

5. With the average child there are five stages of development in drawing.

   (a) Pre-experimental.

(b) Schema.

(c) Beginnings of appreciation of line and form.

(d) Representation according to experience.

(e) Representation according to tridimensional form.

1. Kerschensteiner.
2. Lukens.
3. McCarty.
4. Johnson.
5. Eng.

6. First attempts at visual representation still contain schematic features.

1. Kerschensteiner.

7. The form of representation is determined by the appearance of the object, and is drawn in outline.

1. Kerschensteiner.

8. The final stage, if attained, embraces light, shade, perspective, foreshortening.

1. Kerschensteiner.

9. Each stage designates fairly well the intellectual level reached.

1. Kerschensteiner.
2. Goodenough.
3. McCarty.
4. Ricci.
5. Ayer.

10. The desire to tell something is a significant motive in drawings.

1. Lukens.
2. Sargent.
3. McCarty.
4. Eng.

11. Children draw objects that they like.

1. Lukens.
2. Burk.
3. McCarty.

12. Drawing is a means of expression more natural than writing.

1. Lukens.

13. Opportunity to draw should come well before the ninth year.

1. Lukens.
2. Childs.
3. Eng.
4. Johnson.

14. The self-conscious period retards free expression.

1. Lukens.
2. Sargent.
3. Eng.
4. Judd.

15. As to objects, the preference of children in drawing is indicated in the following order.

(a) Human Figure.

(b) Animals.

(c) Houses.

(d) Plants.

(e) Mechanical Inventions.

(f) Still Life.

(g) Ornament.

1. Burk.
2. McCarty.
3. Eng.
4. Ricci.

16. In teaching, the genetic order is preferable to the logical order.

1. Burk.

17. The abilities of children to draw accord well with the normal curve.

1. Childs.
2. McCarty.

18. Teaching children to draw enhances their results.

1. Childs.
2. Ayer.
3. Sargent.
4. Eng.
5. Meier.

19. Sex difference is not much, but constant and in favor of the boys.

1. McCarty.

20. In the development of technical ability there is definite progress from year to year.

1. McCarty.
2. Eng.
3. Sargent.

21. The Goodenough Intelligence Test is a useful instrument.

1. Terman.
2. Brill.
3. Williams.

22. All normal children can learn to draw.

1. Sargent.
2. McCarty.
3. Meier.

23. Progress in ability to draw is not general, but specific.

1. Sargent.

24. Training in perceptual experience aids in learning to draw.

1. Sargent.
2. Ayer.
3. Meier.

25. Children profit through drill in memory drawing.

1. Sargent.
2. Ayer.

26. Seeing others draw is a strong stimulus to draw.

1. Sargent.
2. Eng.
3. Johnson.
4. McCarty.

27. Children learn to draw by studying drawings and pictures made by others.

1. Sargent.
2. Eng.
3. McCarty.

28. Children have been known to exhibit insight at thirty-five months of age.

1. Johnson.

29. Achievement in drawing is highly correlated with achievement in other school subjects.

1. Ayer.
2. Ricci.
3. Kerschensteiner.

30. Analytical observation improves the ability to make a drawing.

1. Ayer.

31. Drawing must be adapted to the use to which it is put.

1. Ayer.

32. A preconceived purpose in drawing is very significant.

1. Ayer.
2. Sargent.

33. Much of our present drawing is accumulated culture.

1. Judd.

34. The schematic stage may be entered as early as one year ten months of age.

1. Eng.

35. Color is rarely chosen by children before six years of age.

1. Eng.

36. The element of perspective may enter children's drawings in slight form as early as eight years of age. However, perspective is not likely to be fairly mastered at an age less than fifteen.

1. Eng.
2. Lukens.

37. Development of ability to draw exhibits stages similar to those manifested in learning to speak.

1. Lukens.
2. Eng.

38. There is a positive correlation between ability to draw and intelligence.

1. McCarty.
2. Ricci.
3. Kerschensteiner.
4. Ayer.
5. Goodenough.

39. A knowledge of the principles of art with practice in their application will produce significant increase in aesthetic judgment.

1. Meier.
2. Voss.

40. The level of art ability may be changed appreciably under especially favorable conditions even when the initial level is low.

1. Meier.
2. Saunders.

CHAPTER X

AN INTEGRATION OF THE STUDY

In the foregoing nine chapters there has been brought to the surface an immense amount of material related to drawing. Indeed, it would appear that drawing is associated with every major human endeavor. Prehistoric man made use of the line for the purpose of ornamentation and for the purpose of communication. Since that early day man has gradually increased the usefulness of drawing. Today drawing is an integral part of our accumulated culture. The number of sources from which information concerning drawing has been taken in this study is indicative of the number of points at which it serves the needs of society.

Out of the material assembled in the foregoing chapters should emanate advice, theory, procedure, and even principle, concerning drawing and its place in the schools. A list of assumptions based on the findings in the study should serve as guides for the formulation of educational procedure related to drawing and its place in the curriculum.

The order of discussion, henceforth, shall be the statement of each assumption that appears to grow naturally out of the material at hand, followed by a discourse supporting or alleviating the assumption under consideration. It shall also be the purpose to point out any additional significant educational questions or implications that appear immanent.

FUNDAMENTAL ASSUMPTIONS

THE PUBLIC SCHOOL ADMINISTRATOR, THE STUDENT OF EDUCATION, CANNOT WITH RATIONALITY BUT GIVE SIGNIFICANT CONSIDERATION TO LINEAR DRAWING.

Education is concerned with human behavior. Drawing is a form of human behavior. A human activity that has its source imbedded in the structure of the nervous system, whose existence dates back beyond the limits of written history, that has much assurance of universality, that developed into pictograph writing, that developed into symbolic writing, that developed into an art in and of itself, that has become basic to all the related graphic arts, that has become essential to mathematics, that has become essential to the sciences, that has become essential to modern engineering, that has become an integral procedure in modern industry, that has become a tool for thinking in the field of invention, that has become highly useful to modern advertising, that is a strong stimulant to the imagination and to thought, that is an essential supplement to spoken, written and printed language, that is a powerful, indispensable pedagogic aid--cannot with rationality but occupy a significant place in the thinking of the student of education, in the thinking of the public school administrator. Curriculum studies of state-wide proportion have been increasing. The reason for this is in the thought that the curriculum should be made up of elements that respond to present-day social needs. The foregoing array of points indicating the expanding usefulness of drawing in modern life should prove significant to the curriculum builder.

A purview of public school education in operation would lead one to suspect that administrators often fail to realize the varied application of drawing to many significant points in modern life. Drawing is too often considered only a fine art, a dispensable luxury belonging to the margin of life. Drawing may be a fine art, but that is only one of its applications. The usefulness of drawing has been gradually increasing for a period of more than two thousand years. Today it is used even to determine the measure of human intelligence. The point to be emphasized here is that the administrator of education must see drawing in its manifold usefulness. Then its educational significance should be inescapable.

ANY ADEQUATE CONSIDERATION OF THE TEACHING OF DRAWING NECESSITATES NOT ONLY A TECHNICAL KNOWLEDGE OF THE TYPE OF DRAWING TAUGHT, BUT ALSO A KNOWLEDGE OF THE END RESULT ACCRUING TO THE PUPIL FROM SUCH TEACHING.

There is danger in the execution of a general course in drawing which seeks no specific end results. This has been a serious weakness inherent in the so called public school art. Teaching courses in drawing with only the blind hope that much good will come therefrom is certain to prove ineffective. Teaching courses in drawing with the presumption that end results accrue to the pupil that do not actually accrue is obviously not a desirable procedure. When school officials decide that a group of individuals need to be equipped with the knowledge and the skill involved in a specific form of drawing, then those officials need to know the nature of the form of drawing under consideration and at least an approximation of the results that accrue to the individuals taught.

The disappointments accompanying the teaching of drawing made mandatory by the enactment of the Massachusetts Law of 1870 should not be forgotten. This law specified the teaching of industrial drawing. The kind of drawing taught in Massachusetts, as a result of the law, was for the most part a form of mechanical drawing emanating from the descriptive geometry discovered by Monge. Its results were splendid in the direction of facilitating production in industry. Many citizens were expecting therefrom training in the fine arts, training in the aesthetics. Training in appreciation, however, involves the training of the emotions. Industrial drawing is based largely on mathematics. It may not involve the emotions to any appreciable extent. Therefore, the teaching of industrial drawing did not result in training in the fine arts. The truth is that at that time not much was known about the psychology of the emotions, nor was much known about the psychology of drawing. Consequently, there took place much erroneous thinking.

Ayer performed a research experiment, the results of which have a significant bearing on the point here under discussion. Ayer was seeking to determine scientifically the kind or kinds of drawing that are effective in teaching science in the laboratory. The evidence that he assembled points to the conclusion that representative drawing is extremely ineffective in point of description and in point of memory retention. On the contrary, additional evidence that he assembled points to the conclusion that analytical drawing enables the pupil to hold in mind a picture of a specific situation, and to retain facts in memory concerning this situation. The lesson to be drawn from the results of Ayer's experiment is obvious. The type of drawing used may determine the nature of the intellectual result.

DRAWING AS A PERMANENT SUBJECT OF STUDY IN THE PUBLIC SCHOOLS MUST REST ON A PHILOSOPHICAL BASIS UNDERSTOOD AND ACCEPTED BY THE ADMINISTRATORS, BY THE TEACHERS IN GENERAL AND BY A LARGE PART OF THE PUBLIC.

If drawing as a subject of study is deserving of a place in the curriculum, it is deserving of such a place for good and sufficient reasons. These reasons must be understood and must be generally accepted. If no reasons supporting drawing can be located, then drawing as a subject of study does not belong in the curriculum.

A few specialists in a school system are certain to encounter difficulties. The fact that they are specialists indicates that they are handling a work that only they understand adequately. If this condition continues to obtain, elimination of their work is likely to take place.

Fowle of Boston in 1821, Peale of Philadelphia in 1840, Minifie of Baltimore in 1848, Bartholomew of Boston in 1864, were all specialists in drawing, each of whom initiated the teaching of drawing in the public schools of his city. With the exception of Bartholomew each was eliminated. Bartholomew worked under Philbrick, who was an exceptionally strong administrator and who supported the teaching of drawing. In the cases of Fowle, Peale, and Minifie, the superintendent was uncertain concerning the value of drawing, the teachers were traditional, and the public was not enlightened. Hence, the inevitable took place. Their work was not appreciated because there was not existent a commonly accepted philosophy supporting it.

The situation in Cincinnati was much different. Drawing was introduced into the schools in 1848 and thrived reasonably well from the beginning. Calvin E. Stowe had made his report to the state legislature, a part of which was concerned with the value of drawing as a subject of study. The state legislature had Stowe's report printed and widely circulated. Consequently, the public mind in Ohio was, at least in a measure, informed concerning drawing. In addition to this there were many craftsmen resident in Cincinnati who readily saw the value of industrial drawing. With this measure of public sanction, the drawing teachers of Cincinnati encountered less difficulty. In order to thrive, the private schools also need an informed public mind. Alcott met much resistance, especially in small communities, because of his advanced methods in teaching. Although Neef's private school was successful in Philadelphia, it was a failure when located in a smaller community.

It is true that the examples here cited were in an early day, at which time the whole subject was in a state of incipiency. There were few if any precedents to point to. Nevertheless, even today, any subject that remains permanently in the curriculum must rest on public sanction. If the teaching of music suffered loss of ground during the recent depression more severely than did the teaching of reading, it is good proof that the teaching of music is not required by public sentiment as rigidly as is the teaching of reading. There are, perhaps, degrees of public sanction.

THE LEGISLATION OF A SPECIFIC SUBJECT INTO THE PUBLIC SCHOOL CURRICULUM IS A QUESTIONABLE PROCEDURE.

A law must of necessity be definite, specific, and narrow, in order that it may be enforced. There is little reason for passing a law unless it is to be enforced. The process of education is rather involved and inclusive; it deals with intellectual life which is far from being adequately understood. Now when a fixed, inflexible law is applied to a highly involved educational situation, difficulties are certain to arise.

The state of Massachusetts passed the law of 1870, specifying the teaching of industrial drawing. Then the state found that it possessed no one adequately prepared to execute the law. Consequently, Smith was brought from England to execute the law; but Smith was trained in the fine arts. He found himself in a foreign country where teachers were not entirely friendly to him, supervising the teaching of a practical art, and with few if any teachers reasonably well prepared to teach this practical art. It is obvious that this precipitation of conditions would not tend toward the permanent solution of any educational problem.

The point being made here is that the law was rather precipitous. It had, however, a great deal of public sentiment behind it. It would have been better to have directed this sentiment along a longer approach, giving time for study, experimentation, reflection, understanding, and adjustment. Then, perhaps, drawing could have been introduced on a basis of better understanding and without a specific state law.

The state of California was the first state to emulate Massachusetts in legislating drawing into the public schools. California passed its law in 1872. The geographical distance between the two states is indicative of a wide discussion of drawing. California modified its law from time to time, and its modifications are significant of changing educational thought related to drawing. The law of 1872 specified the teaching of "industrial drawing." The modified law of 1901 specified only "drawing," and the modified law of 1925 used the term "art." It should be noted that these changes were about twenty-five years apart. This did not allow much flexibility for frequent educational change and improvement. The important point here for recognition by the student of education is that drawing as a subject of study requires study, experimentation, and understanding, now, as well as in 1870, and that a forced condition is not likely to have a beneficial result.

DRAWING IS ONE OF THE MOST PROLIFIC FORMS OF VISUAL EDUCATION

When Comenius presented his Orbis Pictus to the world in 1657, he introduced visual education to the educators of his day. The Orbis Pictus was a protest against the pure symbolism of the printed book. It was a method for supplying a pictorial supplement to the printed page.

The educational literature of the present day has much to say about the value of visual education. There is little doubt but that the motion sound picture will be used more and more in educational work. It can be adapted to every subject occurring in the curriculum. No screen picture, however, can ever quite take the place of chalk and blackboard. The skilful use of chalk during the recitation meets the detail demands of the recitation. This is visual education of the most effective kind.

While school officials are hoping for a budget that will afford a new motion picture machine, they should not neglect one of the most effective procedures in the schoolroom, namely, chalk handled skilfully by an efficient teacher. There is an inescapable hint at this point for officials of teacher training institutions. A well worked out course in blackboard graphics for teachers in training would result in much inexpensive but valuable visual education.

Mann brought this point vigorously to the officials of the state of Massachusetts in his famous Seventh Report. Mann had been studying education in foreign countries. He marvelled at the skilful blackboard use of linear drawing by teachers in German schools. This took place more than three quarters of a century ago. At the present time significant questions can well be raised. Are our public schools making anything like maximum use of linear blackboard drawing from the viewpoint of teacher manipulation? If not, who is responsible for this neglect, and how may it be rectified? In all the discussion concerning visual education, are educators failing to give sufficient emphasis to this vital tool in teaching? Have the teacher training institutions lost sight of this powerful pedagogic aid? A summary made in this study of the thought of a number of outstanding thinkers across the centuries concerning drawing indicates that in scaling its general usefulness they place first its service as an effective tool in both learning and teaching.

DRAWING IS OF HUMAN INTEREST IN APPLICATION TO USE RATHER THAN IN INSULATED, UNITARY FORM.

School drawing in exercise form on paper that soon finds its way to the waste basket without serving an intervening and satisfying purpose is not likely to receive strong justification. The whole evolution of drawing manifests itself in satisfying some human want. Even the cave drawings of early man served a satisfying purpóse. Ornamental drawings on weapons and utensils were not unsatisfying to the primitive mind. Pictograph drawings served the purpose of communication. Working drawings that came into existence much later aided in construction. Leonardo used drawing as a tool of thought in invention. Dürer a little later used drawing in engraving prints for the printing press. The discovery of the principles of descriptive geometry made drawing of great service in the field of engineering. Drawing seems to have evolved all the way along the line in relation to something aside from itself.

The educational implication coming from the foregoing discussion seems to be that all drawing in the school should be highly motivated. Thorndike probably had this in mind when he warned against teaching drawing to children who felt no need for drawing. It seems to be a reasonable implication that the more drawing is interrelated with other interests in the school, the more readily will the principles and technic of drawing itself be learned.

DRAWING AS A SUBJECT OF STUDY HAS PROVED TO BE CONFUSING IN EDUCATIONAL THOUGHT.

Much erroneous thinking has been done concerning education and drawing. The reason for this lies in the fact that drawing fits logically and correctly into each of several fields of thought. Drawing is a proper subject in the field of fine arts, but it is also a proper subject in the field of vocational education. Drawing is a proper subject in the field of industry, and it is a proper subject in the field of pedagogy. Now to think correctly educationally concerning drawing, one must be conscious of the field or group of fields in which he is thinking. In addition, there are further technical and psychological considerations. One must be conscious of the specific type of drawing which is to be taught and also of the intellectual reaction resulting from the teaching of such a type of drawing. It is quite possible that drawing in education could be concerned with vocation, with the fine arts, and with industry, all at the same time; but the student of education must be keenly aware of each factor in this condition if he is desirous of clear thought. An unconscious lumping together of factors concerning drawing is certain to bring difficulties to the student of education. The confused thinking concerning drawing as a subject of study during the sixties, seventies, and eighties in the United States was due to a lack of understanding and a lack of clear visualization of the several factors involved.

AN INTENSE WAVE OF ENTHUSIASM FOR AN EDUCATIONAL OBJECTIVE IS NOT A SAFE GUIDE FOR EDUCATORS TO FOLLOW.

The foregoing generalization has grown out of a study related only to drawing. However, this generalization could properly be given a much broader application. Due in large measure to what had been learned about educational procedure in several of the European countries, an unusually intense wave of sentiment for the teaching of drawing in the public schools during the sixties, seventies, and eighties had been developed. Mass meetings comparable to our present-day political meetings were held in the interest of the teaching of drawing. Leaders spoke; general discussion followed; legislatures were urged to enact laws. A study of the records of that day tends to make one think that many people had a vague feeling that the teaching of drawing in the public schools would bring about magic results in industry.

Massachusetts was the center of this movement; but the movement was not confined to that state. It encompassed an extensive territory; it crossed the continent. California was the first state to emulate Massachusetts in making the teaching of industrial drawing compulsory. Other states followed with legislative action. Even the territory of Arizona in the deep West passed a territorial law recognizing industrial drawing. Reports of city superintendents of schools and state superintendents of schools of that day are replete with arguments for the pressing necessity of teaching industrial drawing.

In the report of the state superintendent of schools of Maine for the year 1870, a strong plea is made for the compulsory teaching of drawing, notwithstanding the fact that Maine was a highly agricultural state. In 1881 the state superintendent of schools of Iowa made a similar plea for the schools of Iowa, an inland state and highly agricultural.

The educational implication here is obvious. Progress in education requires enthusiasm; enthusiasm alone, however, is not sufficient. All new proposals in education require study of all the factors involved, careful experimentation, and critical evaluation. Drawing as a subject of study needed such treatment then, and the need of such treatment continues to exist today.

EDUCATION CANNOT BE MADE TO GIVE IMMEDIATE AND COMPLETE FINANCIAL SUPPORT TO EDUCATION.

The foregoing is a unique finding. It is related to drawing only in so far as drawing may be a part of an effort to make education support itself financially. No Utopia has yet succeeded in this desirable though difficult endeavor.

The experiment at New Harmony, Indiana in 1825, is the topic under consideration. Maclure, Owen, and Neef were the chief personalities connected with that experiment. The object of that experiment was to build up a democratic social structure that would give to every individual involved reasonable comforts of life. This objective was to be brought about through a procedure in education adjusted to the materializing of such an objective. The factors in the test seemed to have been favorable. Both Maclure and Owen were men of large business experience. Each had amassed a large fortune. Maclure was a noted scientist; Owen was a splendid student of social science. Each was a sincere humanitarian. The community of New Harmony was not burdened with tradition.

The success of the experiment rested on the success of the type of education put into operation. Vocational education was to parallel general education. The vocational education was to be sufficiently productive financially to pay for all education. The experiment failed, although the conditions for success seemed to have been favorable. Reasons other than inherent causes have been given for the failure; but since similar experiments elsewhere have also failed, it is reasonable to regard the causes as inherent.

It would appear that each community must pay for the education of its children from surplus wealth. The tax on children must be deferred until they are no longer children, until they are mature producers.

Evidence points to the conclusion that drawing with a purely vocational end in view was first taught in a free school system in the United States at New Harmony, Indiana. It is true that Fowle had tried to introduce drawing into the schools of Boston in 1821, but Fowle did not have vocational education in mind. It is quite likely that engineering drawing was taught in the United States at the military academy located at West Point even earlier than 1821; but the drawing taught at the United States Military Academy was adjusted to military projects. The point to be emphasized here is that drawing along with the several activities that went to make up the proposed self-sustaining educational procedure at New Harmony, Indiana, failed.

KNOWLEDGE OF THE SOCIAL STRUCTURE OF A COMMUNITY SHOULD BE A SIGNIFICANT DETERMINANT IN ADJUSTING THE DIFFERENT TYPES OF DRAWING TO ESPECIALLY THE UPPER GRADES OF THAT COMMUNITY.

A philosophical principle underlying curriculum building and rebuilding is that the curriculum in operation should respond to present-day social needs. A knowledge of the social structure of a community helps to determine the community needs. Drawing should be adjusted to the curriculum with this thought in mind in the same manner that other subjects of study are adjusted to the curriculum.

The Massachusetts law of 1870 was an attempt to adjust drawing to the curriculum through legislation. It was a success in a narrow sense. It adjusted drawing to the industrial communities of the state. No positive provision was made in the law for communities with other types of social structure. Law is by its nature inflexible and hence not a good medium for adequate curriculum adjustment.

Children coming from the homes of a highly residential district need to be taught a type of drawing somewhat different from the drawing taught to the children coming from the homes of a highly industrial district. The former need drawing for communication, for illustration, and for ornamentation. The latter may need to some degree the same kinds of drawing but some differentiation should be made, based on the fact that they come from homes that for the most part lead to employment in the factory. These children should be taught a type of drawing related more closely to the needs of industry such as blueprint reading, for example.

Drawing in the lower grades should not be determined to so great an extent on a knowledge of social structure. Child nature on this level is a more significant determinant. Studies in psychology of children's drawings indicate that with young children there is a genetic period of drawing, or a period during which children draw impulsively. This in turn would indicate that curricula for the lower grades should embrace for the most part a common body of activities related to drawing. The final thought in this discussion is, then, that drawing for children up to about nine years of age should be determined largely by child nature. From this point on a knowledge of the social structure for a specific community should gradually enter as a determinant. The ninth year in this discussion is a very rough approximation for pointing out the termination of the genetic period of drawing by children.

YOUNG CHILDREN DRAW OF THEIR OWN INITIATIVE.

There is substantial evidence leading to the conclusion that normal children would draw without being taught to draw, provided the materials were available. Eng's genetic study of the drawings of her niece, during a period in her niece's life ranging from ten months of age to eight years, leads to the conclusion that young children have a strong urge to draw. Johnson's observations in her experimental school, substantiate the findings of Eng. Eng studied one German child.

Johnson studied several American children. Vasari, an eminent writer of the Renaissance period, gives testimony that in his day young children roughly brought up were found drawing of their own initiative. Although the child is influenced by his environment, his drawing is unquestionably the unfolding of an inner urge. This is vouched for strongly by the fact that the development of children's drawings takes the same course in its main outline in all countries. Therefore, the general mental development of human beings is concerned.

The educator must recognize the foregoing. Any useful, persistent, pervading form of human behavior should serve its maximum utility. This, of course, necessitates a knowledge of the nature of drawing. In curriculum building for the lower levels of education, the point under consideration here, should receive close attention.

THERE IS SIGNIFICANT CORRELATION BETWEEN ABILITY TO DRAW AND INTELLIGENCE.

The research studies of Kerschensteiner, Ricci, Ayer, McCarty and Goodenough, support the affirmative of the foregoing statement. There are also outstanding examples in history that support the affirmative. Leonardo was a genius as a draughtsman, as an engineer, as an inventor, and as an anatomist. Dürer was a genius as a draughtsman, as an engraver, and as a mathematician. Goodenough bases her intelligence test for young children on the affirmative of the foregoing assumption.

Notwithstanding the array of evidence favoring the affirmative of the above assumption, the question is deserving of more study and more investigation. Do ability to draw and intelligence occur together in the same nervous system? According to Ayer, ability to draw depends upon purpose or motive, upon ability to see, and upon muscular dexterity. Could it not be possible often for a high degree of intelligence to exist in an organism with a low degree of dexterity, which would cause an inferior result in drawing? In such a case there would exist in the same organism high potential intelligence and low ability to draw. Could there not exist in the same organism high potential intelligence and low ability to see form, which would result in low ability to draw. In McCarty's study, a number with high scores in intelligence ranked in the lower 25% in drawing, and a number with high scores in drawing ranked in the lower 25% in intelligence. These last two conditions were not sufficient to make a change in the finding, but they do point to possibilities. They do point to factors in the situation not accounted for. Moreover, could it not be possible that Goodenough's test would serve as an effective measure for children from four years to ten years, and yet not be an effective measure if applied to children of subsequent years? Are individuals ever bright as children and dull during the period approaching maturity?

If Goodenough's test is reasonably effective there is no reason why any school administrator should remain doubtful about the intelligence of the children up to ten years of age in his school system. If intelligence and ability to draw occur together, then children of high intelligence should be encouraged to make a larger use of graphic expression. If intelligence and ability to draw occur together, then normal children with average intelligence should be able to learn to draw. Following out this reasoning, all normal children can learn to draw fairly well. A wide application of Goodenough's test, with a follow-up study to maturity, should result in valuable evidence.

WHETHER FORMAL INSTRUCTION SHOULD BE ADMINISTERED TO CHILDREN DURING THE GENETIC PERIOD OF DRAWING AND WHAT KIND OF INSTRUCTION SHOULD BE ADMINISTERED, IF ANY, ARE QUESTIONS YET TO BE ANSWERED.

The foregoing finding is in the form of raising a significant question. An acceptable teaching procedure adapted to the genetic period of drawing behavior apparently has not been devised. Should the period be interfered with at all, other than by making drawing materials easily accessible to the children? One of Childs' findings in his Indiana study is germane at this point. Childs says that statistical treatment of his data indicates that children develop more ability in drawing before entering school at six or seven years than they do in the entire eight years of the elementary school course. This appears to be an extreme statement. Ordinarily children are not taught systematically before entering school. Yet, according to one finding in Childs' study, they learn more while less mature, in a shorter time, and without formal instruction, than they do in a longer time, while more mature, and with systematic instruction.

The question raised here is not likely to be readily answered. It will probably require much study and experimentation before an adequate answer is at hand. In the meantime, however, children may be helped with their drawing during the genetic period without danger of harm and with some assurance of helpfulness. Imitation is a strong innate tendency in children. It may be used efficaciously during the genetic period. Sargent found in his studies that the act of drawing in the presence of children is one of the most effective ways of teaching them. In addition to this a good supply of pictures and drawings may be made easily accessible to children for their perusal. Discussion of the pictures with the children is likely to prove helpful. These simple helps seem to be in accord with child nature and may bring out more readily and more richly the results that would ultimately mature by virtue of the inner urges.

There is no attempt made here to answer with finality the major question raised. It is certain that there is a period during which young children have an innate tendency to draw. It is also certain that this period is broken up into well-defined stages; namely, the scribbling stage, the schematic stage, the representation stage. It is further certain that this is a very significant period educationally. The question raised and yet unanswered is How may it be treated with maximum profit to the children?

SUGGESTIONS, AIDS, AND TEACHING DEVICES, OUTSIDE OF THE FIELD OF DRAWING ITSELF, ARE OFTEN HELPFUL TO THE LEARNER.

There is a fallacious thought current to the effect that the ability to draw is a talent. If one has this talent there is not much need of instruction. If one has not this talent instruction will avail little. Opposed to this contention is the belief that every normal person can learn to draw. A finding common to the studies of both Childs and McCarty is that the abilities of children to draw accord well with the normal curve.

Outside of the genetic period of drawing, it is certain that there exists effective suggestions and aids in the execution of drawings. Ayer found in his study that a preconceived purpose in drawing was invaluable in securing a desired result. He also found that an analytical study of the object to be drawn is an excellent aid. Sargent found that training in perceptual experience and drill in memory drawing are positive aids in learning to draw. McCarty, Eng, and Sargent found in their separate studies that seeing others draw and studying the drawings of others are powerful stimuli to draw.

In the teaching process and in the learning process, drawing has been pointed out as a powerful pedagogic aid. It is an invaluable tool in the schoolroom. Oftentimes the use to which it is put as a pedagogic aid supplies the motive for learning to draw. Motive, interest, understanding, and utility are often necessary in the process of learning to draw. These may serve as either stimuli or objectives and may be outside the field of drawing itself. In such cases drawing is a means to an end, and the interest in drawing is in its service in attaining the end.

THE PROCESS OF DRAWING DOES NOT NECESSARILY COMPEL EFFECTIVE OBSERVATION.

The foregoing finding is contrary to a superficial consideration of the relation between the act of drawing and the act of observation. It is often presumed that if one draws an object, the very act of drawing will compel close observation which in turn will result in a clearer understanding and in strong memory retention. This is a plausible conclusion. Nevertheless, it is not dependable. One may draw an object passively and secure a fairly good outline likeness, and yet be modified very little intellectually. Ayer tested this point out carefully in the laboratory and found no correlation between representative drawing and later ability to describe. He also found no correlation between representative drawing and later memory retention.

Thorndike was probably sensing this fact when he warned against teaching drawing to children without motivation. Sargent was probably sensing this fact when he advocated teaching devices to bolster up more effective learning. Sargent discovered in his laboratory that, when he conducted a discussion related to the object to be drawn previous to the lesson, the perceptual power of the children was much keener, resulting in better drawing, and in turn resulting in stronger memory retention.

The truth seems to be that in learning to draw, as in learning in general, motive and purpose are very essential. Reflective thinking and analytical thinking are very essential to the learning process. The point being discussed here is very important as a point of equipment which the teacher of science should possess. Drawing is very essential to laboratory instruction. Much drawing executed by students in the laboratory is worthless educationally. Representative drawing is ineffective. Drawing in the laboratory to be highly desirable must be specific, must have a purpose, must be preceded by analytical thinking, and must be accompanied by reflective thinking.

A purview of science teaching in general would indicate that science teachers are not cognizant of drawing values. Teacher training institutions do not seem to recognize this point. The fact, however, that a book written by Mueller, has recently appeared on the market giving instruction in laboratory drawing is a formal recognition of need for such instruction.

THE INFLUENCE OF THE EDUCATIONAL PHILOSOPHY OF PESTALOZZI UPON DRAWING AS A SUBJECT OF STUDY IN THE PUBLIC SCHOOLS OF THE UNITED STATES WAS TREMENDOUS.

A thorough history of education in the United States has not yet been written. No history of education that has come under observation in this study has even hinted at the large part Pestalozzianism played in the evolution of the graphic arts in the United States. Yet the evidence at hand points to the conclusion that drawing as a subject of study came to the United States with the advent of a Pestalozzian school in 1809, which school was taught by Neef, a disciple of Pestalozzi. Following the trend of events, it is evident that the influence of Pestalozzian thought persisted and even dominated at times. The New Harmony experiment was thoroughly influenced by it. Fowle's textbook on drawing was not uninfluenced. Alcott's school was thoroughly influenced. Miss Peabody taught in Alcott's school and, therefore, came in direct touch with Pestalozzian methods. The schools of Cincinnati were affected in point of drawing as a subject of study by the report of Calvin E. Stowe to the State Legislature of Ohio. Stowe's report was charged well with the spirit of Pestalozzi. The Oswego Movement was dominated by Pestalozzianism. The series of books published by the Prang Educational Company and designed to meet the needs of public school art instruction were far from being free from the persistent influence of the Pestalozzian method of teaching drawing. It cannot be said with assurance even today that the Pestalozzian influence related to the teaching of drawing has entirely disappeared from the schools.

THE THEORY OF PESTALOZZI CONCERNING THE TEACHING OF DRAWING AS A SUBJECT OF STUDY IS ERRONEOUS IN THE LIGHT OF PRESENT-DAY THOUGHT.

Pestalozzi was eminently correct in the general trend of his thinking concerning the place of drawing in education. In so far as he saw drawing as essential to child development, as closely related to a study of form, as helpful to sense perception, and as an aid to effective learning, his thinking could be easily justified.

It was in the application of his theory that Pestalozzi erred. Pestalozzi had read the writings of Rousseau, by whom he was probably influenced. Rousseau was a naturalist in education. He advocated going to nature for a knowledge of the laws of nature, which he believed would guide safely in the process of education. Pestalozzi was caught up with this procedure in reasoning also. He sought a rigid method of consecutive steps based on natural laws, which if followed, would lead to the educational end that the act of drawing should properly attain.

Pestalozzi started with the straight line, which he would have studied by itself. Straight lines would be made into angles, and angles into squares. He regarded the four-sided figure as the simplest form, the fundamental form. Differing from Pestalozzi's view, Herbart regarded the triangle as the fundamental form, whereas Froebel considered the circle as the fundamental form. If there is a fundamental form in drawing, it is the circle because children in their initial attempts to draw, draw curved lines.

The operation of Pestalozzi's method violated the laws of child nature instead of obeying them. In the first place children do not draw straight lines at the outset. The things that they desire to draw for the most part are made up of curved lines. Children draw things that they like. Research studies have made it reasonably certain that children draw from memory even when the object they draw is present. Geometric figures are rather abstract. Hence, the laws of nature are probably distorted when children are forced to draw straight lines and geometric figures. Primary teachers of the present-day do not advocate a rigid, consecutive series of steps in teaching children to draw.

THERE ARE A NUMBER OF QUESTIONS RELATED TO DRAWING THAT DEMAND MORE ADEQUATE ANSWERS THAN HAVE THUS FAR BEEN SUPPLIED.

The question of automatism as affecting the drawing behavior of children is extremely important. Children who draw a great deal during the genetic period of drawing develop in themselves a form of automatism; that is, they become habituated to making certain kinds and types of drawings. The tendency with young children is to repeat the making of the drawings they have already learned. Repetition causes the making of the drawings to become automatic. Now is this condition of automatism a basis for further enriched learning to draw, or is it a deadening force that has a tendency to terminate further desire to draw?

Closely associated with the above question is the tendency of children to lose interest in drawing behavior at the end of the genetic period, or very roughly speaking during the ninth year of age. Now is this disposition to cease the drawing behavior the result of automatism or is it the result of some other condition? If there is another cause, what is it? How may children be carried over this doubtful period, preserving some of their earlier desire to draw?

There are a number of questions scattered throughout the study, not closely related, but whose solution may have a significant bearing upon the possibility of a better understanding of the nature of drawing as a subject of study. A few of them are as follows: Why do children draw from memory? How can the act of drawing be made to arouse emotions which in turn will result in the development of aesthetic appreciation? Should any attempt be made to correct children on points of proportion and synthesis during the genetic period of drawing behavior? Can the teaching of drawing for drawing's sake be justified?

THE HUMAN DISPOSITION TO DRAW APPROACHES UNIVERSALITY IN POINT OF GEOGRAPHY AND IN POINT OF TIME.

Prehistoric man drew; present-day primitive man draws. The cave dwellers drew; the American Indian drew. The Egyptians drew; the Greeks drew; the Romans drew. Research studies have proved that young children brought up in a civilized society go through a well-defined period of drawing behavior.

THE DRAWING BEHAVIOR OF CHILDREN IS IN PART A NATURAL INHERITANCE AND IN GREATER PART A SOCIAL INHERITANCE.

During the genetic period of drawing, children draw impulsively. They pass through fixed stages; research studies have proved this beyond question. In passing from the genetic period to the conventional period there is found a vast amount of knowledge concerning drawing that society has accumulated through the ages. Knowledge concerning kinds of drawing and skills in drawing, constitute the social inheritance. This latter field of human knowledge is too vast to be entirely mastered by the average individual.

IN THE LIGHT OF PRESENT-DAY CURRICULUM BUILDING, DRAWING AS A FINE ART AND THAT ALONE, CANNOT BE JUSTIFIED.

The present wide-spread disposition to modify the curriculum is for the purpose of making the curriculum more responsive to social needs. Drawing may be used as a fine art, but that is only one of its vital services. Drawing should serve society to a point approaching its maximum application. Every administrator should see drawing in its varied applications to social needs.

IN SOLVING EDUCATIONAL PROBLEMS RELATED TO DRAWING, THE EDUCATOR MUST SEEK AID FROM THE FIELD OF INDIVIDUAL PSYCHOLOGY AND ALSO FROM THE FIELD OF SOCIAL PSYCHOLOGY.

Knowledge of skill, muscular reactions, perception, insight, and emotion must come from a study of individual psychology. The kind of drawing society needs, the kind of drawing society appreciates, the kind of drawing society will support must come from a study of social psychology. In Grecian society a high social evaluation was placed on all the arts, and as a result the arts thrived. In our own present-day society not so high an evaluation is placed on the production of art, and as a result there is a corresponding retardation of products of fine art.

WITH THE DATA OFFERED IN THIS STUDY A TRAINED SUPERINTENDENT OF SCHOOLS SHOULD BE ENABLED TO FORMULATE A GENERAL EDUCATIONAL PROCEDURE BASED ON A LARGE AMOUNT OF RELIABLE INFORMATION CONCERNING DRAWING AS A SUBJECT OF STUDY.

A school superintendent could well start at the base of his school system and build up, recognizing the laws of child nature, the laws of adolescence, and the demands of the social structure. The problem at the outset would naturally be in connection with the genetic period of drawing behavior, which roughly speaking, embraces the preschool age and the primary age. It is a period often entirely ignored. In fact not a great deal is known concerning the application of formal education to it. Since it is largely the result of impulse, and since it is the basis of a very useful art, it would be well to encourage it by making materials available, and by spurring it on with the stimulus of imitation. In short, it would be well to let it run its natural course. In the early stages the results are meaningless; they are the product of random movements. It is known that a large number of random movements during the period of infancy are productive of great human possibilities later. It is offered then that random movements at the base of the graphic arts be given reasonable freedom at the time designated by nature, thus building neural pathways in the nervous system for future use. In the lower grades motor satisfaction will serve as a powerful motive for drawing behavior; but it should not be depended upon entirely. Another motive of proved worth is correlation. There is no subject taught to little children that cannot be correlated with their drawing behavior.

On the junior high school level there are at least two reliable determinants for adjusting the subject of drawing to the pupils. One is the concept of individual differences; the other is a knowledge of local social structure. Inasmuch as this is a finding period, the several applications of drawing to social needs should be incorporated in the curriculum. On the senior high school level there is need for provision for special talent and for occupational and professional future possibilities.

In all this consideration there is a strong likelihood of the administrator's neglecting two vital points: one on the side of the pupil, the other on the side of the teacher. On the side of the pupil, there is danger of drawing's functioning only during the class drawing period. There is a possibility of its not being carried as an aid to other subjects and to his school life in general. In such a case it will fall far short of contributing its maximum possibility. On the side of the teacher, there is danger of neglecting drawing as a pedagogic aid in class instruction. Teacher training institutions are probably negligent on this point; but if this shortcoming could be brought forcibly to the minds of administrators, correction on this point would be in progress.

OUT OF THE SEVERAL PHILOSOPHIES SUPPORTING THE TEACHING OF DRAWING IN THE UNITED STATES, AND TAKEN FROM A CENTURY OF EXPERIENCE, MAY BE INTEGRATED A SOUND AND FUNDAMENTAL PHILOSOPHY.

Drawing as a subject of study has been under discussion for more than two thousand years. Aristotle has been quoted in this study concerning its relation to education. It would seem that the place of drawing in education should be more firmly fixed than it is. The great educators of the sixteenth, seventeenth, and eighteenth centuries took sharp cognizance of drawing as a significant factor in education. Despite Puritanic opposition, prominent leaders of the colonial period in America pointed out the need of teaching children to draw.

Early in the existence of the United States as a nation, efforts were made to teach drawing in private schools. The early efforts were experimental and were sponsored by individuals or by small groups of people.

There was no wide-spread demand for such instruction. Neef's effort in 1809, Fowle's effort in 1821, and Alcott's effort in 1834 were isolated, individual attempts to teach drawing to children.

Sentiment, however, for the teaching of drawing grew slowly until 1860, when the state of Massachusetts legalized its teaching. Sentiment heavily charged with an industrial philosophy continued to widen until 1870, at which time the state of Massachusetts made the teaching of drawing under certain conditions compulsory. The decade preceding the passage of the law of 1870 was one of fervor and enthusiastic discussion. The law of 1870 was experimental, too, but it was in the form of a state-wide movement. The experiments mentioned above were local in application.

Another anchor-date of importance was the year 1876, during a part of which the Centennial Exposition was held at Philadelphia. Out of this event came impetus for engineering education, vocational education, and manual training. The kind of drawing coming to the public schools out of this event was mechanical drawing. Evidently the industrial philosophy incorporated in the law of 1870 was persisting. The two decades following the Centennial Exposition were decades of heated, contentious educational discussion. The dominant question under consideration was practical education versus traditional education.

Seventeen years after the close of the Centennial Exposition, the Great World's Fair took place at Chicago. Trends were scrutinized again. Evidence pointed to a decrease in emphasis upon industrial drawing and to an increase in emphasis upon the fine arts. By 1900 "Art for art's sake" seemed to have been a slogan in education. Apparently this slogan did not bear great fruit, for at the St. Louis Fair in 1904 there was in operation a movement which aimed at the integration of the fine arts and the crafts. The reasoning underlying this movement was that the practical arts and the fine arts in education were more likely to thrive hand in hand.

With the coming of the junior high school came the industrial arts. The theory underlying the teaching of the industrial arts in the junior high school is that the curriculum in this institution should offer a large number of arts for the purpose of meeting the demands of the concept of individual differences. By 1920 the junior high school was well established. Drawing played its part as one of the arts.

While much of the foregoing was taking place, the psychologists were conducting their research studies related to children's drawing. These studies resulted in the establishing of important facts concerning children's drawing. The added facts helped to build up a sounder educational philosophy of drawing.

All of the foregoing may be interpreted into a new and better educational philosophy of drawing for the future. Although at one time a certain theory supporting the teaching of drawing was emphasized, and at another time another theory was emphasized, a close study of the philosophies offered from time to time indicates that there existed not so much a clash between theories as a clash between the several groups of people representing the several theories. The theories themselves for the most part rest on firm ground.

The truth is that drawing as a form of human behavior serves legitimately a number of purposes in life. Further, the truth is that the art of drawing not only serves a number of legitimate purposes, but is indispensable at a number of points in modern life. Hence, a safe educational philosophy for the educator to follow in the future is embodied in the slogan, "drawing for human use," whether it be in the field of aesthetics, in the field of science, in the field of industry, in the field of invention, in the field of commerce, or in the field of pedagogy. As a sequence to this reasoning, it follows that this philosophy, to be functional, must embrace a procedure for collecting more and more facts related to drawing and the reactions of children to it. In addition to this, it may be said that drawing, common to all schools on the elementary level, should be determined largely by a knowledge of child nature. Types of drawing taught on the secondary level will vary and should be determined by the needs of adolescence, by the needs of special talent, and by the demands of the local social structure.

When the administrator of education secures an understanding of the educational philosophy described in the foregoing, he will then have a reliable procedure to guide him. Many details will have to be worked out, but much of this work may be assigned to his subordinates.

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A P P E N D I X

The University of Chicago

The Department of Education

February 5, 1937

Mr. Orville A. Tearney
332 St. Joseph Street
Baton Rouge, Louisiana

My dear Mr. Tearney:

I am glad to have your letter of January 30 and your questions concerning your research study, "The History of Linear Drawing in the Public Schools of the United States."

1. I am sure that the study as you have outlined it will make a distinctive contribution to literature of education.

2. So far as I know no publication covering the problem has appeared in print.

3. I believe that line drawing can be separated from the other arts and studied properly by itself. I have handled the subject in this way in the little art appreciation readers for the primary grades, Art Stories, Books I, II, and III, recently published by Scott, Foresman and Company of Chicago. Also, Walter Crane in Line and Form and Edmund J. Sullivan in his book, Line (Chapman and Hall, London), have followed this procedure.

4-5. The library of the University of Chicago in its several branches on the campus should serve as an excellent basis for material pertaining to the subject. In addition the Ryerson Library of the Art Institute of Chicago and of the Field Museum would constitute as good a source of material as you could find anywhere, with the possible exception to the various library facilities of New York City. I believe the possibilities are equally good in either city.

You will find some reference to the topic in my book, An Introduction to Art Education (D. Appleton-Century Company, New York), as follows: Contribution to the Documental Needs, p. 29; Drawing as a Means of Communication, pp. 36-37; General Educational Values, pp. 38-42; Types of Drawing and Line, pp. 84-86, 91-98, 106, 244, 246, 250-52, 263-64; and for a general bibliography of research studies in the field pp. 313-18 and 382-84 of the revised edition, 1937.

Trusting this information may be of some help in your problem, I am,

Very truly yours

W. G. Whitford

W. G. WHITFORD
Box 30
Graduate Education Bldg.

WGW:AF

THE OHIO STATE UNIVERSITY
GEORGE W. RIGHTMIRE, *President*
COLUMBUS

February 2, 1937

Mr. Orville A. Tearney
332 St. Joseph St.
Baton Rouge, Louisiana

My dear Mr. Tearney:

While I have not had the opportunity of making a thorough investigation of the material already published on the subject of the History and Psychology of Drawing, I believe you might make a real contribution to students of the subject.

So I answer your Question (1) with a hearty affirmative.

In reply to (2) I do not know of a similar study altho doubtless something of the sort could be found in a collection of books; i.e., Guptill's "Drawing with Pen and Ink," Pencil Points Publications;-French's "Mechanical Drawing and Lettering," Page-Shaw Publications; Van der Pool's "Life Drawing," etc.

(3) I believe line drawing is quite an important subject in itself to afford profitable study.

(4) I regret to say that our Ohio State University Library is far behind the times, much over crowded, and lacking the financial support to make it at all desirable for research work.

(5) If I were attempting to pursue such a subject, I should use the Avery Library of Columbia University; the Yale and Harvard Libraries, or possibly the Ricker Memorial Library of the University of Illinois. Of course, the Congressional Library at Washington might supply all your needs.

Wishing you the best of success in [illegible] undertaking, I am at your service

Sincerely,

THE MANUAL ARTS PRESS

C. A. BENNETT, Pres. W. T. BAWDEN, Vice-Pres. A. M. WOLGAMOTT, Secy. L. L. SIMPSON, Treas.

Publishers of the Industrial Education Magazine, the Home Economics News, and of Books on Manual Arts, Home Economics and Vocational Education

PEORIA, ILLINOIS

September 28, 1931

Professor Orville A. Tearney
Southeastern Missouri State Teachers College
Cape Girardeau, Missouri

My dear Professor Tearney:

Your letter of September 24 has been received and I am interested in what you say. I do not know that I can be of any particular assistance to you, but I am happy to offer the following suggestions which may or may not lead you to new material.

If you have discovered the footnote on Page 20 in my book, "History of Manual and Industrial Education up to 1870," you are already acquainted with the statement of Professor Longfellow in regard to the oldest architectural drawing in existence. At least, you are acquainted with his opinion in regard to the matter. But, we do know a few more facts concerning the use of architectural drawing by the Romans, not only in Italy but in other parts of the world. As you doubtless know, the Romans conquered the Etruscans and appropriated their engineering knowledge. Presumably they obtained the idea of using the round arc above ground from the Etruscans. Thus they obtained ideas of construction which they used later. Then, they conquered the Greeks and adopted the Greek ideals of beauty. The liberal policy of the Romans toward conquered peoples and their great organizing ability and genius for leadership enabled them to organize the conquered nations and build great monuments.

To carry on such great works of architecture and engineering, they could not provide enough trained master builders and sculptors from Italy. Consequently, there came a need for some means of recording the facts concerning architecture so that it could be transmitted to workmen in different parts of the Roman world and be carried out by workmen of comparatively inferior ability. So, as we are told by historians, some bright Roman must have developed the idea of working drawings from which buildings could be constructed. At least, so far as I have discovered, the Romans seemed to have been the ones to devise this scheme. I am not at all sure that they were the earliest to do this, but I have not traced that particular type of drawing any farther back.

Thus, the beautiful forms devised by the Greeks were reduced to paper by the use of the square and compass,and, as we say, degraded, because the Roman forms made with the compass were much less beautiful than the Greek forms which were done by the master sculptors. Instead of the beautiful echinus curve, the Roman draftsmen used the arc of the circle. By this device of a working drawing, great structures were built in Palestine, Asia Minor, Spain, and perhaps in Great Britain, as well as in Italy.

So far as I know , the most famous of the architects and engineers was Vitruvius, who wrote ten books entitled "De Architectura," dedicated to Augustus. Perhaps he was the first to make architectural drawings, but quite likely someone else may have preceded him. I am inclined to think that you would do well to look up the works of Vitruvius if you have not already done so. I believe that it is possible to find reproductions of some of Vitruvius work, but I do not know just where you would secure them.

I think you may be intersted in reading Professor Hamlin's Chapter VIII in "A History of Architecture." This is a very brief statement but may lead to other writings by Hamlin.

You will probably notice that, in my book, on Page 12, I have referred to the drawings made by Egyptian students at a very early time, and to the fact that they made some of these drawings on old manuscript. I obtained this statement from Amelia

Edwards' translation of Professor Maspero's "Manual of Egyptian Archaeology." You may find other books on Egyptian art which will give you information concerning the drawings made by the Egyptians. As you will see, I was looking for methods of teaching drawing, and that is why I was especially interested in the paragraph quoted.

I wish I could give you other references, but I do not believe that I can. My present belief is that the best direction for you to go in your researches is to follow back the art of building, which, of course, involves both engineering and architecture. I am of the opinion that the minor arts would not be as likely to make use of drawing in the way you have in mind as would the major art of building. You certainly have a very interesting subject to work on and I will be very happy to learn what results you are able to secure.

Yours very truly,

C. A. Bennett

CAB*ML

MUSEUM OF FINE ARTS
BOSTON, MASS.

September 4, 1935.

Professor Orville A. Tearney,
952 Convention St.,
Baton Rouge, La.

Dear Mr. Tearney:

You pay me too much of a compliment in assuming that I can answer your questions. I wrote only the Medieval part of Kimball and Edgell and I have been out of touch with the history of architecture for a long time now. Some of the questions I can answer, though perhaps vaguely.

1 - There is no information whatever concerning engineering drawing used by the Egyptians in erecting their pyramids. There is, however, rather vague evidence of engineering drawing used by them in connection with other buildings. Certainly they had them. My informant is Mr. Dows Dunham of the Egyptian Department here.

2 - I imagine this means the Egyptians were the first to use working drawings, although possibly the Assyrians may have used them as early. Even where evidence is not available I imagine that where there exist carefully planned and executed buildings on a large scale some sort of working drawings ~~may~~ be behind them. There are many inscriptions in Greece referring to monuments and how they should be made according to the scheme of the architect. This [illegible] must have been recorded in some way. In Rome there is a plan of the city in stone and certainly there must have been working drawings of buildings. [illegible] none has come down to us. The earliest that I can think of are those of the Middle Ages in such books as "The Album of Villard de Honnecourt". Byzantine miniatures, however, [illegible] of working drawings.

3 - I imagine the Egyptians [illegible] perspective because it did not [illegible] convention like any other [illegible] they appeal.

[illegible] - I should say that the first people to really use and [illegible] perspective correctly were the Italians of the 15th century. I am thinking especially of the Florentine Paolo Uccello and the Umbro-Florentine Piero della Francesca. By the time these men had finished their work there was no excuse for [illegible] a mistake in perspective.

[illegible] - I cannot think that I have heard of any objective studies on this matter although I [illegible] they must exist. I am sorry to be so vague.

[illegible] yours,

G. W. Elgell.

G. W. Elgell, Director.

[illegible]

5000 maggio 1937

R. SOPRINTENDENZA ALLE ANTICHITÀ
DELLA CAMPANIA E DEL MOLISE

DIREZIONE DEL MUSEO NAZIONALE DI NAPOLI
DEGLI SCAVI DI POMPEI E DI ERCOLANO

N.° 3384

Risposta al foglio del

Div. Sez. N

Napoli, addì 25 giugno 1937
(X V. A. E. F.)

Ill/mo
Sig. Orville A; Tearney
332 St. Ioseph Street
Baton Rouge
LOUISIANA
U. S. A.

OGGETTO - Strumenti di disegno. ----
Testimony of Genuineness of Instruments

In risposta alla sua del 27 maggio, le comunico che gli strumenti di disegno che si trovano nel nostro Museo provengono da Pompei e sono di epoca romana. Null'altro potrei aggiungere.

Con osservanza

IL SOPRINTENDENTE
Maiuri

Si prega trattare per ogni lettera un solo argomento e indicare nella risposta la data ed il numero della presente.

5000 sett. 1936

R. SOPRINTENDENZA ALLE ANTICHITÀ
DELLA CAMPANIA E DEL MOLISE

DIREZIONE DEL MUSEO NAZIONALE DI NAPOLI
E DEGLI SCAVI DI POMPEI E DI ERCOLANO

N° 2756

Napoli, addì 30 aprile 1937
(XV A. E. F.)

Signor Orville A. Tearney
532 St. Joseph Street
BATON ROUGE
U.S.A. (Lauisiana)

Risposta al foglio del 7/III/937

Div. Sez. N.

OGGETTO - Invio di fotografia. ----

Con raccomandata a parte viene spedita a V.S. una fotografia con strumenti da disegno.

Poichè la fotografia è stata espressamente eseguita, le spese ascendono, comprese le postali, a L. I5, che V.S. vorrà inviare all'Economo di questo Museo.

Con osservanza

IL SOPRINTENDENTE
Maiuri

Si prega trattare per ogni lettera un solo argomento e indicare nella risposta la data ed il numero della presente.

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Dr.Fu./Gr.

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Herrn Orville A. T e a r n e y ,

==============================

U. S. of America.

Jn Beantwortung Jhres geehrten Schreibens vom 12.v.Mts. erlauben wir uns Jhnen auf Jhre Fragen bezügl. der Geschichte der Zeicheninstrumente folgendes mitzuteilen:

1.) Von den ältesten Zeicheninstrumenten der Griechen und Römer finden sich Belegstücke im Museo Nazionale in Neapel. Wir empfehlen Jhnen sich wegen Beschaffung von Photographien direkt dort hin zu wenden,

2.) die ältesten Jnstrumente waren aus Eisen oder Bronce hergestellt,

3.) die Aegypter und Griechen benutzten zweifellos Zeicheninstrumente. Die Literatur hierüber finden Sie in Cantor, Geschichte der Mathematik, Band I und Blümer, Technologie Band II, 1879, Feldhaus, Technik der Vorzeit Leipzig und Berlin 1914,

4.) ausser in Deutschland wurden seit dem 16. Jahrhundert auch in Jtalien, Frankreich und England Zeicheninstrumente verfertigt, als Literatur hierüber Furttenbach, mechanischer Reissladen, Augsburg 1644, dann Leupold, Teatrum-machinarum, Band über Geometrie u.B.T. Gunther: Early Science of Oxford, historic Jnstruments for the Advancement of Science 1925.

Jndem wir gerne hoffen, Jhnen mit diesen Angaben gedient zu haben, zeichnen wir

mit vorzüglicher Hochachtung

Deutsches Museum

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456 Fourth Avenue

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CABLE ADDRESS: DELARUE
TELEPHONE: BOGARDUS 4 — 4089

July 7th, 1932.

Mr. Orville A. Tearney,
Cape Girardeau, Missouri.

Dear Sir:-

Messrs. George Schoenner of Nuernberg, Germany, have referred to me your letter of April 12th, with reference to the history of mechanical drawing instruments.

There is unfortunately apparently no reference book which would give complete data such as desired by you. Nevertheless, I am pleased to attach some information on the subject, which might help you in your study of the history of mechanical drawing instruments.

You will please note that the data as collected by the factory are in German. I would rather not undertake the translation at this end, for fear that in view of some of the items being technical I might pass on to you the incorrect information.

However, I am quite sure that your institution teaches the German language and one of your German instructors no doubt, will be in a position to make the proper translation.

If I can obtain any further data which might have a bearing on the subject, you can rest assured I shall be glad to pass it on to you.

Yours very truly,
L. H. Mueller
L. H. MUELLER.

LHM:VR
Encl.

L. H. Mueller continued

Zirkel.

Der einfache gradschenklige Zirkel und der hohlbeinige Tasterzirkel waren in Griechenland und Rom bekannt. (Blümmer, Technologie, Bd. 2, 1879 S. 232) Auch Teophilus erwähnt um 1100" Zirkel aus Eisen aus zwei Teilen zusammengesetzt grössere und kleinere, mit geraden und gekrümmten Schenkeln (Teophilus Buch 3 Kapitel 16.) in dem Code adl. von Leonardo da Vinci (Bl. 375 RA) findet sich unter verschiedenen Zirkeln ein Gelenk skizziert, das auf der einen Seite 3, auf der anderen 2 Gleitflächen hat; auf diese Weise wird dem Zirkel ein sehr fester Halt gegeben, sodass seine Schenkel nicht wackeln. Zirkel mit Kreisbogen an einem Schenkel, sodass man den anderen Schenkel an dem Kreisbogen feststellen kann, werden im 16. Jahrhundert häufig. Im Landauer'schen Porträtbuch werden mehrere Zirkelschmiede abgebildet: Bl. 66 r (von 1608), Bl. 95 (von 1625), Blatt 95v (von 1635 usw.) Einen Zirkel für Geheimschrift, gefertigt von Joachim Dauerlein 1633, besitzt der mathemat. phesik, Salon zu Dresden (No. 6). Diese Sammlung besitzt mehrere schöne Zirkel und Reisszeuge des 16. und 17. Jahrhunderts. Was alles zu einem Reisszeug gehört, zeigt Furttenbach in seinen " Mechanischen Reissladen" (Augsburg 1644) in einer Reihe genauer Kupferstiche.

Proportionalzirkel waren schon den Römern bekannt, doch konnte man mit einem solchen Zirkel nur in einem ein für alle Mal festgelegten Verhältnis übertragen. Ein gewöhnlicher Zirkel hatte nämlich seine beiden Schenkel über den Drehpunkt hinausverlängert. Die nach oben hin ragenden Schenkel standen nun in einem bestimmten Längenverhältnis zu den nach unten gehenden Schenkeln, mithin änderte sich der Abstand der beiden oberen Spitzen stets im Verhältnis zur Entfernung der beiden unteren Spitzen. Ums Jahr 1500 versuchte Leonardo da Vinci anscheinend zuerst den Proportionalzirkel für beliebige Verhältniszahlen durch Einsätze verstellbar oder verschiebbar zu machen (Code adl. Blatt [illegible] Ra, Abb. 349 und [illegible] Ra, Abbildung 348; Feldhaus, Leonardo, Jena 1913 Seite 11[illegible]). Eine gleiche Konstruktion, bestehend aus zwei genuteten an den [illegible] mit Spitzen versehenen Linealen, beschreibt Besson (Bl.2[illegible]. Übrigens war [illegible] verstellbare Proportionalzirkel schon vor dem Erscheinen der deutschen Besson-Ausgabe durch den deutschen Festungsbaumeister Daniel Speckle bei uns bekannt geworden (Speckle, Architectura, Strassburg i. E. 158[illegible]).

[illegible] Leonardo da Vinci skizziert einen solchen um 1493 [illegible] Blatt [illegible], dessen eine Spitze sich durch eine [illegible].

Zeichenfeder . (Ziehfeder odercReissfeder)/

Eine aus zwei nahe beieinanderliegenden Backen gebildete Feder, die Tusche oder Farbe aufnimmt, um damit Zeichnungen auszue fuhren. Man unterscheidet Ziehfedern mit festen und verstellbaren Backen. Die prmitivste Form ist am Schreibende aus Blech zusammengebogen und nicht etwa noch geschlitzt. Eine solche Feder besitzt das Römisch-germanische Zentralmuseum in Mainz. Diese Form scheint sich lange erhalten zu haben; denn auch das historische Museum zu Dresden weist solche starre Ziehfedern, wohl aus dem 16. Jahrhundret stammend auf. Eine andere bei den Römern gebrauchliche Art der Ziehfeder hat zwei Backen, die durch Einsägen des vollen Metalls entstanden sind, wie man dies an einem Stück aus einem Römergrab zu Frechen bei Koln erkennen kann. Am anderen Ende dieses Zeichengerätes sieht man einen Klemmhalter für Rötel. Sehr schön gearbeitet ist eine bronzene Ziehefder im Provinzialmuseum zu Bonn, deren Strichbreite durch einen verschiebbaren Ring regulierbar ist. Bemerkenswert ist bei allen antiken Ziehfedern, dass sehr breite Backenpaar. Auch Albrecht Dürer's Ziehfeder im Germanischen Nationalmuseum zu Nuernberg hat ein breites Maul und Verstellung durch Ringverschiebung. Man fand Sie nach Dürer's Tod hinter einer Wandverkleidung. (1528). An Zirkeln festsitzende Ziehfedern erwähnt Josef Furttenback 1644 in seinem Buch "Mechanische Reissladen" (Augsburg 1644). Die Schlitzbreite ist nicht verstellbar. Schrauben zur Verstellung der Schlitzbreite sind im Jahre 1569 in einem deutschen Zeichenetui vorhanden, das sich im Kunstgewerbemuseum zu Berlin (No. K 4690) befindet. 1872 erfand E. Laguin in Paris eine Ziehfeder, deren Backen sich allmählich so verstellen, dass der Strich dünner oder dicker wird. Eine Ziehfeder, die verschiedene Arten von punktierten Linien ziehen kann, erfand der Uhrmacher E. C. Richter in Chimmitz. Man setzt bei ihr kleine verschieden gezahnte Räder ein, so dass die Ziehfeder in regelmässigen Abstanden vom Papier aufgehoben wird (preuss. Patent vom 11.12.1874).

STIFTSBIBLIOTHEK ST. GALLEN

ST. GALLEN, DEN 21. Septl 1935.

Herrn Orville A. Tearney,

952 Convention Street, Baton Rouge, Louisiana.

Sehr geehrter Herr !

Ihr Schreiben vom 27. August, adressiert an die Benediktiner Abtei St. Gallen, ist unserm hochwürdigsten Bischofe zugestellt worden. Die Abtei St. Gallen ist leider 1805 schon aufgehoben worden. Unser hochwürdigste Bischof hat Ihr Schreiben zur Beantwortung an die Stiftsbibliothek weitergeleitet, da der von Ihnen erwähnte Plan sich als kostbares Stück auf der Stiftsbibliothek befindet.

Ihre Information ,dass der Plan aus dem Jahre 820 stamme, ist richtig. Im Jahre 830 hat der St. Galler Abt Gozbert nach diesem Plane die grosse Kirche schon erbaut und 830 einweihen lassen.

Der Plan selbst ist zu gross, als dass man ihn auf Postkartenformat verkleinern könnte. Ich lasse Ihnen als Drucksache eine Photographie des Planes zugehen. Vielleicht darf ich Sie ersuchen, als Entgelt für den Plan meiner Schwester, welche Philatelistin ist, einige gebrauchte bessere Briefmarken Ihres Landes zuzusenden.

In vorzüglicher Hochachtung

CLEMENS RIEFLER
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München Nr. 250

Nesselwang, ~~München C 2,~~ den 28. April 1932.
Lenbachplatz 1

MAY 11

Mr. Orville A. Tearney,

Em/Sch

Wir danken Ihnen für Ihre Anfrage vom 12.ds. und gestatten uns, hiezu folgendes zu bemerken:

Leider ist in der gesamten vorhandenen Literatur über die Entstehung und Entwicklung von Zeicheninstrumenten nicht viel zu finden, insbesondere sind Abbildungen über alte Zeicheninstrumente ganz vereinzelt und dürften nur in ganz beschränkter Anzahl in Museen zu finden sein. Man ist daher hinsichtlich Zeit und Ort der Entstehung solcher Instrumente vielfach auf Vermutungen angewiesen.

Die Anzahl der bekannten Zeicheninstrumente war in alter Zeit sehr gering. Ausser Winkel, Lineal, Bogenmesser war das wichtigste Instrument der Zirkel, dessen Erfindung in die Vorgeschichtliche Zeit zurückreichen dürfte. Dieses beweist schon die Errichtung von vorgeschichtlichen Baudenkmälern, die ohne Verwendung von Zirkeln nicht hätten entstehen können. Nach einer Sage soll der Erfinder des Zirkels Perdix, ein Neffe des Griechen Dädalus, sein. Über die von den bekannten alten Mathematikern benützten Zirkel ist leider in der Literatur nichts erwähnt, so dass man auf die Konstruktion dieser Instrumente keine Schlüsse ziehen kann. Als Material dürfte Eisen oder Bronce Verwendung gefunden haben.

Genaueres über Zeicheninstrumente ist erst um die Mitte des 15. Jahrhunderts bekannt geworden. Ein Muster eines damals

Clemens Riefler, Nesselwang

Blatt 2

gefertigten Zirkels ist im Germanischen Museum in Nürnberg, zu sehen. Es handelt sich um einen einfachen eisernen Zirkel, bei welchem der Zirkelkopf (Drehgelenk) genietet war. Solche Zirkel wurden geschmiedet und wurden hauptsächlich in Nürnberg von den sogenannten "Zirkelschmieden" , die zu einer Gilde zusammengeschlossen waren, hergestellt. Seit dem 16. Jahrhundert wurde zur Zirkelherstellung auch Messingguss verwendet. Es ist aber möglich, dass solche Messingzirkel schon um die Hälfte des 15. Jahrhunderts zurückreichen. Erst im 18. Jahrhundert mussten die Eisenzirkel den Messingzirkeln den Platz räumen.

Auch das zweite wichtigste Zeichengerät, die Reissfeder, lässt sich etwa bis zum Jahre 1500 zurückverfolgen. Wer sie erfunden hat, ist nicht bekannt. Ein Muster, und zwar eine von Albrecht Dürer selbst gebrauchte Reissfeder, ist ebenfalls im Germanischen Museum in Nürnberg aufbewahrt.

Über die Herstellungsländer wäre zu sagen, dass Zirkel damals auch ausserhalb Deutschlands angefertigt wurden, da von einem Export in derartigen Artikeln im Mittelalter wohl nicht die Rede sein konnte.

Erst als sich im 18. und 19. Jahrhundert mit der fortschreitenden Entwicklung der Technik das Bedürfnis nach verbesserten Zeichengeräten bemerkbar machte, befasste man sich in einzelnen Ländern mit der Herstellung solcher Geräte. In erster Linie war es Deutschland, sowie die Schweiz und England. Allmählich bildete sich eine hochentwickelte Industrie heraus unter Deutschlands Führung, das bis vor dem Krieg fast die ganze Welt mit seinen Zeicheninstrumenten belieferte.

In knappen Worten haben wir Ihre Fragen nach Möglichkeit beantwortet, aber leider konnten wir gerade über die alten Zeicheninstrumente wenig berichten.

Hochachtungsvoll

Summary of Report of the Committee on Art in Missouri High Schools

1927

Aims of the survey.

1. To ascertain the facts in regard to art in Missouri high schools.
2. To ascertain the attitude of superintendents toward high school art.
3. To study the needs of Missouri for art in the high schools.
4. To make suggestions for meeting those needs.

Scope of the survey.

The entire state except St. Joseph, Kansas City and St. Louis.

Sources of data.

1. Questionnaires to all city and county superintendents, and all art teachers in high schools.
2. Publications of the State Department of Education.
3. Catalogues and letters from University of Missouri and all State Teachers Colleges.

Facts ascertained.

1. The number of schools having art.

   8% of the first class high schools have art.

   1% of the second and third class and unclassified high schools have art.

   5% of all high schools have art.

   100% of the high schools of St. Joseph, Kansas City and St. Louis have art.

2. Art compared with other subjects.

   Agriculture is taught in 64% of all high schools; commercial subjects in 20%; domestic art in 21%; music in 20%; manual training in 9%; and art in only 5%.

3. The number of children who have an opportunity to take art in the high school is very limited.
4. The present course of study is inadequate.
5. Reasons why art is not taught in Missouri high schools were given as follows: Lack of funds by 102 superintendents; lack of trained teachers by 83; lack of appreciation, interest, or demand, by 36; lack of room, facilities, or equipment, by 31; lack of time or of place in the curriculum, by 29.

Attitudes ascertained.

Of 313 superintendents answering the questionnaire 12 were opposed to having art in the high schools and 220 were in *favor of it*. There were 18 times as many superintendents favoring art as there were opposing it.

Reasons why Missouri high school children need art, as given by superintendents.

1. For appreciation of beauty in nature and man made surroundings.
2. For culture; to enrich and broaden the individual.
3. For practical applications in school, home, and vocations.
4. For finer citizenship.
5. For worthy use of leisure time.
6. For opportunities to develop special talent.

Recommendations of the committee to the Assembly of Delegates.

1. That they authorize this committee to continue its study in the high school field, and to broaden the scope of its investigation to include elementary schools and institutions engaged in the training of teachers.
2. That they consider ways and means of having a new course of study in art written.
3. That they urge the proper authorities to make art an elective in all first class high schools, after sufficient time has elapsed to do this without injustice to those teaching in such schools.
4. That they urge the proper authorities to form some central agency for the encouragement of art education in the State.

The Committee

JEAN KIMBER, Chairman, Harris Teachers College, St Louis,

D. D. WEISEL, State Teachers College, Springfield.

O. S. DE LUCE, State Teachers College, Maryville.

H. M. KURTZWORTH, Art Institute, Kansas City.

MRS. MARGARET SQUIRES, State Department, Jefferson City.

I

Internationales Institut für das Studium der Jugendzeichnung.

Sitz: Pestalozzianum Zürich.
Switzerland

Zürich, den 23. Juli 1937.

Herrn Orville A. Tearney,
330 St. Joseph Street,
Baton Rouge. U.S.A.

Sehr geehrter Herr,

In Beantwortung Ihrer Anfrage vom 17. Juni, die mir das Eidg. Departement des Innern zugesandt hat, teile ich Ihnen mit: Der Zeichenunterricht in der Schweiz wird nicht nach einheitlichen Grundsätzen erteilt. Gründe:

1. Es fehlt eine eidgenössische Ausbildungsgelegenheit für Zeichenlehrer.
2. Jeder schweizerische Kanton ist in Erziehungsfragen autonom, besitzt also ein eigenes Schulgesetz, was von der geschichtlichen Entwicklung, der Viersprachigkeit und den verschiedenen Konfessionen herrührt. Es gibt demnach in der Schweiz 25 verschiedene Lehrpläne für den Zeichenunterricht, die jedoch zum grössten Teil veraltet sind; neu revidiert sind in den letzten Jahren einzig die von Basel-Stadt, Aargau und Luzern.
3. In einigen Kantonen wird der Zeichenunterricht nach bestimmten Stoffprogrammen erteilt, worüber Inspektoren wachen; in den meisten Schulen der Schweiz aber besitzt der Lehrer die Freiheit, initiativ vorzugehen, Stoff und Methoden gegebenen Verhältnissen anzupassen.

Drei verschiedene Arten des Zeichenunterrichts lassen sich heute in der Schweiz unterscheiden:

1. Das Abzeichnen nach Vorlagen,
2. Das Abzeichnen von Naturgegenständen. Auf der Elementarschulstufe werden Grundformen (Kreis, Ellipse, Quadrat usw.) eingeübt und daraus gegenständliche Formen abgeleitet. (Apfel, Ball, Uhr, usw.). Als Zusatzmotive treten gelegent-

lich die menschliche Figur und [illegible] Zeichen [illegible].

Auf der Oberstufe beansprucht [illegible] matische Seite des Zeichnens sehr viel Zeit. [illegible] und [illegible] n-konstruktionen werden geübt. Der Schüler blockiert, visiert, misst. Vom Typus, der Grundform, [illegible] allmählich zur Einzelform vor. Die Zeichnung [illegible] ist mit einer möglichst gleich [illegible] Kontur [illegible].

Das Ge [illegible] streng [illegible] Ge-genst [illegible] Art [illegible] Nr. 3. Das Zeichnen aus der [illegible].

Der moderne Zeichenunterricht [illegible] nicht nur analytisch, sondern synthetisch vor. Auf der Kleinform, der Einzelheit aufbauend, führt er durch rh [illegible] von Ein-zelformen allmählich zum Erfassen [illegible] der Zusammenhänge und zur Gesamtform. Die [illegible] Linie als graphischer Ausdruck rhythmischen Erlebens [illegible] durch die kalligraphischen Kontur [illegible]. Der moderne Zeichen-unterricht geht grundsätzlich nicht mehr vom naturwissen-schaftlichen, sondern vom biologischen, künstlerischen und psychologischen Gesichtspunkt aus. Durch Selbstbestätigung erlebt der Schüler die Vorstufen künstlerischen Erlebens. Indem so der Zeichenunterricht die schöpferischen Kräfte löst und die Eigenart des Schülers achtet und fördert, stimmt er auch mit den Grundsätzen der schweiz. Staatsauffassung überein.

Führend in der Entwicklung des modernen Zeichenunterrichts ist das Internat. Institut für das Studium der Jugendzeichnung, angegliedert an das Pestalozzianum Zürich, das durch seine Zeichenkurse viele Hunderte von Lehrern in das neue Zeichnen eingeführt, ferner durch Ausstellungen in Kapstadt, Johannesburg, Paris, London, New York (Teilausstellung in Rockefeller Centre, eröffnet durch Frau Präsident Roosevelt), Den Haag, Brüssel, Lille und Lyon die Gedanken des neuen Zeichnens verbreitet hat. Zu weitern Auskünften steht Ihnen unser Institut gerne bereit.

Mit vorzüglicher Hochachtung
sig. Jakob Weidmann

Switzerland

EIDGENOSSISCHES DEPARTEMENT DES INNERN
DÉPARTEMENT FÉDÉRAL DE L'INTÉRIEUR
DIPARTIMENTO FEDERALE DELL'INTERNO

:.4.22.-Rg/Sch.

Berne, le 10 août 1937.

Monsieur Orville A. Tearney,
Louisiana State University
332, St. Joseph Street
Baton Rouge.
Louisiana (U.S.A.)

Monsieur,

Par lettre du 17 juin 1937, vous nous avez demandé de vous fournir certains renseignements concernant l'enseignement du dessin dans les écoles primaires et secondaires de notre pays.

L'instruction publique étant en Suisse du ressort, non de l'autorité centrale fédérale, mais des cantons, nous avons, plutôt que de procéder à une enquête auprès des départements de l'instruction publique des différents cantons, ce qui aurait demandé un temps assez long, invité l'Institut international pour l'enseignement du dessin, qui a son siège au musée scolaire (Pestalozzianum) de Zurich, de nous fournir les éléments d'une réponse.

Nous avons l'honneur de vous remettre en annexe une copie du rapport que ledit institut vient de nous adresser à votre intention.

Au cas où vous désireriez des renseignements complémentaires à ce sujet, vous voudrez bien vous adresser directement à M. Weidmann, directeur de l'institut précité, à Zurich.

Veuillez agréer, Monsieur, l'assurance de notre considération distinguée.

p. o. Département fédéral de l'Intérieur

Annexe mentionnée.

EXAMINATION AND THESIS REPORT

Candidate: O. A. [illegible]rney

Major Field: Education

Title of Thesis: The Evolution of Linear Drawing as a Subject of Study

Approved:

Date: May 9, 1938

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Major Professor and Chairman

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Dean of the Graduate School

EXAMINING COMMITTEE:

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