THE APPLICATION OF JOHN DEWEY'S PHILOSOPHY TO INDUSTRIAL ARTS TEACHER EDUCATION

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THE APPLICATION OF JOHN DEWEY'S PHILOSOPHY TO INDUSTRIAL ARTS TEACHER EDUCATION

BY

RONALD JAMES BAIRD

A THESIS

Submitted to the School for Advanced Graduate Studies of
Michigan State University of Agriculture and
Applied Science in partial fulfillment of
the requirements for the degree of

DOCTOR OF EDUCATION

Department of Teacher Education

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AN ABSTRACT

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Approved ____________________

Ronald James Baird

The emphasis upon traditional methods and organization of industrial arts teacher education programs is quite prevalent. There has been little progress made in the development of consistent, progressive, philosophical viewpoints concerning these programs. The purpose of this study, therefore, is to analyze one of the prominant American philosophies, experimentalism, and provide a program for industrial arts teacher preparation based upon such an analysis. The study identifies three areas of concern, namely, objectives, curriculum, and methodology to which the experimentalist viewpoint is directed.

The philosophy of experimentalism, as exemplified by John Dewey, rests in the experiences of man as he reacts in his social and physical environment. Interaction of an intellectual nature through inquiry induces learning. Inquiry into meaningful problems, drawn from the student's experiences, provokes intellectual action for satisfactory consequences. Intelligence, thinking, and knowledge are the components of this complete act of thought. It is the purpose of the instructor to provide learning activities that grow out of the student's experience which require intellectual investigation and application for solution. In the industrial arts teacher education laboratory, students should have the opportunity to experiment with ideas relating tools, materials, and processes as well as techniques of teaching.

The objectives of the experimentalist's program for industrial arts teacher education should grow out of the social and industrial needs of man. They would be unique only to the profession of teaching

and would emphasize the values of democracy, scientific methodology, social efficiency, and the place and needs of man in our industrial society.

The industrial arts teacher education curriculum should reflect man's needs in his social environment. The emphasis of subject matter should be on activities involving materials rather than on materials as such. Material subject matter should be unified to represent materials man works with in satisfying his goals. The curriculum should be structured to bring into play the various methods with which the experimentalist is deeply concerned. The curriculum should induce activities of problem solving, experimentation, investigation, critical thinking, and extensive planning, research, and creativity. The materials of our industrial society should be used and studied in terms of these activities.

The industrial arts teacher education program should be challenged to prepare teachers who have an experimental attitude toward education, who can apply the method of science to all areas of study, and who view education as a series of experiences which influence and lead into future experiences. Learning activities must provide the prospective industrial arts teacher with an ability to consistently evaluate his students in terms of experiences to meet their needs, both those of society and of the individual.

The instructor in the program is not an external authority. He is a leader of learning activities. He must be a practical, up-to-date individual who is continually searching for new methods and proces.

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processes that better his teaching. He believes in his experimentalistic philosophy and is faithful to study and practice what he avowedly feels is the best education for his students.

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CHAPTER I

INTRODUCTION

Industrial arts teacher education programs have made very little progress down through the years in terms of philosophical advancement and a consistent approach to organizational development. Teacher education in industrial arts has mainly been concerned with manipulative skills and the dissemination of information from teacher to student. Little change has taken place since programs of this nature were established. "It would appear that a direct parallel can be drawn between shopwork instruction at the turn of the century, and industrial arts instruction (in the public schools as well as in teacher education) in mid-twentieth century. It would seem that very little over-all progress has been made."[1]

The Problem and Its Implications

It is the purpose of this study to develop a consistent philosophical approach to a program of industrial arts teacher education based upon the beliefs and theories of John Dewey. As such, the study is concerned with the broad areas of objectives, curriculum, and methodology as they can appropriately be conceived through Dewey's

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[1] Robert L. Thompson, Problems and Issues in Industrial Arts Teacher Education American Council on Industrial Arts Teacher Education, Sixth Yearbook, (Bloomington, Illinois: McKnight and McKnight Publishing Company, 1956), p. 106.

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philosophy. The study is limited to industrial arts programs in teacher preparation at the college level. In other words, the problem is one of philosophical interpretation and application dealing with the present concept of industrial arts as it pertains to teacher preparation in this area.

The author developed a particular interest in this study in trying to bring together his ideas and understandings of educational philosophy and industrial arts teacher education. There appeared to be little consistent relationship. Further, through a study of Dewey's works, it became apparent that much discussion concerning the practice of his views was distorted. The challenge to attempt an interpretation and application of Dewey's philosophy to the author's own area of interest was at hand.

The author first found this interest in the problem while teaching industrial arts in the public school. In faculty discussions of objectives and curriculum, the place of industrial arts to the total program of the school was not clear. The author was limited in his understandings of philosophical foundations upon which to base his beliefs in these areas. Further teaching at the college level and graduate study still did not provide enough direction. The author welcomed the opportunity, during advanced graduate study, to pursue work in the field of educational philosophy while also teaching laboratory courses. It was here that the problem grew to reality. While working on the study, the author was also able to involve many of the concepts developed into his own teaching organization and methods which provided f

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provided further belief in the values of the study. Discussions with faculty members proved there was much in Dewey's writings which would broaden and emphasize the place of industrial arts in our educational programs. Finally, the author intends to devote his career to the field of industrial arts teacher education. The interest developed through the course of this study has caused inspiration for more consistent and effective teaching.

The Need and Importance of the Study

Our educational programs, in many respects, do not keep up with the advancement and change of our society. This fact is generally accepted as an understatement. In the area of philosophical change, the lag is even more noticeable. Our society is advancing at such a rate that many of the principles, methods, and beliefs held by educators are outmoded and inadequate to meet the needs of the individual in his modern environment. The authors of the Minnesota Plan illustrate the need for advancement in educational theory and practice when they state:

> Schools are a reflection of the society they serve. While here and there we see educators and educational institutions exercising leadership, the typical picture shows education lurching along in the ruts of practices twenty to forty years behind changing theories. As long as general education did not come along too fast, educators were not too uncomfortable. But our generation has entered an era of unprecedented explosiveness.
>
> ... we have an explosion of knowledge and population, a burst of technological and economic advance, an outbreak of ideological conflict, an uprooting of political and cultural patterns on a world wide scale. In this setting, what are some facts and assumptions which might guide our probing into the future?[2]

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[2]William J. Micheels and Wesley S. Sommers, The Minnesota Plan for Industrial Arts Teacher Education (Bloomington, Illinois: McKnight and McKnight Company, 1958), p. 16.

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[3]Kennet
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[4]John D
Company, 195

The foregoing statement illustrates the need for change and advancement in our educational policies and presents the question of what is to be done to bring about a better educational program. Speaking of the industrial arts teacher education program in this respect Perry says:

> Back of all our work there must be a sound philosophy, influenced by such men as Dewey. A core of solid, basic material can lie in every course of study. But our critics will continue to criticize unless we ourselves first understand our potential in general education and work consciously toward its fulfillment. That responsibility is ours.[3]

Dewey, one of the leading exponents of change, saw the problem or need as one of either standing still and letting education slip back, or intellectually moving ahead in the spirit of investigation and experimentation. He states that on this point there is much agreement among intellectual people. "The educational system must move one way or another, either backward to the intellectual and moral standards of a pre-scientific age or forward to ever greater utilization of scientific method in the development of the possibilities of growing, expanding experience."[4] This idea illustrates the importance of a study dealing with a philosophical approach to a program of teacher education that will help to provide new goals, democratic ideals, and practices in line with the ever-changing tide of environmental society.

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[3]Kenneth F. Perry, "The Industrial Arts Salute John Dewey," The Industrial Arts Teacher, Volume XIX, Number 3, January-February, 1960, p. 9.

[4]John Dewey, Experience and Education (New York: The Macmillan Company, 1952), pp. 113-114.

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Another justification for developing this study lies in the need of industrial arts teacher education programs to establish their purposes and philosophical consistency.

> Many of the difficulties in which education finds itself are due to a lack of clarity of purpose. The American philosophy assumes the individual to be more important than state or society, therefore education aims at the fullest development of the individual without favoritism, priviledged classes, or continuance of control and intolerance on the part of the few. Education must assume a major role in developing confidence in our ever-changing future. Any educational philosophy designed for our future must allow for diversity and change and must grow from the convictions of our people, their mores, and their ethical beliefs.[5]

In brief, most educators concerned with industrial arts in the public schools and industrial arts teacher preparation agree that many changes are needed. Just what these changes should be and how we can get at them is very difficult. However, it is felt that the importance of this study grows out of the consistent experimentalist philosophy which deals with the value of the individual in society, his general educational growth, the importance of democracy and the place of industrialization in this democracy.

Most important, however, is the need of the profession for a consistent philosophical approach to turn to for direction. A common core of philosophical implication is lacking in the field. It appears that the student is left on his own to develop a piece-meal philosophy as he progresses through the industrial arts teacher

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[5]William J. Micheels and Wesley S. Sommers, The Minnesota Plan for Industrial Arts Teacher Education, pp. 16-17.

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education program. He should be given the opportunity to study various philosophical viewpoints in order to gain understandings concerning the place of industrial arts in our schools and the place of education in our society. The industrial arts teacher education program must be guided by a workable, consistent philosophy toward this end. It is for this purpose that the following study was undertaken.

The Research Approach Used

The approach to the problem discussed is that of a philosophical research in terms of our present day concept of industrial arts teacher preparation. The study attempts to bring to light the major theories of Dewey's philosophy concerning education through an analysis and the author's interpretation of his writings. These theories or beliefs are then applied to a program of industrial arts teacher education, namely, objectives, curriculum, and methodology. The viewpoints are organized to form a practical program, in light of Dewey's philosophy, and in view of our present society.

In this philosophical research the author has examined the writings and ideas of Dewey, discussed these views with other educators interested in the field, and made a critical interpretation in light of these findings. Of this type of research, Hillway states:

> This process in scholarship has undeniable values. Without it, we might find it impossible to arrive at workable conclusions on matters about which definable facts are scarce. While it is true that research has been assumulating for us more and more facts about man and his universe, there still remains a vast part of human experience, artistic production, and thought which

is not approachable by the factual method. Our only approach is through critical interpretation.[6]

Review of the Literature

The major portion of the literature used in this study was the writing of John Dewey. Especially of value were his works Experience and Education,[7] Democracy and Education,[8] and The Way Out of Educational Confusion.[9] These reflect the spirit of his philosophy in definite application to teacher education and theories of learning.

Material on the experimentalist viewpoint concerning industrial arts and industrial arts teacher education was found to be scarce. The author found no material concerning industrial arts teacher education programs which was drawn from Dewey's writings alone. The most significant writings were found in the Sixth Yearbook of the American Council on Industrial Arts Teacher Education.[10] Though the authors did not base their writings directly on Dewey's viewpoints, many of their implications were found to be in line with the experimentalist position. Hornbake develops a philosophical viewpoint

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[6] Tyrus Hillway, Introduction to Research (Boston: Houghton Mifflin Company, 1956), p. 90.

[7] John Dewey, Experience and Education.

[8] John Dewey, Democracy and Education (New York: The Macmillan Company, 1916).

[9] John Dewey, The Way Out of Educational Confusion (Cambridge: Harvard University Press, 1931).

[10] American Council on Industrial Arts Teacher Education, A Sourcebook of Readings in Education, Sixth Yearbook, Carl Gerbracht, Editor, (Bloomington, Illinois: McKnight and McKnight, 1957).

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[11] Ibid.

[12] Ibid.

[13] Ibid.

for industrial arts teacher education which emphasizes the thinking of Bode, Bonser, and Dewey. In consideration of curriculum, administration, psychology, and sociology in regard to education he states, "Perhaps Dewey's Democracy and Education has done more to stimulate reflection along these lines than any other publication."[11]

Waetjen, in the same volume, indicates a similar position which follows the viewpoint of Dewey. Concerning teacher education, he states:

> The industrial arts teacher's role, at whatever level he is teaching, is chiefly that of contributor to the continued stream of self-involvement of his students.... Specifically, the industrial arts teacher's role is that of contributing to the self-development of his students through providing experiences with tools, materials, processes and people, in an industrial, democratic climate of learning.[12]

An article by Maley indicates the experimentalist influence concerning methodology for industrial arts teacher education. He places experimentation and problem solving above the more traditional approaches and states that they must be used to meet our generally accepted objectives. He feels that the present beginning teacher has only the demonstration method competently at hand, "with very little real experiences in experimentation, problem solving, group projects, unit methods, or the recognition of teaching in terms of objectives...."[13]

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[11] Ibid., p. 32.

[12] Ibid., p. 84.

[13] Ibid., p. 182.

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[15] Ibid.,

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Authors Fuzak, Seefeld, and Whitesel, writing in the Fifth Yearbook, [14] reveal the influence of experimentalism in their respective views of industrial arts teacher preparation. Speaking of the professional side of the program, Fuzak states:

> While we await the day when some sort of total approach to the education of teachers is possible, we must reverse the fragmentation of the field of professional education and the narrow specialization of its personnel. The possibility of promoting learning through problem solving as well as the provision of a continuous sequence of significant learning experiences should be enhanced by the use of larger blocks of time in the program of professional preparation.[15]

Micheels and Sommers, writing primarily for industrial arts teacher education, tend strongly toward an experimentalist view. This is evidenced in their statement:

> The industrial arts teacher must be a problem solver"par excellence." He must be able to solve a wide variety of problems related to the use of tools and materials. In addition, he must be able to handle problems related to students, curriculum development, class organization, and curriculum implementation.[16]

The proceeding writings have indicated that the theme of experimentalism is in the minds of industrial arts teacher educators. No over-all experimentalist position, however, appears to have been developed in the literature.

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[14]American Council on Industrial Arts Teacher Education, Problems and Issues in Industrial Arts Teacher Education, Fifth Yearbook, C. Robert Hutchcroft, Editor, (Bloomington, Illinois: McKnight and McKnight, 1956).

[15]Ibid., p. 223.

[16]William J. Micheels, and Wesley S. Sommers, The Minnesota Plan for Industrial Arts Teacher Education, p. 32.

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Observance of the one hundredth anniversary of the birth of John Dewey during the preparation of this work provided some current viewpoints of his philosophy which were quite helpful. Such authors as Villemain in the Saturday Review[17] identified many areas in which present application of experimentalism was appropriate and needed.

Definition of Terms

The term industrial arts teacher education, as used in this study, is that phase of teacher preparation at the college level that deals with industrial arts as a content area. In many universities it falls under the broad heading of industrial education and thus, is parallel to a program for preparation of vocational teachers. We are here concerned with the industrial arts teacher education program alone. A generally accepted definition of industrial arts by Silvius is as follows:

> Industrial arts is the instruction in shopwork, drafting, and laboratories that is industrially orientated. It is that integral and essential part of American education that provides for youth and adults to have experiences in solving problems with the basic tools and materials of industry, and it is the curriculum area, dedicated to an understanding of the products, the workers, and the problems of industrial technology.[18]

The term experimentalism is used to designate a philosophy, particularly of education, which reflects primarily the thinking of

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[17] Francis T. Villemain, "Dewey and the Critical Faculty", The Saturday Review, November 21, 1959.

[18] G. Harold Silvius, "Functional Aims for Industrial Education in American Schools," The Industrial Arts Teacher, November-December 1959), p. 11.

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John Dewey. "It appears that the temper and character of its radically experimental approach to both the world of nature and the world of man is more adequately suggested in this latter name than in any other yet proposed."[19] Experimentalism in education is primarily concerned with the relationship of the individual and his environment as they enter into and react in an experience. Each of the constituents of the experience provoke change in the other, the individual in terms of his behavior and the environment in terms of the individual's control over it. This is the process of education. Childs illustrates the emphasis placed upon experience when he states:

> Experimentalism is a radically empirical philosophy. It maintains that the ultimate source, authority, and criterion for all beliefs and conduct are to be found in ordinary human experience. Experience stands on its own bottom. Life is its own sanction. ...The very cornerstone of experimentalism is the faith that experience is able to develop from within its own processes all necessary regulative standards and ideals.[20]

The term laboratory is used in this study to denote those usually manipulative activities that take place other than in the classroom. It includes more than just the traditional concept of industrial arts shops. Such activities as planning, research, drawing, experimentation, and so on, are also included in the definition of the term.

Organization of the Study

The study has been formulated through an overview of Dewey's philosophy which leads into the interpretation and application of his

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[19]John L. Childs, Education and the Philosophy of Experimentalism (New York: The Century Company, 1931), pp. 5-6.

[20]Ibid., p. 96.

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views to major areas of the industrial arts teacher education program. Chapter II brings out the fundamental elements upon which the philosophy is based and is concerned with the many aspects of education and its implications for how people learn. Chapters III, IV, and V, respectively, make an interpretation of Dewey's views in applying them to objectives, curriculum, and methodology in light of our present concept of education for prospective industrial arts teachers. The final chapter presents a summary of the study along with an evaluation. The strengths of the program are compared with its weaknesses and lead to a statement of conclusions.

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CHAPTER II

THE PHILOSOPHY OF JOHN DEWEY AS REFLECTED THROUGH HIS WRITINGS

The philosophy of John Dewey as it applies to education or any other field of thought is usually called "experimentalism"[1] although it is often referred to as "instrumentalism" or "pragmatism". It is a philosophy that is particularly sympathetic to the spirit of American democracy with emphasis upon the social interaction of the individual and his development in a democratic society. In it, human values are of utmost importance and are given moral value as their consequences, when inflicted upon and interacted by many in the society, provide for a better relationship between man as an organism and his environment.[2]

Environment, as it would be conceived in experimentalism, consists of more than the physical setting of nature, the inanimate objects of the cold material world. Environment is that seemingly complete relationship of the individual, the organism, with his surroundings, his fellow human beings, and with the problems and

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[1]In this work the term experimentalism and the philosophy of John Dewey are used synonymously.

[2]John L. Childs, American Pragmatism and Education (New York: Henry Holt and Company, 1956), pp. 105-110. This reference thoroughly develops John Dewey's interpretation of democracy.

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[3]John I
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activities of society. Dewey states it this way:

> The environment in which human beings live, act and inquire, is not simply physical. It is cultural as well. Problems which induce inquiry grow out of the relations of fellow beings to one another, and the organs for dealing with these relations are not only the eye and ear, but the meanings which have developed in the course of living, together with the ways of forming and transmitting culture with all its constituents of tools, arts, institutions, traditions and customary beliefs.[3]

Environment, then, is that total cultural, physical, and organic setting in which man lives, for "a being connected with other beings cannot perform his own activities without taking the activities of others into account".[4]

In experimentalism there is no all prevailing reality, for there are no absolutes, save change or adjustment, and no perfect ideals. All things are in a state of flux or change. Nothing stands still. Man, as he makes value judgments in his environment, is the measure of all things. Values and morals are determined by discerning the ways in which they affect man and his development. Experimentalism is a practical, workable philosophy, helping man to solve his own problems in his immediate situational need.

Experience, The Philosophical Foundation

The basis for the very nature of experimentalism is in its acceptance of experience as the source and test of all knowledge.

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[3]John Dewey, Logic, The Theory of Inquiry (New York: Henry Holt and Company, 1938), p. 42.

[4]John Dewey, Democracy and Education (New York: The Macmillan Company, 1916), p. 14.

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[6]Ibid.

This approach to philosophical belief differs from other major philosophies such as idealism, with its realities of absolutes and the self, and realism with its materialistic realities. Experimentalism is grounded in experience. It is experience that forms the foundation from which all education begins. Although Dewey states that all experience is educative he also holds that there are experiences which can retard education or change and distort the direction of future experiences. These he would call "mis-educative" experiences as they tend to reduce the quality of future experiences.

In experimentalism or the "new education" as Dewey might call it, experience is the basis by which a person learns. However, how well the person learns and his attitude toward learning depend heavily upon the type of experience he has had. Dewey states:

> It is not enough to insist upon the necessity of experience, nor even of activity in experience. Everything depends upon the quality of the experience which is had. The quality of any experience has two aspects. There is an immediate aspect of agreeableness or disagreeableness, and there is its influence upon later experiences.[5]

This expression by Dewey sets the stage for any educational program. "Hence the central problem of an education based upon experience is to select the kind of present experiences that live fruitfully and creatively in subsequent experiences".[6] This has

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[5]John Dewey, Experience and Education (New York: The Macmillan Company, 1938), p. 16.

[6]Ibid., pp. 16-17.

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many implications. For example, one part of having an experience lies in the doing, such as a student setting up the apparatus to perform an experiment in a physics class. To many, this is an experience in itself, but not to Dewey. The true experience has a second part, that of receiving the results, impression or consequences of the act of doing. In our experiment the completed experience would then include the results or consequences of the physics experiment as the act of doing created a meaningful activity of experience.

The direction taken by the educational program should be the result of an understanding of experience as the basis for teaching and learning. The subject matter, curriculum, methodology, and all other phases of the educational program should be developed through an understanding of the experiences to be received by those engaging in any given activity. Thus, experience is education and education is the result of pleasant, creative, direction-giving, experiences. Unpleasant experiences, though educative in some cases, usually retard the flow of learning.

Dewey felt that the need for developing a theory of experience was always present, in that education would continually fall back upon the traditional methods of following facts and cultural heritage. If our educational systems are to be based on experience, then we are in need of sorting out all of those things that will give us a theory of experience. This sorting process establishes a basis for deciding whether any given experience is worthwhile or whether it is not. Dew

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is not. Dewey calls this process the continuity of experience. He was greatly concerned with trying to illustrate that the continuity of experience is the criterion by which all experiences should be judged as to their value in education. He emphasizes this fact in the following manner:

> ...If an experience arouses curiosity, strengthens initiative, and sets up desires and purposes that are sufficiently intense to carry a person over dead places in the future, continuity works in a very different way. Every experience is a moving force. Its value can be judged only on the ground of what it moves toward and into. The greater maturity of experience which should belong to the adult as educator puts him in a position to evaluate each experience of the young in a way in which the one having the less mature experience cannot do. It is then the business of the educator to see in what direction an experience is heading.[7]

Again in our educational work, experience thrives through the knowing and doing. Dewey would like us to realize that experience requires more than just doing. He presents the meaning of an experience in this way: "To put one's hand in the fire that consumes it is not necessarily to have an experience. The action and its consequences must be joined in perception."[8]

We have now formulated the concept that "mere activity does not constitute experience,"[9] but rather that experience requires intellectual activity carried through to a meaningful consequence. The consequence makes a change in the learner and learning takes

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[7] *Ibid.*, pp. 31-32.

[8] John Dewey, *Art as Experience* (New York: Minton, Balch and Company, 1935), p. 44.

[9] John Dewey, *Democracy and Education*, p. 163.

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place. It is at this point that Dewey's emphasis upon learning by doing takes on significance. Some action or doing must take place to set the learning process into motion, providing an experience which, when carried through to its ultimate understanding, will return an insight to the learner.

Knowledge

The experimentalist's theory of knowledge is significantly different from other viewpoints. Concerning a more realistic view of knowledge, Dewey says that "pure knowing is pure beholding, viewing, noting. It is complete in itself. It looks for nothing beyond itself; it lacks nothing and hence has no aim or purpose."[10] In a case such as this, the application of knowledge or facts to the problems of the individual would be difficult. It also stands that the ability to apply facts alone to the solution of problems is often inadequate and inappropriate; something more is required. Dewey felt that the most logical approach to knowledge was to use the scientific method of inquiry which required the development of critical thinking and the formation of habits from experience which would lead to principles of knowledge. Dewey says: "In other words, knowledge is a perception of those connections of an object which determine its applicability in a given situation."[11]

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[10]John Dewey, Reconstruction in Philosophy (Boston: The Beacon Press, Enlarged Edition, 1948), p. 109.

[11]John Dewey, Democracy and Education, p. 396.

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This thought illustrates Dewey's feeling that there is more to knowledge than the acquisition of information by observation and sense perception.

> An ideally perfect knowledge would represent such a network of interconnections that any past experience would offer a point of advantage from which to get at the problem presented in a new experience. In fine, while a habit apart from knowledge supplies us with a single fixed method of attack, knowledge means that selection may be made from a much wider range of habits.[12]

In other words, knowledge could be likened to a network of habits crosslinked with a continuity of experience which places the learner in a position of drawing upon this intellectual resource to face future problems with a broad approach. Knowledge could be said to be made up of two facets. First, that there are recognizable experienceable events in the world which can be learned by sense perception. These could be called known objects, perception events, or even facts. The experimentalist recognizes that these are necessary but can be come upon by observation or sense perception. "Sense qualities are something to be known, they are challenges to knowing, setting problems for investigation. Our scientific knowledge is something about them, resolving the problems they propose."[13] This initiates the second phase of knowledge, the knowing something about sense qualities or facts. The

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[12] *Ibid.*, p. 396.

[13] John Dewey, *The Quest for Certainty* (New York: Minton, Balch and Company, 1929), pp. 122-123.

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observed facts or sense qualities alone do us very little good for they cannot enter into any solution of future situations without knowing something about them. They are organism received sense impressions. It is the knowing something about these impressions that completes the concept of knowledge. This is what Dewey meant when he said, "We may approach it, so to speak, from any one of the angles provided by its connections. We can bring into play, as we deem wise, any one of the habits appropriate to any one of the connected objects."[14]

With this philosophic outlook toward knowledge we can proceed to its usefulness. Knowledge, to be useful, must be concerned with events to come, the future. It would be sheer fantasy to conceive that knowledge is complete in itself. "For one has only to call to mind what is sometimes treated in schools as acquisition of knowledge to realize how lacking it is in any fruitful connection with the ongoing experience of the students -- how largely it seems to be believed that the mere appropriation of subject matter which happens to be stored in books constitues knowledge."[15]

The experimentalist would further advocate that knowledge takes on no reflection as an absolute or finite quantity to be searched for and ultimately gained. It is the ability of one to draw from experience an appropriate means to the solution of problems in the

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[14]John Dewey, <u>Democracy and Education,</u> p. 396.

[15]<u>Ibid</u>., p. 398.

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ever changing context of his present experience. Knowledge could be known more as an immeasurable instrument of differentiation. Albert Lynd expresses Dewey's view of knowledge this way:

> The search for knowledge must be continuous and arduous, but it is not, as in most older systems of philosophy, an aspiration toward any 'ultimate reality' in the universe. It is a search for principles which will 'work' here and now in a changing context; and there is no other way of getting them than through the experimental method. In the physical and natural sciences, all discoverable facts about a problem are collected, and explanations of them are tested by experiment. The simplest explanation which will account for all of them is set up as a hypothesis, avowedly tentative and subject to change if new data should render it inadequate. The hypothesis is 'true' to the extent that its consequences are favorable for furthering the investigation. That, according to Dewey, is the only kind of knowledge we can have about anything.[16]

This illustrates that knowledge in and of itself is of relatively little significance to learning. One might memorize a body of data and gain pride in being able to repeat it word for word, but does this lead to anything more than mental recreation? "Frequently (knowledge) is treated as an end itself, and then the goal becomes to heap it up and display it when called for. This static, cold storage ideal of knowledge is inimical to educative development."[17] This thought has an incalculable implication for education, for if a student is continually set upon the acquisition of subject matter, he will probably not obtain the ways and means of application, the ability to

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[16] Albert Lynd, "Who Wants Progressive Education? The Influence of John Dewey on the Public Schools," Atlantic Monthly, (April, 1953), p. 31.

[17] John Dewey, Democracy and Education, p. 186.

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assimilate and intelligently apply the information. In fact, it is most probable that the long process of memorizing and retaining this material would disrupt his ability to apply it. He has lost the study of how to think and approach a problem situation for which the facts he has memorized might be appropriate. To the experimentalist, however, in education "knowledge has also a meaning more liberal and more humane. It signifies events understood, events so discriminately penetrated by thought that mind is literally at home in them. It means comprehension, or inclusive reasonable agreement."[18] Knowledge then is an instrument by which the facts, meanings, and understandings of the present can be projected into the future to determine solutions to the on-going problems of man.

Mind

The experimentalist likes to think of the mind as a capacity or aptitude to place one in the position of satisfactorily meeting situations as they occur in life. The mind is a means of acting with intelligence, with meaning, a process for action. Acting which grows out of experiences and dealings with the environment gives the mind no restrictions or limits. Mind is a result of experience and environment, it "is the body of organized meanings by means of which events of the present have significance for us."[19]

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[18]John Dewey, Experience and Nature (Chicago: The Open Court Publishing Company, 1925), p. 161.

[19]John Dewey, Art as Experience, p. 273.

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Accordingly, the mind is dependent upon the experiences of the individual for action, and the individual's experiences require an environment in which his experiences can become meaningful in the solution of problems that face him. The mind then becomes a continuum with experience and environment. It grows out of experiencing; it develops in consistency with the environment. "Mind that bears only on accidental relation to the environment occupies a similar relation to the body."[20] Environment is a major directing force of the mind and cannot be disassociated from it.

It is important to understand then that the mind, first of all, is not a transcendental entity which operates above and beyond the body without regard for experience and environment. Secondly, the mind is not separated from the body. It is an organism in and of the body providing mental activity when the organism reacts with its environment. Lynd gives an analysis of Dewey's concept of the mind as follows:

> In experimentalism there is no mind or soul in the traditional sense. This, if anything, is the key doctrine of Deweyism. Most previous philosophy, Dewey believes, has been infected by a double error of the Greeks: that there is some perfect or ultimate reality in the universe, and that it is discoverable by the use of a special intellectual faculty. Dewey finds no evidence in man of a nonmaterial faculty which thinks, or which can be filled up with knowledge like a tank or sponge. Nor is there a soul which is immortal or otherwise distinguishable from the body. Man is an organism engaged in an instinctive effort to adapt itself to the environment. There are many difficulties, many problems to be solved in this effort. Thinking, in Dewey's meaning of inquiry, is one kind

[20] *Ibid.*, p. 264.

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> of effort to solve these problems, as walking is another. Intelligence grows in action and seeks to go beyond adaptation to control of the environment.
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> Mental activity like physical activity (the distinction is merely verbal) proceeds through habits developed by the organism in its relations with the environment.... Mind is not a separate something which acts upon objects of thought. Like sight, mind is an <u>activity</u> which occurs when the organism interacts with the environment in a certain way. In Dewey's phrase, 'mind is primarily a verb.'
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> Mr. Dewey's view of the mind is critically important in his educational theories. The process of learning, for him, is not the accumulation of a mental stock of information. It is the acquisition by the organism of certain habits. Children are not born with minds. They acquire habits, including those of thought, which are not different in mode or origin from other habits. But their relations with the environment would be unbearably regid and survival would be difficult if all activity had to be that of habit. Living is possible because habits are subject to modification; they are made flexible by impulses. The relation of impulse to habit varies greatly among individuals; it is a key to character and the proper concern of education.[21]

In brief then, the experimentalist views the mind as an activity of the biological and social organism. It functions through experience and interaction with environment. The capacity for integrating present information and conditions to deal with future problems and situations becomes the activity of the mind in the social-biological organism. As Dewey believes, the "mind appears in experience as ability to respond to present stimuli on the basis of anticipation of future possible consequences, and with a view to controlling the kind of consequences to take place."[22] We can then conceive the mind as a selective agency based upon experience

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[21] Albert Lynd, Atlantic Monthly, (April, 1953), p. 31.

[22] John Dewey, Democracy and Education, p. 153.

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which filters out factors in one's experience, combines them into meaningful precepts, and provides directive consequences.

Educationally, the mind viewed from this position requires that instruction be based upon more than the acquisition of information which might hinder and suppress its activity. Educational activities should provide opportunities for the mind to function in the manner formerly suggested. Activities, giving the mind a challenge, causing it to develop the habit of searching and sorting, will lead to a better equipped individual, one who sees value in the outcomes of his mental processes.

Interest

Accordingly, in view of his position concerning knowledge and the mind, the experimentalist takes a similar approach to interest. This approach lies in his need to base interest on the individual as a thinking biological organism. Interest is sometimes viewed as an external force acting upon the individual causing him to do certain things. Other schools advocate that interest comes to the individual from a transcendental entity, that interest is within the individual without the individual having much to do about it. Interest is there, within, and the self follows it. This is not true for the experimentalist. Interest is an empirical thing; it develops through "the active or moving identity of the self with a certain object."[23] Interest comes from the reaction or identification of the

[23] *Ibid.*, p. 408.

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24 Ibid

individual with his environment. This thought is more easily accepted through an illustration. A lawyer who has involved himself in the defense of a person under indictment for a specific crime often does so for various reasons which others do not perceive. It might be wrong to deduce that the interest he has taken in the case is for sheer monetary return. He possibly has taken an interest in the defense of this person because it is here that he finds himself; it is here that he finds the relation between self and qualifications, self and position, self and ability. Here Dewey says, "The mistake lies in making a separation between interest and self, and supposing that the latter is the end to which interest in objects and acts and others is a mere means. In fact, self and interest are two names for the same fact."[24] He feels that the self is measured in terms of the quality and quantity of interest a person places in a situation. Therefore, interest and self cannot be separated.

Dewey denotes two kinds of interest that an individual is capable of possessing. First, a person may just have an interest though it might have little significance to him. We might say that a person has interests of golf, the stock market, and business. This is the ordinary conception of the word. It could be said that this type of interest is "the whole state of active development", meaning that a person is attracted by some general field of emphasis

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[24]Ibid.

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[25] *Ibid.*,

[26] *Ibid.*

or endeavor.[25] Secondly, Dewey feels that there are greater interests that have direct relationship to a person's emotions, attitudes, and feelings. This type of interest is stated as a person's interest in something, "to be absorbed in, wrapped up in, carried away by some object. To take an interest is to be on the alert, to care about, to be attentive."[26] This represents a togetherness of the self and the object.

Applying this concept of interest to educational matters, it is easily seen that one of the most important elements of learning is upon us. How do students become interested in something? How is interest in something developed? How does discipline affect in-interest of the learner? These are questions for which the experimentalist is eager to develop answers. First, he must say that the efforts to induce the learner to take an interest in something by the use of bribes or prizes or irrelevant excuses not only does not contribute to learning but also lets the learner know that the subject matter is irrelevant to him since it has nothing of its own merit to induce his interest. To make excuses for learning is just bad sense. Interest in something is more logically developed by counseling a person so he may see the connection between the object and his self. We might also illustrate the meanings that association with this object may have, showing how outcomes and consequences can be determined

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[25] Ibid., p. 148.

[26] Ibid.

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and the significance they have. Dewey lists the student's interests as, "The interest in conversation or communication; in inquiry, or finding out things; in making things, or construction; and in artistic expression. These are the natural resources, the uninvested capital, upon the exercise of which depends the active growth of the child."[27]

Along with interest, and never separated, comes a type of discipline. Again the experimentalist proposes two types, that of external compelling or coercing and that of internal response to desire or will to carry out one's objectives. The common acceptance of discipline is in the sense of constraint, a punishment, often thought to force a person to learn. This, according to the experimentalist, is not worth the doing and possibly retards learning. An internal, self-disciplining action, however, is necessary to the acquisition of goals and develops a "power at command; mastery of the resources available for carrying through the action undertaken."[28] Discipline is a self-controlling factor without which a person's interest in something is unable to be directed toward established goals. Interest is not enough, discipline provides encouragement and fertilization in which interest may grow. In Dewey's words:

> To know what one is to do and to move to do it promptly and by use of the requisite means is to be disciplined, whether

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[27]John Dewey, School and Society (Chicago: University of Chicago Press, 1916), p. 45.

[28]John Dewey, Democracy and Education, p. 151.

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> we are thinking of an army or a mind. Discipline is positive. To cow the spirit, to subdue inclination, to compel obedience, to mortify the flesh, to make a subordinate perform an uncongenial task——these things are or are not disciplinary according as they do or do not tend to the development of power to recognize what one is about and to persistence in accomplishment.[29]

There has continually been directed criticism of Dewey's position concerning interest as the dominant force in educational development. Few have been able to accept the proposals set forth, i, e., that following and directing the student's interests is the key to educational organization. Frederic Ernst supports Dewey's position in this way:

> Remember that this organization of subject matter was at first denounced as based on 'soft pedagogy.' If children are to be merely interested, what becomes of work which they must learn to do? Yet, in spite of the fact that Dewey's writings proved irrefutably that interest and work are not mutually exclusive; in spite of the fact that he proved that the most systematic and consecutive work that children and adults do is based either on a direct or mediated interest, and criticisms continued for all too many years. Dewey's thoughts on the organization of the school curriculum led him to propound the difference between what he called a logical and psychological organization of subject matter, the psychological organization being based on the child's interests and experiences. The experience is not just passive reception but active experience. The logical organization is for the specialist engaged in adding to a body of knowledge.[30]

Aims in Education

Man has always been concerned with goals, aims, results, and ends as he pursues the various aspects of life. Previously, the

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[29] Ibid., p. 151-152.

[30] Frederic Ernst, "How Dangerous is John Dewey?" Atlantic Monthly, (May, 1953), p. 61.

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aims of man have often been directed by external forces, forces which have placed aims in the scheme of things indirectly and for distorted reasons. It is not the place of aims in life or education to be externally applied without direct association to the means of the act. Dewey says that "an aim implies an orderly and ordered activity, one in which the order consists in the progressive completing of a process."[31] Man has often set up ends or aims which are not connected with the process in a way that directs or implements the process.

A typical illustration is in the college classroom course where the instructor distributes a duplicated course outline establishing the objectives and aims of the course. Each student reacts quite differently to such a situation. The aims established by the instructor do not necessarily take individual differences or interests of the students into account. The aims become goals to conquer or requirements to be satisfied, the consequences of which may not provide much meaning to the student. On the other hand, if the class is allowed to participate in the planning of course aims and individual differences met by the instructor and student working out individual course aims, the possibilities for directed and ordered activity can be located. When the instructor's aims and student's aims become identical, the greatest amount of learning takes place. Following a course of study developed out of individual and group aims pro-

[31]John Dewey, Democracy and Education, p. 119.

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vides means for consistent, economical, and meaningful activity. The consequences of the student's activity will not necessarily be the conquering of his established aims, for his aims may change as his experiences provide new direction giving activities. Consequences and aims though often confused as synonymous are quite dissimilar. The aim in this example should be chosen relative to its direction giving qualities. Intelligent analysis of the process involved will determine appropriate aims which will not be just an end or result but also a planned beginning and guided means. Meanwhile the consequences of this act, directed by foreseeing aims, may be far richer and more desirable than the aim itself set up as a goal.

Another aspect of aims is that they are not ends in themselves. Activity does not cease when the aim is obtained. By direct contrast the obtaining of an aim "is as truly the beginning of another mode of activity as it is the termination of the present one."[32] Dewey expresses the development of aims in this way:

> The aim as a foreseen end gives direction to the activity; it is not an idle view of a mere spectator, but influences the steps taken to reach the end. The foresight functions in three ways. In the first place, it involves careful observation of the given conditions to see what are the means available for reaching the end, and to discover the hindrances in the way. In the second place, it suggests that proper order or sequence in the use of means. It facilitates an economical selection and arrangement. In the third place, it makes choice of alternatives possible. If we can predict the outcome of

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[32]John Dewey, Human Nature and Conduct (New York: The Modern Library, 1930), p. 226.

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> acting this way or that, we can then compare the value of the two courses of action; we can pass judgment upon their relative desirability.[33]

Expressed as a function of the individual, aims become meaningful when they support the furthering of education as a continuing process directed at man's needs. The aim of education for the individual according to the experimentalist cannot be the acquisition of long sought bodies of knowledge, the final filling up of the mind, or the solution of all problems. It must be the developing of habits and intellect for "continued capacity for growth."[34] The aims of education then, for society and the individual, are the development of continual learning activities. Dewey speaks of the criterion of good aims and these he feels are two. First, that aims must come from within, "an outgrowth of existing conditions."[35] To be developed from within, they must deal with what the problem or activity consists of, its resources and conflicts, and its connection with other experiences of the individual. Secondly, aims must be revisable. This is to say that in many situations the first sought or developed aim may suffice in directing an activity to its conclusion. However, in more difficult and complicated activities this original aim may get the activity started off but redirection, according to the situation, overlooked

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[33] John Dewey, Democracy and Education, p. 119.

[34] Ibid., p. 117.

[35] Ibid., p. 121.

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conditions, etc., may call for revision. Here we see how externally applied aims hold a rigid grip upon the continuum of an activity, not allowing for alterations as conditions might prescribe.

Finally, in accordance with the experimentalist's theory, it is necessary to pursue the idea that aims in education must be developed out of the interests and needs of the individual, anticipated consequences in the social setting, and intelligent planning of the activity. It is a common belief that the aims of the teacher or parent should be accepted as the aims of the learner. As we have seen, this belief misaligns the educational process. Imposed aims of the teacher upon the student give the student little self-realized direction, little inherent need or desire, and little identification with the activity into which he is lead. Aims should be developed by student and teacher working together. They "mean acceptance of responsibility for the observations, anticipations, and arrangements required in carrying on a function."[36] Student-developed aims may be lacking in direction and mature observation of conditions; teacher-developed aims would surely be lacking in student need, interest, and desire. "Any aim is of value so far as it assists observation, choice, and planning in carrying on activity from moment to moment and hour to hour; if it gets in the way of the individual's own common sense (as it will surely do if imposed from without or accepted on authority) it does harm."[37]

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[36] Ibid., p. 125.

[37] Ibid.

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Impulse, Habit and Intelligence

In discussing the mind, knowledge, and interest we have seen the connection of the term habit as the experimentalist views it. Moreover, he is concerned with habits as they apply to intelligence for "habits are conditions of intellectual efficiency."[38] In developing the sequence of intellectual efficiency, Dewey would start with the impulse which is the beginning point for action in learning. Impulses are starting points. They are caused by interaction of the organism with the environment. They are not learned activities; they are reactions to environmental stimuli. They are sudden, usually unpredictable ways of acting when the individual or organism is confronted with something, especially environmental. The impulse does not give time to thought and contemplation for it is a quick reaction to a set of given conditions. However, it is possible that impulses can be given determination and direction. If they are starting points for given activities, it is undoubtedly true that they could be governed. Such governing could be thought of as "reflection upon the way in which to use impulse to renew disposition and reorganize habit."[39] If impulses are used advantageously, they promote thinking, and linked with the development of habits provide for effective intelligence. Habits

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[38] John Dewey, Human Nature and Conduct, p. 172

[39] Ibid., p. 170.

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are developed ways of consistently doing things without the need for contemplation and perspective. They are an interconnection of the organism and environment that more or less automatically operate when the two are in relation. Habit again, like impulse, does not know or think, it just operates. It has been acquired and reacts as it has in past situations. Dewey points up the similarities and differences between habits and impulses when he states:

> Yet habit does not, of itself, know, for it does not of itself stop to think, observe or remember. Neither does impulse of itself engage in reflection or contemplation. It just lets go. Habits by themselves are too organized, too insistent and determinate to need to indulge in inquiry or imagination. And impulses are too chaotic, tumultuous and confused to be able to know even if they wanted to. Habit as such is too definitely adapted to an environment to survey or analyze it, and impulse is too indeterminately related to the environment to be capable of reporting anything about it. Habit incorporates, inacts or overrides objects, but it doesn't know them. Impulse scatters and obliterates them with its restless stir. A certain delicate combination of habit and impulse is requisite for observation, memory and judgment. Knowledge which is not projected in the black unknown, lives in the muscles, not in consciousness.[40]

This statement by Dewey throws light upon the interconnection of habit and impulse which gives them a more significant meaning in the development of knowledge and intelligence. The experimentalist pauses to reflect that habit alone is very repetitious, knowing its own way only to the extent that it has acted previously. It can be seen that "habits alone are not enough (since rigidity of habit ex-

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[40] Ibid., p. 177.

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plains many present social ills), the program should also provide for the liberation of impulses useful for making habits flexible."[41] Habits in themselves cause narrowness for which the individual's behavior must suffer. Consequently, the more habits a person develops, the more narrow his life becomes if habit formation alone is the basis for his activity. However, when habits are linked together through thought, impulse, and purpose they become the foundation for directed activity. It is here that Dewey is concerned that "communication not only increases the number and variety of habits, but tends to link them subtly together, and eventually to subject habit-forming in a particular case to the habit of recognizing that new modes of association will exact a new use of it."[42] This becomes his theory between habit forming and intelligence, for without the alignment of many habits into processes for recognizing and presenting applications to new situations, habit forming becomes stagnant. It is this process that the experimentalist calls intelligence. The function of this intelligence is to solve practical problems by the interconnection of directed impulses with reorganized habits to provide rich, interesting, and resourceful living. In this sense "all habit forming involves the beginning of an intellectual specialization which if unchecked ends in thoughtless action."[43] To

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[41]Albert Lynd, Atlantic Monthly, (April, 1953), p. 33.

[42]John Dewey, Experience and Nature, p. 281.

[43]John Dewey, Human Nature and Conduct, p. 173.

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be more specific, habit forming which leads only to more habit forming provides action which has had no contemplation, no present or future directive force. Intelligence means to act effectively with direction. As Dewey explains it:

> Intelligence means operations actually performed in the modification of conditions, including all the guidance that is given by means of ideas, both directly and symbolic.
> The statement may sound strange. But it is only a way of saying that the value of any cognitive conclusion depends upon the method by which it is reached, so that the perfecting of method, the perfecting of intelligence, is the supreme thing.[44]

The experimentalist then would say that intelligence and method cannot be separated, that they go hand in hand in the effective solution of problems. A discussion of methodology will be developed further in this chapter.

The value of intelligence shows its meaning when directed at everyday problems in life. The organism reacts with the environment; the organism then takes impulsive action, modified by habits and thought, which redirects the activity to foreseeable consequences. This is the method of intelligence, intelligent interaction with the environment. Interaction with the environment where habits are in sole operation disguises intelligence into outcomes dependent upon repetitive experiences. The scheme of impulse, habit, and intelligence is now complete. When the even-going intercourse of organism and environment is broken by some unexpected obstacle or development, the organism reacts impulsively. The impulse of action

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[44]John Dewey, The Quest for Certainty, p. 200.

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is different in every situation, setting direction to thought and redirecting and reorganizing old habits. Habits which have been established and have meaning to the situation supply the needed background of experience. They provide stabilization, for "concrete habits do all the perceiving, recognizing, imagining, recalling, judging, conceiving and reasoning that is done."[45] Intelligence then becomes the overriding factor in the process. It guides the overall activity toward predetermined goals and foreseen consequences, sitting back to digest the facts and weigh the proposals, interjecting ideas, suggestions, and direction to more fruitfully satisfy the arranged goals. Intelligence can guide the individual further, to the extent that aims and goals may be rearranged and he may better adjust and evaluate the consequences of the situation. Intelligence also gives order to the activity and "impulses and desires that are not ordered by intelligence are under the control of accidental circumstances."[46]

Thinking, An Educative Method

As we have addressed ourselves to the problem of intelligence, it was noted that thinking or thought played a major role in the development of the process. It was found that thought entered into the situation as a mediator between impulse and habit to give direction

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[45]John Dewey, Human Nature and Conduct, p. 177.

[46]John Dewey, Experience and Education, p. 75.

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to the mental activity. This again must be tied together with the development of knowledge as well. Dewey shows the connection when he says, "There are three aspects of thinking as more or less complete states of it. There are, conception, judgment, and reasoning."[47] As quoted in the section on intelligence, these three aspects also applied equally well to habit formation. Thinking and habit formation are therefore very closely related and Dewey finds very little need for differentiating between the terms reason, intelligence, and thought.

As we have seen previously, the development of habits without thought provides for nothing but sheer repetition. Thought and habit must be integrated, they must work together. So also for thought alone, for pure thought without habit cannot lead to action or further activity other than more thought. The experimentalist is not concerned about thought for the sake of intellectual activity, for this does not provide as worthwhile experience to the individual. He is mainly concerned with thinking as it lends itself to action, the furthering of human endeavors. Thought is developed through the relation of the human being and his environment, which, in turn, demands the association of habit. "For thinking cannot itself escape the influence of habit, anymore than anything else human."[48]

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[47]John Dewey, Psychology (New York: American Book Company, 1886), p. 205.

[48]John Dewey, Human Nature and Conduct, p. 69.

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The concept of thinking as the experimentalist would have it naturally involves the biological function of the human being. This biological function uses the environment, both animate and inanimate, in association and interaction, as its material for contemplation. The experimentalist would further regard this process, the relation of the human biological organism with his environment, as the beginning of the formation of knowledge so long as the process involves thinking in respect to the furthering of the human needs, desires, and necessities of living. This process is in all regards the process of thinking. The product of thinking then must be knowledge; the product received as the result of intellectual relationship with the environment.

Dewey's three aspects of thinking which are conception, judgment, and reasoning, become the basis for the complete process. These aspects are not to be considered as separate states of thinking, for thinking cannot take place without all three in operation. They can be thought of as the developmental process of thinking. Working together they become: conception, the "function of the image or train of images to stand for some mode of mental action;"[49] judgment, the idealization of "a real thing, by stating its meaning;"[50] and reasoning, "that act of mind which recognizes those relations of any context of consciousness through which it has the meaning

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[49]John Dewey, Psychology, p. 205.

[50]Ibid., p. 214.

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which it has, or is what it is."[51]

Through Dewey's method of inquiry, which he holds as synonymous with thinking and reflection, a pattern for action is established to accomplish the desired end. From this point of view, thinking becomes the functioning agent in inquiry or problem solving, selecting and organizing out of the present situation to establish meanings of things to come which will be reliably grounded in the present. The function of thinking or reflection broadens the meanings of present experiences and provides for more purposeful solutions and understandings. In this sense, as future arrives, the intellectual thought process going on at the present has provided meaningful direction to those on-going activities by means of projecting solutions from the involvement to present impulses, habits, and reflection. To become useful and productive, thinking requires training and continuous development. If not, it leads to nihility and ceases to live. "Thought is born as the twin of impulse in every moment of impeded habit. But unless it is nurtured, it speedily dies, and habit and impulse continue their civil warfare."[52] Dewey defines thought in these terms:

> Thought, reason, intelligence, whatever word we choose to use, is existentially an adjective (or better an adverb), not a noun. It is disposition of activity, a quality of that conduct which foresees consequences of existing events, and which

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[51] Ibid., p. 221.

[52] John Dewey, Human Nature and Conduct, p. 171.

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uses what is foreseen as a plan and method of administering affairs.[53]

As had been mentioned, Dewey feels that reflective thought requires training. In speaking about thought he says:

> Training (in thinking) is that development of curiosity, suggestion, and habits of exploring and testing, which increases sensitiveness to questions and love of inquiry into the puzzling and unknown; which enhances the fitness of suggestions that spring up in the mind, and controls their succession in a developing and cumulative order; which makes more acute the sense of the force, the proving power, of every fact observed and suggestion employed. Thinking is not a separate mental process; it is an affair of the way in which the vast multitude of objects that are observed and suggested are employed, the way they run together and are made to run together, the way they are handled. Consequently any subject, topic, questions, is intellectual not per se but because of the part it is made to play in directing thought in the life of any particular person.[54]

As thinking and the development of thought are applied to education, requirements are set upon both the teacher and student. Thought is not developed haphazardly since "the training of thought can be attained only by regulating the causes that evoke and guide it."[55] The experimentalist is insistent upon the fact that thinking, and the training of thinking, must go hand in hand with the other educational activities. It is not an activity in and of itself and cannot be learned in this sense. The more traditional school made separate divisions in its curriculum for the ease of

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[53]John Dewey, Experience and Nature, pp. 158-159.

[54]John Dewey, How We Think (New York: D. C. Heath and Company, 1933), pp. 55-56.

[55]Ibid., p. 57.

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teaching and learning, so they thought. These divisions may have been the development of manipulative skills, mental skills, acquisition of information and facts, and a division for training in thinking. Dewey feels that this approach is not sound; it does not satisfy the purposes for which it was designed. In the first place, thinking which is developed separately from subject matter has no relationship or value to the problems of life. Secondly, the development of skills or acquisitions of knowledge without thinking as an integral associate has no purposes or direction. Skill in itself needs the direction and guidance of thought to give it purpose, to give it meaningful use, and to provide relationships of this ability to objects in the individual's environment. Again Dewey reverts to the method of experience, this time as it relates to developing the ability to think in the school situation. Thus, when subject matter and the method of thinking are operating together, there is no separation between learning things and learning to think; then the ultimate teaching-learning activity exists. Dewey establishes the development of thinking in the learning situation when he says:

> Thinking includes all of these steps, --the sense of a problem, the observation of conditions, the formation and rational elaboration of a suggested conclusion, and the active experimental testing. While all thinking results in knowledge, ultimately the value of knowledge is subordinate to its use in thinking. For we live not in a settled and finished world, but in one which is going on, and where our main task is prospective, and where retrospect--and all knowledge as distinct from thought is retrospect--is of value in the solidity, security, and fertility it affords our dealings with the future.[56]

[56]John Dewey, Democracy and Education, pp. 177-178.

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All of this discussion then leads us to conclude that "thinking is the method of an educative experience,"[57] a way of handling the materials of inquiry or problem solving. "Thinking is the accurate and deliberate instituting of connections between what is done and its consequences."[58]

Growth

The experimentalist has shown his concern for the development of thinking, intelligence, and knowledge throughout his philosophy. This concern is directly focused now upon the growth of the individual in society. He is mainly interested in intellectual growth which he defines as "constant expansion of horizons and consequent formation of new purposes and new responses."[59] As we can see by this definition, growth is very carefully tied in with habit formation and the development of intellectual efficiency. Growth in general means the development of good habits which have control over the individual's environment, power to learn from experience, and activity in education which "is all in one with growing; it has no end beyond itself."[60] Growing becomes a positive activity, but it can have a negative side. A characteristic of growth is that is leads to further growth. For

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[57] Ibid., p. 192.

[58] Ibid., p. 177.

[59] Ibid., p. 206.

[60] Ibid., p. 62.

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example, if an individual begins a life of occupational activity based on lies and falsehood, he may grow in that direction. He may be able to move ahead to high prestige and power in his profession by harming others and stealing anything he may need to secure his future. This could be classified as growth, for this individual may become very good at lying and theft. His growth may lead to further growth but it is limited by society. The consequences of this growth in a democratic society would be condemned for it is detrimental to the individual and society itself. Dewey feels that growth such as this would retard growth in general. Though a person may grow in an activity which may be harmful to his life in general, and to life of society, this does not add to his total growth but indeed, may stand in the way of it. Growth must have direction and it must have aims or goals, for growth alone is not enough. Without direction it may lead to situations as discussed.

This observation leads us to the fact that growth and education, from the experimetalist's viewpoint, must start with immaturity and lead to expanding intellectual activity. "In any case, development, growth, involve change, modification, and modification in definite direction."[61] Education, growth, and life can be seen to involve the above qualifications and are further likened when Dewey states that they are the "reconstruction or reorganization of experience which

[61]John Dewey, Education Today (New York: G. P. Putnam's Sons, 1940), p. 292.

adds to the meaning of experience, and which increases ability to direct the course of subsequent experience."[62]

A final aspect that should be considered concerning growth is that the "power to grow depends upon need for others and plasticity. Both of these conditions are at their height in childhood and youth."[63] This is to say that the child is, in and of himself, ready to grow. He does not need external inducements, for his own activity leads toward growth. The place of the educator in this growing process is to give direction, meanings, and faith; an environment for human growth. The school can provide this environment. "... only when development in a particular line conduces to continuing growth does it answer to the criterion of education as growing."[64]

Motivation

The problem of motivation, again difficult to separate from impulse and habit, has a number of meaningful concepts to the experimentalist. First of all, motives should be expressed in terms of habits and the continuity of habits with one another. Dewey presents his conception of motivation as "the projective force of habit and the implication of habits in one another."[65] Motivation thus becomes

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[62] John Dewey, Democracy and Education, pp. 89-90.

[63] Ibid., p. 62.

[64] John Dewey, Experience and Education, p. 29.

[65] John Dewey, Human Nature and Conduct, p. 43.

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a force, a velocity toward action, conceived not by human drives or instincts but rather through the habit formation of human environmental experiences. Many positions stress that motivation is developed through the needs of the individual to satisfy drives of hunger, thirst, etc., or that motivation is developed through desire and feeling. This is not true for the experimetalist. He realizes that the body has basic environmental needs and desires, that it is a living organism that must have certain food, so to speak, upon which it survives. He does not, however, feel that these basic needs constitute the total development of human motivation. Dewey does not base his psychology of motivation upon fixed facts or absolutes, since he is a continual foe of doctrines and absolutism. He does, however, feel that the individual is an acting human being and that activity in the human being in general requires no motivation. Dewey makes this point when he says that "the individual is an active being and that is all there is to be said on that score."[66] However, motives come into being when the behavior of the individual is given meaningful direction, when he is giving command to his own physical and mental activity toward predetermined goals. Dewey states:

> A motive is then that element in the total complex of man's activity which, if it can be sufficiently stimulated, will result in an act having specified consequences. And part of the process of intensifying (or reducing) certain elements in the total activity and thus regulating actual consequence is to impute these elements to a person as his activating motives.... An element in an act viewed as a tendency to produce such and

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[66] *Ibid.*, p. 119.

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> such consequences is a motive. A motive does not exist prior to an act and produce it. It is an act plus a judgment upon some element of it, the judgment being made in the light of the consequences of the act.[67]

We see now that the basis for motivation is action, action based upon a continuity of habits propagated by an analysis of future outcomes and possible consequences. Man does not act because of motives alone, he acts because he has developed the ability to act intelligently within his goals.

> Thus he learns to influence his own conduct. An inchoate activity taken in this forward-looking reference to results, especially results of approbation and condemnation, constitutes a motive. Instead then of saying that a man requires a motive in order to induce him to act, we should say that when a man is going to act he needs to know what he is going to do -- what the quality of his act is in terms of consequences to follow. In order to act properly he needs to view his act as others view it; namely, as a manifestation of a character or will which is good or bad according as it is bent upon specific things which are desirable or obnoxious. There is no call to furnish a man with incentives to activity in general.[68]

A second aspect of motivation which applies itself more directly to education is that of unity of learning and activity. Many schools of thought have held to the position that mental activity and physical activity of the individual are separate functions, one leading to the other but both operating in its own setting without direct dependence upon or interactivity with the other. The experimentalist, of course, cannot accept this position for he deems that these two functions must operate together, that they do not exist as

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[67] _Ibid._, p. 120.

[68] _Ibid._, p. 121.

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separate activities with each going in its own direction. The inner activity of the individual needs the environment of physical doing in order that it may operate intelligently. This inner activity which constitues motivation sets a pattern of action toward defined goals and considered consequences. Motivation in this sense is an activity which thrives in action and develops out of the habit forming process. Dewey states that "these separations (inner disposition and motive vs. deeds as purely physical and outer) are overcome in an educational scheme where learning is the accompaniment of continuous activities or occupations which have a social aim and utilize the materials of typical social situations."[69]

In the teaching-learning process motives are dominant factors relating to educational growth of the individual. To cite an example that involves motivation which changes the color of a learning activity, we can observe a physics student undertaking to analyze the principle of levers. Through the use of experimental apparatus he sets up the movable lever and fulcrum device. He easily sees that when the force is applied further from the fulcrum than the previous trial that greater leverage is produced. An understanding of the principle through this device and computations of the weights and forces involved may provide him with the original consequences he sought through predetermined aims. However, assuming the same situation and the introduction of motivation (which we shall assume did

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[69]John Dewey, Democracy and Education, p. 118.

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not operate in the previous situation) the activity would undoubtedly be altogether different. As the activity of the experiment took place, judgments concerning many aspects of the action would incite motivational factors which would undoubtedly cause readjustment of goals and a renewed look at proposed consequences. These motives would enhance the activity, causing it to become more personal and meaningful to the individual. As an example, through the observation and judgments made upon the consequences, the student may be motivated to investigate the principle of levers found as examples in his home; the arm as a lever on the casement window, the length of the handles needed on a pair of scissors, or why the handle on the automobile jack must be a certain length. From this we can see how the experimentalist classifies his theories on motivation. They are developed through action, not the cause of it. They arise out of inquiry integrated with activity, not the agent of instigation. "A motive in short is simply an impulse viewed as a constituent in a habit, a factor in a dispostion."[70]

Subject Matter

Before developing the concept of Dewey's approach to learning or his methodology, his beliefs and views toward subject matter will be expounded. It is quite understandable that Dewey would not make a separation between subject matter and methodology or method of

[70] John Dewey, Human Nature and Conduct, p. 122.

inquiry in his theories of learning. He would undoubtedly feel that these two functions of learning are an integrated part of the total process. "Method means that arrangement of subject matter which makes it most effective in use. Never is method something outside of the material."[71] Although this statement is a brief definition of method, it clearly illustrates his position on subject matter. Subject matter is sought, so to speak, because of its unique application to the everyday social and occupational needs of man. This is its derivation, its course. Many more traditional views have unfolded boldies of facts or subject matter from the expert, the authority, the one who knows the most about a certain subject. The body of facts obtained in this manner then becomes the subject matter for a particular course or study. For example, the problems, examples, and applications of material in a course in algebra are taken from a textbook written by an expert in algebraic manipulation. This is the subject matter. The experimentalist would question this approach. He would undoubtedly rely upon the textbook as a source of authority for the student to turn to when in need of factual information but he would not use it as the only form of subject matter and method. Problems would be developed out of the student's experiences where algebraic application would be suitable and the course would revolve around practical application and uses of algebra in everyday life. These would be the true sources of subject matter. The experimenta-

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[71]John Dewey, Democracy and Education, p. 194.

list's approach seems to take on meaning. We have seen the part that interest plays in educational theory according to the experimentalist. It now involves more meaning as subject matter is considered. Subject matter is more than pure facts or objects of thought. Dewey contends that subject matter "consists of the facts observed, recalled, read, and talked about, and the ideas suggested, in course of a development of a situation having a purpose." He further states that "this statement needs to be rendered more specific by connecting it with the materials of school instruction, the studies which make up the curriculum."[72] This definition involves much more than previous views. It first of all requires that there is no subject matter for its own sake. There is no body of facts held above and isolated from the individual which the individual seeks to digest, understand, or acquire for purposes of assimilating knowledge. Subject matter is an evolving quantity growing out of needs and purposes of the individual or group to be applied to some purposeful end. Here Dewey suggests:

> At this point, we need only to say that, in contrast with the traditional theory, anything which intelligence studies represents things in the part which they play in the carrying forward of active lines of interest. Just as one "studies" his typewriter as part of the operation of putting it to use to effect results, so with any fact or truth. It becomes an object of study—that is, of inquiry and reflection—when it figures as a factor to be reckoned with in the completion of a course of events in which one is engaged and by whose outcome one is affected. Numbers are not objects of study just because they are numbers already constituting a branch of learning

[72]*Ibid.*, p. 212.

> called mathematics, but because they represent qualities and relations of the world in which our action goes on, because they are factors upon which the accomplishment of our purposes depends. Stated thus broadly, the formula may appear abstract. Translated into details, it means that the act of learning or studying is artificial and ineffective in the degree in which pupils are merely presented with a lesson to be learned. Study is effectual in the degree in which the pupil realizes the place of the numerical truth he is dealing with in carrying to fruition activities in which he is concerned.[73]

The experimentalist views this problem of subject matter as a common sense approach somewhere between the traditionalist, who stresses the 'facts', and the progressivist, who stresses the 'child'. Neither of these over emphasized aspects of the educational scheme can survive alone. Dewey states that the problem of subject matter is "to get rid of the prejudicial notion that there is some gap in kind (as distinct from degree) between the child's experience and the various forms of subject matter that make up the course of study."[74] The traditional aspects of the problem are illustrated in Dewey's request, a request that we no longer view the individual and the curriculum as independent dimensions of the total process. He emphasizes the idea that the separation of these dimensions is to retard growth, while the integration of these dimensions is to promote meaningful perpetuation of learning. If we view the process in this respect, then the experience of the individual becomes all important in the formulation of subject matter. For experience in-

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[73] *Ibid.*, p. 158.

[74] John Dewey, *The Child and The Curriculum* (Chicago: University of Chicago Press, 1902), p. 15.

cludes both the "child" and the "subject matter", and upon this basis education proceeds naturally. Counseling of the student is the important aspect of this process. Dewey makes a very interesting analysis of the place of subject matter in experience when he states:

> From the side of the child, it is a question of seeing how his experience already contains within itself elements—facts and truths—of just the same sort as those entering into the formulated study; and, what is of more importance, of how it contains within itself the attitudes, the motives, and the interests which have operated in developing and organizing the subject matter to the plane which it now occupies. From the side of the studies, it is a question of interpreting them as outgrowths of forces operating in the child's life, and of discovering the steps that intervene between the child's present experience and their richer maturity.[75]

Thus, subject matter or "the subject matter of education consists primarily of the meanings which supply content to existing social life."[76] The experimentalist does not say that facts are not subject matter and that they should not be acquired at times. He does however, feel that they are not the only aspect of the learning process and that they assume their role only as the purposeful learning activity takes place. The learning situation then becomes the setting forth of proposed aims and the development of understandings through thinking and habit formation, where facts and truths are sought as need arises in moving on toward its consequences. This cannot be accomplished, however, without individual interest. Interest is the factor which sets learning into activity. Interest, as Dewey says concerning subject

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[75] Ibid., p. 16.

[76] John Dewey, Democracy and Education, p. 226.

matter "is a warning to furnish conditions such that the natural impulses and acquired habits, as far as they are desirable, shall obtain subject matter and modes of skill in order to develop to their natural ends of achievement and efficiency."[77]

All of this brings us to the place of the teacher in the process of education concerning subject matter. Again, by comparison of older systems, the teacher has played the role of the authority, the director of educational goals, educational supervisor, and disseminator of educational facts and truths. He was not to be challenged as an authority, and he was expected to bring each student up to the standards of achievement, "usually the ability to appropriate and reproduce the subject matter in set statement,"[78] that the institution set forth. This subject matter approach, however, did not necessarily involve intellectual modification, the ability to integrate the facts to purposeful goals and hence to desirable outcomes. In the experimentalist's view, the teacher becomes more of a guide to educational activities. Though he may be an authority or expert in his subject matter field, it is more important that he have a basic understanding of human beings and a broad psychology of how people learn. As far as subject matter is concerned, "it thus becomes the office of the educator to select those things within the range of

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[77]John Dewey, Interest and Effort in Education (New York: Houghton Mifflin Company, 1913), p. 95.

[78]John Dewey, Democracy and Education, p. 227.

existing experience that have the promise and potentiality of presenting new problems which by stimulating new ways of observation and judgment will expand the area of further experience."[79] It is the educator's job to work individually with the student, not to assist with the acquistion of knowledge in the traditional sense, but to promote the search for understandings, which also includes a method of inquiry, an ability to apply facts to needs of life, and an insight to stimulated thinking. This type of knowledge requires the teacher to look ahead, to picture the future in terms of present experiences and consequences. "He must be aware of the potentialities for leading students into new fields which belong to experiences alread had, and must use this knowledge as his criterion for selection and arrangement of the conditions that influence their present experience."[80]

From all of this we might assume that there is no basic need for selection and organization of subject matter in the modern school, but that is not true. Though many have interpreted this assumption from Dewey, he rigorously states that "the problem of selection and organization of subject matter for study and learning is fundamental."[81] It is the traditional concept of selection and organization that is so repugnant to him, that subject matter is conceived and justified outside the realm of the individual learner. It is supposedly good for

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[79] John Dewey, Experience and Education, p. 90.

[80] Ibid., p. 92.

[81] Ibid., p. 96.

him because the teacher said so. The selection and organization of subject matter should be meaningful to life and individually inviting. "That the conditions found in present experience should be used as sources of problems is a characteristic which differentiates education based upon experience from traditional education. For in the latter, problems were set from outside."[82] In the development of the curriculum and subject matter from this point of view it is necessary to continue on the basic assumption that education is a social institution, established for the promotion of the individual in society. From this assumption then, it is understandable that the subject matter should be conceived and arranged through the school and community life of those engaged in it, since the school is an active institution for the propagation of social life. The subject matter, taken from this idea, has many more meanings than did the traditional viewpoint, since the student is challenged by more activities than just stuffing his head with facts. Some of these are illustrated when Dewey states:

> For the child properly to take his place in reference to the various functions means training in science, in art, in history; means command of the fundamental methods of inquiry and the fundamental tools of intercourse and communication; means a trained and sound body, skillful eye and hand; means habits of industry, perseverance; in short, habits of serviceableness.[83]

This viewpoint further illustrates his feelings that education is for living and the subject matter of the school should be drawn

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[82]*Ibid.*, p. 96.

[83]John Dewey, *Moral Principles in Education* (New York: Houghton Mifflin and Company, 1909), p. 10.

from moral needs in life, organized around democratic school and community social interactions, and based on the interests and needs of the individual.

Methodology

For John Dewey, the emphasis upon method in education was of extreme importance; the method of attacking the problems of life. The process of learning has been stressed by the experimentalist until many feel that method is the only part of education that he was interested in, that the product of education was not important. In a realistic sense this is somewhat true for the traditionalist has defined the product in terms of factual knowledge the individual has acquired. Meanwhile, the experimentalist defines the product as a human being capable of learning. This makes quite a difference between the two views, and while the experimentalist is very much concerned with method he also is concerned about his product which will be the outgrowth of his method.

In the discussion of methods in education, a brief description of Dewey's theory of inquiry, a method in itself, will form the background. The basis for any act of inquiry is thought itself, or "reflective thinking, in distinction from other operations to which we apply the name of thought, involves (1) a state of doubt, hesitation, perplexity, mental difficulty, in which thinking originates, and (2) an act of searching, hunting, inquiring, to find material that will resolve the doubt, settle and dispose of the perplexity."[84] The

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[84]John Dewey, How We Think, p. 12.

theory of inquiry begins with doubt, confusion, something which causes the organism to act. The individual then begins to form a tentative plan of attacking the problem, removing the doubt, understanding the situation, and developing preliminary solutions. Reflective thinking becomes a part of the pattern of inquiry when the individual does not grasp at the first answer from his experiences or habits, but pauses to search for many possible answers and solutions which he can weigh and contemplate. Should he use the first answer his mind comes upon from his objective memory, the pattern of inquiry is indeed destroyed. The answer he chose might possibly be correct or good but most probably not, for only through the examination and testing of solutions does reflective thinking provide answers with meaningful foresighted consequences. The basis of the theory of inquiry developed in Dewey's Logic The Theory of Inquiry lies in the connection between reflective thinking and objective inquiry. This is called the continuum of inquiry. That is, the "work of bringing logical theory into accord with scientific practice."[85]

As for the method as it applies to education, it again is grounded in experience and all supposed truths or hypotheses must be tested by action. The experimentalist feels that one of the key words in his theory of methods is 'discovery'. Dewey illustrates this when he says that, "In ancient science the essence of science was demonstration; the life blood of modern science is discovery. In the former, re-

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[85]John Dewey, Logic The Theory of Inquiry, p. v.

flective inquiry existed for the sake of attaining a stable subject-matter; in the latter systematized knowledge exists in practice for the sake of stimulating, guiding and checking further inquiries."[86] This is characteristic of the experimentalist's feelings toward methodology. In the more traditional concept, the authority merely gave his great realm of knowledge over to the students who, in turn, put it away in their mental storehouses along with all other items of wisdom to be recalled upon demand as the present situation required it. The experimentalist cannot accept this dogmatic view. He feels that when the subject matter is presented to the student by this method that first of all, the student cannot remember all of the facts that are required. Secondly, he doubts that the content that the master has lectured or demonstrated is pertinent to each individual student's needs. Third, has the student developed much of an ability to think during this process? And last of all, the student undoubtedly had questions, inquiries for which he did not find answers, or even an opportunity to discuss them.

According to Dewey, this method is merely following the logic of facts or nature, and it is quite possible that the psychologic tendencies of the individual require other methods to foster learning than that of nature. He is more concerned with basing his method on experience, by doing something, taking action toward something, or looking into something to see what happens. This is where the pro-

[86] John Dewey, Experience and Nature, p. 152.

cess of experimental method comes to light. In more simple terms it is the method of trial and error. Dewey defends the experimental method of teaching when he attacks the autocratic methodology by stating:

> A reaction inevitably occurs from the poor results that accrue from these professedly 'logical' methods. Lack of interest in study, habits of inattention and procrastination, positive aversion to intellectual application, dependence upon sheer memorizing and mechanical routine with only a modicum of understanding by the pupil of what he is about, show that the theory of logical definition, division, gradation, and system does not work out practically as it is theoretically supposed to do.[87]

In contrast to the subject matter approach, the experimentalist is much more concerned about the individual in his method. In the experimental method, Dewey finds the answer to be that of involving the student in activity while learning. He makes this point while discussing the traits of the experimental method when he states:

> They exhibit three outstanding characteristics. The first is the obvious one that all experimentation involves overt doing, the making of definite changes in the environment or in our relation to it. The second is that experiment is not a random activity but is directed by ideas which have to meet the conditions set by the need of the problem inducing the active inquiry. The third and concluding feature, in which the other two receive their full measure of meaning, is that the outcome of directed activity is the construction of a new empirical situation in which objects are differently related to one another, and such that the consequences of directed operations form the objects that have the property of being known.[88]

In applying these criteria to the teaching situation, certain characteristics of method are brought to light. So that a comparison

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[87] John Dewey, How We Think, p. 82.

[88] John Dewey, The Quest for Certainty, pp. 86-87.

can be made and in order to clarify the meaning of method as it pertains to experimentalism, a listing of its basic characteristic should be most helpful.

1. A few outstanding problems are integrated with the subject matter in order to develop the scientific approach.
2. The difficulties, doubts, needs, and interests of the individual should be located and expounded upon.
3. No limit is placed upon resources the student may use to solve his problem.
4. Students are encouraged to join together in the investigation of a common problem.
5. Subject matter should be derived from all sources of authority, occupation, science, social and cultural life, and prior experiences.
6. The laboratory is the experimentalist's classroom, the place where learning by doing is exemplified.
7. Discussion groups are prominent for initiating planning, investigating and evaluating human and scientific problems.
8. Counseling or teaching method is the organization, insight, relation, and interest provided as a learning atmosphere by the teacher to encourage inquiry.
9. The attitude of the individual when applying method is "straightforwardness, flexible intellectual interest or open-minded will to learn, integrity of purpose, and acceptance of responsibility for the consequences of one's

activity including thought".[89]

10. Problems are isolated and solved as they appear in the student's experience, not externally applied through the lecture notes of the teacher.

We are now in a position to view these outstanding differences in method between the experimentalist and the traditionalist objectively, as methodology shows up as being more "different" than most of the experimentalist's viewpoints. Thought he is firmly established on the scientific method of thinking as the road to effectual learning, he also pinpoints the place of empirical thinking as a method of learning. Empirical thinking is narrow. It relies only upon the recall of habit based upon one's experiences. "Whenever two things are associated together, like, say, thunder and lightning, there is a tendency on the part of the mind to expect that, when one occurs, the other will happen too."[90] This method of approaching a problem is often times appropriate, for if the problem deals with simple facts and uncomplicated associations there is little need for a scientific attack and the empirical method will suffice. Many of our ordinary everyday problems that confront us are solved in this manner. We know that when a jet airplane passes above that the sound of its exhaust will soon follow. They are associated together and we expect the results. The need for this method of solving problems

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[89]John Dewey, Democracy and Education, p. 211.

[90]John Dewey, How We Think, p. 190.

has been illustrated, and shows that it is limited and also dangerous to intellectual growth if not controlled. Dewey lists three faults found in this method: "(1) its tendency to lead to false beliefs, (2) its inability to cope with the novel, and (3) its tendency to engender mental inertia and dogmatism."[91] He does, however, feel that this type of method readily moves us along with the necessities of living, saving time and energies which would otherwise be wasted if we scientifically investigated every conflict in our conversations, associations, and existence. Lodge, speaking of the experimental method as it applies to education, states that the experimental teacher:

> ...primarily by doing, by starting a train of consequences in the space time world and interacting with them until their direction is satisfactory to him, i.e., by the method of experimental trial and error, develops in his pupils the piecemeal, experimental, scientific techniques which lead to success in the solution of individual problems as they occur. He turns out, not men who know, and not men who contemplate, but men who do things.[92]

This is 'the' method of Dewey's philosophy of education. Defining method in his own words he states:

> Method is a statement of the way the subject matter of an experience develops most effectively and fruitfully. It is derived, accordingly, from observation of the course of experiences where there is no conscious distinction of personal attitude and manner from material dealt with. The assumption that method is something separate is connected with the notion of the isolation of mind and self from the world of things. It makes instruction and learning formal, mechanical, constrained. While methods are individualized, certain features of the normal

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[91] Ibid., p. 192.

[92] Rupert C. Lodge, Philosophy of Education (New York: Harper and Brothers, 1937), p. 268.

> course of an experience to its fruition may be discriminated, because of the fund of wisdom derived from prior experiences and because of general similarities in the materials dealt with from time to time.[93]

Again, Dewey's concept of method places emphasis upon the fact that there is no separation between the method and the subject matter. This involves his ideas that there is also no separation of mind and body as many previous positions have held. He cannot perceive how organized bodies of subject matter can be presented to the student with a method wholly external to the subject matter and the learner. The method must be an integral part of the subject matter. "Method is not antithetical to subject matter; it is the effective direction of subject matter to desired results. It is antithetical to random and ill-considered action, --ill--considered signifying ill-adapted."[94] For example, some teachers logically organize a body of knowledge, facts, and theories, and by lecture, textbook, and objective examination see to it that the student has acquired or knows the subject matter. Their method and the subject matter are not necessarily related. Not so for the experimentalist, for he would insist that the subject matter in the foregoing example become part of his method and is useless without it. He would, first of all, examine the properties of the individual to determine experiences already existing in his background and also to determine ways of experiencing the content that will be most meaningful toward the desired consequences of this

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[93]John Dewey, Democracy and Education, p. 211.

[94]*Ibid.*, p. 194.

activity. This is the experimentalist's method, it varies according to needs, interests, desires, application, significance, and consequence. It always considers the individual's experience and ways of experiencing in any learning activity. The method is used by the student and is directed and guided by the teacher. It can be seen that "flexibility and initiative in dealing with problems are characteristic of any conception to which method is a way of managing material to develop a conclusion."[95] Method and subject matter are integral components of the ever present process of learning.

A final aspect of methodology is that involved in the process of meeting, defining, and carrying to a meaningful conclusion the problem of the individual. Dewey defines this process as "method as individual". It is more commonly known in progressive schools as the problem solving method. This individual method must begin with a problem, a real problem for the learner. A real problem is not one which is implied or suggested by an external force, the teacher or textbook, for this type of problem "is artificial, so far as thinking is concerned, to start with a ready-made problem is problem made out of whole cloth or arising out of a vacuum. In reality such a 'problem' is simply an assigned task."[96] A problem with real meaning which causes doubt and confusion is one which "perplexes and challenges

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[95] Ibid., p. 200.

[96] John Dewey, How We Think, p. 108.

the mind, so that it makes belief at all uncertain."[97] This viewpoint requires significant elaboration in the classroom, causing teachers to be sensitive and receptive to the problems of the individual and the group. The teacher, in understanding meaningful problems of the student, must 'know' the students in a way the traditionalist never dreamed possible. For it is here, the association between student and teacher, that the meaningful problems of the student come to life, as needs, interests, and desires are expressed. A sensitive teacher is able to captivate these interests through which many individual problems arise and serve to direct and help define these problems. The sequence of the method of problem solving may best be expressed through an outline of the steps involved.

1. The problem is created or confronted through doubt, a development of the relation of the individual to his environment.
2. The student collects as much information about the problem as he can, sorting and differentiating to give support to various solutions.
3. Ideas, suggestions, and factual information are formed into working hypothesis, setting aims and considering consequences. A plan is developed through experience.

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[97]John Dewey, Philosophy and Civilization (New York: Minton, Balch and Company, 1931), p. 12.

4. The plan is set into action by experimentation and testing to determine results.
5. The result or solution to the problem is evaluated according to the original aims and goals established. Judgments are made to its applicability as a solution.

The problem solving method, being individual, will vary according to its use and according to the temperament of the individual. Dewey lists the traits of the individual method and notes its adaptability when he states:

> The most general features of the method of knowing.... are the features of the reflective situation: Problem, collection and analysis of data, projection and elaboration of suggestions or ideas, experimental application and testing; the resulting conclusion or judgment. The specific elements of an individual's method or way of attack upon a problem are found ultimately in his native tenedencies and acquired habits and interests. The method of one will vary from that of another (and properly vary) as his original instinctive capacities vary, as his past experiences and preferences vary.[98]

In summing up methodology in terms of experimentalism, Dewey says, "While we may speak, without error, of the method of thought, the important thing is that thinking is the method of an educative experience. The essentials of method are therefore identical with the essentials of reflection."[99] Education must be based upon the method of reflective thinking to provide society with people who know more than how to answer a question or how to think but rather how to take intelligent action. The experimentalist's conception of knowledge

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[98] John Dewey, Democracy and Education, p. 203.

[99] Ibid., p. 192.

exemplifies his value of method. "Knowing is itself a mode of practical action and is the way of interaction by which other natural interactions become subject to direction. Such is the significance of the experimental method as far as we have as yet traced its course."[100]

Truth and Reality

The experimentalist's position concerning truth in his philosophy is unique in that the whole idea of the philosophy is not based upon a theory of truth as are most philosophies. His philosophy is based upon the needs of man as a social organism in an ever changing environment. Truth is important so long as it plays a part in this process. More important to him is the concept of the idea, for if the idea leads to meaningful consequences, if it works in the life activities for which it was meant, then it is considered true. That is, it is true for that given situation. This points up his belief that there can be no eternal truths, for all things are in flux or change, and ideas that may be tested and found true today may not be the same tomorrow. Since the organism must be involved with the environment to have any thinking or knowing, and the environment, social and natural, is always in a state of change, it follows that the consequences of any act are subject to change. Hence truth, or the testing of an idea, is always relative. Dewey explains his own meaning when he says: "The best definition of truth from the logical standpoint

[100] John Dewey, Quest for Certainty, p. 107.

which is known to me is that of Peirce: 'The opinion which is fated to be ultimately agreed to by all who investigate is what we mean by the truth, and the object represented by this opinion is the real'."[101] Dewey prefers to use the term "warranted assertibility" in place of truth, belief, or knowledge because "it is free from the ambiguity of these latter terms, and it involves reference to inquiry as that which warrants assertion. When knowledge is taken as a general abstract term related to inquiry in the abstract, it means warranted assertibility."[102] Truth, then, becomes the result of a scientific inquiry after the consequences have been experimentally tested. This explains the experimentalist's pet saying, if it works it's true. Truth becomes a temporary 'label' attached to those meanings resulting from the complete act of the method of inquiry. Dewey states:

> What direction, therefore, must an empirical philosopher take who wishes to arrive at a definition of truth by means of an empirical method? He must, if he wants to apply this method, and without bringing in for the present the pragmatic formula, first find particular cases from which he then generalizes. It is therefore in submitting conceptions to the control of experience, in the process of verifying them, that one finds examples of what is called truth. Therefore any philosopher who applies this empirical method without the least prejudice in favor of pragmatic doctrine, can be led to conclude that truth "means" verification, or if one prefers, that verification, either actual or possible, is the definition of truth.[103]

We now see that Dewey's whole conception of truth or warranted assertibility is in the verification of ideas in the process of

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[101] John Dewey, Logic The Theory of Inquiry, p. 345 (footnote).

[102] Ibid., p. 9.

[103] John Dewey, Philosophy and Civilization, p. 23.

inquiry. He further believes, regarding so-called dogmatic truths "that the only alternative to ascribing to some proposition self-sufficient, self-possessed, and self-evident truth is a theory which finds the test and mark of truth in consequences of some sort is, I hope, an acceptable view."[104]

As far as the experimentalist is concerned, there is little distinction between truth and reality. They are separate terms but they work together. He would suggest that an idea is true if it agrees with reality, that is, if it is in accordance with the existing workable experiences of the individual. The two terms are not identical in the sense that some things in reality are not true according to a given situation. For example, a fact in reality may not be true though it exists in the experience of man when it does not provide valuable consequences in a particular activity. Hence, to the experimentalist, there is no all prevailing reality. Reality is the facts and relations of facts found in the immediate ideas and experiences of man. Therefore, reality neither needs to be true or false, it is the realization man has of his organistic-environmental involvement, both in thought and doing. Dewey states:

> It is often said that pragmatism, unless it is content to be a contribution to mere methodology, must develop a theory of Reality. But the chief characteristic trait of the pragmatic notion of reality is precisely that no theory of Reality in general, uberhaupt, is possible or needed. It finds that 'reality' is a denotative term, a word used to designate indifferently everything that happens. Lies, dreams, insanities,

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[104] John Dewey, Problems of Men (New York: Philosophical Library, 1946), p. 335.

deceptions, myths, theories are all of them just the events they specifically are."[105]

Facts or reality are temporary instruments but do not necessarily have infinite value. When they are true they have "warranted assertability". "In briefest formula, 'reality' becomes what we wish existence to be, after we have analyzed its defects and decided upon what would remove them; 'reality' is what existance would be if our reasonably justified preferences were so completely established in nature as to exhaust and define its entire being and thereby render search and struggle unnecessary."[106]

In short, then, truth depends upon a theory of knowledge and ideas and it follows naturally upon the application of the experimental approach. It requires a problem and the testing of its solution. If the solution is satisfactory and is workable for the needs of the individual and society, it is considered true. Hence, truth and reality are very closely associated, for if something is proven as true it is also proven as real. Reality exists as the environment in social happening and truth its workability in relation to man and his needs.

Value

The experimentalist does not define his notions concerning values by insisting that they are absolutes or ultimates to be sought after.

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[105]John Dewey, Creative Intelligence (New York: Henry Holt and Company, 1917), p. 55.

[106]John Dewey, Experience and Nature, pp. 53-54.

He would rather show that values are rooted in the social, individual, and environmental relationships of society. This relationship is often referred to as the social-vocal phenomenon! Values exist as they evolve from the individual-social interaction of men. As is true with the experimentalist in other fields of thought, he bases his theory of value on experience. The experiencing of an activity or event causes a value judgment to take place. Dewey provides the more meaningful concept of experience and value when he says:

> The term 'value' has two quite different meanings. On the one hand, it denotes the attitude of prizing things, finding them worthwhile, for their own sake, or intrinsically. This is a name for a full or complete experience. To value in this sense is to appreciate. But to value also means a distinctively intellectual act—an operation of comparing and judging—to valuate. This occurs when direct full experience is lacking, and the question arises which of the various possibilities of a situation is to be preferred in order to reach a full realization, or vital experience.[107]

In respect to the first of these direct theories about values that Dewey has presented, it should be pointed out that he insists it is a full and complete experience. That is, for example, that for a person to see a new automobile does not mean that he has placed or developed a valuation of it. It does mean, however, when he drives the new car, experiencing its ease of handling, economy of fuel, beauty, etc., that he has had a complete experience which has developed in him an attitude of pleasure, desire to own, prizing, or asthetic need. Through this experience he has developed a value. This value created, however, does not indicate its finality or everlastingness.

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[107]John Dewey, Democracy and Education, p. 292.

Dewey illustrates the instability of values due to change when he states:

> But values are as unstable as the forms of clouds. The things that possess them are exposed to all the contingencies of existence, and they are indifferent to our likings and tastes. Good things change and vanish not only with changes in the environing medium but with changes in ourselves.[108]

It will be noticed that he uses the expression, "things that possess them" (values), meaning that experiences possess value, where as objects not related to the individual or society do not. For objects of this nature possess nothing in the way of value.

Another aspect of values, that of valuating, involving an intellectual activity, is of major concern to education. This, of course, is directly connected with his theory of inquiry and problem solving where choices have to be made from the facts and understandings at hand. It is also effectively used in the placing of value judgments on the solutions of problems. "Judgments about values are judgments about the conditions and results of experienced objects; judgments about that which should regulate the formation of our desires, affections and enjoyments. For whatever decides their formation will determine the main course of our conduct, personal and social."[109] It can be seen that Dewey likens his theory of values to his theory of science. If values are to be useful they need to be more than just 'liking' something, they need to be involved judgments arrived at by a similar system as that of scientific inquiry.

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[108] John Dewey, Experience and Nature, p. 399.

[109] John Dewey, The Quest for Certainty, p. 265.

CHAPTER III

THE OBJECTIVES OF AN INDUSTRIAL ARTS TEACHER EDUCATION PROGRAM

The basic philosophy of John Dewey, having been developed in the previous chapter, leads us to consider some of the applications of this position concerning a program of industrial arts teacher education. While the philosophy of Dewey is not new to many fields of education and educational thought, its implications for industrial arts teacher preparation programs have not been rendered either completely or practically usable to the teacher educator. It is the purpose of this chapter to develop and define some of the major objectives of the industrial arts teacher education program falling within the experimentalist's viewpoint and to recognize their usefulness in the teaching-learning process.

The Basis for Educational Objectives

The objectives of education under any given philosophical viewpoint undoubtedly develop out of the fundamental principles of that philosophy; so too for the experimentalist. As we have already seen, he is overwhelmingly wrapped up in the experiences of the individual and his existence as a social organism in his outlook toward education. Though it would be difficult for the experimentalist to express an over-all or all-inclusive objective of education that would be extremely useful as a guiding function from this basis, he would rather provide a general objective. Education toward further education would fit his theme, or perhaps, learning how to experience new experiences or the development of experience through reconstruction might be better. However, these are extremely general and have little meaning in educational practice for they involve many philosophical implications. In the ever-changing mode of his philosophical belief, the experimentalist is hard put and reluctant to pin down a hard and fast objective, specific or general. Experience is the basis of education, and all things, including experience, are in a state of change and by their very nature require us to have ever changing and adjusting educational objectives.

With these thoughts as a starting point we can now look to the experimentalist for some more detailed guiding principles upon which to base our educational purposes. In discussing this point, Dewey states that "it is not out of the question to aim at making the methods of learning, of acquiring intellectual power, and of assimilating subject-matter, such that they will render behavior more enlightened, more consistent, more vigorous than it otherwise would be."[1] He indicates here that education should cause a change in behavior toward a more spirited intellectual being and not a change in his ability to retain bodies of knowledge as we commonly set as our goal. Another area in which Dewey is concerned about

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[1]John Dewey, Moral Principles in Education (New York: Houghton Mifflin Company, 1909), p. 3.

objectives is that of how the specific objectives are obtained. He would definitely object to the establishing of specific individual or even over-all objectives from an external source, outside of the teaching-learning situation. He makes this quite clear when he states:

> It is, then, a sound instinct which identifies freedom with power to frame purposes and to execute or carry into effect purposes so framed. Such freedom is in turn identical with self control; for the formation of purposes and the organization of means to execute them are the work of intelligence. Plato once defined a slave as the person who executes the purposes of another, and, as has just been said, a person is also a slave who is enslaved to his own blind desires. There is, I think, no point in the philosophy of progressive education which is sounder than its emphasis upon the importance of the participation of the learner in the formation of the purposes which direct his activities in the learning process, just as there is no defect in traditional education greater than its failure to secure the active co-operation of the pupil in construction of the purposes involved in his studying.[2]

Thus, as Dewey has illustrated, all of our striving toward the development of educational objectives _must_ include the consideration and participation of the individual and group in their formulation. This is not, by far, a new proposal by Dewey, yet it would frighten many professional educators to consider establishing their educational purposes under these conditions.

A third consideration that must be given attention when proposing objectives is that of understanding one's self. This purpose grows out of the negative traditional view that what the student learns is more important than what understandings and changes he

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[2]John Dewey, _Experience and Education_ (New York: The Macmillan Company, 1952), pp. 77-78.

sees in himself, as the experimentalist might feel. "To the growth of the child all studies are subservient; they are instruments valued as they serve the needs of growth. Personality, character, is more than subject matter. Not knowledge or information, but self realization is the goal."[3] Even as far back as the early 1900's Dewey pointed out the need for a democratic and socially orientated education when he said, "The democracy which proclaims equality of opportunity as its ideal requires an education in which learning and social application, ideas and practice, work and recognition of what is done, are united from the beginning and for all."[4] The stress placed upon the human and social organization of education by the experimentalist causes us to believe that the major purpose of education would be toward this end. He upholds this position, stating:

> Similarly a social efficiency which is defined in terms of rendering external service to others is of necessity opposed to the aim of enriching the meaning of experience, while a culture which is taken to consist in an internal refinement of a mind is opposed to a socialized disposition. But social efficiency as an educational purpose should mean cultivation of power to join freely and fully in shared or common activities. This is impossible without culture, while it brings a reward in culture, because one cannot share in intercourse with others without learning—without getting a broader point of view and perceiving things of which one would otherwise be ignorant. And perhaps there is no better definition of culture than that

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[3]John Dewey, The Child and the Curriculum (Chicago: The University of Chicago Press, 1902), p. 13.

[4]John Dewey, Schools of Tomorrow (New York: E. P. Dutton and Company, 1915), p. 315.

> it is the capacity for constantly expanding the range and accuracy of one's perception of meanings.[5]

With this background of the experimentalist, and though he is hesitant in proposing so-called objectives of education, let us pull together his major points of view concerning the purposes of education to establish a basis for our thinking in terms of the industrial arts teacher education program.

The purposes of education should be to:

1. Cause a change in behavior such that the individual seeks to be enlightened, strives for consistency in thinking, and becomes actively intellectual in growth.
2. Seek out the needs, interests and desires of the individual in formulating both his own and group objectives; a basic rule.
3. Develop social efficiency, broadly defined, along the lines of nature and "culture or personal mental enrichment."[6]

It is felt that with these guiding principles concerning education in general, the purposes of an industrial arts teacher education program can be developed, and must be within and consistent with this framework.

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[5]John Dewey, Democracy and Education (New York: The Macmillan Company, 1916), pp. 144-145.

[6]*Ibid.*, p. 144.

Concerning Industrial Arts Teacher Education

Since the beginning of industrial arts programs and its forrunners, manual arts and manual training, both the professional educator and the classroom or laboratory teacher have been concerned with the purposes of their programs. Objectives have been developed by individuals, committees, and organizations and are discussed and debated with exhausting persistence, each to his own point of view. This has been of extreme value to our profession and undoubtedly will continue to guide those interested in perpetuating its improvement. However, the contribution of some organized objectives for the industrial arts teacher education program evolved from the philosophy of John Dewey, it is hoped, will shed some light on another consistent approach to their development.

The position held by many traditional educators concerning objectives for the industrial arts teacher education program illustrates a separation between purposes common to all curricular teaching areas and those supposedly unique to the industrial arts curriculum. This separation was based upon the assumption that the industrial arts curricular area was the only place where some of these things could be gained. This is perhaps true, but more basic is the fact that all curricular areas aim to educate teachers, and the common broad background for teachers should be the same if the integration and interrelationships of subject matter areas and general educational aims are to be met. The objectives of a program should foresee outcomes of what a person should be like when he embarks upon teaching. We are not here concerned with unique course aims or what the industrial arts program can do in developing technique, providing information, or establishing work habits. These are minor objectives, or perhaps methods, and not sought outcomes. From this viewpoint, the purposes of the industrial arts teacher education program shall be developed. A number of areas with which the experimentalist is deeply concerned will be examined and purposes for the industrial arts teacher education program withdrawn.

Effective Experience

The experimentalist has long argued that the human being learns best by going through pleasant meaningful experiences, experiences which build on past experiences and lead to further experiences that are in line with the aims and interests of his life. The type of experience about which he is concerned is not that which sets up a framework in which a student must learn, an externally imposed framework based on what some teacher or professor knows the student needs. He is interested in developing criteria for planning experiences formulated out of needs, desires, and interests of the student in going through an activity. In this connection, Dewey feels that in the case of experience as it was viewed by the traditional educator, it was "not the absence of experience, but their defective and wrong character—wrong and defective from the standpoint of connection with further experience" that made it ineffective.[7] It is this point

[7]John Dewey, Experience and Education, pp. 15-16.

about which he is greatly concerned as he says, "Everything depends upon the quality of the experience which is had."[8] He feels that the truly educative experiences must have some sort of pleasantness about them, and more important, that they be planned and integrated into future experiences. The common phrase "learning by doing" is often misunderstood in its connection with effective experience. Learning by doing denotes activity but it does not denote continuity, direction, integration, and planning as it was intended. Learning by doing or effective experiencing insists upon the association of experiences. For example, to go through the experience of baking a cake with no regard for past experiences in this activity and no outlook toward future interests or consequences is meaningless. "Mere activity does not constitute experience".[9] However, when the experience of baking a cake is taken on as a directed activity, born out of and growing from previous trials and guided by past consequences toward future needs, desires, and results, it becomes a true learning situation. Dewey states it this way; "When an activity is continued <u>into</u> the undergoing of consequences, when the change made by action is reflected back into a change made in us, the mere flux is loaded with significance. We learn something."[10] Learning by doing has

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[8]*Ibid.*, p. 16.

[9]John Dewey, *Democracy and Education*, p. 163.

[10]*Ibid.*, p. 163.

taken place through effective experience. Thus, effective experience is the basis for learning.

This, however, is not the whole story. In the process of learning the going through of experiences by the student requires more than his own activity and planning, at least while learning how to effectively experience experiences. It is not enough to go through a soundly planned experience, for has the student learned how to develop the habit of providing effective experiences for himself? This also, then, involves the teacher as an integral part of the process. The teacher sees the process as a method of teaching and in the teacher education program realizes the need on the part of the student to understand this segment of how people learn. The teacher becomes the guide or resource person in assisting the student in planning activities incorporating these criteria toward effective experiences.

As an outcome of the industrial arts teacher education program, effective experience provides the prospective teacher with a background of growth through activity invaluable in his future profession as an industrial arts teacher in the public schools. This is an important outcome under the Deweyan attitude, mainly because the prospective industrial arts teacher has gone through experiences far beyond the limits of the textbook, the traditional subject matter, and skill development. For example, he is familiar with the ongoing avocational activities of our society, of do-it-yourself, hobbies, and recreational craft programs through his experiences in these activities. He is living and learning through the consequences of his planned activities and has developed an insight upon which are based his understandings of the teaching-learning process.

With so much emphasis upon effective experiencing one might challenge its importance as an outcome of this phase of education. The traditionalist would far prefer the ability to recall facts as a desirable objective. Dewey takes his stand in defense of experience as a basis for learning when he states:

> Anticipation is therefore more primary than recollection; projection than summoning of the past; the prospective than the retrospective. Given a world like that in which we live, a world in which environing changes are partly favorable and partly callously indifferent, and experience is bound to be prospective in import; for any control attainable by the living creature depends upon what is done to alter the state of things. Success and failure are the primary "categories" of life; achieving of good and averting of ill are its supreme interests; hope and anxiety (which are not self-enclose states of feeling, but active attitudes of welcome and wariness) are dominant qualities of experience.[11]

With these thoughts in mind we may foresee an objective or outcome of the industrial arts teacher education program based on the experimentalist's notion of effective experience as a fundamental process in the teaching-learning situation. This notion is especially well taken when we note the possibilities of planned experiences in the industrial arts teacher education laboratory which, when viewed realistically, can be more life situational than most areas of teacher education. Students work individually and in groups with materials of everyday living and those of industry, with processess congruent with

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[11]John Dewey, Creative Intelligence (New York: Henry Holt and Company, 1917), p. 13.

our social and industrial society, and with the practical tools and operations that sustain our level of living. Where else could Dewey's emphasis upon practical, present needs of life be more effectively experienced?

A final analysis which subordinates the value of knowing how to experience given activities in learning is illustrated by Philip Phenix when he states:

> Dewey insisted that all thought must refer to experience, that all valid knowledge and sound practical judgment must proceed from the analysis of experience. Distinctions and contrasts may be made by thought, but always from within the encompassing unity of experience. Ideas are worthless when they lose connection with the actual struggle of human beings to understand and control themselves and their environment. Hence productive thinking about human problems should proceed, not from ready-made, a priori abstractions, but from real situations in which people try to solve problems and seek for meaning in what they undergo and direction for what they perform.[12]

Educational Philosophy

It has already been discussed that the experimentalist bases his philosophy upon experience, and the experiences of man as a social organism are expressed as his ultimate interest. This thought signifies the key to the educational philosophy of experimentalism, for it is man and man alone around which all things should revolve. Man is all important, and those things that temper or regulate his life are held of value in so far as they provide meaningful experiences

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[12]Philip H. Phenix, "John Dewey's War on Dualism—Its Bearing on Today's Educational Problems," The Phi Delta Kappan, (October, 1959), p. 6.

for him. In other words, all things can be measured by their effect upon man. It is common in some philosophic points of view to place little emphasis upon man when establishing values, absolutes, or theories. This upsets the experimentalist, for how can anything have value or absolute status when it does not exist in the mind or environmental world of the individual. The need for a sound philosophy to be developed by the prospective industrial arts teacher on this basis is eminent under the philosophy of John Dewey. As an outcome or purpose of the industrial arts teacher education program, the need for each student to develop a philosophy of education based on man, as he makes value judgments in his environment, is essential. It places him in a position to understand himself and his relationship to the student in the educational process of experimentalism.

With this philosophy then, developed through his total educational program, the prospective industrial arts teacher would become a living example of the experimentalist position. He would hold this even above his teaching for without it his teaching could not be consistently effective. His teaching would be based upon the student, his needs, his interests, and the problems with which he is faced, for to help students find solutions to their problems is his greatest asset. Dewey points out the importance of the individual as the basis of philosophy when he states:

> Until it frees itself from identification with problems which are supposed to depend upon Reality as such, or its relation to a Knower as such, the hands of philosophy are tied. Having no chance to link its fortunes with a responsible career by suggesting things to be tried, it cannot identify itself with questions which actually arise in the vicissitudes of life.

> Philosophy recovers itself when it ceases to be a device for dealing with the problems of philosophers and becomes a method, cultivated by philosophers for dealing with the problems of men.[13]

This illustration by Dewey shows his position concerning a philosophy of education prepared to attack the problems of the individual in society, and not a philosophy organized to establish predetermined subject matter which the student can memorize and draw from when problems in his life arise. In the hands of the teacher this philosophy enables him to help students become very much like himself. They would rather think and act for themselves, do rather than know, and develop their education through activity. "Activity calls for the positive virtues—energy, initiative, and originality—qualities that are worth more to the world than even the most perfect faithfulness in carrying out orders."[14]

To develop in the prospective teacher a sound educational philosophy of teaching and learning based upon the problems of man and his valuations, is the proposed desired outcome of the industrial arts teacher education program. No further justification will be made since this program is being organized out of Dewey's philosophy. It is assumed that he would agree that an understanding of his philosophy serve as an outcome for the industrial arts teacher education program.

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[13]John Dewey, Creative Intelligence, p. 65.

[14]John Dewey, Schools of Tomorrow, p. 298.

Educational Interrelationships

Historically it has long been observed that various aspects of education from kindergarten to higher studies have been organized around so-called subject matter areas. Also, these subject matter areas have had little integration, one with another, and yet grouped together in total to be called general education. To Dewey this is a logical organization but psychologically unsound. Why study chlorides in chemistry class and not be able to spell the word in the following class in English? Why study the philosophy of education in that department and have difficulty assimilating it with teaching methods in statistics? Examples such as these can be found on any level of our educational programs and cause us to reflect just how the subject matter areas of the public schools are interrelated one with another and with the general education program as a whole. The experimentalist would probably not organize the curriculum, content, or subject matter of the school around established fields of study so definitely as we have today. However, it is necessary since this organization is almost totally used in our schools, to understand the experimentalist's viewpoint concerning this organization. The prospective industrial arts teacher should definitely have a sound understanding of the role of subject matter in general to the total school philosophy, aims, and purposes. For if this understanding does not exist, "the bonds which connect the subject matter of school study with the habits and ideals of the social group are disguised and covered up. The ties are so loosened that it often appears as if there were none; as if subject matter existed as knowledge on its own independent behoof, and as if study were the mere act of mastering it for its own sake, irrespective of any social values."[15]

It also holds true that the various subject matter areas have definite relationships to one another and to the total school program, and the teacher should be the first to recognize this and utilize its existence. Is industrial arts not concerned with mathematical principles, with the social sciences, the physical sciences, art, history; is there any subject matter area with which it is not concerned? And for that matter is there any curricular area in the school that does not interrelate itself with the broad field of industrial arts in our society? The good teacher then, to be effective in student growth and development, would know of these existing relationships and pursue his teaching activities from this point of view. Industrial arts is not a concrete unity of subject matter in and of itself, but rather a contributing area of emphasis in the total program of education. This idea illustrates Dewey's interpretation of general education. The child comes first and the subject matter is subordinate, for "the facts and truths that enter into the child's present experience, and those contained in the subject matter of studies, are the initial and final terms of one reality."[16] This topic, the interconnectedness of studies or subject matter areas about which Dewey is greatly

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[15]John Dewey, Democracy and Education, p. 213.

[16]John Dewey, The Child and the Curriculum, p. 17.

concerned, is made quite clear when he states:

> In the first place, there is no line of demarkation within facts themselves which classifies them as belonging to science, history, or geography, respectively. The pigeon-hole classification which is so prevalent at present (fostered by introducing the pupil at the outset into a number of different studies contained in different text-books) gives an utterly erroneous idea of the relations of studies to one another and to the intellectual whole to which all belong. In fact, these subjects have to do with the same ultimate reality, namely, the conscious experience of man. It is only because we have different interests, or different ends, that we sort out the material and label part of it science, part of it history, part geography, and so on."[17]

It is here that Dewey intimates that our public school organization concerning subject matter has developed on selfish or near-sighted grounds; that our own individual goals and interests cause us to see our own specialized field as far more important than the total picture of education within which we work. Further, that by not understanding the place of our own area of emphasis we cannot contribute to the total development of the student as effectively as we might. This leads us then to the introduction of an objective to the industrial arts teacher education program based upon the development of an understanding of the interrelationship of the industrial arts curricular area with other curricular areas and the total program of general education. Such an understanding would help to integrate teaching and learning to a common cause rather than differentiate it into separate, often over-lapping and competitive, subject matter

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[17]John Dewey, Moral Principles in Education, pp. 32-33.

areas. We often hear a teacher state that teachers in other fields don't understand her problems; that she can't be expected to teach grammar in her home economics classes. Why not, we might ask; aren't the problems of the student the real content of a given course? Isn't good grammar just as important to the individual in home economics class as it is to him in English class or in discussions with his peers? Dewey has often stated that the logical organization of subject matter is an easy way to compile a body of facts but that the psychological organization wraps the student in the meanings of life. This also bears upon the dualism of mind and body which Dewey was trying to overcome. The prospective teacher should be aware of the place of his field of emphasis in the overall educational program which deals with the lives of people. The study of mathematics should certainly be interrelated with the needs and uses of mathematics in the home, office, or industry, thus separation leads to ineffective education. The need for a togetherness of thought and action or subject matter and purposes is illustrated when Dewey states:

> Chief among these obstacles are the practices which are associated with the traditional separation of mind and body and the consequent neglect of informed and intelligent action as the aim of all educational development. The division has affected every subject of study, every method of instruction and discipline. More than anything else it explains the separation of theory and practice, of thought and action. The result is a so-called cultural education which tends to be academic and pedantic, in any case aloof from the concerns of life, and an industrial and manual education which at best gives command of tools and means without intelligent grasp of purposes and ends.[18]

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[18] John Dewey, "Body and Mind", Bulletin of the New York Academy of Medicine, Volume IV, pp. 17-19.

Now from this point of view, the prospective teacher will know more than his subject matter area and methods of teaching this area. He should realize what education is and how he fits into the pattern and what contribution he can make. "The thing needful is improvement of education, not simply by turning out teachers who can do better the things that are now necessary to do, but rather by changing the conception of what constitutes education."[19]

Problem Solving

In accord with the experimentalist's position the industrial arts teacher education program has the responsibility of providing for a two-fold activity. First, that the prospective teacher learn how to solve problems, problems that are real and meaningful to the individual. Secondly, that the prospective teacher be in a position to instruct on the problem solving or scientific approach basis. The latter, of course, deals with methodology in teaching and will be discussed at length under that heading. As an outcome or objective of the industrial arts teacher education program, the problem solving attitude takes on unlimited importance. Problem solving, or reflective thinking as Dewey usually regards it, "is to bring about a new situation in which the difficulty is resolved, the confusion cleared away, the trouble smoothed out, the question it puts answered."[20] As

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[19]John Dewey, "The Relation of Theory to Practice in the Education of Teachers," National Society for the Scientific Study of Education, (Third Yearbook, Part I, 1904), p. 30.

[20]John Dewey, How We Think, (New York: D. C. Heath and Company, 1933), p. 99.

we have previously noted, the experimentalist would far rather the student develop a problem solving attitude by studying the techniques and steps in reflective thinking than spend the student's time in repetitive tasks and memorization of bodies of knowledge. Many traditional schools held this process as a definite objective of our educational programs. The good teacher would be an expert, having all the answers stored away for future problem situations. However, the experimentalist does not agree that this will work. He would probably ask if two problems exactly alike ever arise, or are the environmental conditions for two problem situations ever the same? Is the solution of a problem for one individual the satisfactory solution for everyone? These questions are very hard for the traditionalist to answer and the experimentalist feels there is no answer except to be prepared to function through reflective thought, "to transform a situation in which there is experienced obscurity, doubt, conflict, disturbance of some sort, into a situation that is clear, coherent, settled, harmonious."[21]

The condition of the student developing a scientifically orientated outlook, a pattern of thought or inquiry, "is satisfied only as the educator views teaching and learning as a continuous process of reconstruction of experience."[22] This condition cannot be developed through the more traditional methods of teacher passing out

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[21] Ibid., p. 99.

[22] John Dewey, Experience and Education, p. 111.

the facts and inactive student receiving these. Dewey is quite concerned that the problem solving attitude or method be cultivated, for it is an individual method and satisfies the quest for knowledge based upon one's experience. Though the subject matter is important, the method by which it is assimilated is equally important and should be encouraged as Dewey points out:

> Intellectual thoroughness is thus another name for the attitude we are considering. There is a kind of thoroughness which is almost purely physical: the kind that signifies mechanical and exhausting drill upon all the details of a subject. Intellectual thoroughness is seeing a thing through. It depends upon a unity of purpose to which details are subordinated, not upon presenting a multitude of disconnected details. It is manifested in the firmness with which the full meaning of the purpose is developed, not in attention, however "conscientious" it may be, to the steps of action externally imposed and directed.[23]

If this scientific outlook or problem solving attitude becomes a part of the student, he is in a position to adequately handle most situations that arise. This attitude or method "can be employed in dealing with problems that were not anticipated. The mind is prepared in advance for all sorts of intellectual emergencies, and when the new problem occurs it does not have to wait till it can get a special instrument ready."[24] With this type of emphasis placed upon the problem solving attitude by Dewey it is felt that it should be included as an objective of the industrial arts teacher education program.

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[23]John Dewey, Democracy and Education, p. 210.

[24]John Dewey, Reconstruction in Philosophy, (Boston: The Beacon Press, enlarged edition, 1948), p. 149.

Tools and Materials

As in the other phases of educational purposes, an understanding and ability in connection with the subject matter emphasis deems itself necessary. This also has its aspect of dualism in its appropriateness for the prospective teacher in the public schools and for the individual as a student of education. The topic here, tools and materials of our industrial society reflected in the industrial arts program, are not necessarily unique to any curricular area for all areas should have some concern for our industrial society. The uniqueness is seen more in the methods and processes available in the industrial arts laboratory.rather than in its place as an objective in the educational program. Stated as an objective of the industrial arts teacher education program, the prospective teacher should gain basic skills in the use of tools and materials common to the present industrial demands of society. With little alteration this statement has been proposed as an objective of industrial arts programs by realistic educators for many years, and its interpretation in this work must be defined and justified. First of all, the outcome as just stated is appropriate to any subject matter area of the teacher education program. It is unique only as it is attained through the facilities and processes of the industrial arts laboratory. For example, in the science education program, homemaking education, any phase of teacher education, tools and materials are involved and they represent the present demands of our industrial society. It can be seen then that the terminology here is to be interpreted broadly. The tools and materials of the program for the preparation of English teachers can be seen to be involved under this definition. From this assumption we can pursue an understanding of the development of some basic skills with these tools and materials.

If the prospective industrial arts teacher is to be highly effective he must develop basic skills in the use of tools and materials with which his future students will be engaged. Can we tell what tools and materials he will need to know about? The answer is "yes", to some extent. Since we know there are many materials, tools, and machines being used in present industrial activities we can provide a basic list. Would the industrial arts teacher be effective if he knew nothing about woods, plastics, metals, electricity and synthetic materials, or the common tools and machines that fabricate these materials? So the main question, as far as the experimentalist is concerned, is not whether basic skills should be developed but how these habits are gained and what meaning they have to the individual. Dewey states, concerning laboratory exercises and manual activities, that "their utilitarian value in forming habits of skill to be used for tangible results is important, but not when isolated from the appreciative side."[25] Here we see the difference between the traditionalist and experimentalist position. The traditionalist was concerned about the development of skill for its own sake. Thus, the most highly skilled musician would be the most effective music teacher.

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[25]John Dewey, Democracy and Education, p. 277.

Not so for the experimentalist, as Dewey states, the basic skills are important but their major role is found in the direction of knowledge.

Another aspect of basic skill development is that it gives the prospective teacher the ability to assume the responsibilities of teaching without being continually held back by trying to re-learn common place technical skills in each teaching-learning activity. When the algebra teacher is discussing quadratic equations he needs the basic skill of factoring, and when the homemaking teacher is assisting a student in the use of the sewing machine she will be far better off as a helpful teacher if she is basically skillful in the machine's operation and can spend her time helping the student in her individual problem situation. "It is common place that the mastery of skill in the form of established habits frees the mind for a higher order of thinking," Dewey states. "Something of the same kind is true of the introduction of mechanically automatic operations in industry."[26] He goes on to state, however, that schooling, even for direct occupations, should not be based upon skill development alone, for life is more than doing one's job and even doing one's job requires more than skill.

To secure the idea that Dewey is only concerned with the formation of basic habits of skill, to allow a person to go on to higher levels of thought and action or to learn something society demands of him, we may heed his statement that:

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[26] Ibid., p. 304.

> It is consequently futile to set up even the ulterior development of faculties of observation, memory, etc., unless we have first determined what sort of subject matter we wish the pupil to become expert in observing and recalling and for what purpose. And it is only repeating in another form what has already been said, to declare that the criterion here must be social. We want the person to note the recall and judge those things which make him an effective competent member of the group in which he is associated with others. Otherwise we might as well set the pupil to observing carefully cracks on the wall and set him to memorizing meaningless lists of words in an unknown tongue—which is about what we do in fact when we give way to the doctrine of formal discipline.[27]

From these emphatic words by Dewey our objective takes on more meaning. It stated that these basic skills concerning tools and materials be taken from our present industrial society, not just any technical skills or processes dreamed up by the teacher's interests or desires. The important meaning here is that the criteria for deciding what basic skills the prospective teacher should have should be carefully selected from our industrial society and altered as the industrialization alters. In the industrial arts area many manipulative processes are still being emphasized which are no longer of importance in our industrial society. The prospective industrial arts teacher should definitely be aware of the industrial and avocational needs of society and its changes.

Democracy and Industry

What should be the place of industry in the democratic society? What is the relation of one's occupation or vocation to the community,

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[27] Ibid., p. 77-78.

society, and democracy in which he lives? These are questions with which the prospective industrial arts teacher should be very familiar, questions which should be mingled through his total program as a future teacher in our society. These questions should form the foundation for a specific objective for the industrial arts teacher education program. Dewey states that, "With the change from an oligarchical to a democratic society, it is natural that the significance of an education which should have as a result ability to make one's way economically in the world, and to manage economic resources usefully instead of for mere display and luxury, should receive emphasis."[28] The democratic society provides for industrial pursuits to the extent that those occupations and industrial professions further the cause of the society. However, "wherever social control means subordination of individual activities to class authority, there is danger that industrial education will be dominated by acceptance of the status quo. Differences of economic opportunity then dictate what the future callings of individuals are to be."[29] We can see here that Dewey is quite concerned about the relationship of one's occupation, or industry as a whole, to the social group in which he operates and the democratic society. Pushing this theme further, in the education of the individual he says that, "if he is not trained in the right use of the products of industry, there is grave danger that he may deprive himself

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[28] Ibid., p. 139.

[29] Ibid., p. 140.

and injure others in his possession of wealth. No scheme of education can afford to neglect such basic considerations."[30]

If, as Dewey has indicated, these things are so important that they should not be overlooked in any educational scheme, they are necessary to be considered as an outcome of the industrial arts teacher education program. Especially so, since the people coming out of this program will be working in the public schools of our society directly with those children who will soon make up our industrial society in their future vocations. Education which does not include all of the aspects of the individual as a member of society is not complete and in many cases is so specific as to disregard the place of the individual in a democracy. For the industrial arts teacher education program this is especially important since the subject matter emphasis is mainly toward industry. Dewey supports the emphasis placed upon an understanding of the place of industry and vocation in democracy when he states:

> Personality must be educated, and personality cannot be educated by confining its operations to technical and specialized things, or to the less important relationships of life. Full education comes only when there is a responsible share on the part of each person, in proportion to capacity, in shaping the aims and policies of the social groups to which he belongs. This fact fixes the significance of democracy. ...It is but a name for the fact that human nature is developed only when its elements take part in directing things which are common, things for the sake of which men and women form groups—families, industrial companies, governments, churches, scientific associations and so

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[30] Ibid., p. 139.

> on. The principle holds as much of one form of association, say in industry and commerce, as it does in government.[31]

For the prospective industrial arts teacher to possess an understanding of the place of industry in our democratic society is essential according to the experimentalist. An educated society, even though the greatest percentage will be working in laboring, skilled, and technical occupations, needs more than an education to prepare for his occupation. He needs to have an understanding of where his job, his industry, his life, fits into the pattern of the democratic society. "The place of industry in education is not to hurry the preparation of the individual pupil for his individual trade. It should be used to give practical value to the theoretical knowledge that every pupil should have, and to give him an understanding of the conditions and institutions of his environment."[32] If this concept is to be carried out in public education, it becomes necessary for the industrial arts teacher to understand the principles upon which industry and the operation of a democracy rest. It should be a planned outcome of the industrial arts teacher preparation program.

Social Efficiency

We have already discussed, in general, that the experimentalist would probably set social efficiency at the top of his list as an objective of education. A narrowing of the term is now proposed as

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[31]John Dewey, Reconstruction in Philosophy, p. 209.

[32]John Dewey, Schools of Tomorrow, p. 312.

an objective of the industrial arts teacher education program, narrowed by Dewey's own words. "Social efficiency as an educational purpose should mean cultivation of power to join freely and fully in shared or common activities."[33] Our proposed objective of the industrial arts teacher education program, including Dewey's words, is stated; to develop social efficiency, "the power to join freely and fully in shared or common activities" as a member of his profession. This statement qualifies the teacher as a professional person who must operate socially with others in his group for the best interests of that group. He must be able to work with his professional group in sharing of experiences, making and observing rules, and contributing to better relationships between members of the group. As to the values and effectiveness of social efficiency Dewey remarks:

> It must be borne in mind that ultimately social efficiency means neither more nor less than capacity to share in a give and take of experience. It covers all that makes one's own experience more worthwhile to others, and all that enables one to participate more richly in the worthwhile experiences of others. Ability to produce and to enjoy art, capacity for recreation, the significant utilization of leisure, are more important elements in it than elements conventionally associated oftentimes with citizenship.[34]

This viewpoint brings out some very careful considerations for the industrial arts teacher education program. First of all, as a prospective industrial arts teacher, the student should realize the significance and value of his relationship with the profession into

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[33] John Dewey, Democracy and Education, p. 144.

[34] Ibid., p. 141.

which he is entering. He should not, as the experimentalist feels, regard all of his educational interests and activities as a personal matter built upon his own judgments and knowledge. Rather, he should have a nature of sharing with and profiting from others the experiences of his teaching and learning career. Secondly, and justly as important, he should apply the principles of social efficiency in his classroom activities. He should be a member of his class in a leading capacity rather than an outside authority who conveys his great knowledge to the waiting ears of his students. "When education is based on experience and educative experience is seen to be a social process, the situation changes radically. The teacher loses the position of external boss or dictator but takes on that of leader of group activities."[35] To give and take of experiences, also a form of social efficiency, operates effectively in the classroom or laboratory situation for "one cannot share in intercourse with others without learning."[36]

Social efficiency, then, becomes an area of emphasis above and beyond the subject matter, much broader than a method, and yet as important as either in the teaching-learning process. From these thoughts, for the prospective industrial arts teacher to have this ability, the development of social efficiency becomes an objective of the industrial arts teacher education program.

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[35]John Dewey, Experience and Education, p. 66.

[36]John Dewey, Democracy and Education, p. 145.

Educational Growth

The topic of educational growth rates much higher to the experimentalist than it does to advocates of other major philosophical positions. The experimentalist is deeply concerned about the fact that education should be a life long endeavor and he is as much concerned about this aspect of the educational process as he is about the years of formal schooling. As long as man is associated with his fellow men and democratic principles are the major emphasis of society, the educational growth of the individual can prevail. "For it is assumed that the aim of education is to enable individuals to continue their education—or that the object and reward of learning is continued capacity for growth."[37] This objective holds more value when it is placed within the realm of teacher education than it does in other areas, for where else do people have the need to develop the capacity for continued learning than in the education of teachers? Besides a need for this capacity, teachers have probably the greatest laboratory for continued educational growth in themselves; their own classroom. "Education as growth or maturity should be an ever present process."[38]

One of the most beneficial meanings that can be derived from the experimentalist's feelings about the ever present process of education is that education is not just a preparation for the future. It is

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[37] Ibid., p. 117.

[38] John Dewey, Experience and Education, p. 52.

not just a study of past and present to prepare the individual for future activities. This is where more traditional positions have failed, for they have apparently overlooked the fact that education is more than adults or the mature trying to bring the young up to their level or to the place where they can survive on their own abilities. We often hear statements that there are certain things that children will need to get along in society, when speaking of education. To the experimentalist this is not enough, for education is a continuing process. "The best thing that can be said about any special process of education, like that of the formal school period, is that it renders its subject capable of further education: more sensitive to conditions of growth and more able to take advantage of them. Acquisition of skill, possession of knowledge, attainment of culture are not ends: they are marks of growth and means to its continuing."[39] To the experimentalist then, education is a process common with living and its qualification includes only that man be an associating member of society.

How do these thoughts concern teacher education and the industrial arts teacher education program? Dewey says, "The mistake is not in attaching importance to preparation for future need, but in making it the mainspring of present effort."[40] This implies that our efforts be directed toward developing a program out of which teachers will

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[39]John Dewey, Reconstruction in Philosophy, p. 185.

[40]John Dewey, Democracy and Education, p. 65.

develop the capacity for continued educational growth; that the ability to grow educationally take on as much importance in our program as preparation for future needs in teaching. The good teacher can then learn and continue to learn from his immediate experiences and activities, causing growth toward yet better teaching ability, rather than having been prepared to teach in college and referring to this educational storehouse as the activities of his teaching career require. Dewey emphasizes this point when he states:

> If at whatever period we choose to take a person, he is still in process of growth, then education is not, save as a by-product, a preparation for something coming later. Getting from the present the degree and kind of growth there is in it is education. This is a constant function, independent of age. ...The contrast usually assumed between the period of education as one of social dependence and of maturity as one of social independence does harm. We repeat over and over that man is a social animal, and then confine the significance of this statement to the sphere in which sociality usually seems least evident, politics. The heart of the sociality of man is in education.[41]

To the end that the prospective industrial arts teacher be able to develop his capacity for continued educational growth, the industrial arts teacher education program should be concerned. As indicated by our discussion of skills, the industrial arts teacher should be a student of educational growth and development and philosophy and psychology first, and then develop basic manipulative skills as needed. "Unless a teacher is such a student, he may continue to immprove in the mechanics of school management, but he cannot grow

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[41]John Dewey, Reconstruction in Philosophy, pp. 184-185.

as a teacher, an inspirer and director of soul-life."[42]

Democracy and the Individual

All of the topics that have been discussed have yet to be woven into the needs and worth of the individual as a member of a democratic society. It is within the framework of the democratic society that the education of human beings must operate. It is also the need of education to further the purposes and sustain the belief in democracy as a way of life. "The democracy which proclaims equality of opportunity as its ideal requires an education in which learning and social application, ideas and practice, work and recognition of the meaning of what is done, are united from the beginning and for all."[43] To supplant the meanings of Dewey's concept of education and democracy it is necessary that the teacher education program in industrial arts provide for this concept as an outcome. For the student, and especially for the prospective teacher in the public schools, the meanings and realizations of education in a democracy should be understood and viewed as to their integration into each curricular area. The concept of democracy does not restrict but rather enlarges the opportunities for educational growth and development and it is for the individuals in our society that democracy in education must operate. Dewey states that:

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[42]John Dewey, National Society for the Scientific Study of Education, (Third Yearbook), p. 15.

[43]John Dewey, Schools of Tomorrow, p. 315.

> With the spread of the ideas of democracy, and the accompanying awakening to social problems, people are beginning to realize that everyone, regardless of the class to which he happens to belong, has a right to demand an education which shall meet his own needs, and that for its own sake the State must supply this demand.[44]

When we consider the meaning of Dewey's previous statement, we can note that the needs of the individual are uppermost in his mind and should be emphasized when planning educational programs in the democratic society. Also under this concept of education in the democratic society, it is the purpose of the schools to prepare people "for the life they are to lead in the world."[45] If people are to live in a democratic society then the education of the young should point in this direction. "Since a democratic society repudiates the principle of external authority, it must find a substitute in voluntary disposition and interest; these can be created only by education."[46]

Many of Dewey's viewpoints concerning education in a democratically orientated society have been considered, and it is from these considerations that the proposed objective for the industrial arts teacher education program is drawn. In short, an outcome of the industrial arts teacher education program should be to provide the prospective industrial arts teacher with an understanding of the democratic society and its implications for the life needs of the individual.

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[44] _Ibid._, pp. 305-306.

[45] _Ibid._, p. 288.

[46] John Dewey, _Democracy and Education_, p. 101.

Proposed Objectives

A discussion has been made of what is felt are the major viewpoints of Dewey concerning the needs or desired outcomes of an educational program. These objectives are stated in terms of the industrial arts teacher education program, not as a unique subject matter area but as a program of teacher education. The experimentalist feels that the education of teachers should be broad and not limited to the theory and practice of specialized subject matter areas. Dewey makes this quite clear when he speaks of the education of teachers, saying, "What is needed is the habit of viewing the entire curriculum as a continuous growth, reflecting the growth of mind itself."[47] It is on this basis, therefore, that the following objectives of the industrial arts teacher education program are based; unique only to the profession of teaching. Their order is inconsequential.

The objectives of the industrial arts teacher education program should be:

1. To expound the value of effective experiencing as the basis for learning and method of teaching industrial arts courses.
2. To develop in each student a sound educational philosophy of teaching based solely upon the problems of man and his value judgments in his environment.

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[47] John Dewey, National Society for the Scientific Study of Education, (Third Yearbook), p. 26.

3. To develop an understanding of the interrelationships of industrial arts with the total educational program and other individual curricular areas.

4. To cultivate a problem solving attitude and scientificially orientated outlook in the prospective teacher.

5. To gain basic skills in the use of tools and materials common to the present industrial demands of the society.

6. To develop an understanding of the place of industry and vocation in democratic life and community.

7. To develop social effficiency, "the power to join freely and fully in shared or common activities" as a member of his profession.[48]

8. To develop the capacity for continued educational growth.

9. To gain an understanding of the democratic society and its implications for the life needs of the individual.

It might be well to reiterate that the proposed objectives of the industrial arts teacher education program, growing out of the philosophy of John Dewey, are formed to serve as a guide in setting up the educational activities of prospective teachers in this field. Under these objectives the next two chapters on curriculum and methodology will be developed. One can easily see that these objectives are pointed toward the individual and his needs; a guiding principle for the operation of educational programs. It is in this

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[48] John Dewey, Democracy and Education, p. 144.

vain that Dewey so seriously states: "If we could really believe that attending to the needs of present growth would keep the child and teacher alike busy, and would also provide the best possible guarantee of the learning needed in the future, transformation of educational ideals might soon be accomplished, and other desirable changes would largely take care of themselves."[49]

[49] John Dewey, Schools of Tomorrow, p. 5.

CHAPTER IV

THE CURRICULUM IN INDUSTRIAL ARTS TEACHER EDUCATION

A study of curriculum development under the philosophy of experimentalism proves both interesting and enlightening in regard to the industrial arts teacher education program. Down through the years industrial arts subject matter has multiplied rapidly and little has been done to critically analyze its philosophical organization from other than a traditionalist point of view. Since the field of industrial arts contains so many so-called content areas, such as electricity, woodworking, crafts, etc., it is necessary to provide some over-all scheme or philosophy toward organization and evaluation under which matters of the curriculum can be most satisfactorily worked out. The curriculum is frequently considered to be those things that the school wants students to learn. Often overlooked are the many other things that students learn while in school, such as ways of thinking and acting or how to get along with other people. These are all part of the experiences of the student and should justly be considered in curriculum development. The purpose of this chapter is to present a concept of curriculum development in line with the philosophy of John Dewey which will be applicable to a teacher education program in industrial arts.

Fundamental Basis for Curriculum Planning

The fundamental basis for curriculum planning lies in the experimentalist's position concerning the individual. He feels that when an individual enters into an activity he engages in it as a total organism, calling on all of his active powers to pursue the problem and locate workable solutions. The way in which an individual enters into given activities is determined by his social, psychological, and physical needs and his learnings are the consequence of this activity. The purpose with which he engages in activities will determine the outcomes and consequences of these activities. The purposes of his activity determine how the learning takes place and they are the product of his needs; needs that have developed out of his relationship with his social environment as a human being. The purpose of education thus becomes an institution to help the individual lead a good life for himself and for others. This purpose, as we have already discussed, is developed out of the experimentalist's concept of the democratic society and its responsibilities for education. "A society which makes provision for participation in its good of all members on equal terms and which secures flexible readjustment of its institutions through interaction of the different forms of associated life is in so far democratic."[1] The schools in the democratic society can help the individual best by developing in

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[1]John Dewey, Democracy and Education (New York: The Macmillan Company, 1916), p. 115.

him a valid system of values, a sound system of rational thinking, and habits of scientific inquiry so that he may be able to satisfactorily apply his knowledge and values to problems that confront him. It is important that the individual be able to develop value patterns out of his experiences which will enable him to think rationally in any given situation. The individual must develop these values out of those that have worked successfully in behavorial situations in the past and yet not be restricted as to weighing new values with old ones in present situations. Demands of the present should cause for reorganization of educational values. Education should help the individual to improve behavior, to further his relationship with others in the society in which he lives and works. The action of the individual, grounded in his experiences and values, should further the purposes of the social group when he has knowledge of what is to be done and information concerning how to do it. It is upon this fundamental basis, the experimentalist's position concerning the individual and his place and needs in the democratic society, that an approach toward planning the industrial arts curriculum will be developed.

Formulation of Criteria for Curriculum Development

As a Member of Society

To bring out some points of emphasis upon which criteria for curriculum planning can be developed is the first necessary step. As we have seen before, the experimentalist is mainly concerned about the welfare, growth, and desires of the individual, and it is only natural that he would select his criteria for curriculum planning from this area. The curriculum should be based upon those things drawn from the individual in his social setting. With his interest in the scientific method, he would contend that the criteria have a scientific orientation. Dewey supports this position when he says that "it is a sound educational principle that students should be introduced to scientific subject matter and be initiated into facts and laws through acquaintance with everyday social applications."[2] This establishes a basic criterion that all subject matter should be selected according to its relation to individuals in the social scene. "With the wide range of possible material to select from, it is important that education (especially in all its phases short of the most specialized) should use a criterion of social worth."[3] In other words, this is in opposition to the selection of subject matter according to historical bodies of knowledge, individual interest groups, specific professional or vocational interests, or obsolete practices. "A curriculum which acknowledges the social responsibilities of education must present situations where problems are relevant to the problems of living together, and where observation and information are calculated to develop social insight and interest."[4] On this ground subject matter must be selected from those factors

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[2]John Dewey, Experience and Education (New York: The Macmillan Company, 1952), p. 98.

[3]John Dewey, Democracy and Education, p. 225.

[4]*Ibid.*, p. 226.

that play in the lives of those engaged in social activities. Dewey sums this up when he states:

> ...the social life of the child is the basis of concentration, or correlation, in all his training or growth. The social life gives the unconscious unity and the background of all his efforts and all his attainments....the subject matter of the school curriculum should mark a gradual differentiation out of the primitive unconscious unity of social life.[5]

Aims of the Individual

A second criterion for selection is based upon the belief of the experimentalist that each individual has his own goals, purposes, and aims. Subject matter selection should be considered from the viewpoint of these factors which require a good look at the present and future. "What new experiences are desirable, and thus what stimuli are needed, it is impossible to tell except as there is some comprehension of the development which is aimed at...."[6] Many would react unfavorably to this criterion saying that his would require a curriculum custom-tailored to each student. In so many words, this is exactly what Dewey is stating. Any given curricular area is naturally enclosed by the present definitions of the subject matter needs in the area. However, in the given area the needs, desires, goals, and interests should play an important part in the selection of subject matter experiences that each individual should have. An

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[5]John Dewey, Education Today (New York: G. P. Putnam's Sons, 1940), p. 9.

[6]John Dewey, The Child and the Curriculum (Chicago: The University of Chicago Press, 1902), p. 25.

illustration may shed more light upon this position. In a recent situation a student in a college course in education asked the instructor if it would be possible for him to take an examination over the subject matter in his particular course. He felt that he knew the subject matter and in this way he could get credit for the course and not have to take the time to actually go though it. The experimentalist would show his position quickly in a situation such as this, as did the instructor. The instructor explained to the student that this course did not contain a specific body of subject matter over which a comprehensive examination could be constructed. Rather, the subject matter area of the course had been established and students basically formed their own subject content out of problems, ideas, methodological deficiencies, understandings, and specialized topics of interest in this particular area. He further explained that all students came to this course with different backgrounds of experience in the area and with varied abilities and that it was the purpose of the course to provide positive growth along the lines of the students needs within the content area. A mastery of specific bodies of knowledge was not a purpose of the course. The position illustrated here is also that of the experimentalist. He supports a criterion of subject matter selection based upon the activity, needs, and planned outcome of the student. "Does not the presentation in doses and chunks of a ready-made subject-matter inevitably lead to passivity?"[7] It is a curriculum

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[7]John Dewey, The Way Out of Educational Confusion (Cambridge: Harvard University Press, 1931), p. 34.

based upon interests and needs which provides for mental and physical activity that Dewey proposes. "The mentally active scholar will acknowledge, I think, that his mind roams far and wide. All is grist that comes to his mill, and he does not limit his supply of grain to anyone fenced off field."[8] Dewey goes on to substantiate the reconstruction of the curriculum at the college level when he states:

> There seems a certain lack of perspective, a certain lack of sanity and balance in those arguments regarding the college curriculum that assume that the subjects are already in a settled condition, that there are ready made standards by which to measure their various claims, and that it only remains to pick out just so much of this and so much of that and put an end to all this confusion and conflict which is troubling us. Until the various branches of human learning have attained something like a philosophic organization, until the various modes of their application to life have been so definitely and completely worked out as to put even the common affairs of life under scientific direction, confusion and conflict are bound to continue.[9]

Flexibility of Content

Another factor or criterion for the planning of the curriculum is in the flexibility and practicality of material to be used. This criterion is also reflected heavily in methodology, as would all criteria chosen by the experimentalist, nevertheless, it requires the selection of subject matter that is practical in lives of those engaged in study and that can be used or not used as the teacher may see fit. This criterion "is the principle of alternate concentration

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[8] Ibid.

[9] John Dewey, Education Today, pp. 44-45.

and remission of work in special lines....there is still an undue tendency to a uniform four-abreast treatment of the subjects that make up the school program. Certain studies tend to appear in every month and in every year of a school program."[10] There is a need for flexibility, for subject matter to be made appropriate to special classes, special interests, and special degrees of concentration and specialization. This type of a program is not one that is repeated semester after semester in hopes that all students selecting this area will come out as blueprints of the master plan. The criterion here should require those in aposition of selection to take a good look at our changing political, industrial, sociological, and psychological world. In a situation such as this the subject matter for a specific course would revolve around those things that are pertinant in this area at this particular time and around the type of class and individual students involved. Speaking of the practical nature of the curriculum and the need for a look at the present and future, Dewey says:

> The past is the past, and the dead may be safely left to bury its dead. There are too many urgent demands in the present, too many calls over the threshold of the future, to permit the child to become deeply immersed in what is forever gone by.[11]

Reflective Thinking

If we allow the experimentalist to further his views concerning the criteria for curriculum planning he would enlighten us with the

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[10]*Ibid*., p. 210.

[11]John Dewey, *The School and Society* (Chicago: University of Chicago Press, 1915), p. 155.

thought that <u>any</u> subject matter, within the framework or definition of our area of emphasis, can be selected so long as it allows the instructor to provide the student with the latest scientific techniques. He also would want the student, through this subject matter, to develop into a person who is able to devise new techniques or approaches to new social problems. As has often been repeated, the experimentalist is mainly concerned about the ability of the student to think, face new situations, solve his own problems, and apply himself to any task that confronts him. To prevent misconception, this does not mean that the subject matter that <u>is</u> selected be picked up in any manner. It does, however, invite the meaning that the subject matter should be planned according to its appropriate nature for developing the qualities mentioned. A curriculum planned on this criterion "is such that it arouses in the learner an active quest for information and for production of new ideas."[12]

To illustrate the meaning of this point, suppose that a student is enrolled in a philosophy course taught under the experimentalist views. He would undoubtedly have some determination of what he studied under the guidance of the instructor. Suppose, also, that his interests, needs, and goals led him to the study of Plato. Would this not be a satisfactory development of subject matter for this particular student? He should not be forced to study a pre-arranged area of subject matter which does not take into account his experiences, interests, and

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[12]John Dewey, <u>Experience and Education</u>, p. 97.

purposes. So long as the student is learning how to think reflectively, understand the meaning the problems of philosophy, and gain an ability to develop satisfactory workable answers to his questions does it matter if he studies Plato, or must be study just what the instructor assigns? "The formation of proper standards in any subject depends upon a realization of the contribution which it makes to the immediate significance of experience, upon a direct appreciation."[13] The satisfying of the needs of the learner and the development of the previously discussed qualities of the learning situation are the important criteria upon which content should be formed.

Interest and Experience

A further look at curriculum planning shows the experimentalist's position concerning interest as a criterion for the selection of subject matter. This topic has already been discussed briefly as the difference between the logical and the psychological organization of subject matter. Frederic Ernst illustrates Dewey's concept of this difference when he states:

> Dewey's thoughts on the organization of the school curriculum led him to propound the difference between what he called a logical and psychological organization of subject matter, the psychological organization being based on the child's interests and experiences. The experience is not just passive reception but active experience. The logical organization is for the specialist engaged in adding to a body of knowledge.[14]

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[13]John Dewey, Democracy and Education, p. 292.

[14]Frederic Ernst, "How Dangerous is John Dewey?" Atlantic Monthly (May 1953), p. 61.

In other words, curriculum organization should be grounded in the experiences of the learner. That is to say that the experiences of the learner should provide the starting point for the organization of his future experiences. This is in direct contrast to the position that the authority organize the curriculum from a logical standpoint with little regard for what the learner already possesses in the form of experience in his particular area of study. The logical organization develops subject matter content that is based upon the building up of facts or concepts from the simple to the complex and this is not necessarily the way people learn nor does it necessarily satisfy the needs people have in learning. Perhaps in a given situation a student has need for a more complex understanding while studying in a logically organized situation. He would probably be told, as we have often heard, that we'll get to that as soon as we master the fundamentals. This illustration is opposed to the experimentalist's feeling that the student should face the problems and needs he has in his present situation, building upon his experiences and using whatever he needs to provide a solution. If the problem he has calls for some complex solution, he would not delay his activity until the class or his own individual work got to the place in the program where this topic was studied. He would develop the needed background starting from his own personal experience and direct his activities toward immediate solution of the problem. Experience, therefore, plays an important part in curriculum planning. "When education is based in theory and practice upon experience, it goes without saying that the organized subject-matter of the adult and the specialist cannot provide the starting point."[15] The starting point must be experience; the experience of students in the particular area of concern. "Unless the problem of intellectual organization can be worked out on the ground of experience, reaction is sure to occur toward externally imposed methods of organization."[16]

Another phase of interest which has meaning as far as curriculum planning is concerned is that of selection of subject matter that also provides or incites interest. Besides considering the learner's interest in possible subject matter, it is also important to consider how planned subject matter will arouse interest that will be enduring. "Every intelligent observer of the subsequent career of those who come from our schools deplores the fact that they do not carry away from school into later life abiding intellectual interests in what they have studied."[17] In planning the curriculum this type of sustaining intellectual interest should be considered.

The Method of Science

The experimentalist sees a need to establish his curriculum on such content that will develop in the student the method of science, not in the more popular sense, but rather in the vein of the social sciences. "He feels that physics and chemistry lead the student away

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[15]John Dewey, Experience and Education, p. 103.

[16]Ibid., p. 107.

[17]John Dewey, The Way Out of Educational Confusion, p. 37.

from the concrete realities of experience to a systematic realm of symbolic abstractions, while sociology and psychology familiarize the student with human experience as it is actually experienced, in all its concreteness as well as in its fragmentariness."[18] The scientific or experimental method is more commonly known as the problem-solving method as we have already discussed. Here, we are concerned about this method as a criterion for planning the curriculum rather than as an approach to teaching. As a criterion for curriculum planning, the scientific method requires subject matter that provides questions, intellectual problems, and practical meanings. Dewey explains his own case in this way:

> In the first place, the experimental method of science attaches more importance, not less, to ideas as ideas...the ideas employed are hypotheses, not final truths.... In the second place, ideas or hypotheses are tested by the consequences which they produce when they are acted upon.... To reflect is to look back over what has been done so as to extract the net meanings which are the capital stock for intelligent dealing with further experiences.[19]

The experimental method of science has many ramifications for curriculum planning. It is tied closely to experience, for subject matter taken from the experiences of life provides for experiences that lead onward and outward. "It means that scientific method is the only authentic means at our command for getting at the significance of our everyday experiences of the world in which we live."[20]

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[18]Rupert Lodge, Philosophy of Education (New York: Harper and Brothers, 1937), p. 214.

[19]John Dewey, Experience and Education, pp. 109-110.

[20]Ibid., p. 111.

A curriculum that contains subject matter which causes the learner to approach problems on the basis of investigation, development of ideas, and a quality of searching will further the understanding and value of the experimental method of science. From this viewpoint the criterion of the experimental method as a factor in curriculum planning is necessary. Let us illustrate how this criterion might serve to guide curriculum development. In planning for subject matter in a particular area under this guiding factor, one would reject those things that tended to provide their own solutions or stimulated no further investigation. We would search for those things that provide meaningful problems, that formulate questions, and involve analysis. To be more specific, in planning the content for a college course in the history of education this criterion would perhaps direct us to such material as the effects of the work of Pestalozzi upon present educational practices or the problem of method as advanced by Froebel. This would provide problems that would cause scientific investigation if the class were so orientated. If this criterion did not serve as a guide, it would possibly result in content that forced students to know names of all educational leaders, dates and locations of specific reforms, or any number of factual manifestations.

Unification for Continuous Growth

A final criterion under which curriculum planning should operate is that of viewing the curriculum as a continuous unification of subject matter in terms of human growth. The growth of the individual, as has been indicated, is an aim of education in the experimentalist's position and continued growth can take place only in an educational situation where the curriculum represents a unification of all pertinent content. In other words, the experimentalist is opposed to a curriculum plan where often unassociated subjects are compiled one upon another to make an educational program. In many programs concerning curriculum planning "the question comes to be one concerning selection, rejection, and arrangement among these subjects, already admitted to be, in the general scheme of selection and arrangement, the proper and indeed necessary studies involved in learning."[21] Since in many cases the educator in this position feels he knows what studies are important, he has few problems in establishing the curriculum. Dewey feels that "in many subjects it is convention rather than conviction which enforces whatever degree of uniformity or homogeneity exists—including of course, the conventions which stem from the assiduous skill of textbook publishers."[22]

Let us turn now to the more positive side of the problem as the experimentalist sees it. The curriculum should be planned in accordance with the aims and objectives of the program and should reflect a total plan of educational growth. As a student moves from one classroom to another or from one topic of study to another he should be in a position to understand the relation of things discussed, problems and ideas developed. They should be so unified to provide

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[21]John Dewey, The Way Out of Educational Confusion, p. 5.

[22]*Ibid.*, p. 9.

for broad and connected understandings. "What is needed is the habit of viewing the entire curriculum as a continuous growth, reflecting the growth of mind itself. This in turn demands, so far as I can see, consecutive and longitudinal consideration of the curriculum...."[23]

An example of this type of curriculum planning can be seen in some of the more modern schools where, for instance, the English classes take up the problem of language required in the sciences, vocabularly used in technical industry, and problems of speech in the political scene. Further, an educational philosophy class would bring to play problems of the various curricular areas and their relation to teaching needs rather than be taught as an isolated study above and beyond the practical applications which teachers might use. In the teacher education program the problems of psychology or sociology are not isolated studies unrelated to the prospective teacher of home economics who is studying these subjects. Dewey sums up the experimentalist's position when he states:

> The failure is again due, I believe, to segregation of subjects. A pupil can say he has had a subject, because the subject has been treated as if it were complete in itself, beginning and terminating within limits fixed in advance. A reorganization of subject-matter which takes account of outleadings into the wide world of nature and man, of knowledge and of social interests and uses, cannot fail save in the most callous and intellectually obdurate to awaken some permanent interest and curiosity. Theoretical subjects will become more practical, because more related to the scope of life; practical

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[23]John Dewey, "The Relation of Theory to Practice in the Education of Teachers," The Third Yearbook of the National Society for the Scientific Study of Education (Bloomington, Illinois: Public School Publishing Company, 1927), p. 26.

> subjects will become more charged with theory and intelligent insight. Both will be vitally and not just formally unified.[24]

As a criterion for curriculum planning, the unification of subjects of study toward the growth of the individual will give us much needed direction. "The tendency to assign separate values to each study and to regard the curriculum in its entirety as a kind of composite made by the aggregation of segregated values is a result of the isolation of social groups and classes."[25] It is the duty of the educator to see that values of the educational program are taken from those proven good for the individual and society and that the curriculum reflect these values in its over-all orientation.

Basic Criteria—A Guide

In order to provide a guide to curriculum planning out of the philosophy of experimentalism the basic criteria formulations which have been discussed shall be listed. This listing, if we are interested in understanding and operating within the experimentalist's position, should be helpful in determining organization, content, and values when planning a program. These criteria also are established to provide for a more meaningful program to the individual and his society; one in which education is subservient to the learner. Dewey points out some of the pitfalls of past curriculum planning, those that these criteria might overcome, when he states:

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[24]John Dewey, _The Way Out of Educational Confusion_, pp. 38-39.

[25]John Dewey, _Democracy and Education_, p. 292.

> Since the curriculum is always getting loaded down with purely inherited traditional matter and with subjects which represent mainly the energy of some influential person or group of persons in behalf of something dear to them, it requires constant inspection, criticism, and revision to make sure it is accomplishing its purpose. Then there is always the probability that it represents the values of adults rather than those of children and youth, or those of pupils a generation ago rather than those of the present day. Hence a further need for a critical outlook and survey.[26]

The criteria for curriculum planning according to the experimentalist's position are as follows:

1. The curriculum should be planned around the social needs and interactions of man in his environment; around the problems of social living.
2. Subject matter should be considered as to its appropriateness to the aims and purposes of the individual.
3. Curriculum content should have the qualities of flexibility and practicality.
4. All curriculum planning should provide for reflective thinking in subject matter determinations.
5. Interest and experience of students should provide the starting point for curriculum development.
6. Appropriate use of the method of science should be a factor in subject matter selection.
7. Curriculum planning should take place in terms of unification of subject matter toward continued growth of the individual.

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[26] *Ibid.*, p. 283.

Design of the Curriculum

The design of the industrial arts teacher education curriculum is the framework or structural pattern used in planning, selecting, and putting into operation the educational experiences of the program. This design is closely related to the objectives or outcome of the program since only through planning the program along these lines shall the purposes be met. The curriculum design is also closely related and dependent upon the criteria for curriculum planning which have just been discussed. Probably the two major aspects of curriculum design are its scope and sequence. The scope of the curriculum being defined as those things to be included in the overall development of the program. This is the factor that decides what the program shall contain. The sequence in curriculum design means the way in which the content is structured in respect to the student and teacher.

Curriculum design as far as the experimentalist is concerned requires that the scope be within the experience of the learner at the beginning. "Anything which can be called a study...must be derived from materials which at the outset fall within the scope of ordinary life experience."[27] This is the starting point in the design. "The next step is the progressive development of what is already experienced into a fuller and richer and also more organized form, a

[27] John Dewey, Experience and Education, pp. 86-87.

form that gradually approximates that in which subject matter is presented to the skilled, mature person."[28] To continue with the scope of the curriculum, there are no boundaries except the established objectives of the program which should include the aims and purposes of the learner. In other words, the content of the industrial arts teacher education program is limited only by the interests and needs of the individual operating within the aims of the program. The main point of concern in the design of the industrial arts teacher education curriculum is that organization of subject matter start within the range of the learner's experience and proceed toward more specialized content as the learner becomes more skilled in thinking, solving problems, and development of knowledge. This curriculum design is one that is ever changing according to the level of the student's growth. Speaking of this type of curriculum organization or design Dewey states:

> ...the educator cannot start with knowledge already organized and proceed to ladle it out in doses. But as an ideal the active process of organizing facts and ideas is an ever-present educational process. No experience is educative that does not tend both to knowledge of more facts and entertaining of more ideas and to a better, a more orderly, arrangement of them. It is not true that organization is a principle foreign to experience.[29]

This, then, is the framework for curriculum design in the industrial arts teacher education program. It starts with subject

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[28] Ibid., p. 87.

[29] Ibid., p. 102.

matter within the learner's experience and moves to more specialized and more orderly organized bodies of knowledge. As the learner grows, these are brought into his experience. From this framework of the design we move to the basis from which the design will be formulated. This basis, of course, is the criterion for curriculum planning. Within this framework and from these criteria the curriculum design takes shape. The major present day curriculum designs such as the broad fields design, the subject matter design, the social functions design, the needs of the learner design, and the core curriculum do not individually provide for the experimentalist's views. As we have seen he would be repelled by the broad fields or subject matter approach to curriculum design for they have little regard for the individual. They are organized from without, on the basis of what the educator feels is important in terms of content and structured according to their logical sequence of organization. "The adult mind is so familiar with the notion of logically ordered facts that it does not recognize—it cannot realize—the amount of separating and reformulating which the facts of direct experience have to undergo before they can appear as a study, or branch of learning."[30] The needs of the learner approach satisfies some of the experimentalist's requirements but is lacking in social responsibility and it is difficult to determine genuine needs and interests. The social functions design is similarly deficient in meeting needs and is difficult to present realistically in the school setting.

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[30] John Dewey, The Child and the Curriculum, p. 10.

The core curriculum design or plan fits in with the experimentalist's theme more closely than do the others. We can see the similarity in the following description of the core curriculum design:

> Block classes which are true core recognize the importance to youth of acquiring skill in democratic living through actually practicing it in the classroom. Core issues may be topics to find out about; ideally they are problems to be solved. Problems grow out of the personal, social, and civic needs of youth. Problem solving techniques are used. Working in groups and in committees is common practice. Activities are so varied that each member of a class, whatever his level of ability, will be able to participate and to feel that he is making a contribution.[31]

To a degree this description is adequate, but the experimentalist, according to our criteria, would feel that there are other important factors to be considered and included. However, with these thoughts about the core design in mind, we can begin to construct a design for the industrial arts teacher education program out of Dewey's philosophy.

The Problem-Needs Design

For want of a better name we shall call this the problem-needs curriculum design, these two factors being of major importance in the experimentalist's view of curriculum development. This name also implies method (for if there is a problem, a solution is required) which should be included, as there is definitely no separation between method and subject matter in the experimentalist's view. Other

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[31]Grace S. Wright, Core Curriculum Development; Problems and Practices (Washington, D. C. : Federal Security Agency, U. S. Office of Education, 1952), p. 6.

designs do not give this great emphasis to method. The term 'project' could be used in place of 'problem', but the common use of the project in the field of industrial arts education is not at all in line with Dewey's definition of the term. Dewey makes this distinction quite clear when he states:

> It is fair for an objector to ask what is the substitute, the alternative, to organization of courses on the basis of adherence to traditional divisions and classifications of knowledge. The reply which goes furthest to the left is found in reference to the so-called _project, problem,_ or _situation_ method. ...In fact, like anything that _is_ a method other than in name, it has definite implications for subject matter.[32]

The problem-needs design is somewhat similar to the core curriculum design in that it could be centered around a common core of content which has been agreed upon as a common knowledge, problems, or understandings for all. Furthermore, the problem-needs approach could operate within an area of emphasis where learning takes place as group and individual problems and needs, coordinated by the teacher, stage the situation. This does not say that the students may not all be working on the same problem at a given time if this situation provides the most meaningful experience for all concerned. It also does not say that each student may be working on his own problem according to his needs, with the help of the instructor, and in the framework of his experience.

This design also emphasizes the social aspect of living and learning; these are the problems of society. To draw together the more

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[32]John Dewey, _The Way Out of Educational Confusion,_ pp. 30-31.

meaningful aspects and ramifications of the problem-needs design, let us list some of its essential characteristics.

1. The problem-needs design heavily emphasizes methodology, especially the method of scientific investigation.
2. The problem-needs design encourages the adaptation of learning experiences to individual needs and abilities.
3. The problem-needs design promotes learning and growth as a continuum.
4. The problem-needs design encourages the study of practical problems of immediate importance to the individual and society.
5. The problem-needs design emphasizes guidance as an integral part of the problem solving situation.
6. The problem-needs design encourages the use of any materials, methods, or resources which provide for satisfactory solutions or consequences for the learner.
7. The problem-needs design promotes the concept of student-teacher planning which eliminates random activity.
8. The problem-needs design emphasizes the value of basing subject matter on interest and experience.
9. The problem-needs design places heavy emphasis upon the learner as being responsible for serious investigation of situations that confront him.
10. The problem-needs design encourages study of the democratic society and its value in the life of the individual.

11. The problem-needs design encourages the use of the laboratory for application of learning experiences.

As we have already noted, the curriculum for the industrial arts teacher education program depends heavily upon method and the problem-needs curriculum design is ordered more by methodology than any other factor. "There is, therefore, method in subject matter itself—method indeed of the highest order which the human mind has yet evolved, scientific method."[32] In other words, if a decision had to be made between method and subject matter the method would be of greater importance. For example, if we were planning an activity concerning problems or processes in industry and decided upon studying industrial consumer products of our present industrial society, both subject matter and method would have to be planned. The experimentalist would turn first to a method, say experimentation, and adapt the subject matter to this method. In this case some aspect of consumer products of industry would be tested, not just to find and know the results, which would be important, but more important to learn and understand the value of experimentation as method of learning, gaining understandings, and providing for practical solutions to problems. A discussion of methodology will be developed in the next chapter but it is felt that it is appropriate to illustrate its vital relationship to subject matter and curriculum here.

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[32] John Dewey, National Society for the Scientific Study of Education, Third Yearbook, p. 22.

With these thoughts in mind concerning method and subject matter we can return to the problem-needs curriculum design. If we were asked to pinpoint the subject matter or "core" of the industrial arts teacher education program within the problem-needs design it would be the individual and our industrial society. Along with this broad curriculum area should also be the core of learning to teach. These two areas are the curriculum core from which all learning activities should be planned. Within this curriculum area should fall the usually separated programs of professional education and industrial arts subject matter preparation. "What we want, in other words, is not so much technical skill, as a realizing sense in the teacher of what the educational development of a subject means, and, in some typical case, command of a method of control, which will then serve as standard for self judgment in other cases."[34] Many of the present industrial arts teacher education programs have laboratories for the development of skill and understanding in the subject matter field and offer professional education for teaching in unrelated environment. In the problem-needs curriculum design these areas are all one and the activities all take place in the industrial arts laboratory. The prospective industrial arts teacher should grow in a unified environment of subject matter; skill development, philosophy, methodology, psychology, organization, etc. "This is possible only where the would-be teacher has become fairly saturated with his subject matter, and with his

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[34] *Ibid.*, p. 28.

psychological and ethical philosophy of education....practical work should be pursued primarily with reference to its reaction upon the professional pupil in making him a thoughtful and alert student of education."[35]

The key to the problem-needs curriculum is this interrelationship of teaching with subject matter as a unified content in the curriculum. We might refer to the Minnesota Plan, one of the most recent developments in curriculum in industrial arts teacher education.[36] Here the professional and industrial arts subject matter are again separated and little indication is given toward including methods, philosophy, organization, and teaching experiences in the industrial arts subject matter broad area. Learning about subject matter and learning about teaching subject matter should be one common unit of the curriculum. This is the curriculum. Its content is "Mastery of subject matter from the standpoint of its educational value and use; or, what is the same thing, the mastery of educational principles in their application to that subject matter which is at once the material of instruction and the basis of discipline and control...."[37]

Industrial Arts Subject Matter

It has been illustrated that the main concern the experimentalist

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[35] Ibid., p. 15.

[36] William J. Micheels, The Minnesota Plan for Industrial Arts Teacher Education (Bloomington, Illinois: McKnight and McKnight, 1958).

[37] John Dewey, National Society for the Study of Education, Third Yearbook, p. 13.

has for curriculum lies in its appropriateness to bring about reflective thinking and the method of scientific investigation. This often has been taken to mean that he is not concerned about subject matter as long as these things can be provided through it. This fact is not true. The methods and ability to think which he emphasizes are the most important product of the program, but the content of the program is also important, especially at the higher levels of maturity. We pointed out that the organization of subject matter begins quite loosely, within the experience of the learner, and becomes more tightly organized as the learner becomes more mature and more skilled. This type of organization provides for the acquisition of the properites of learning at the early stages of maturity and proceeds to the acquisition of knowledge through these properties for the highly skilled person (highly skilled in learning). This idea has implications for subject matter selection as well as organization. Let us illustrate this point. In the early stages of the program the aim is mainly toward the abilities of thinking and how to learn. In this case the subject matter is broad, loosely organized, and selected as to its application to knowledge. Now, this organization is in a gradual process of change until it approaches the tightly organized content presented to the skilled learner. At this end of the organizational range we become more concerned about what the learner finds out about, gains understandings of, and develops growth in. At this stage the learner has developed his ability to think, solve problems, appreciate, reflect, apply scientific methods, and assimilate factual information and our aim now is not so much toward further development of these qualities but toward growth in knowledge through these capacities.

The implications for subject matter in the industrial arts teacher education program from this viewpoint are many. The industrial arts curriculum should start with broad content and grow more specific as the needs and abilities of the learner warrant. In other words, courses in the freshman and sophmore years are of a general nature both in the subject matter of teaching and in the subject matter of the industrial arts area. These courses then lead into more specialized study of teaching industrial arts and of industrial arts content. An example of this organization and content in the industrial arts teacher education program is as follows.

First Year

The Industrial Society
Introduction to Industrial Careers
Industrial Arts in the Public School (Visitations)
Introduction to Tools and Materials
Techniques of Laboratory Teaching I
Graphic Communication of Industry I

Second Year

Experimentation in Industrial Materials
Techniques of Laboratory Teaching II
Classroom Counseling and Planning
Contemporary Industrial Practices
Creativity and Design in Industrial Products

Second Year Cont'd

Graphic Communication of Industry II

Industrial Construction

Third Year

Philosophy of Industrial Arts Education

Tools and Materials II

Mass Production Techniques

Transportation and Communication

Power and Transmission

Graphic Representation

Fourth Year

Avocational Activities in Our Society

Industrial Design

Teaching Experience in Industrial Arts

Specialization in Industrial Arts

Methodology in Teaching Industrial Arts

Laboratory Curriculum and Organization

The foregoing example of the industrial arts curriculum is not a packaged program for all to follow. It is rather a suggestion of curriculum planning growing out of Dewey's views. The curriculum also represents only the industrial arts teacher education program and would be interrelated with general education courses through the total college program on the same basis and through requirements of the college. As we have discussed, it is based upon three major factors in curriculum development.

1. It is based upon the needs of the individual in his social environment. "Man, for Dewey, is not only 'the measure of all things; but man is also the 'measurer' and the 'maker' of what is genuine worth."[38]
2. The organisation of subject matter beings within the experience of the learner and grows out to more specialised content.
3. The subject matter is planned according to its value in present society and to its value in presenting the best methods of learning.

Development of Experiences

As the prospective industrial arts teacher moves through the curricular activities of the program he should be continually confronted with meaningful experiences in regard both to teaching and subject matter. In the first year of the sample curriculum he will be introduced to industrial education; its implications and meanings in our present society. He will develop an understanding of the place of industrial arts in the scheme of general education in the public school. His experiences will be broad in the study of tools, processes, materials, and communication. He will also have immediate planned experiences in teaching through study and visitation and these

[38]Francis T. Villemain, "Dewey and the Critical Faculty", The Saturday Review (November 21, 1959), p. 26.

experiences will flow through his total program as it is the major purpose of his education. The flow of experiences also takes place in tools and materials from broad understandings to specializations in his last year. It can be seen that the interrelationship of methods, philosophy, planning, guidance, and creativity are woven into the more factual aspects of the program. This quality of the flow of experiences, especially in the beginning courses, gets us away from the older notion of gaining skill and understanding facts as the goal of learning. Dewey has said that skill and knowledge are important but they can be had along with learning how to think and solve problems. "Skill and information about materials, tools, and laws of energy are acquired while activities are carried on for their own sake. The fact that they are socially representative gives a quality to the skill and knowledge gained which makes them transferable to out-of-school situations."[39] The curriculum gives the student the opportunity to see how the things he does in class are related to those in industrial and social life. This is an important aspect of education which Dewey illustrates when he says:

> I would ask, then how far are studies, methods, and administration of our schools connecting knowledge, information, and skills with the way things are done socially and how they may be done. For only in this connection of knowledge and social action can education generate the understanding of present social forces, movements, problems, and needs that is necessary for the continued existance of democracy.[40]

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[39]John Dewey, Democracy and Education, p. 241.

[40]John Dewey, "The Challenge of Democracy to Education", Philosophy of Education (Ames, Iowa: Littlefield, Adams and Company, 1958), p. 50.

The philosophy of experimentalism is founded upon experience and it is within the curriculum that planned experiences for learning receive the most meaning. It must be understood that the curriculum is basically made up of a series of experiences concerned with the subject matter rather than being made up of a series of studies within the subject matter. Subject matter is important only as it provides a meaningul flow of experiences for the learner. "...there is, therefore, no succession of studies in the ideal school curriculum. If education is life, all life has, from the outset, a scientific aspect, an aspect of art and culture, and an aspect of communication."[41] The curriculum should provide experiences that are integrated and grow out of previous experiences forming a continuum of experience dealing with the subject matter concerned. This is progress in experience. "The progress is not in the succession of studies, but in the development of new attitudes towards, and new interests in experience."[42]

Unification of Knowledge

Another aspect of the industrial arts teacher education curriculum under the problem-needs design involves the unification of knowledge or so-called subject matter areas within the curriculum. Many practices tend to separate areas of the curriculum into individual courses that become highly unrelated when the program is in

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[41] John Dewey, Education Today, pp. 11-12.

[42] Ibid., p. 12.

operation. Each course operates for its own sake and with little regard for other courses or the objectives of the total program. This organization is quite typical in industrial arts. For example, we have courses in our industrial arts teacher education programs such as welding, photography, pattern making and machine drawing. These course titles do not necessarily indicate the type of experiences found within a given course but they do suggest a strong division of content. The experimentalist feels that such separation of bodies of subject matter in the curriculum is quite unrealistic in relation to the same subject matter or content as it appears in industrial or social life. He feels that the subject matter of the curriculum should as closely assimilate that of social uses as is possible. The course that was mentioned as pattern making is not unrelated to other courses in the field or other processes and yet it is often taught as though it were a separate study, an end in itself. In industry we all know that pattern making is but an area of work in the total process of manufacturing various goods. It is dependent upon and interwoven into such areas as design, drawing, finishing, planning, foundry, woodwork, and machining to name but a few. It is also related to such things as economy, consumer needs, communication and transportation and yet we teach it as a nicely bound package of knowledge all ready for student use when the course is completed. Educators often "assume that this material which is unified through its isolation from other things is the natural occasion for the act of studying."[43] If it were at all possible or practical to develop a program of education where the curriculum was not made up of courses but rather four years of classes which were all called industrial arts teacher education, I believe Dewey would concur. The organization of teaching materials and methods would be as we have discussed. However, since courses and course titles must be used we should strive to relate subject matter from all courses with each other toward our total program aims. The unification of subjects as practically and consistently with those practices in industrial and social life should be our goal. Dewey devoted most of his book, The Way Out of Educational Confusion, to this problem; trying to show how strict classification, division, and isolation of subject matter is not educationally sound. He states it this way:

> In the actual advance of knowledge and the arts, there is much more than mere extension of facts and principles. It has been attended by constant development of cross references, of interdependencies and interrelation. When we compare the actual situation with the scholastic, we find growing divergence, till now there is a split. ...What has been said about interdependence in branches of knowledge holds equally well in those technical activities of use of knowledge that we call industrial or practical arts. In operation they are often immensely specialized in detail. But back of the operations there lies a concentration of knowledge derived from many sources, an integration of many processes which originated in separate arts. ...In a situation where the skills or arts and the subject-matter of knowledge have become interwoven and interdependent, adherence to the policy forming the studies of secondary and collegiate instruction on the basis of many isolated and independent subjects is bound to result in precisely the kind of confusion we have at present.[44]

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[43] John Dewey, The Way Out of Educational Confusion, p. 13.

[44] Ibid., pp. 14-18.

Along with these considerations the experimentalist feels that vocational subject matter as preparation for occupations other than teaching has little place in the college program. And yet in many of our industrial arts teacher education programs the actual subject matter and methods are vocationally orientated. In the problem-needs curriculum it was illustrated that the program is designed to give a broad understanding of industrial life and the place of the individual in an industrial society. Emphasis upon any specific subject matter area as vocational preparation, or the organization and methods of vocational teaching have no place in the industrial arts program. Speaking of the more technical phases of college programs Dewey states that they should "...give up the idea that they can really give adequate technical preparation, and hence make it their business to open to students the scientific and social potentialities of important occupations of society...."[45] This implication is of special importance to those in industrial arts for often the emphasis placed upon the program is not toward the socially important occupations of the present time. The importance of laboratory activities in the problem-needs curriculum is not to give the student an opportunity to develop occupational skills but rather to give the student a place to experiment and learn about industrial life through the use of tools and materials. "The educative value of manual activities and of laboratory exercises...depends upon the extent in which they aid

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[45] *Ibid.*, p. 30.

in bringing about a sensing of the meaning of what is going on."[46] The meanings rather than the facts and skills should be emphasized. "In effect, if not in name, they are dramatizations. Their utilitarian value in forming habits of skill to be used for tangible results is important, but not when isolated from the appreciative side."[47]

From this analysis we can see that the experimentalist is interested in a curriculum that unifies rather than separates subject matter. New aims and new purposes are required if we are to provide practical up-to-date education, education that gives meaning to the things that are done and applies classroom situations to social and industrial life activities. We cannot stick to old subject matter and out dated methods when teaching about today's industrial problems. Dewey sums up the problem of today's curriculum when he states:

> The simile of new wines in old bottles is trite. Yet no other is so apt. We use leathern bottles in an age of steel and glass. The bottles leak and sag. The new wine spills and sours. No prohibitory holds against the attempt to make a new wine of culture and to provide new containers. Only new aims can inspire educational effort for clarity and unity. They alone can reduce confusion; if they do not terminate conflict they will at least render it intelligent and profitable.[48]

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[46]John Dewey, Democracy and Education, p. 277.

[47]Ibid.

[48]John Dewey, The Way Out of Educational Confusion, pp. 40-41.

Evaluating the Curriculum Plan

In the total picture of curriculum planning there should be no separation between planning and evaluation, they should go hand in hand, for planning depends upon evaluation for direction and reconstruction. Actually, evaluation is the process of establishing educational values in the curriculum. These values are established in many ways and should always be looked upon in the light of revision and change as the situation requires. However, evaluation is not a process to be applied only after the curriculum is planned. It is an integral part of the planning process itself. Too often evaluation is thought of in terms of a set of standards to be applied to the curriculum after it has been planned and in operation. This sort of evaluation gives little direction and often loses sight of past experiences and judgments in comparing activities. The incorporation of evaluative processes with planning activities gives the people involved an opportunity to make judgments, place values, during the planning. Since, according to the experimentalist, everything is in a state of change it follows that the evaluative process should function at all times in regards to the curriculum to make judgments concerning its practically, appropriateness, and usefulness to the learning situation. The learning situation is based upon experiences and the planned experience is the key to organization of content. "...education must be conceived as a continuing reconstruction of experience; that the process and the goal of education are one and the same thing."[49] Evaluation must fit into this process and become part of it to give meaningful direction to the process. In some situations the curriculum is evaluated from an outside source or goal and standards are set up accordingly. This adds little to the process for "...to set up any end outside of education, as furnishing its goal and standard, is to deprive the educational process of much of its meaning, and tends to make us rely upon false and external stimuli...."[50]

One of the first principles of evaluation of curriculum planning is to use an evaluative process that is in line with the aims and objectives of the program. For example, if an objective of the industrial arts teacher education program is to develop social efficiency it is necessary that one phase of evaluation in planning deals with this area of the subject matter. Since the objectives of the program are a criterion for curriculum planning so are they for curriculum evaluation. In planning the curriculum Dewey states: "What new experiences are desirable, and thus what stimuli are needed, it is impossible to tell except as there is some comprehension of the development which is aimed at...."[51] From the development which is aimed at gives us an evaluative device in dealing with curriculum planning. In other words, the curriculum should be evaluated and

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[49] John Dewey, Education Today, p. 12.

[50] Ibid.

[51] John Dewey, The Child and the Curriculum, p. 25.

constantly re-evaluated according to the objectives of the program and how well experiences in the curriculum meet these purposes.

A second phase of evaluation involves the planning of learning experiences within the curriculum. This is the favorite area of concentration for the experimentalist for he is so deeply concerned about the integration and building up of learning experiences. The evaluation of learning experiences requires constant observation of how these experiences are meeting the student's purposes, needs, and habit development along with behavior changes taking place in line with course and program objectives. Behavior change is the sign of how effective the planned experiences of the curriculum are causing growth in the learner. "The central problem of an education based upon experience is to select the kind of present experiences that live fruitfully and creatively in subsequent experiences."[52] This negates an area of evaluation. Experiences which live fruitfully and creatively in future experiences are of value in curriculum planning and can lead the educator in making evaluations. "Every experience is a moving force. Its value can be judged only on the ground of what it moves toward and into."[53] The value judgments made concerning curriculum experiences must be made on the basis of what the experience leads to in terms of growth and behavior change. Valuable learning experiences give direction and growth toward pre-established

[52] John Dewey, Experience and Education, pp. 16-17.

[53] Ibid., p. 31.

goals and needs and should be judged as to their effectiveness. "Continuity and interaction in their active union with each other provide the measure of the educative significance and value of an experience."[54]

Further evaluation of curriculum planning involves such factors as what the student learns along with or at the same time he is going through a particular learning experience. "Collateral learning in the way of formation of enduring attitudes, of likes and dislikes, may be and often is much more important..." than the actual subject matter.[55] "The most important attitude that can be formed is that of desire to go on learning."[56] These factors should show up in our scheme for evaluation of subject matter for they are a large part of the learning activity and can lead to further growth in educational activities.

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[54] *Ibid.*, p. 43.

[55] *Ibid.*, p. 49.

[56] *Ibid.*

CHAPTER V

METHODOLOGY IN INDUSTRIAL ARTS TEACHER EDUCATION

A brief description of the experimentalist's position concerning methodology was discussed in an earlier chapter. It is now appropriate to further develop his concept of method and make some applications to the industrial arts teacher education situation. The methods used by the instructor for teaching purposes and the methods used by the student in solving problems and assimilating information are prime concerns. It has also been pointed out that the experimentalist makes little separation between subject matter and method. The scientific method prevails while instructional methods are chosen according to a given situation: the teacher, the student, the equipment, and the subject matter. From this point of view we take on the task of gaining an insight into the meaning of method and the ways in which it operates in the learning situation.

Experimental Method, A General Concept

The concept of method, as many other philosophical principles of experimentalist belief, is based upon the complete act of thought. It is grounded in experience which is considered a reaction to some stimulation. As an experience takes place a method is required to begin and complete it and provide for projection into future experiences. The subject matter is the content of the experience, and the method is the way in which this content is made meaningful to the learner. As Dewey points out:

> Method is a statement of the way the subject matter of an experience develops most effectively and fruitfully. It is derived, accordingly, from observation of the course of experiences where there is no conscious distinction of personal attitude and manner from material delt with. The assumption that method is something separate is connected with the notion of the isolation of mind and self from the world of things. It makes instruction and learning formal, mechanical, constrained. While methods are individualized, certain features of the normal course of an experience to its fruition may be discriminated, because of the fund of wisdom derived from prior experiences and because of general similarities in the materials dealt with from time to time.[1]

This idea is opposed to the view that method is a way of presenting subject matter to the learner for him to memorize and have ready for future application. The experimentalist is not interested in this type of learning situation. His method is actually an experimental approach, or, more often, called the experimental method. The problems that arise in the classroom are the actual subject matter for the course. The student recognizes the problem situation and reacts to it in such a way that he begins to do something, starts an activity directed by the teacher and the resources available, finds out what happens, and makes decisions as to how satisfactory the results or consequences seem to be. When the consequences satisfy as a solution to the problem they are said to work and are true for that situation. Further searching is not necessary. If the consequences are

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[1]John Dewey, <u>Democracy and Education</u> (New York: The Macmillan Company, 1916), p. 211.

not satisfactory than alternative trials and experiments are made until a solution proves meaningful. This, in a few words, is the experimental method. In a classroom situation involving this method of instruction there is no systematic coverage of prearranged subject matter or ground to be covered. Rather, the subject matter is broken up into problems to be investigated, and investigation is undertaken by both student and instructor. The direction taken by the course will be dependent upon many factors, such as the needs of the students, type of problems to be undertaken, the flow of experiences, and others, and the subject matter may not be completely covered in the realistic sense. This fact makes little difference to the experimentalist instructor for it is not so important what the student knows when he has completed the course as it is what he has learned to do with the subject matter of this particular course. In other words, the development of the experimental attitude in regards to this specific subject matter is his key concern. "Intellectual thoroughness is thus another name for the attitude we are considering."[2] The experimental method does away with lectures and teacher dominated planning. "It substitutes detailed analysis for wholesale assertion, specific inquiries for tempermental convictions, small facts for opinions whose size is in precise ratio to their vagueness."[3]

The experimental method is more than just a way to teach or

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[2]*Ibid.*, p. 210.

[3]John Dewey, *Education Today* (New York: G. P. Putnam's Sons, 1940), p. 124.

learn something. It could be better defined as a way of approaching problematic situations, or a way of setting a learning activity into action and seeing it through. It is not a method in the sense of one of many methods to be used in a certain situation. It is an attitude and ability for scientific investigation. There are many other so-called methods such as the lecture or demonstration, but these would all be sub-methods within the over-all framework of an atmosphere of experimental methodology. Dewey further substantiates this concept in saying, "The only significant method is the method of the mind as it reaches out and assimilates."[4] This would be the climate of the industrial arts teacher education laboratory. There would be a sense of searching, investigating, and experimenting present in the activity of learning. In the industrial arts teacher education laboratory, for example, here is what we might observe. Students would be working individually and in groups, planning activities, experimenting with tools and materials, and locating resources for learning units. In the planning area a group of students might be developing a unit in the mass production of a modern wrought iron chair, while in another corner an individual student is viewing slides on the production of iron ore. At the table saw one student is illustrating to another some ways of cross-cutting stock to length, and in the welding area two students are breaking welds in a jig they have designed to record weld strength. In the meantime the instructor is assisting a student

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[4]John Dewey, The Child and the Curriculum (Chicago: The University of Chicago Press, 1902), p. 14.

who is demonstrating to a small group how power is transmitted as illustrated, by a cut-away gear box. This activity, according to the experimentalist, represents learning in action and the responsibility of the student in assisting others, planning solutions to problems, and working with others toward a common goal. This is the classroom application of the experimental or scientific method. "It means that scientific method is the only authentic means at our command for getting at the significance of our everyday experiences of the world in which we live."[5] This does not imply that the instructor has less to do with the planning of classroom activities; on the contrary, he has more responsibility. "Adaption of the method to individuals of various degrees of maturity is a problem for the educator, and the constant factors in the problem are the formation of ideas, acting upon ideas, observation of the conditions which result, and organization of facts and ideas for future use."[6]

Opposed to this method of teaching and learning is the industrial arts teacher education program that views knowledge as an end in itself ready to be organized and learned. "...how largely it seems to be believed that the mere appropriation of subject matter which happens to be stored in books constitutes knowledge."[7] In this situation there would probably be two major activities; that of the

[5]John Dewey, Experience and Education (New York: The Macmillan Company, 1952), p. 111.

[6]*Ibid*., p. 112.

[7]John Dewey, Democracy and Education, p. 398.

classroom lecture and that of a highly organized laboratory activity. In the first of these the instructor presents through lectures the fundamental facts, procedures, and operations concerning the subject matter of the industrial arts course. The students sit in passive reception and take notes to be recalled for use in the laboratory or on examinations. Interest and need are given little consideration, for the facts and laws are there and are logically organized for learning. The textbook supplies the background for the course, and it is held as authority as to the right and wrong way of doing and knowing. In the laboratory, projects or exercises assigned by the instructor or chosen from a project book by the learner provide the activity. All students might possibly be doing the same thing at the same time. "The difference between this (the experimental) procedure and the traditional one is not that the latter involves acquisition of new knowledge and the former does not. It is that in one a relatively fixed and isolated body of knowledge is assumed in advance; while in the other, material is drawn from any field as it is needed to carry on an intellectual enterprise."[8] As this illustration points out, the experimental method involves the student in the learning process as completely as possible, he should be the center of activity. Dewey draws a similar illustration when he states:

> Another feature of the problem method is that activity is exacted. I suppose that if there is one principle which is not

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[8]John Dewey, The Way Out of Educational Confusion. (Cambridge: The Harvard University Press, 1931), p. 32.

> a monopoly of any school of educational thought, it is the need of intellectual activity on the part of teacher and student, the condemnation of passive receptivity. But in practice there persist methods in which the pupil is a recording phonograph, or one who stands at the end of a pipe line receiving material conducted from a distant reservoir of learning. How is this split between theory and practice to be explained? Does not the presentation in doses and chunks of a ready-made subject-matter inevitably conduce to passivity?[9]

Another phase of the experimental method is that it is the method of knowing or the method of gaining knowledge. The experimental method also provides a measure of certainty that what is learned is meaningful "knowledge, and not mere opinion — the method of both discovery and proof — is the remaining great force in bringing about a transformation in the theory of knowledge."[10] This concept of method, which provides both discovery and proof for the situation at hand is quite different from other theories. An example of this concept may better illustrate the point. In the industrial arts laboratory a student finds he must grind a twist drill to drill a hole in a soft nitrite plastic. He has developed a problematic situation. In approaching this situation through the experimental method the student would intellectually plan his solution. He would not blindly begin grinding the drill in hopes that it might work, nor would he ask someone else and accept an answer that there is only one way to do it. He would locate possible solutions through resources of all types and make his selection according to intelligent understanding of all ideas

[9] *Ibid.*, pp. 33-34.

[10] John Dewey, *Democracy and Education*, p. 393.

concerned. After he has then completed the activity of grinding the drill and drilling the plastic, his evaluation of the consequences provides meaningful knowledge which has given him both discovery and proof. This type of experimental activity has provided him with more than just an opinion and also shown him that thinking is of avail. Rather than accepting the facts and objects of the world as knowledge, "... experimental inquiry treats them as offering a challenge to thought."[11] The illustration was also experimental in that it provided consequences which could be used in the future under similar conditions. It must be noted that the experimental method, as discussed in this light, is not a blind trial-and-error method. It could be more completely described as an intellectually active trial-and-error approach. The method is used as a result of all facts, resources, idea, and understandings that the individual has at his command. "What we call magic was with respect to many things the experimental method of the savage; but for him to try was to try his luck not his ideas."[12] It is within this framework that the experimental method really provides meaning and usefulness to the learner. "The scientific experimental method is, on the contrary, a trial of ideas; hence even when practically — or immediately — unsuccessful, it is intellectual, fruitful; for we learn from our

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[11] John Dewey, The Quest for Certainty (New York: Minton, Balch and Company, 1929), p. 103.

[12] John Dewey, Democracy and Education, p. 394.

failures when our endeavors are seriously thoughtful."[13] In many learning situations the idea that a student failed in an attempt to solve his problem places him in an unfavorable position. He is probably a target for criticism and possibly a low evaluation. In a case such as this the experimentalist would undoubtedly evaluate the activity experienced and the activity and ideas which went into it rather than the practicality of the consequences. This has an important meaning in the industrial arts program for the consequences of an experiment or the finished project in an activity often become the yardstick for measurement rather that the validity of the approach or method the student used in pursuing his experiment or developing his project. The true knowing is not the understanding and retaining of consequences. "Interpret the aim and test of knowing by what happens in the actual procedures of scientific inquiry, and the supposed need and problem vanish."[14]

The experimental method, as we have seen, gives the learner the opportunity to try out his own ideas, recognize and evaluate consequences, and understand relationships that will be meaningful in future experiences as well as in his present activity. Dewey further illustrates the emphasis placed upon reasoning and relationship in the experimental method when he states:

> In the laboratory the student becomes engrossed in the processes of manipulation, irrespective of the reason for

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[13] Ibid.

[14] John Dewey, The Quest for Certainty, p. 103.

their performance, without recognizing a typical problem for the solution of which they afford the appropriate method. Only deduction or reasoning brings out and emphasizes consecutive relationships, and only when relationships are held in view does learning become more than a miscellaneous scrap-bag.[15]

We have developed a general concept of the experimental method as viewed by the experimentalist and it must again be emphasized that it is a way of doing things, a way of thinking, a way of approaching problems rather than a specific method of teaching or learning. Joseph Ratner explains Dewey's concept of the experimental method when he states:

> In Dewey's educational philosophy, 'experimentation' is not a loose term used to denote any kind of novel, spontaneous, or random departure from habitual ways. For him it is a precise term, denoting the way of thinking and doing that is exemplified, in its most highly developed form, in modern science. ...It is a way of creatively reconstructing the old. Every scientific experiment is based upon and utilizes the experience of the past for the purpose of solving new problems and discovering new truth. It is poles apart from random or impulsive behavior. Every experiment involves careful selection and organization of materials, a thinking through of the relations of means to consequences, and a control of the whole undertaking by ideas. ...Scientific method is the method of learning, the form that learning takes when intelligence is fully freed.[16]

The Problem Solving Attitude

Within the atmosphere of the experimental method operates the problem solving sequence. The solution of problems is actually the continuous activity of learning, and the problem solving sequence or

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[15]John Dewey, How We Think (Boston: D. C. Heath and Company, 1933), p. 185.

[16]John Dewey, Education Today (Introduction by Joseph Ratner, pp. 11-12).

method is a way of getting at solutions to problematic situations. Problem solving is not, in itself, a method of instruction such as the demonstration or method of group instruction. It is, rather, a way of handling the ideas and data that go into the activity of confronting, analyzing, and solving problems.

Problems solving is not new to educational practices for it takes place in one form or another in all learning activities. It is the way in which the problem solving situation develops that is of such great concern to the experimentalist. Speaking of the student's own problems, Dewey states, "They give the pupils something to do, not something to learn; and the doing is of such a nature as to demand thinking, or the intentional noting of connections; learning naturally results."[17] The problems that the student meets unintentionally through work assigned by the instructor are often times solved in terms of right or wrong or in terms of the correct way of doing something, but this is not problem solving in the experimentalistic sense. This is just providing factual answers to previously established problems. In the industrial arts laboratory for example, a student, in an assigned activity, faces the problem of cutting out a circular disc of sheet steel. He must make a decision as to how he can do it best for that particular situation. So often, he turns to the instructor to find out the correct way or turns to a text which explains how it should be done. The fact that there are many ways in which the steel disc

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[17] John Dewey, Democracy and Education, p. 181.

might be shaped and that one method might prove better in this situation than another is seldom considered. The correct way should be learned. This illustrates Dewey's concern for the method of problem solving and why it contributes more to the learning process than the method just used.

In analyzing the foregoing illustration from the experimentalist's view we would ask the question, is the problem real and meaningful to the learner. Dewey provides a guide for answering this question when he states:

> It is indispensable to discriminate between genuine and simulated or mock problems. The following questions may aid in making such discrimination. (a) Is there anything *but* a problem? Does the question naturally suggest itself within some situation of personal experience? Or is it an aloof thing, a problem only for the purposes of conveying instruction in some school topic? Is it the sort of trying that would arouse observation and engage experimentation outside of school? (b) Is it the pupil's own problem, or is it the teacher's or textbook's problem, made a problem for the pupil only because he cannot get the required mark or be promoted or win the teacher's approval, unless he deals with it?[18]

These questions would certainly guide us in problem selection for directing student activities in problem solving techniques. In terms of our illustration in the laboratory, the problem the student must solve is not of the type Dewey would advocate. It was assigned by the instructor and is undoubtedly not as real and meaningful as if it were the student's own problem, growing out of his past experiences. The student "...has a problem, but is it the problem of meeting the

[18] *Ibid*., p. 182.

peculiar requirements set by the teacher. His problem becomes that of finding out what the teacher wants...."[19] We can summarize the development of problem solving as the selection of an idea or problem that confronts the individual, growing out of his past experiences, which is meaningful to him and provides for observation, investigation, and experimentation. Dewey illustrates the required laboratory situation for developing problems of this nature by stating that we have "... the need of active pursuits, involving the use of material to accomplish purposes, if there are to be situations which normally generate problems occasioning thoughtful inquiry."[20]

The second phase of the problem solving method as a learning activity demands that the student recall previously understood facts and data that have implications for the problem at hand. This means that the difficulty proposed must have relation to past experiences so that the student will be in a position to provide a means for handling the problem. A problem which has no ties with past experiences or possesses no relationship to other problems the student has met with and solved provides nothing to guide the student's plan of attack. We sometimes hear of an instructor who has told his students to think things out for themselves as if they could plan something or solve a problem with their mind alone with no other means available. It is impossible to deal with a problem without bringing in past experiences,

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[19] Ibid., p. 183.

[20] Ibid., p. 184.

observed facts and their relationships. "A large part of the art of instruction lies in making the difficulty of new problems large enough to challenge thought, and small enough so that, in addition to the confusion naturally attending the novel elements, there shall be luminous familiar spots from which helpful suggestions may spring."[21] It is actually of little concern how the data or factual material related to the problem is brought out for reflective thought. "Memory, observation, reading, communication, are all avenues for supplying the data."[22] But the data must be available; and in all cases must be sorted and selected through the process of reflective thinking in application to the particular problem at hand. It is often misunderstood that the collection of data is a resource for learning activity and problem solving. The collection of data sometimes becomes an end in itself, and its purpose is toward quantity. When this is true, thinking is hindered. However, when data is gathered as a means for solving problems, the process of reflective thinking becomes the important phase of the activity. "The outcome is a continuously growing intellectual integration.... There is digestion, assimilation, not merely the carrying of a load by memory, a load to be cast off as soon as the day comes when it is safe to throw it off."[23] This point can be made clear through an illustration in our industrial arts laboratory. How often we see the outward objectives of a course, say, in metalworking

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[21] Ibid.

[22] Ibid., p. 185.

[23] John Dewey, The Way Out of Educational Confusion, pp. 34-35.

as that of memorizing the necessary terms and data of the foundry process for example. Students are drilled on such definitions as cope, drag, tempering, spru, etc., and are required to know the qualities of the casting metal, the so-called correct way of ramming a mold, how all elements of the mold should be arranged, and the right way to pour the mold. These things are assumed as static and must be known by all in order to be able to make a good casting. "It aims at mere manual facility, at an immediate external product, or a driving home into memory of something already learned as a matter of mere information."[24] To the experimentalist, this activity in the foundry provides for little ability to identify and solve the problems of the individual student as they arise in his experience. He would feel that it would be far better to pursue this activity on the basis of problems in the area in which the student finds a need for investigation. It should be structured, of course, but not in the sense of lecturer and listener or with a series of castings to be made by each student progressively involving more difficulty. The problem solving approach provides an activity "...in which the mere isolated specilization of collegiate subject-matter is surrendered, and in which there is brought to conscious and interested attention its significance in expression of fundamental modes of mental activity — so fundamental as to be common to both the play of the mind upon the ordinary

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[24] *Ibid.*, pp. 35-36.

material of everyday experience and to the systematized material of the sciences."[25] Under this approach, the facts or data concerning a problematic situation are gathered at the time of need from all available resources. Strict reliance upon recall of previously memorized facts becomes but a small factor in the process. Thus, the collection of data by all means at one's command becomes the second phase of the problem solving sequence.

In many learning activities the collection of data concerning a problematic situation becomes the final step in developing a solution, especially when the data is held as final truth. However, when the data is seen only as a resource for the selection of material to apply to the problem situation, the most important phase of the problem solving method is at hand, that is, the formation of intellectual and practical application of the facts to the problem as tentative solutions. Dewey clearly illustrates this formation of ideas toward problem solution when he states:

> The correlate in thinking of facts, data, knowledge already acquired, is suggestions, inferences, conjectured meanings, suppositions, tentative explanations: — <u>ideas,</u> in short. Careful observation and recollection determine what is given, what is already there, and hence assured. They cannot furnish what is lacking. They define, clarify, and locate the question, they cannot supply its answer. Projection, invention, ingenuity, devising come in for that purpose. The data <u>arouse</u> suggestions, and only by reference to the specific data can we pass upon the appropriateness of the suggestions. But the suggestions run beyond what is, as yet, actually given in experience. They

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[25] John Dewey, "The Relation of Theory to Practice in the Education of Teachers" <u>National Society for the Scientific Study of Education,</u> (Third Yearbook, Part I, 1904), p. 25.

> forecast possible results, things to do, not facts (things already done). Inference is always an invasion of the unknown, a leap from the known.
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> In this sense, a thought (what a thing suggests but is not as it is presented) is creative, — an excursion into the novel. It involves some inventiveness. What is suggested must, indeed, be familiar in <u>some</u> content; the novelty, the inventive devising, clings to the new light in which it is seen, the different use to which it is put.[26]

It is interesting to analyze the meaning Dewey places upon the injection of ideas and facts into the new context of the problem situation. This process provides for alternate solution, creativity, and unique applications but to the experimentalist it also provides for one of the most valuable avenues for individual learning. "... it consists in noting the bearing and function of things acquired."[27] Creatively, the application of ideas to facts is an important part of this learning activity but it is not formed by unrelated ideas. "Only silly folk identify creative originality with the extraordinary and fanciful; others recognize that its measure lies in putting everyday things to uses which had not occurred to others."[28] Educationally it follows that the originality of the activity lies in the student's ability to think out considerations of ideas and facts which have not previously been considered. The learning process can take on this aspect of originality when the student is exposed to conditions that stimulate thinking and when the teacher takes a sympathetic attitude

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[26]John Dewey, <u>Democracy and Education</u>, pp. 186-187.

[27]John Dewey, <u>The Way Out of Educational Confusion</u>, p. 33.

[28]John Dewey, <u>Democracy and Education</u>, p. 187.

toward the student's activities by working with him. In the industrial arts laboratory, ideas are usually provided through many sources, project books, textbooks, the instructor, magazines, etc.; "...we do not usually take much pains to see that the one learning engages in significant situations where his own activities generate, support, and clinch ideas — that is, perceived meanings or connections."[29] If we were to relent some of the facts and ideas, operations and procedures, that are so dear to our hearts in industrial arts, we could probably provide learning activities in which the student's ideas become the meaningful, direction-giving paths to learning.

The fourth stage in the development of the problem solving method is the testing of ideas or possible solutions to find out how well they meet the requirements of the established problem. Here, again, the experimentalist is much concerned about the workability of consequences. "They are therefore tested by the operation of acting upon them."[30] It is not enough, according to the experimentalist, to go through the problem solving sequence for learning purposes just to the stage of forming solutions or establishing consequences. The solutions so established are only informative unless they are acted upon. However, if they are placed into meaningful life situations and followed to their natural conclusion they are better understood and become useful. "They animate and enrich the ordinary course of life. Information

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[29] Ibid., p. 188.

[30] Ibid., p. 189.

is vitalized by its function; by the place it occupies in direction of action."[31] For example, if a student goes through the problem solving experience in trying to find out what angle the point of a twist drill should be to drill a particular type of plastic he may come up with various tentative solutions. Should he stop at this point, he may have developed some thoughts or information about his problem but how real and meaningful is it to him. He could undoubtedly answer some examination questions about the topic or recite to the class what information he has gathered. But does he know if his information, when applied to actual situations, will work or provide the consequences expected? Dewey says that "the bad effects are twofold. Ordinary experience does not receive the enrichment which it should; it is not fertilized by school learning. And the attitudes which spring from getting used to and accepting half-understood and ill-digested material weaken vigor and efficiency of thought."[32] If, however, the tentative solutions were tested in the actual course of activities, it would enrich the outlook of the learner and provide him with direction for further experiences in this area. By testing the drills he had decided upon, the student would live the experience of satisfying his problematic need and also be able to indicate what certain drill angles will do under actual conditions when drilling plastic. So often the student is told what will happen if he does

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[31] *Ibid.*, p. 190.

[32] *Ibid.*

this or that and he is not encouraged to find out for himself what will happen when solutions are tested. Without the process of testing, the idea or solution provides little for the student. "It is not a reality, but just the sign of a reality which might be experienced if certain conditions were fulfilled."[33]

The process of testing or evaluating the ideas and tentative solutions to the problematic situation is the final outcome of the individual problem solving experience. It is final, however, only in the respect that the problematic situation has been resolved but it should be remembered that, through the flow of experiences, this situation should lead into others for continual educational growth. Dewey sums up the various stages of the problem solving method by stating:

> They are first that the pupil have a genuine situation of experience — that there be a continuous activity in which he is interested for its own sake; secondly, that a genuine problem develop within this situation as a stimulus to thought; third, that he possess the information and make the observations needed to deal with it; fourth, that suggested solutions occur to him which he shall be responsible for developing in an orderly way; fifth, that he have opportunity and occasion to test his ideas by application, to make their meaning clear and to discover for himself their validity.[34]

We can now make an analysis of the application of the problem solving method to industrial arts teacher education laboratory teaching. It is, first of all, a series of steps through which the

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[33]John Dewey, The Child and the Curriculum, p. 32.

[34]John Dewey, Democracy and Education, p. 192.

instructor may lead his students in the study of the subject matter of a particular course. It means that topics or subject matter areas would be studied as problems rather than as assignments from the instructor or chapters from the textbook. The problems should be developed through felt needs and difficulties of the student as well as through the value placed upon subject matter. Thus, the subject would not be taught directly, but the instructor would use questions to guide the student's thinking through the steps of the problem solving sequence. Secondly, it is the pattern the student should use in developing his own work; in preparing papers, planning operations dealing with machines and materials, and experimental investigation. He would use the process in formulating and defining his problem, in discovering what data he needs, in arranging that material and developing his procedures, and in providing means for constructing or testing his ideas.

The first step in teaching through problem solving or reflective thinking deals with the problematic situation. It must be remembered that problems do not arise by themselves, that students do not have many problems dealing with the subject matter when the course begins. Problems arise from the process of interaction of the individual with his environment, both physical and human. In the laboratory, the materials, resources, tools, machines, equipment, and students, and teacher become the environment, and each student will operate and develop his problems in this environment. The instructor should serve as an intermediary to help the student bridge the gap between his own experiences and those skills, attitudes, habits, and knowledge that society expects the young to acquire. The difficulty for the student in bridging this gap is that he does not know exactly what society expects of him nor does he have enough information in experience to clearly define his own problems and goals. The instructor is in a much better position to understand the expectations of society and thus assist the student in locating his inadequacies and resolve them.

The student and instructor should work together, if the problem solving method is being used, to develop a plan to locate the student's deficiencies and provide experiences to meet his proposed objectives. It must be remembered that the problems or experiences that the student is going to undertake should be cooperatively developed. Difficulty can often arise when experiences are planned completely by the instructor before the class meets or completely by the student after the class is underway. With these thoughts in mind concerning the formulation of the problem solving method, let us look at a practical illustration.

A student and the industrial arts instructor, working together, plan some experiences that the student will go through in a college general shop course. Some problems and areas of deficiency have been identified and defined and the student must now find ways of instituting the problems. He needs to gain an understanding of the implications the problem presents and establish an orderly arrangement of the data related to the problem. One of the deficiencies which he and the instructor agreed upon as an activity to pursue during the course was to develop some abilities and understandings about teaching arc welding through demonstrations. The problem being defined, he undertook to form his plan of attack. First of all, he brought to light the data concerning the area of arc welding and demonstrations from his own background. This data consisted of past observations, participation, discussions, readings, etc., which he had previously experienced and directed him toward those aspects of the problem where he needed information and understanding. Upon this analysis, he consulted a technical expert, a welder in the community, to find out some of the detailed techniques of arc welding. He discussed the problems of the demonstration in this area with the instructor who suggested some industrial and educational literature which might provide some pertinent information. He also talked with some instructors outside of industrial arts to learn various views toward methods of giving demonstrations. From this data, he was in a position to form some tentative solutions to his problem. He outlined these solutions and discussed them with the instructor who asked a number of questions pertaining to improving his solutions and his general approach to the problem. From all of the information he had available, he chose a solution which he decided would best satisfy the requirements of the problem and would provide the most satisfactory outcome. The solution he chose was to demonstrate how to lay a horizontal bead with the arc welder to a group of four students at a time. He would use chalk board illustrations to develop concepts of electrode weave, position, downward feed, and direction of movement. Information concerning the welding machine would be demonstrated on the actual welder and a glass eye shield would be set up so that the students could observe the actual welding technique. His final step was to evaluate his solution to the problem in terms of its application. This he did through a written evaluation sheet, discussions with the students, and observation of the student's performance after the demonstration.

This example illustrates a possible use of the problem solving method in the industrial arts teacher education laboratory. It can also be used along with the project method in the development of an individual or group project in the same manner. Suitable problems in design, course content, safety, instruction, or teaching aids can all become a problem solving activity when the instructor provides the setting. Through out this discussion we have not yet signified the values of the problem solving method in terms of outcomes for the student. We have seen that the method provides for solutions to problems the student investigates, but are there not other valuable outcomes to justify its use? The American Council on Education identified the following behavioral outcomes of the problem solving activity which Dewey would certainly recognize, namely:

1. Ability to recognize the existance of a problem.
    a. To locate missing links in a series of ideas or incidents.
    b. To recognize problems which have no solution.
    c. To recognize problems which have significance.
    d. To recognize conflicts and issues in a situation.

2. Ability to define the problem.
    a. To identify the nature of a problem.
    b. To understand what is involved and required in the problem.
    c. To recognize ways in which the problem can be phrased.
    d. To define and abstract elements of the problem in simple concrete and familiar terms.
    e. To break complex elements into simple parts.
    f. To place the elements into an order in which they can be handled.
    g. To eliminate extraneous elements.
    h. To place the problem in its context.
3. Ability to find and select information pertinent to the solution.
    a. To distinguish reliable and unreliable sources of information.
    b. To recognize bias upon which information is selected and rejected.
    c. To recognize information relevant to the solution of the problem.
    d. To select reliable and adequate samples of information.
    e. To systematize information.
    f. To select information from personal experience relevant to the solution.
4. Ability to recognize stated and unstated assumptions.

a. To identify reasonable assumptions.

b. To identify unsupported and irrelevant assumptions.

5. Ability to formulate and select relevant and promising hypotheses.

a. To discover clues to the solution of the problem.

b. To formulate various hypotheses on the basis of information and assumptions.

c. To select the most promising hypotheses for final consideration.

d. To check the consistency of the hypotheses with the information and assumptions.

e. To make hypotheses concerning unknown and needed information.

6. Ability to draw valid conclusions from information, assumptions, and hypotheses.

a. To detect logical relationships.

b. To recognize necessary and sufficient conditions.

c. To identify cause and effect relationships.

d. To identify and state the conclusion.

7. Ability to evaluate a conclusion in terms of its application.

a. To recognize conditions which would be necessary to verify a conclusion.

b. To recognize conditions which would make a conclusion invalid.

c. To judge the adequacy of the conclusion as a solution of the problem.[35]

These behavioral outcomes, which could also be stated as objectives of the problem solving activity, provide both guidance for the activity and goals for learning. They would also provide the instructor with assistance in practicing the problem solving method. "Adaption of the method to individuals of various degrees of maturity is a problem for the educator, and the constant factors in the problem are the formation of ideas, acting upon ideas, observation of the conditions which result, and organization of facts and ideas for future use."[36] The challenge is placed before us, "...we have no choice but either to operate in accord with the pattern it provides or else to neglect the place of intelligence in the development and control of a living and moving experience."[37]

Methods of Instruction

Under the concept of the experimental method of learning which would revail in the experimentalist's classroom fall his methods of instruction. A differentiation should be made here between the two. It has already been mentioned that the experimental method is an overall method of learning and is mainly used by the learner in solving his problems and in pursuing his understandings. The methods

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[35]Paul L. Dressel and Lewis B. Mayhew, General Education: Exploration in Evaluation (Washington: American Council on Education, 1954), Chapter 7.

[36]John Dewey, Experience and Education, p. 112.

[37]Ibid.

of instruction used by the experimentalist fall within the framework of the experimental method of learning and are used mainly by the instructor in providing understandings, arranging learning activities, organizing subject matter, and providing areas of study for individual and group activities. Although there are many methods of instruction that the experimentalist would not advocate using, some will be discussed to illustrate his reasons for regarding them inappropriate in the learning situation. It might also be well to point out that methods of instruction are as directly related to the objectives of the program as is the curriculum. Though the relation of methods to objectives will not be discussed directly, one can understand their relationship as the methods are developed. Each one of the established objectives should cause the instructor to provide or make available processes and methods by which the desired outcomes of the program may be brought about. In the industrial arts teacher education program it can certainly be seen that one or two methods of instruction, such as the lecture or demonstration, can bring about behavior changes toward desired outcomes. It is apparent that many methods must be available to meet the conditions of learning that will present themselves during a given course. These methods cannot all be planned in advance as to their specific time, place, and manner of use, but must be given consideration as the need requires. With these thoughts in mind, let us now turn to some specific discussions of instructional methods which meet with the experimentalist's approval.

The Demonstration

One of the foremost methods of instruction in the industrial arts teacher education laboratory course is the teacher demonstration. We are not so much concerned here with the qualities of a good demonstration but rather with the validity of the demonstration as a teaching method in the experimentalist's philosophy. To frame the situation in which the learning activity is to take place we must remember that "processes of instruction are unified in the degree in which they center in the production of good habits of thinking. ... the important thing is that thinking is the method of an educative experience."[38] The demonstration must be a device for stimulating reflective thinking as well as presenting a way of doing something.

In the industrial arts laboratory course the demonstration has long been depended upon by the teacher as well as the student as the major method in which skill or know-how are transmitted from teacher to student. The use of the demonstration in many situations did very little to stimulate thinking or an attitude of investigation, but rather, it placed the student in the position that he should practice the operation or skill demonstrated until he could do it very much as the teacher demonstrated. The experimentalist would not be satisfied with this use of the demonstration. He would feel, first of all, that the demonstration is one way to open up new fields of thought and activity and that students should be stimulated in

[38]John Dewey, Democracy and Education, p. 192.

pursuing activities through the demonstration. He would be quite concerned, on the other hand, if the demonstration merely excited the student to the place that he wanted to copy the instructor and developed no further ideas of his own. If a demonstration only provided information and desire to copy the instructor, the experimentalist would have little use for it. Students are often encouraged to do as the instructor demonstrated. "Instead of being encouraged to attack their topics directly, experimenting with methods that seem promising and learning to discriminate by the consequences that accrue, it is assumed that there is one fixed method to be followed."[39] Let us examine an example of how the experimentalist might present a demonstration in wood turning on the lathe. This is a typical demonstration in the industrial arts laboratory and is usually given quite authoratively in a step-by-step manner of the right way to operate the lathe. The experimentalist would use a different presentation for he would feel that the previous presentation would lack in imagination, ideas, and judgment on the part of the student. The experimentalist instructor would probably suggest some possible uses of the wood lathe and ask some questions to stimulate ideas in its use in the shop and in industry. His demonstration would suggest some possible ways of mounting stock in the lathe, using lathe cutting tools, and finishing. He would be very careful not to intimate that any of the things he illustrates are the only ways they can be done, and he would encourage

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[39]Ibid., p. 199.

suggestions of other ways of approaching the problems of mounting stock, rough and smooth turning, and finishing in the lathe. The instructor would definitely not demonstrate all possible operations that he feels can be performed on the lathe, but he would present some ways of doing things and pose questions which might encourage the student to experiment with his own ideas of lathe operation. He would carefully structure his demonstration so as to encourage questions from the group which he could use to develop interest, investigation, and experimentation. For example, a student asks, "At what angle should the gouge be held to make a shearing cut?" The instructor would take this opportunity to help the student investigate the problem for himself, suggesting some resource materials and inviting the student to experiment with the gouge, letting the student know he is also interested in this problem and that they could work on it together.

The proposed demonstration should cause thinking and an attitude of desire to experiment rather than a passive attitude of feeling that the way the instructor did certain operations must be memorized for fear of examinations or criticism when one does not do exactly as the instructor demonstrated. These are some of the qualities of the experimentalist's use of the demonstration. It is true that the demonstration should provide information, safe work habits, and ways of doing things, but it is also true and more important, that the demonstration stimulate critical thinking, provide for questions to be followed through, encourage ideas for communication and investigation, and open up areas of interest in which the student may identify himself and his own problems. Dewey says, "That the situation should be of such a nature as to arouse thinking means of course that it should suggest something to do which is not either routine or capricious—something, in other words, presenting what is new (and hence uncertain or problematic) and yet sufficiently connected with existing habits to call out an effective response."[40] Does the cut-and-dried, how-to-do-it demonstration provide for this effective response? The experimentalist does not believe it does. Here again he refers to the validity of the problem the student may develop from the demonstration. "...it is indispensable to discriminate between genuine and simulated or mock problems."[41] In terms of the methods (in this case the demonstration) used to present subject matter Dewey says that the following questions must be asked in order to discriminate between real, meaningful problems to the student and those that are of little value to him. In presenting the demonstration, these questions, offered by Dewey, can serve as a guide for presentation in a problem approach.

1. "Is there anything but a problem?
2. Does the question naturally suggest itself within some situation of personal experience? Or is it an aloof thing, a problem only for the purposes of conveying instruction in some school topic?

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[40] *Ibid.*, p. 181.

[41] *Ibid.*, p. 182.

3. Is it the sort of trying that would arouse observation and engage experimentation outside of school?
4. Is it the pupil's own problem, or is it the teacher's or textbook's problem, made a problem for the pupil only because he cannot get the required mark or be promoted or win the teacher's approval, unless he deals with it?
5. Is the experience a personal thing of such a nature as inherently to stimulate and direct observation of the connections involved, and to lead to inference and its testing?
6. Or is it imposed from without, and is the pupil's problem simply to meet the external requirement?"[42]

A reaction to Dewey's questions is usually that we are certainly not doing this in current practice. "Such questions may give us pause in deciding upon the extent to which current practices are adapted to develop reflective habits."[43] The demonstration as a technique for providing areas of interest and opening up avenues of exploration where problems may be identified is a sound method of presentation. However, when it is used to impart facts, operations, and pre-arranged problems for study it becomes a hinderance to the learning process.

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[42]*Ibid.*

[43]*Ibid.*

The demonstration can be used for total class presentation, to small groups of students, or to individuals as their needs require. The latter two situations would be of most importance to the experimentalist. It is seldom that the whole class would have need for a demonstration at the same time, nor would they all be in a position to make it meaningful at the same time. The experimentalist would rather use the demonstration in individual or small group situations where a problem has been confronted, and it would set the stage for further learning activity. It need not be a completely structured demonstration with an outline on file cards and all equipment precisely at hand. Rather, it would be an informal presentation where the instructor is illustrating a principle or operation as one student might do for another. This concept presents the idea that the instructor does not constantly preside over the class, demonstrating his great skill and knowledge in handling tools and materials. He becomes a leader of class activities; a student sharing his knowledge and understandings with other students. "...the alternative to furnishing ready-made subject matter and listening to the accuracy with which it is reproduced is not quiescence, but participation, sharing, in an activity. In such shared activity, the teacher is a learner, and the learner is, without knowing it, a teacher -- and upon the whole, the less consciousness there is, on either side, of either giving or receiving instruction, the better."[44]

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[44]Ibid., p. 188.

A further viewpoint concerning the demonstration is that it should probably be used as much or more by students as by the instructor. In the experimentalist classroom or laboratory students would be requested and would also feel duty bound to demonstrate principles or ways of doing things to other individual students and to small groups working on the same problem or in the same area. This interaction of student activity toward a mutual problem would constitute a prime learning situation.

The Project Method

It is without question that the project method of teaching in industrial arts teacher education dominates and has dominated all methodology. The first question of its use is not whether it is acceptable to the experimentalist as a method of teaching, but should it be used at the expense of so many other methods of teaching and learning. We are speaking now of the project method of instruction as it is generally used in industrial arts laboratories. Each student is either assigned, selects from a given list, or designs a project within the framework of the course and constructs the project, meeting problems of materials, procedure, machine operation, etc., as they come along. The experimentalist feels that there are many methods of teaching and these methods should be used according to the type of activity that is taking place and according to the aims and purposes of the student and his problem. "The problem of instruction is thus that of finding material which will engage a person in specific activities having an aim or purpose of moment or interest to him, and dealing with things not as gymnastic appliances but as conditions for the attainment of ends."[45] The problem of instruction in present industrial arts courses, however, appears more to be the selection or assignment of projects that the instructor feels the student should construct according to the aims of the instructor imposed upon the student. The frequent justification for the assignment or limited selection of projects by the instructor is that the student will be required to use such-and-such machinery, or tools and materials if he constructs this project and these tools and materials are fundamental for him to understand and be able to use.

Now let us look at the project method and its use in the industrial arts laboratory course from Dewey's point of view. Here the project may have many advantages as a device for learning but must meet a number of conditions to be educative. These conditions are somewhat different than the criteria used for project selection in many present day industrial arts activities. Speaking of this method of teaching, Dewey says that "they are usually known as 'projects'. In order that they may be truly educative, there are certain conditions that should be fulfilled."[46] It should be remembered that Dewey is speaking of the project as an item to be constructed in the industrial arts laboratory when he lists the following conditions:

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[45] Ibid., p. 155.

[46] John Dewey, How We Think, pp. 217-218.

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47 Ibid

48 Ibid

> The first condition, that of interest is usually met. Unless the activity lays hold on the emotions and desires, unless it offers an outlet for energy that means something to the individual himself, his mind will turn in aversion from it, even though externally he keeps at it.[47]

The interest Dewey speaks of must be enduring and provide for action that is meaningful and thought provoking. He feels that interest alone that does not provide these things is not enough to justify the project.

> Hence the second condition to be met is that the activity be worthwhile intrinsically. This statement does not signify, as we have just seen in another connection, that its outcome be something externally useful from the adult point of view. But it does mean that merely trivial activities, those that are of no consequence beyond the immediate pleasure that engaging in them affords, should be excluded.[48]

For this condition to be met the project must be of value, not just to the student but of value to applications of life. This is the point at which Dewey excludes the exercise method or the construction of an intrinsically useless article which has no value except in providing supposed learning which might accrue from its construction.

> The third condition is that the project in the course of its development present problems that awaken new curosity and create a demand for information. There is nothing educative in an activity, however agreeable it may be, that does not lead the mind out into new fields. The new field cannot be entered unless the mind is led to ask questions that it had not thought of before and unless the presence of these questions creates a thirst for additional information to be obtained by observation, by reading, by consulting persons expert in that particular

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[47] Ibid., p. 218.

[48] Ibid.

field.[49]

The important concept here is that careful consideration and planning should be undertaken by student and instructor in providing a challenging project which leads to new information and understandings. A project which involves tinkering and the recall of previously learned activities alone is not educative as a learning activity. This requires that the project be on the level of the student's ability. How often we see the student construct a project which he already knows how to do and impresses the instructor with his skill and knowledge of tools and materials. Dewey's first question would probably be to ask what the student learned.

> Finally, as a fourth condition, the project must involve a considerable time span for its adequate execution. The plan and the object to be gained must be capable of development one thing leading on naturally to another. Unless it does so, new fields cannot be entered. It is the province of the adult to look ahead and see whether one stage of achievement will suggest something else to be looked into and done.[50]

The suggestion made by this fourth condition limits the selection of projects which are so insignificant so as not to provide enough time in the activity to allow the student to solve and relate the problems that arise. Projects of very short time span tend to provide only unrelated problems which lead to little more than their conclusion.

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[49] Ibid.

[50] Ibid., pp. 218-219.

We can now see that the experimentalist feels that the project is a valuable learning device especially for laboratory activities. He does not, however, feel that it is the only method of instruction, but realizes that other methods may be much more conducive to learning depending upon the situation. He would undoubtedly be quite upset to observe so many industrial arts teacher education laboratory courses begin activities and proceed to the end of the term with no consideration of method other than the project, each student completing one after the other. How then, should the project in a given course be selected? The ready-made plans of a project designed by the instructor or taken from a text or project book are obviously unacceptable. These would have no part in the selection except for, perhaps, resource materials to provide ideas. The simply expressed desire of the student saying he wants to make this or that would be a start but definitely should not be the guiding principle of choice. Projects are too often undertaken with no more intellectual investigation than the sheer desire to make something that the individual would like to own after its completion. It is granted that interest or desire is the starting point, for the activity could not proceed practically and meaningfully without it, but as we have seen by Dewey's conditions of an educative project, more planning and justification must be done to develop the project into a true learning experience. Goals of the project must be established. The possible projects and areas of needed study should be identified and considered as to their application to this learning situation. A plan should be prepared by the student as a guide for working out the project. These should all be worked out with the instructor and the responsibility for following the project through to completion should be held up to the student. Risk points out the experimentalist's view concerning the characteristics of a good project as follows:

1. "The undertaking is complete in itself.
2. The learning activity is aimed at a definite, attainable goal.
3. The learning activity is purposeful, natural, and life-like in its procedure to attain the goal.
4. The learner plans and directs his own learning activities.
5. The goals or ends of achievement are definitely and objectively measureable."[51]

The project fashioned after these characteristics becomes an effective learning experience. The concept that the ideas, purposes, goals, and plans are basically the student's makes him responsible for the project's completion and also frees him from the drudgery of following an instructor's assigned project. A project of this nature provides intelligent activity, the foundation for effective learning. "Intelligent activity is distinguished from aimless activity by the fact that it involves selection of means — analysis — out of the variety of conditions that are present, and their arrangement —

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[51]Thomas M. Risk, Principles and Practices of Teaching in Secondary Schools (New York, American Book Company, 1941), p. 470.

synthesis — to reach an intended aim or purpose."[52]

With this analysis of the project as a method of instruction, it might be felt that it has been over-emphasized as an experimentalist method for industrial arts teacher education laboratory use. It must be remembered that the experimentalist has many methods, each with its own purpose and place of use. As far as emphasis is concerned, he would undoubtedly place the problem-solving method and the method of experimentation over the project because of his obvious belief in the educational value and effectiveness of the former. These will be discussed at length in this connection. The point to be made here is that the project, as a teaching method, is of great value as long as it is used for purposes of learning and not for merely the construction of items for personal use or as a crutch for causing students to use specific tools and machines or perform specific operations. This criticism may sound unjust, but how frequently do instructors assign projects so that students will have to work in a particular area or be forced to do specific operations, deemed fundamental by the instructor, in order to complete the project? These are some of the considerations that the instructor should work out in using the project method in industrial arts laboratory courses.

It should also be pointed out that this discussion deals only with the project as the production of some physical or material product. The other aspects of the project method as the experimentalist

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[52]John Dewey, Experience and Education, pp. 105-106.

would have it, intellectual problems and projects, and learning projects will be discussed under the problem solving method.

Experimentation

"Men have to do something to things when they wish to find out something; they have to alter conditions. This is the lesson of the laboratory method, and the lesson which all education has to learn.... Experience then ceases to be empirical and becomes experimental."[53] This introduction clearly illustrates Dewey's attitude toward experimentation as an instrumental activity in education, especially in the laboratory. Though he did not write directly about experimentation in the industrial arts laboratory he certainly would be enthusiastic about the opportunities of such activities in this field for the problems, materials, and conditions are overwhelmingly applicable. Maley illustrates the opportunities for experimentation in industrial arts when he writes:

> Industrial arts as taught in the college programs and at the secondary-school level has remained blind to the fact that a considerable part of the work of industry is in the realm of experimentation, analysis, and testing.... The presence of this activity in industry cannot be denied. Yet in a school program that professes 'the interpretation of industry', 'the understanding of materials and processes', and 'consumer knowledge', there is an almost complete absence of such activity.... The industrial arts laboratory is an ideal setting for such activities with its many tools of industry plus the raw and finished products.[54]

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[53]John Dewey, Democracy and Education, pp. 321-323.

[54]Donald Maley, A Sourcebook of Readings in Education, American Council on Industrial Arts Teacher Education (Bloomington, Illinois: McKnight and McKnight Publishing Company, Sixth Yearbook, 1957), p. 165.

It is interesting to note how many educators along with Dewey have emphasized the use of the experiment in education and yet how little it is actually being used as a method of instruction. As early as 1917 Dewey had hopes that the experimental attitude was being formed when he said that "experimental work already done makes it possible to find teachers who are themselves capable of assuming the experimental attitude — the most difficult single condition to realize."[55] It is felt that this is one of the main reasons for such little use of experimentation in our industrial arts programs today. Dewey consistently points out in his writings that the progressive methods that he advocated were much more difficult to use than the more traditional methods and that it requires teachers with deeper understandings of how people learn and think; the teacher has more responsibility. Applying these thoughts to the use of experimentation we find that the instructor is confronted with a difficult job. His students will be working in many different areas, and he has the responsibility of assisting and guiding each student or group through their particular activity. He would no longer have the security of reading and discussing a few pages from his lecture notebook and then sending the class to the laboratory to continue work on their projects. With these ideas in mind, let us examine the real meaning of experimentation. Dewey says that "the object of the experimentation is the construction, by regular steps taken on the basis of a plan thought

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[55]John Dewey, Education Today, p. 125.

out in advance, of a typical, crucial case, a case formed with express reference to throwing light on the difficulty in question.... experiment is simply the most adequate regulation of these conditions that is possible."[56] It can be seen here that experimentation involves the establishment of a plan of action which is prepared in advance of the proposed investigation of the question. It is not random hit-and-miss activity. It is an ordered investigation into the observable details of a question where all conditions can be controlled to the highest degree possible. "Making observations open, overt, precise, constitutes experiment."[57] It is also apparent from the experimentalist's view that experimentation requires action. It is not the intellectualising of ideas to a reasonable consequence which proves of value but rather the setting up of an experience, an activity, which provides practical, usable results. "To magnify thought and ideas for their own sake apart from what they do is to refuse to learn the lesson of the most authentic kind of knowledge — the experimental — and it is to reject the idealism which involves responsibility."[58] The knowledge received through the use of experimentation, according to the experimentalist, is also readily available and more accurate than that received when "...we simply wait for an event to happen or

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[56]John Dewey, How We Think, pp. 175-176.

[57]Ibid., p. 176.

[58]John Dewey, The Quest for Certainty, p. 138.

an object to present itself."[59]

Let us turn now to the industrial arts teacher education laboratory and make some applications of experimentation as a practical learning experience. The first thing to be considered when beginning an activity in experimentation is not a pre-planned situation where the student follows the steps of procedure through an experiment but rather an atmosphere of free interplay of ideas. Ideas are the starting points for experimentation. "There is no such thing as experiment in the scientific sense unless action is directed by some leading idea."[60] Ideas in this sense should be those of the student, those that cause the student to look for answers. The instructors ideas for experimentation often hinder the investigative attitude. The ideas are then established as hypotheses to be tested. "....Ideas or hypotheses are tested by the consequences which they produce when they are acted upon. This fact means that the consequences of action must be carefully and discriminatingly observed."[61] After the testing of ideas and observation of results or consequences, "...the experimental method demands keeping track of ideas, activities, and observed consequences. Keeping track is a matter of reflective review and summarizing.... to look back over what has been done so as to extract the net meanings which are the capital stock for intelligent dealing

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[59]John Dewey, How We Think, p. 176.

[60]John Dewey, Experience and Education, p. 109.

[61]Ibid., p. 110.

with further experiences."[62] For fear of over emphasizing the use of experimentation in all types of educational activities Dewey illustrates its place in the educational scheme as follows:

> I am aware that the emphasis I have placed upon scientific method may be misleading, for it may result only in calling up the special technique of laboratory research as that is conducted by specialists. But the meaning of the emphasis placed upon scientific method has little to do with specialized techniques. It means that scientific method is the only authentic means at our command for getting at the significance of our everyday experiences of the world in which we live.[63]

It is appropriate to emphasize here, following Dewey's remarks, that experimentation is not just a means of searching and testing for consequences which already exist in textbooks or answer sheets. When answers already exist, the use of the experiment has little value to the student in simply following the sequence or pattern that someone else used to derive the same answer. The experimentalist views experimentation as a method of investigation for unknown facts or ideas. A comparison of the two concepts of experimentation might prove helpful. Say, for example, that a student does an experiment to see if aluminum is more ductile than brass. He may already know the answer and, if not, he could easily review reference material on the topic which has been previously affirmed. On the other hand, a student might plan an experiment concerning the use of various wood finishes on gum to imitate walnut. Here, the experiment is open-ended. There

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[62] Ibid.

[63] Ibid., p. 111.

is no definite, compact answer to his investigation. His experimentation will serve as a means to his problem solution. There are also other educational values to this type of experimentation where answers are not available. First of all, behavioral changes take place which constitute learning. Secondly, experimentation, as a method, provides the student with a process for solution of indefinite problems. He takes on an experimental attitude toward learning. Third, the student is able to learn through sense impressions during the process of experimentation. Fourth, the process of experimentation gives the student the opportunity to verify or disprove previous experiments.

To apply this concept of experimentation to industrial arts laboratory work means to capitalize upon the student's significant interests and ideas which deal with meaningful and practical industrial products and processes. For example, a student has an idea or question concerning the durability of various species of wood for use in outdoor furniture. This interest can either be capitalized upon by working with the student in testing and observation or can easily be subdued by telling the student to look up the answers in a book or ask an expert. He will undoubtedly get answers from the latter sources but will they be meaningful to him? Will they provide him with understandings of why and how? Will they lead him to further investigation and develop new experiences from past activity. The experimentalist would feel that it is doubtful. He would immediately grasp this opportunity to assist the student in setting up an experimental learning activity. The student, with the instructor's assistance when needed, would work out a plan for testing a selected group of woods as to their durability in various weather conditions.

These woods might be placed out of doors for a given period or a humidity chamber possibly would be used to assimilate weather conditions. Observation and testing would follow and all conditions controlled as closely as possible. General observation of cracks, discoloration, deterioration, etc., would be made and recorded. Each sample would be tested for moisture content, shrinkage, and swelling and recorded. Through this recorded data, the consequences would provide meaningful review of the activity which would lead to useful conclusions. Certain woods could be judged as superior to others for the construction of furniture to be used in various weather conditions. In this example of experimentation we can also see how the activity allowed the student to observe and test hypotheses which would probably be very difficult to do under natural conditions. In other words, it would take years to observe and test pieces of furniture which were already in use as to how well they were holding up and the differences in species. In our experiment these conditions can be speeded up and many tested at the same time. This brings us to Dewey's three advantages of experiment. "Experiment overcomes defects due to (a) the rarity, (b) the subtlety and minutenss (or the violence), and (c) the rigid fixity of facts as we ordinarily experience them."[64] The example illustrated the advantage of overcoming rarity so that we do not have to wait for an event to happen in order to observe and test the conditions. We can often overcome subtlety or minuteness

[64] John Dewey, How We Think, p. 176.

of events by controlling conditions, such as the study of various gasses. By their very nature most gasses escape our ordinary experience but by experimentation we can gather and control the conditions of various gasses to test them. The third advantage, that of overcoming the rigid fixity of facts, allows experimentation to analyze those things that appear in nature as fixed and yet can be altered by man. An example is the liquification of air which changes the natural qualities of air to another form to be analysed.

These are some of the characteristics of the use of experimentation in education. Its prime consideration is in the discovery of truth; truth which is formed through a sound conclusion from observable and testable data. This process usually provides a principle or rule upon which other experiences may be based. It can also be noted that the experimentalist feels that the use of experimentation provides for more permanent learning than do other methods. Students retain and understand a meaning or principle better when they actively engage in discovery for themselves. The passive reception of facts and principles through other methods, such as the lecture or textbook, do not provide for this more meaningful understanding. Dewey supports the use of experimentation as a method of instruction when he states:

> When trying, or experimenting, ceases to be blinded by impulse or custom, when it is guided by an aim and conducted by measure and method, it becomes reasonable — rational. When what we suffer from things, what we undergo at their hands, ceases to be a matter of change circumstance, when it is transformed into a consequence of our own prior purposive endeavors, it becomes rationally significant — enlightening and instructive.[65]

[65] John Dewey, Democracy and Education, p. 319.

It might be well to reiterate that the method of experimentation is held by the experimentalist as the outstanding method of instruction in educational activities. Its use in industrial arts teacher education laboratory work would provide an invaluable activity through which the subject matter could be developed. A final value of this method lies in the fact that experimentation leads the learner to develop an experimental attitude along with development of knowledge. The experimental attitude is a trait that provides a consistent approach to gaining understanding.

An Experimentalist Unit Method

Another method of instruction, that which can be called the experimentalist unit method, is appropriate in this section. The common use of the unit method, the organization of material into larger blocks, does not apply to this discussion. We are here concerned with instruction based upon unit experiences or activities. In other words, a unit could be defined simply as a specific activity in which the group engaged as a whole. A typical activity, serving as a unit, might be creativity, and organization of experiences and materials would be around this activity. We might say that anything that can be called a study or unit, "must be derived from materials which at the outset fall within the scope of ordinary life-experience."[66] It can be seen here that under the unit method must come many varied individual methods. The unit method itself is a general way of

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[66] John Dewey, Experience and Education, p. 87.

organizing and presenting material. It allows for group and individual activities where responsibility for planning and carrying out the unit lies with the student.

The instructor has major responsibility for unit teaching in the following areas. First, he must be able to organize the class for group activities and prepare them for this type of activity. Secondly, he must be able to foresee problem areas in the planned activity and give guidance and direction to the learning situation. Third, he must be able to ask questions which will provide for ideas and investigation rather than be the person to answer all questions. Finally, he must have an understanding of present day industrial and social life and stress the need for social efficiency in working together toward a common goal.

When the unit method is to be employed in reference to experimentalism it would require at least the following conditions.

1. The unit must be selected by students and instructor as a group and not imposed upon the group by the instructor.
2. The unit should, as closely as possible, grow out of the past experiences of the group.
3. The students should do all planning with the instructor serving as a guide.
4. The unit should be practical, up-to-date, and be of social-industrial significance.
5. The unit should involve all students of the group according to individual needs, abilities, and interests.

The unit method of teaching can be used for a complete course, that is, dividing the course up into several units of study organized within a given subject matter area or one or more units can be inserted into the subject matter of a course. The unit can also be used as a part of each day's work and the remainder spent on regular content. Typical units in the industrial arts teacher education course would be mass production, industrial processes, experimentation with materials, tool and machine maintainence, teaching aids, specific applications, such as the identification of woods, and so on. The selection of the unit must be guided by the objectives of the course, the course content, and the needs of the individual.

Let us examine a unit on mass production in a course in metalwork. A unit of such diversity requires considerable planning to make it a valuable learning experience. It first of all involves the occupations of individuals in the production of a consumer product. Of this phase of industry Dewey says:

> The fundamental point in the psychology of an occupation is that it maintains a balance between the intellectual and the practical phases of experience. As an occupation it is active or motor; it finds expression through the physical organs — the eyes, hands, etc. But it also involves continual observation of materials, and continual planning and reflection, in order that the practical or executive side maybe successfully carried on. Occupation as thus conceived must, therefore, be carefully distinguished from work which educates primarily for a trade....[67]

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[67]John Dewey, The School and Society (Chicago: University of Chicago Press, 1900), p. 68.

Secondly, the mass production unit must be guided by the objectives of the industrial arts program and of the given industrial arts course. That is, aims or objectives should be established by the class in order to give direction to the activity. In this case the aim of the unit would be to provide some understandings and abilities in developing a mass production activity through interpretation of industry. It is at this point that the unit method often developes difficulties. The objectives have been established and the activity gets under way only to forget the means by which the objectives are to be met. The mass production activity may provide little more than the individual project method unless a means for meeting the proposed objectives is established and followed. One of the most difficult challenges to the industrial arts teacher in this respect is for him to realize that an objective of this unit is not to develop skill in machine or tool operation. Undoubtedly some degree of skill will be developed along with the activity but it is not an objective and little concern should be shown for it. Our concern for this unit should be to develop an activity that provides behavior changes in terms of our unit objectives. This is our responsibility. The mass production activity as a unit of instruction provides a means of attaining some of the objectives that we hold as valid in industrial education.

It can be seen that the unit method of instruction gives the opportunity for group learning activities and concentrated efforts of learning toward some understandings which are otherwise difficult to meet. It has its place only in that it may better serve to meet the needs of the student and of the program in a way that other methods might not be able to do.

Group Instruction

A final consideration in terms of methodology for industrial arts teacher education is that of group instruction. As we recall instruction in any area at the college level we can see that it has been, and is, highly individualized. Each student carries on his own study, whether assigned or elective, as an individual of the group. Instruction is often given to the class as a group but there is usually little interaction of ideas and subject matter between individuals. Dewey is quite concerned with the lack of group activities when he states:

> There is no opportunity for each child to work out something specifically his own, which he may contribute to the common stock, while he, in turn, participates in the production of others. All are set to do exactly the same work and turn out the same products. The social spirit is not cultivated, — in fact, in so far as the purely individualistic method gets in its work, it atrophies for lack of use.[68]

Dewey is indicating here that our methods of instruction should encourage students to work together for their own good in learning and also for the good of the group. "When this tendency is not used, when conditions are such that other motives are substituted, the accumulation of an influence working against the social spirit is much larger than we have any idea of ..."[69] It is important that we provide the student with a social atmosphere in which to learn, where

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[68]John Dewey, Moral Principles in Education (New York: Houghton Mifflin Company, 1909), p. 22.

[69]*Ibid.*

the interplay of ideas and participation in common activities broadens this learning atmosphere. When students work and study in isolation from other students, they lack the opportunity to share ideas and help others in learning activities. "The educator is responsible for a knowledge of individuals and for a knowledge of subject matter that will enable activities to be selected which lend themselves to social organization, an organization in which all individuals have an opportunity to contribute something, and in which the activities in which all participate are the chief carrier of control."[70] Group instruction is one means by which the social emphasis upon learning can be met. But how does group instruction, or better yet, group learning, take place? Many instructors insist that they cannot carry on small or total group learning activities which will cover the subject matter. Others feel that group instruction must be too loosely organized to be meaningful. However, the experimentalist does not recognize these difficulties. He feels that meaningful group learning can take place in many ways and that any method that appeals to the student's "capacities in construction, production, and creation, marks an opportunity to shift the center of ethical gravity from an absorption which is selfish to a service which is social."[71] The industrial arts teacher education laboratory is one of the most suitable areas for this type of activity. Students must work and study together to some

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[70]John Dewey, Experience and Education, pp. 61-62.

[71]John Dewey, Moral Principles in Education, p. 26.

extent in any activity in the laboratory and methods that induce further interaction are easily identified. "The principle that development of experience comes about through interaction means that education is essentially a social process."[72] This principle, adapted to method, provides for unlimited laboratory learning situations where students work individually and in groups on a common topic. Such group learning activities in industrial arts would include group experimentation with machines and materials, units in mass production, industrial processes, group planning, and group teaching situations. All of these would provide for the experimentalist's view that learning should be socially orientated. Though this process has been seldom adopted, back in 1909 Dewey advocated that "manual training is more than manual; it is more than intellectual; in the hands of any good teacher it lends itself easily, and almost as a matter of course, to development of social habits."[73]

Probably the most important phase of group learning is in the area of planning; more so than in individual study. Coordination of student responsibilities, how objectives are to be met, facilities to be used, materials, and an evaluative procedure to indicate outcomes should be planned by the teacher and group. The sharing of responsibility is an important part of the group learning activity and planning for this responsibility prepares the group for social-

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[72] John Dewey, Experience and Education, p. 65.

[73] John Dewey, Moral Principles in Education, p. 26.

industrial interaction. "A being connected with other beings cannot perform his own activities without taking the activities of others into account."[74] Let us examine the planning process for a group activity such as mass production. The group, first of all, must look at all the various aspects of mass production in our society and determine the type of activity that would readily adapt itself to the facilities available. Let us say, for example, the group decided upon the mass production of a wrought iron telephone table. Considerations that now must be made concern class organization. A committee should be formed to study design of the table, propose manufacturing techniques, and develop a plan for marketing and sales. The class should then be involved in discussion of production which might include decisions to take field trips to observe typical mass production techniques, library resources to be investigated, and organization of the class into production operation groups. The final organization would probably be around groups for engineering, production, and management. These groups would plan their own activities and report back to the class how they decide to function. All of this, of course, would involve the instructor for suggestions and direction. The division of the class into groups of engineering, production, and management, with a supervisor in each area, allows for democratic organization and operation. These supervisory positions are usually elective. The production period involves the total group in fabrication of the table

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[74]John Dewey, Democracy and Education, p. 14.

following the established schedule of operation. Each group of operators design their own fixtures and jigs and perform their part of the manufacturing process according to flow charts of production established by the supervisory groups. After assembly, finishing, and sales, the class makes a final evaluation of the mass production activity in terms of behavioral outcomes, objectives, and possible improvements if it were to be done again.

This illustration points out many aspects of the learning situation which can be obtained through group participation. Problems must be solved by interaction of ideas rather than through individual study. Individuals must learn to cooperate and share in production of an item of common interest. The whole atmosphere of learning and working together is much different than laboratory work on an individual basis. Speaking of this atmosphere and the educative values of group instruction, Dewey states:

> The social environment consists of all the activities of fellow beings that are bound up in the carrying on of the activities of anyone of its members. It is truly educative in its effect in the degree in which an individual shares or participates in some conjoint activity. By doing his share in the associated activity, the individual appropriates the purpose which actuates it, becomes familiar with its methods and subject matters, acquires needed skill, and is saturated with its emotional spirit.[75]

Thus we can see that the many possible methods of group instruction would be dear to the experimentalist's heart. They provide for difficult but satisfying and rewarding teaching techniques. Indicating

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[75]*Ibid.*, p. 26.

the teacher's role in group instruction Dewey says, "As the most mature member of the group he has a peculiar responsibility for the conduct of the interactions and intercommunications which are the very life of the group as a community."[76] Group instructional methods are a necessity in the industrial arts teacher education laboratory program.

After all is said and done, what is the experimentalist methodology? It is certainly more than a method of instruction for educational purposes alone. It is also more than a method a student may use in gaining knowledge. Could it not be said that this methodology is a way in which individuals or groups handle the problems of living? This, of course, includes education, personal and social life, and all the dealings a person has with his environment. Speaking of method in experimentalism, Childs says:

> As thus understood, philosophy is a spirit and method with which we approach the various subject-matters of experience. To be philosophical is to approach experience in the manner of critical, experimental inquiry; to be unphilosophical is to be uncritical, or non-experimental in thought and action.[77]

Dewey's methodology structures a permeating atmosphere of experimental inquiry into educational activities. Within this atmosphere the problem solving approach to indeterminant situations hovers over each learning experience. Now, within this framework, the instructor provides learning experiences through the methods of instruction discussed, the demonstration, the project method, experimentation, the

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[76]John Dewey, Experience and Education, pp. 65-66.

[77]John L. Childs, Education and the Philosophy of Experimentalism (New York: The Century Company, 1931), pp. 44-45.

unit method, and group instruction. The methods highlighting the industrial arts teacher education program would be those of experimentation, group instruction and the unit method. These, as we have seen, provide for learning on an activity basis. A unit activity on mass production or design illustrates the break from traditional organizational methods according to materials. These methods place much responsibility for learning on the student, they express subject matter in a psychological manner, and they correlate learning with life.

Another feature of experimentalist instructional method is found in his belief that if it works, proves satisfactory for this situation, then it should be used. This idea places no restriction on instructional methods except that of validating the method through practice and evaluation. If the instructor and group find, through experience, that the best method for learning how to saw on a straight line is by demonstration and individual practice, then this method should be certainly used.

The following chapter will attempt to draw together the basic ideas of Dewey's philosophy of education and then point out some major strengths and weaknesses of this philosophy in application to the industrial arts teacher education program.

CHAPTER VI

AN EVALUATION OF THE PROPOSED INDUSTRIAL ARTS TEACHER EDUCATION PROGRAM

The purpose of this study has been to develop a concept of Dewey's philosophy which is both consistent and adaptable in a practical sense to principles of education. It has also been the purpose to apply these philosophical understandings to the industrial arts teacher education program in order to obtain a statement of objectives, curriculum, and methodology that represent the experimentalist's views. The study is intended to illustrate what an industrial arts teacher education program should entail and the ways in which it should function if founded on Dewey's philosophy. The procedure has been to examine the philosophy of experimentalism and describe its major contributions and significance to educational theory and practice and then to explore the industrial arts program in light of these beliefs.

A Summary of the Study

Experimentalism is founded on experience, the experience of the individual as he pursues his goals in his social and physical environment. Man must interact with this environment in order to serve his needs, and as the environment is always in a state of change his life balance is held in controlled reaction. The reaction of man to his environment provides his experience. With his experiences, man is able

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to inquire into problematic situations with a background for making decisions. Experience becomes the source and evaluation of all knowledge and must be an intellectual activity carried through to a meaningful consequence.

Experience provides us with the foundation for the formulation of knowledge. Dewey is usually associated with the phrase "learning by doing", which means the development of knowledge through activity. Knowledge is not acquired through random, non-directed activity which places the learner in the position of making all the choices and decisions as to his learning activities. Knowledge is the ability or quality of the individual to meet and satisfactorily solve the problematic situations that he meets in life, drawing from his past experiences, searching for principles that will work, and adapting these to the ever changing context of his present experience. The experimentalist views knowledge as much more than that which the individual gains through memorization, repetition, and exercise. A person who has a great deal of knowledge undoubtedly possesses vast factual information, but he also possesses the ability to sort information, make applications, test hypotheses, and evaluate results. He also has the ability to investigate, experiment, and assimilate in his quest for consequences that will work in his present problematic situation. These are the measures of knowledge to the experimentalist.

In the development of knowledge there is no separation of mind and body, for the mind is just another of the many reactions of organism with environment. Just as the hand and ear react differently to the various environmental conditions, so too does the mind. The function of the mind is called thinking, and thinking takes place due to the environmental reaction of the organism. Through thought, the mind provides an organic effort not just to adapt but to overcome and control the environment. Thinking, or mental activity, can be compared to physical activity in that each is a response to environmental conditions and each adapts itself, through experience, to these conditions. Further, the conditions can often be overcome and controlled. The mind develops in terms of the habits it forms, these habits being learned or acquired during the process. The habits formed by the mind are subject to change or modification through impulse. If impulse did not modify habits of thinking, the reaction of the mind to objects of the environment would be highly controlled. Education is one means by which habits of thinking become modified and increased. The mind also develops habits of selectivity, organization, and evaluation through educational activity. The experimentalist feels that it is a purpose of the school to provide activities through educational objectives that will cause the mind to form habits of reflective thinking. We can observe a student approach a problematic situation and derive some idea of how his habits of thinking direct his activity. Many times we see him stop to think, analyze the situation, devise a plan of attack, etc., while another student may become frustrated, throw up his hands in disgust, and turn to something else. The habits of the mind are deeply instilled, and as education has found are not easily changed. Yet, change in terms of reflective thinking can better take place when

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when problems are met and solved than when the student accepts and stores away the facts of the textbook and instructor. Dewey explains the relationship of mind to experience when he says that the "... mind appears in experience as ability to respond to present stimuli on the basis of anticipation of future possible consequences, and with a view to controlling the kind of consequences to take place."[1]

Experience, knowledge, and thinking are grounded in yet another factor, that of interest. Interest is the stimulating factor of the learning process. It is the factor that identifies the self with an object. "In fact, self and interest are two names for the same fact."[2] The self and its attachment to an object or situation are the measures of interest. It is developed from within the individual, not derived from other persons or outside objects except in their relationship to the individual. Educationally, student interest should be capitalized on as learning activities are more easily developed and pursued when the area of study holds definite interests to the individual. "The interest in conversation or communication; in inquiry, or finding out things; in making things, or construction; and in artistic expression. These are the natural resources, the uninvested capital, upon the exercise of which depends the active growth of the child."[3] The instructor should be aware of his student's interests in things

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[1]John Dewey, Democracy and Education (New York: The Macmillan Company, 1916), p. 153.

[2]*Ibid.*, p. 408.

[3]John Dewey, School and Society (Chicago: University of Chicago Press, 1916), p. 45.

and, rather than stifle them, give them direction and encouragement toward meaningful learning activities.

The direction of the activities of learning must be centered around aims of the individual and of his social group. In education, aims become foreseen ends which provide for thoughtful guides in going through the activity. They are ends only to the extent that the activity terminates temporarily to be directed to other planned learning situations. Aims provide opportunity to look ahead and work out a plan of action. "If we can predict the outcome of acting this way or that, we can then compare the value of the two courses of action; we can pass judgment on their relative desirability."[4] Aims must be flexible, allow for freedom to pursue the course of activity, grow out of the individual's experiences, and provide meaning to the process of attaining them.

Habits and impulses, directed by intelligence, provide for activity which leads to meaningful consequences. Habits are learned responses to stimuli and impulses are unlearned responses. Intelligence is the factor which sorts out the appropriate habit, impulse, or combination to apply to a given situation. Impulses become habits of thought when they have been used and learned. Education is a major process by which habits of the mind can be developed toward critical thinking and scientific investigation. Intelligence constitutes that which we call the mind. It gives insight into relationships and understandings which lead the activity to meaningful consequences. Thinking and intelligence are ways of acting. "We speak legitimately enough, about the method

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[4]John Dewey, Democracy and Education, p. 119.

of thinking, but the important thing to bear in mind about method is that thinking is method, the method of intelligent experience in the course which it takes."[5]

Growth is the development of habits which enable the individual to preside over his environment. It is never ending as his life situation and environment is constantly in a state of change. However, growth must have direction and be guided by aims and purposes of the individual. In this case education and growth become synonomus.

A motive requires action and since the human being is an active organism his motivation is begun when activity takes place. With activity, motivation requires direction, judgment, and stimulation. "A motive is then that element in the total complex of man's activity which, if it can be sufficiently stimulated, will result in an act having specified consequences."[6] Motivation in an educational activity is provided through inquiry into a problem situation resulting in continued interest, desire to obtain satisfcatory consequences, and the continuation of learning.

The subject matter of the curriculum can be defined as anything that the mind studies which carries forward the concerns of the individual and society toward meaningful, useful, pre-established goals. There is no separation of subject matter and method for both are a required, integrated part of any learning activity. The selection of subject matter for educational purposes should be based upon the range

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[5] Ibid., p. 180.

[6] John Dewey, Human Nature and Conduct (New York: The Modern Library, 1930), p. 120.

of the individual's experience and presented in such a way that it will broaden and further this experience. "The subject matter of education consists primarily of the meanings which supply content to existing social life."[7] It should be drawn from the moral, social needs of life and founded on the interests and needs of the individual.

Method, to the experimentalist, is a way of handling the problems of inquiry in learning. The scientific method, often referred to as problem solving, is the only way of bringing the subject matter of the learner into the perspective required for solution of the indeterminant situation. The scientific method consists of describing and defining the problematic situation which has grown out of the learner's own experience. Secondly, the facts of the situation must be ascertained and their relation to the problem and to each other established. These can be supplied through communication, recall of experiences, reading, observation, and comparison. The facts of the situation must be filtered, ordered, and arranged in reference to their application to the problem. Third, ideas must be applied to the facts to form hypotheses which serve as possible outcomes or solutions to the problematic situation. The fourth step requires the reasoning through of the possible hypotheses to provide relationships and the intellectual validity of the idea. This step answers the proposal that if this is done such and such will follow. A choice must be made as the fifth step to provide the most satisfactory solution to the problem. Experimentation often provides the method

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[7] John Dewey, Democracy and Education, p. 226.

for executing this choice. The consequences resulting from execution of the idea must be tested through application to discover their meanings and validity. The results of the scientific method are not final. They are said to work or be true for the given situation but are subject to change through changing environmental conditions and increased understanding and information on the part of the learner. The scientific method of inquiry and investigation is the supreme method of acquiring knowledge.

The scientific method also brings about the experimentalist's beliefs concerning truth. The results of the scientific method of inquiry are true for the given time and situation. Truth is not a static absolute. It is the verification of ideas, or that which Dewey calls "warranted assertibility". The simple statement, if it works it is true, characterizes this meaning. If the verification of an idea proves to work or be satisfactory for an individual or group it is considered true. Dewey favors the following definition: "The opinion which is fated to be ultimately agreed to by all who investigate is what we mean by the truth, and the object represented by this opinion is the real."[8] From this view the experimentalist develops his theory of reality. There is no all prevailing reality except, perhaps, everything that happens in the experiences of man. Reality becomes that which man experiences, the facts and ideas and their relationships in his environment. Truth and reality are separate

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[8]John Dewey, Logic, The Theory of Inquiry (New York: Henry Holt and Company, 1938), p. 345 (footnote)

terms for explaining the existence and workability of ideas. Reality is the realization man has of his environmental experiences, and truth is the workability of the ideas and facts in this experience. "Reality is a <u>denotative</u> term, a word used to designate indifferently everything that happens."[9]

Values, to the experimentalist, are of two types. One is the attitude of prizing or highly regarding things for their own sake, called intrinsic values. The other, instrumental values, refers to those things that are of value in attaining future goals or ends. They are instrumental to the process of living. The experimentalist is mainly concerned with these instrumental values.

When man interacts with his environment, values arise. These values are conceived through investigation into the problems of living as the individual makes intelligent judgments and choices. During the process, intelligent judgments provide for choices which lead to desirable consequences. Therefore, values are given meaning as they fulfill the conditions of inquiry and are good in as much as they are the preferred outcome of present activity. Values are not static, they change as conditions and environment change. They develop through continuous experiencing of events, and preference is given to them as they satisfy the conditions of an activity.

Educationally, students become aware of values as they develop an appreciation of growth and intellectual advancement. The instructor

[9]John Dewey, <u>Creative Intelligence</u> (New York: Henry Holt and Company, 1917), p. 55.

must allow for student interest and appreciation, for inquiry and investigation. Values are acquired as the student is able to provide solutions to his problems and develop workable techniques. "Since education is not a means to a living, but is identical with the operation of living a life which is fruitful and inherently significant, the only ultimate value which can be set up is just the process of living itself."[10]

The objectives of an industrial arts teacher education program based upon Dewey's philosophy would evolve out of his beliefs concerning the individual, his environmental society, and the industrial society of our present day. With Dewey's view that all parts of the educational program should be directed toward the development of a sound teacher, the objectives of the industrial arts teacher education program should not be separated or classified as unique from other areas of teacher education. It is only the way in which these objectives can be met through the industrial arts laboratory facilities that a unique contribution can be made. Through the emphasis placed upon the democratic society, the scientific method of inquiry, experience through activity, and social efficiency by the experimentalist, the following objectives were derived.

1. To expound the value of effective experiencing as the basis for learning and method of teaching industrial arts courses.
2. To develop in each student a sound educational philosophy

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[10] John Dewey, Democracy and Education, p. 281.

of teaching based solely upon the problems of man and his value judgments in his environment.

3. To develop an understanding of the interrelationships of industrial arts with the total educational program and other individual curricular areas.
4. To cultivate a problem solving attitude and scientifically orientated outlook in the prcspective teacher.
5. To gain basic skills in the use of tools and materials common to the present industrial demands of the society.
6. To develop an understanding of the place of industry and vocation in democratic life and community.
7. To develop social efficiency, "the power to join freely and fully in shared or common activities" as a member of his profession.[11]
8. To develop the capacity for continued educational growth.
9. To gain an understanding of the democratic society and its implications for the life needs of the individual.

The curriculum of the industrial arts teacher education program grows out of the experimentalist's beliefs concerning the individual and the social society. The emphasis upon the social aspects of the democratic society brings about the major criteria for curriculum development. "With the wide range of possible material to select from, it is important that education (especially in all phases short

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[11] *Ibid.*, p. 144.

of the most specialized) should use a criterion of social worth."[12] Along with this overall guide, the following criteria provide a standard for content selection for the industrial arts teacher education program.

1. The curriculum should be planned around the social needs and interactions of man in his environment, around the problems of social living.
2. Subject matter should be considered as to its appropriateness to the aims and purposes of the individual.
3. Curriculum content should have the qualities of flexibility and practicality.
4. All curriculum planning should provide for reflective thinking in subject matter determinations.
5. Interest and experience of students should provide the starting point for curriculum development.
6. Appropriate use of the method of science should be a factor in subject matter selection.
7. Curriculum planning should take place in terms of unification of subject matter toward continued growth of the individual.

The curriculum design evolving out of these basic criteria for the industrial arts teacher education program is called the problem-needs design. This design is based upon the needs and problems of the individual in society and a method is required for solution of

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[12] Ibid., p. 225.

these problems. The experimentalist's position bears out these requirements. The subject matter of the problem-needs design, selected through the established criteria, provides for broad experiences in industrial tools, processes, and materials, as well as in teacher education, for the first two years of the program. The junior and senior years become more specialized. Rather than the broad compartmental breakdown of woodworking, metalworking, electricity, crafts, etc., the laboratory is organized on the basis of activities to be pursued. In otherwords, activities such as experimentation, group projects, design and creativity, techniques of teaching, and mass production would determine laboratory organization. Emphasis would be placed upon the developmental experiences that the students would receive rather than on the strict acquisition of skills pertaining to subject matter areas. Unified subject matter content areas would form the basis for structuring experiences.

The methodology of the industrial arts teacher education program would be the application of experimental and investigative procedures. An atmosphere of investigation would replace theories of learning based upon passive student reception. The whole program would be one of activity, group learning, experimentation, and planning. Through this activity situation the methods of instruction and learning would take place. The experimentalist would heavily emphasize the problem solving method for individual investigation. He would also use the method of experimentation, units of instruction, group learning, and the project method as he defines its use. The lecture, instructor dominated demonstration, and factual assignment would have very limited use.

Discussions and student participation in learning activities would dominate the classroom scene.

The problem solving attitude would be of prime importance in both instructor and student. This attitude must be cultivated by involving it as an objective of every part of the program. As an objective, problem solving actually becomes part of the subject matter in any given course. In other words, a study and practice of how to get at the solution of problems goes along with the factual course content. For example, when studying the transmission of power through gearing mechanisms, emphasis would also be placed upon the method of arriving at satisfactory solutions to any problems in this subject as well as on the subject itself. This interrelatedness of method and subject matter must always be a part of any course.

The problem solving attitude has two phases. The instructor must use this method as part of his teaching to provide for behavioral change in his students. Secondly, the student must be encouraged to see the value of using this method in approaching his own problems in learning.

In this problem solving and experimental atmosphere lie the instructors methods of instruction. Rather than lecture to his classes he would plan and conduct discussions which would involve the students in understandings, problems, and identification of interests and needs. His laboratory activities would involve methods in such a way as to get at the objectives established for the course. He would rely heavily upon the method of experimentation, both to get at the facts and understandings and to develop in the student a way of providing meaningful consequences to his activities. Group instruction would be used to bring about understandings of a social nature while pursuing the content of the course. The group would work together on a common problem, sharing ideas in planning, research, construction or experimental activities, and evaluation. Very little is done in the college program of this nature and yet the individual must live and work throughout his life in this kind of a setting.

A further ramification of methodology in the industrial arts teacher education program is that the prospective teacher not only becomes acquainted with methods for his own use, but has the opportunity to work through activities which apply various methods for use in his own teaching. Thus methodology becomes the backbone of the experimentalist's classroom activities and the most valid methods are those that contribute to the established objectives of the program. It is no wonder that the lecture, demonstration, and take-home project do not fill the experimentalist's needs. To teach democracy, problem solving, manipulative skills, social efficiency, educational growth, and the complexities of modern industry, require methods of unending limitations based on sound psychological and philosophical principles. These are the methods experimentalism hold for industrial arts teacher education activities.

Strengths in the Program Under Dewey's Philosophy

The program that has been formed for industrial arts teacher education from the experimentalist philosophy, covering the major areas of objectives, curriculum, and methodology, proves to be significantly different from actual programs of the present time. Let us look now at the program in light of its strengths when put into practice.

The objectives of the program are based on sound philosophical principles which reflect the needs of society and the place of the industrial arts teacher in this society. In the past, little has been done in terms of objectives concerning how experiences can be planned, that reflective thinking should be stressed, and that democratic principles should be a guide to action in preparation of the industrial arts teacher. If the proposed objectives were met, we would be providing industrial arts teachers who would be far beyond those who have been subject matter indoctrinated. This is one of the strongest points of the program. The industrial arts teacher who has gone through this program would be, first of all, a teacher, and his subject matter specialization would follow his strong desire to help children learn. The objectives evolved out of Dewey's views suggest this pattern. Dewey does not advocate subject matter specialization as such, and to him it is certainly not the major aspect of the teacher education program. He points this out clearly when he speaks of the aims of teacher education programs, stating:

> It aims, in a word, at <u>control of the intellectual methods required for personal and independent mastery of practical skill,</u> rather than at turning out at once masters of the craft. This arrangement necessarily involves considerable postponement of skill in the routine and technique of the profession, until the student, after graduation, enters upon the pursuit of his calling.[13]

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[13]John Dewey, "The Relation of Theory to Practice in the Education of Teachers," <u>National Society for the Scientific Study of Education,</u> Third Yearbook, Part I, 1904, p. 11.

The prospective industrial arts teacher, upon completion of the program, would be more than a craftsman, a manipulator of tools and materials, a demonstrator of techniques. He would be mainly a student of education, interested in industrial arts as a media for providing his students with an ability to think creatively, to adapt themselves to the problems of industrial democracy, and to become a better citizen in our world. "If teachers were possessed by the spirit of an abiding student of education, this spirit would find some way of breaking through the mesh and coil of circumstance and would find expression for itself."[14]

A second important strength of the program is the emphasis given to the unification of subject matter and method. Much of our teacher education in industrial arts at the present time is devoted to the acquisition of knowledge and skills simply through practice, exericse, and repetition. The method of learning is usually based upon the assumption that by doing or making something the facts and relationships of that doing will be remembered. For example, the project or item of construction, which is the chief method of learning in the laboratory, provides all that is necessary in terms of method to learn how to use tools and materials. Little thought is given to various approaches to construction of the item other than an orderly, logical procedure. The experimentalist makes a significant contribution to learning with the application of the scientific method to problems of the learner. As we have seen, the scientific method provides more than just a way

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[14] Ibid., p. 16.

of solving the problem or constructing the project. It also helps to develop patterns of critical thinking, modes of experimentation, and an investigative attitude. These, along with the project, provide for learning experiences unequaled by methods which require the student only to follow instructions or search for and memorize facts. The industrial arts teacher education program based on experimentalism which emphasizes methodology as a part of subject matter, and equally important as subject matter, gives the student a complete learning experience in all of his activities. The method of the mind and the subject matter with which it deals cannot be separated. Dewey emphasizes this point when he states:

> How about method from the standpoint of an individual who is dealing with subject matter? Again, it is not something external. It is simply an effective treatment of material — efficiency meaning such treatment as utilizes the material (puts it to a purpose) with minimum of waste of time and energy. We can distinguish a <u>way</u> of acting and discuss it by itself; but the way <u>exists</u> only as a way-of-dealing-with-material. Method is not antithetical to subject matter; it is the effective direction of subject matter to desired results. It is antithetical to random and ill-considered action, —ill — considered signifying ill-adapted.[15]

It is the stress placed upon the unification of subject matter and method that broadens the concept of learning in the laboratory and classroom activity.

A further strength of the experimentalist's program is that of the unification of subject matter through which facilities for learning should be determined. A majority of our industrial arts teacher

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[15]John Dewey, <u>Democracy and Education,</u> p. 194.

education laboratories are established on the basis of a separate shop for each material area of emphasis. Examples of this arrangements are the machine shop, woodworking shop, electricity shop, etc. The experimentalist would be quite concerned about this type of organization. He would question why these areas are completely separated. He would also question the basis upon which each were established. An organization such as this certainly does not lead to instruction based upon an interpretation of our industrial society in terms of an integration of materials and processes. Most every industry in our society is concerned with various materials and their adaptation to a product. The individual in his home or shop is also confronted with many materials with which to construct, repair, or decorate. Limited use of materials in separated shops is not a realistic setting for life like experiences to be gained by the student. As instructional area approach, such as general areas of power, communication, transportation, industrial materials, etc., would be emphasized by the experimentalist. If the objectives of the program which have been established upon experimentalism are to be met, a broad curriculum with little compartmental breakdown would provide the student with unlimited material to pursue his goals and those of the program. This type of organization would provide better opportunities for experiences in mass production, group projects, experimentation with materials and processes, creativity, design, and critical thinking which we have seen the experimentalist would advocate.

The major contribution of experimentalism in this organization is in terms of first planning what we want to do in the laboratory. What activities do we want to take place? The basis for organization would be what type of activities one expects to stimulate. This is the starting point. Physical organization of equipment and facilities should follow. Examples of this type of organization might include a laboratory for experimentation, one for research and planning, a design and creativity center, or a materials processing laboratory. The experimentalist would see no reason why these activities should be routed into limited material conscious areas of specialization. There is no present relation between the traditional compartmentalization of courses by identification of material and our industrial, social, recreational, or personal lives. Dewey states that "in many subjects it is convention rather than conviction which enforces whatever degree of uniformity or homogeneity exists...."[16] Convention has undoubtedly played a major role in laboratory organization in the past, however, the consistent organization of the experimentalist, based upon the objectives of the program, provides a meaningful guide for industrial arts teacher education laboratory organization, both in curriculum and facilities.

A step further into this area of laboratory organization brings us to the concept of courses in the curriculum. Here again the experimentalist provides a strong contribution. The division and, hence, multiplication of courses in the field cause confusion and lack of

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[16]John Dewey, The Way Out of Educational Confusion (Cambridge: Harvard University Press, 1931), p. 9.

understanding of interdependent relationships of various subjects. Why should the study of patternmaking be a separate course from woodworking? And further, why should woodworking not be a part of a course dealing with materials and processes? The multiplication of courses through the separation and breaking down of subject matter causes the college course to grow further away from life like situations. The subject matter of our lives is varied and interrelated. Dewey elaborates this point, concerning the traditional division of courses, when he says:

> In the actual advance of knowledge and the arts, there is much more than the mere extension of facts and principles. It has been attended by constant development of cross references, of interdependencies and interrelations. When we compare the actual situation with the scholastic, we find growing divergence, till now there is a split. The extension of knowledge in scope has had an effect of multiplication of courses; its movement in complex intricacy has had little effect. The scholastic and the actual now sustain an almost reverse ratio to each other.... It is no wonder under such circumstances... that subjects grow superficial and barren, and that their multiplication brings weariness to the spirit and the flesh.[17]

The unification of courses on the basis that we have already discussed would bring the course situation back to a place where experiences can be broad and close to the life situation. A student should not be limited to using only plastic in a given activity just because this is the name of a course. In the least, he should be given the opportunity to use plastic as a material of our industrial society in all of its relationships. This concept of course construction and designation is a definite strength of the experimentalist's

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[17]*Ibid.*, pp. 14-16.

position for the industrial arts teacher education program.

We may turn now to an examination of a number of concepts held by the experimentalist which Dewey notes as strong points in his educational philosophy. These concepts are in opposition to traditional education practices and are justly in opposition to concepts held by many present industrial arts teacher education programs. Illustrating this opposition, Dewey makes the following statements which we may apply to practical situations in our program. "To imposition from above is opposed expression and cultivation of individuality...."[18] Much of our instruction in industrial arts is planned on the basis that all students need and require the same things. We have them making the same projects, reading the same text assignment, and following the instructor's explicit directions. The strength of the experimentalist's position in opposition to this principle lies in the development of the student as an individual. We must allow him much self-expression; free him from restrictions which tend to narrow his own abilities. The student should be given the opportunity to locate meaningful problems in terms of ideas, tools, and materials and be able to express his individuality in solving these problems. Rather than imposition, instruction should develop investigation through individual assistance and guidance by the instructor.

The second principle, "... to external discipline is opposed free activity...", suggests the need for providing the student with time

[18]John Dewey, Experience and Education (New York: The Macmillan Company, 1938), p. 5.

for his own planning, research, and creativity.[19] An external discipline retards creative expression. The opportunity for free activity and expression with the instructor's direction in the industrial arts laboratory allows the student to expand his potential creative abilities. His experiences should not be confined to instructor imposed activities alone.

Dewey's third principle, "... to learning from texts and teachers, learning through experience...", illustrates the experimentalist's view of the value of planned learning experiences.[20] The lecture and reading assignments on subject matter of the industrial arts course is a narrow learning device for the student. He experiences only the factual requirements of the instructor. A broader, more meaningful approach places much of the responsibility for learning on the student. By going through a series of student-instructor planned experiences, the student is able to meet his own needs and learn through active participation, by doing, with the ideas and materials of the course. The planning of active student experiences, growing out of past experiences and leading toward pre-established goals, should be an ever present concept for industrial arts educational instruction.

Fourth, "... to acquisition of isolated skills and techniques by drill is opposed acquisition of them as means of attaining ends which make direct vital appeal...."[21] This principle is of strong

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[19] Ibid.

[20] Ibid., pp. 5-6.

[21] Ibid., p. 6.

significance when applied practically to the industrial arts program. There are so many facts, definitions, and ways of doing things with industrial materials and processes that over emphasis upon memorization and drill in order to gain these things has limited the value of many educational experiences in the laboratory. If the ends of the learning experience were properly established, the activities for attaining these ends should provide for broad understandings and relationships. For example, let us say that a student's objective is to know about and be able to use the oxyacetylene welding equipment. The possibilities for selection of means in this activity are varied and many. Selection should, however, be made on the basis of experiences which are of direct need and appeal to the student. Rather than read and memorize facts about the welding equipment and practice using it to gain skill, the experimentalist would prefer some planned experiences which would get at these things and also provide outleadings into further experiences and understandings. Typical experiences would include experimentation with various metals and different kinds of welding rods, discussions with resource persons, visits to industry using the oxyacetylene process, or a problem requiring the use of oxyacetylene welds in its fabrication. These kinds of experiences are much more meaningful in that they secure interest, lead to other learning experiences, and are psychologically more sound from the learning standpoint.

The fifth principle, serving as a strength in the experimentalist's position, is, "... to preparation for a more or less remote future is opposed making the most of the opportunities of present life...."[22] This idea is often illustrated when a student is heard to ask why he must learn this or that. The answer is often that he may need it in the future. The experimentalist insists that this does not justify its being taught. He feels that the needs, problems, and practices of the present are the materials for study. If the materials of the present are studied with respect to future goals and aims, the student will be in a position to solve the problems he confronts in future situations without need of a storehouse of memorized facts in preparation for the future. The student should be encouraged to study problems that grow out of his present experiences and use the resources presently available as background for this study.

The sixth strength of the experimentalist's position concerning deviation from traditional patterns is, "... to static aims and materials is opposed acquaintance with a changing world...."[23] Here again the characteristics of experimentalism relate to sound educational practice. One of the major problems of the industrial arts teacher education program is that of keeping up with present industrial practices, organization, materials, tools, and equipment. In professional study there is often a lag in the philosophical, psychological, and sociological implications of teacher preparation. A typical example in the industrial arts laboratory situation is the teaching of obsolete practices in terms of industrial processes and

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[22] Ibid.

[23] Ibid.

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techniques. The practice of cutting mortise and tenon joints by hand is a good illustration, or even the construction of a dining table which might require a semester for completion. These activities are practically obsolete in our industrial society today save for mass production. If we are to teach toward our objectives, we must engage the student in activities that are representative of our industrial and social society. At times the use of a chisel to cut a wood joint is appropriate, but activities of this nature certainly do not contribute completely toward recognized objectives. Yet in many instances it proves to be the case. Again, we must revert to our objectives to determine the types of experiences that will most fruitfully provide behavior changes in light of these objectives. Our changing world, both materially and functionally, requires that educational practice keep pace. One of the strengths of experimentalism in regards to the industrial arts teacher education program is that the program be continually examined and adjusted in light of our changing society and the place of man in this society. The program cannot be static nor can the methods employed to instigate the operate it. The industrial arts instructor who lectures from his thumb worn notebook year after year certainly illustrates a violation of this experimentalist belief.

Another strength of experimentalism found in the program is that of curriculum planning. The criterion established through the philosophy provides a basis for development. It is important to note that the curriculum is not planned according to what the administration or faculty personally feel the students need, but by a careful analyses of present educational theory, industrial society, and experiences of the student, in line with the established objectives of the program. This is where the experimentalist program shows its strength. Let us examine some present curriculum practices and then see how the experimentalist approach would differ. One of the most frequently offered courses in industrial arts teacher education programs is woodworking. A course of this nature is very difficult to justify from the experimentalist position and seldom is a very good justification given from any other position. Most often this course contains little more than cabinet making with the construction of the individual project as its basic method. The experimentalist would challenge that this type of course does not reflect our industrial society, for cabinet making or hand furniture construction is a by-gone industrial process and represents little of our industrial practice. He would also challenge why the course is based on a material rather than on activity or process. Now if the course was planned on the study of wood and its implications in our industrial society and appropriate methods and activities were pursued, a different program would emerge. The experimentalist would feel that all aspects of wood as a resource and industrial product of our society should become the content of the course activity. Students might learn how industry uses wood in manufacture, how wood products satisfy the needs of society, the creative aspects of wood as a means of individual expression, and all the problems of the area dealing with design, research, and planning.

It has been illustrated that the experimentalist would probably not separate the curriculum into courses dealing with materials alone.

He would rather plan definite activities and develop the content around these activities. For example, a laboratory for experimentation might be decided upon as an activity center. The content of this activity would certainly not be limited to one material. It would consist of any materials and facilities needed to satisfy the demands of the activity.

It is felt that the experimentalist would not jump from our present practice to the one just mentioned, but rather evolve this new concept through intermediate changes in course construction as has been illustrated. The important concept, however, to be gained from Dewey's position concerning the curriculum is that the curriculum is based upon an analysis of our industrial society and that its application begins by deciding upon appropriate activities through which the subject matter of the curriculum can be developed in a given course. This concept provides an outstanding contribution of experimentalism to the industrial arts teacher education program.

Evident Weaknesses in Practicing the Program

It is evident that throughout this study the emphasis has been upon the contributions experimentalism can make toward the development of the industrial arts teacher education program. It therefore seems necessary to examine some of the weaknesses of the program based on experimentalism which would cause difficulty in practice or in interpretation by the industrial arts teacher. It can be assumed that every philosophical approach to a problem will have weaknesses, for if weaknesses did not exist there would be no need to analyze or practice other positions.

It is felt that the major over-all weakness of this industrial arts teacher education program lies in the difficulty of instructional staff to practice what Dewey advocates. Dewey himself recognizes this problem but gave little indication toward solution except in terms of individual study and patience. "As I have emphasized more than once, the road of the new education is not an easier one to follow than the old road but a more strenuous and difficult one."[24] The practice of experimentalism in the classroom is very difficult to follow and it is doubted whether many instructors would ever be able to completely effect its practice. Two major reasons stand out for this difficulty. First, the philosophy is based on an understanding of the individual, his experiences, and the society in which he lives. These factors require constant study and understanding which the average instructor will probably never grasp and follow up. Such questions as, how do people learn, how is the student motivated, what activities best represent the subject matter, and what are the needs of society do not have definite answers. They require continued study and investigation. Teaching based upon such a philosophy is probably too challenging for many instructors to continue its study. Speaking of this difficulty Dewey states: "It will remain so until it has attained its majority and that attainment will require many years of serious co-operative work on the part of its adherents."[25]

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[24] Ibid., pp. 114-115.

[25] Ibid., p. 115.

A comparison of the difficulty of instruction based upon experimentalism with that of realism is quite revealing in this respect. The realist instructor is in little doubt of his true subject matter, his methods of teaching, or his understanding of the individual. His major problem is the realization of more facts and understandings which he can pass on to his students for their absorbtion. If this were all the experimentalist had to do in matters of education, his job would not be so difficult. The weakness lies, not in experimentalism as a poor philosophical approach, but in its diversity of concern over intangible areas of emphasis; the mind, the individual, society, and human experience.

The second major reason for difficulty in practicing the program is that of environment and change. The experimentalist knows that individuals cannot all be taught effectively in the same manner. Their experiences, needs, interests, and aims vary according to the individual. These factors cause serious difficulty in providing instruction or activities for a class of individuals to the best of the instructor's ability. Along with individual differences, the changing environment, both social and physical, requires instruction that keeps up with this change. There are many doubts that instruction is capable of keeping effectively up with changing times and needs. It must be pointed out again that these difficulties are a definite weakness to the program just as the taste of some medicines are a weakness to programs of health for children. We do not stop giving medicine, but much is done to improve its flavor. Dewey elaborates some of these weaknesses when he states:

> Hence the only ground I can see for even a temporary reaction against the standards, aims, and methods of the newer education is the failure of educators who professedly adopt them to be faithful to them in practice.... The greatest danger that attends its future is, I believe, the idea that it is an easy way to follow, so easy that its course may be improvised, if not in an impromptu fashion, at least almost from day to day or from week to week.... It is, accordingly a much more difficult task to work out the kinds of materials, of methods, and of social relationships that are appropriate to the new education than is the case with traditional education.[26]

It is interesting to note that Dewey had doubts about educators being able to faithfully practice his beliefs. It is also interesting that Dewey felt many misinterpretations of his doctrines would result, such as educators believing the new education to be easier than the old. Difficulties such as these are explicit unless educators continually reflect upon the basic spirit and organizational patterns fundamental to experimentalist belief. The industrial arts teacher education program that has been developed should, of necessity, be constantly aware of these dangers.

Moving now to the content of the industrial arts teacher education program, some illustrations will be made to provide an insight into practical weaknesses of the proposed objectives, curriculum, and methodology. First of all, it is necessary to point out that the objectives of the program are felt to reflect the real meaning and purposes of the experimentalist position. There are, however, some weaknesses in getting them into practical operation. Again, a comparison will be made between this position and present practices to

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[26]Ibid., p. 19, pp. 114-115.

illustrate the point. Such generally accepted objectives as skill development, safety practice, interpretation of industry, and related information are more factual and, hence, a little easier to plan activities for than are the objectives of this program. Let us cite just one of the important objectives of this program as an example; to cultivate a problem solving attitude and scientifically orientated outlook in the prospective teacher. Now a difficult task is before us. The problem of providing activities and experiences directed toward this objective that will cause effective behavioral change is significant. Individual differences, experience, maturity, and intelligence are but a few of the factors that cause difficulty in planning such activities. An evaluation of such planned activities is further involved and also difficult. An objective examination of facts retained and skills developed finds the realist satisfied with meeting his objectives. The experimentalist does not have such handy devices for evaluating behavioral change in terms of problem solving ability. The inability to effectively plan and evaluate learning experiences directed toward objectives is a definite weakness of the program.

The method of curriculum planning proposed in this program is a challenge to any industrial arts teacher educator. Its complex of criteria for determining content, though sensible in theory, becomes very abstract in practice. To illustrate this point, suppose a program involving an interpretation of industry is to be planned for an industrial arts teacher education curriculum. It is possible, and not too difficult, to decide upon major activities which meet this objective such as materials and equipment, consumer products, and the mass production technique. However, it is very difficult to make valid decisions concerning activities in the class or laboratory that accurately reflect the industrial society. It might take years for the industrial arts instructor to study the complexities of industrial mass production in order to provide a significant, meaningful experience in this activity. Little is really known at the present time about the operation and effects of automation in industry and it would be a tremendous challenge to the educator to select the most appropriate activities from this area of industrial production. In the following account, Dewey gives an indication of curriculum reorganization and direction which would take tremendous investigation and patience.

> The change is in many respects revolutionary. Yet the intelligence needed to bring it about is not lacking, but rather a long-time patience and a will to cooperation and coordination. I can see schools of education leading in the movement. They will hardly do much to reduce the existing confusion if they merely move in the direction of refining existing practices, striving to bring them under the protective shield of "scientific method." That course is more likely to increase confusion. But they can undertake consecutive study of the interrelation of subjects with one another and with social bearing and application; they can contribute to a reorganization that will give direction to an aimless and divided situation.[27]

The weakness in this organization lies in the inability of the educator to devote enough time, study, and understanding to continued investigation of the interrelation of subjects and social bearing to adequately keep up with curriculum reorganization in line with the experimentalist's beliefs.

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[27]John Dewey, The Way Out of Educational Confusion, pp. 39-40.

In terms of methodology, the author can see no major weakness in practice in the industrial arts teacher education program. Since experimentalism is a method as well as a philosophy, and freedom is the by-word for action, the industrial arts instructor is not limited in his use of method. No quarrel can be made over the scientific method or problem solving, and if other methods prove more adequate for particular purposes they should certainly be used. Dewey's plea was for education, not for the sake of following his methods alone. The spirit of this study was founded on this plea, as Dewey says:

> I am not, I hope and believe, in favor of ends or any methods simply because the name progressive may be applied to them. The basic question concerns the nature of education with no qualifying adjectives prefixed. What we want and need is education pure and simple, and we shall make surer and faster progress when we devote ourselves to finding out just what education is and what conditions have to be satisfied in order that education may be a reality and not a name or a slogan. It is for this reason alone that I have emphasized the need for a sound philosophy of experience.[28]

Conclusions

The philosophy of experimentalism, expressed through the writings of Dewey, and the implications of experimentalism for industrial arts teacher education brought out in this study indicate that it would be desirable to establish and practice programs of industrial arts teacher education consistent with this position. At present there is little indication in the literature that any consistent approach, within the scope of experimentalism, is being practiced.

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[28] John Dewey, Experience and Education, p. 116.

It is felt, however, that those concerned with industrial arts and teacher preparation programs for this area should confront themselves with the implications of experimentalism in regard to such programs and make an attempt to evaluate this position in terms of current practice.

It can be concluded from this study that an experimentalist approach to industrial arts teacher education would involve much reorganization in thinking and practice when compared to our present programs. The major aspects of reorganization would be in regard to methods, subject matter, and the place of the student in the program. Our present methods lack breadth in application and involvement for learning. The experimentalist instructor would have many methods at his command, especially that of scientific investigation. His industrial arts classes would be organised on an activity basis where students are learning to plan, investigate, experiment, solve problems, and engage in group learning in anticipation of gaining an understanding of our industrial society and of the materials which it uses.

The industrial arts teacher education program would be an integral part of the college program for the education of teachers. The purpose of the program would be to provide industrial arts teachers who visualize industrial arts as a phase of general education in the public school, who would be challenging leaders of learning activities, and persons who feel and understand that the educational growth of the student is just as important as the traditional subject matter. Subject matter would be conceived as learning new ways of doing things, learning how to think and be creative, becoming socially efficient, and learning how to investigate as well as learning the concrete facts about tools and materials. This would be the purpose and setting of the industrial arts teacher education program through the philosophy of experimentalism. An atmosphere of experimentation and scientific investigation would pervade the very nature of all learning activities.

The study has pointed out many areas of deviation from both traditional and present practices. If a present day industrial arts teacher education program was founded on this study, it can be concluded that it would uphold the following characteristics.

1. Industrial arts is an integral part of general education.
2. Industrial arts teacher education is an area of emphasis of a program for the education of public school teachers in a college or university.
3. The learner <u>must</u> participate in the formulation of purposes which will direct his learning activities.
4. The philosophy of the program must be a method for solving educational problems.
5. Subject matter must be selected in terms of activities which will provide behavioral change in light of objectives.
6. The objectives of the industrial arts teacher education program are unique only in facilities available to accomplish them.
7. The shops or laboratories should be unified. No material classification should determine independent laboratories.
8. Shops or laboratories should be determined on the basis of

activities to be undertaken. Examples: an experimentation laboratory, a research center, an experimental public school industrial arts laboratory, a communication and design laboratory, a process or fabrication laboratory.

9. Learning experiences must be selected in accordance with the experimentalist's views concerning how people learn.
10. Problem solving must prevail as the leading exponent of learning activities.
11. Visitation and observation of teaching situations should be a continuous part of each student's experiences.
12. Philosophical and psychological implications of education should be an integral part of the content of every course.
13. There should be no separation between so-called professional courses and those of a more practical nature.
14. Emphasis of the total program must be on reflective thinking, democratic ideals, industrial society, growth as a prospective teacher, and industrial arts in the public school.
15. The growth of the student as a prospective teacher should be the primary concern of the program.
16. The student must be given an opportunity to gain an understanding of our industrial society in terms of design, production, and distribution of products.
17. Every phase of the program should be planned on an activity basis of learning by doing.
18. The student should be given the major responsibility for learning while the instructor assumes the role of coordinator

of educational activities.

19. The curriculum must be flexible and adaptable to provide the most significant learning experiences possible.

20. The concerns, problems, needs, and difficulties of the student must out-weigh all other duties in terms of staff activities.

21. Experimentation and testing should provide the major portion of instructional methodology.

22. The student should be free to try his ideas, test their consequences, and make judgments as to their validity.

23. The interaction of the program with industry, community, and the public school should be consistently utilized.

The foregoing characteristics of an industrial arts teacher education program growing out of the philosophy of experimentalism indicate the direction the program would take. This direction relies heavily upon Dewey's concept of experience. As he has stated, "The central problem of an education based upon experience is to select the kind of present experiences that live fruitfully and creatively in subsequent experiences."[29] This problem rests with the industrial arts teacher educator. It may be concluded from this study that the instructor in such a program plays a role much more complex and challenging than in more traditional programs. He is no longer the authority and subject matter expert. "When education is based upon experience and educative experience is seen to be a social process,

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[29]*Ibid.*, pp. 16-17.

the situation changes rapidly. The teacher loses the position of external boss or dictator but takes on that of leader of group activities."[30] As such, he is an expert in planning learning activities. He structures his program on activities which will grow into future experiences involving new areas of investigation. As an instructor, he relies heavily upon discussion, both in groups and with individual students. This two-way communication lets him know his students, their experiences, desires, and shortcomings. In this way he is able to do extensive planning toward more meaningful and consequential experiences. He is an experimentalist. He tries all techniques at his command and adapts himself to the problems of teaching as his students must to the problems of learning. He operates in a changing environment and is never satisfied to rely upon the structure and materials of previous courses to meet new situations. He is challenged to keep up to date in terms of techniques, the latest products of industry, the newest tools and materials, and the best in methods. The structuring of his courses is not incidental, it requires rigorus intellectual planning. He takes advantage of improvisions only when the situation at hand deems it practical. All in all he is tremendously interested in his student's growth and development in becoming a capable teacher of both industrial arts and education in general.

It must also be concluded that the strengths of an industrial arts teacher education program based upon experimentalism out-weigh

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[30]<u>Ibid</u>., p. 66.

its major weakness. The fact that the program may be difficult to practice and that teachers may not be able to grasp its many ramifications in dealing with students needs and those of society does not condemn it from use. For example, the strengths of Christianity certainly overcome the inability of its followers to understand and practice all of its implications for man. Those who are deeply concerned about industrial arts in our public schools should not be compelled to conform to the foundations of experimentalism. They should, however, be willing to analyze its characteristics and develop a consistent philosophy, from all viewpoints, which will continue to improve our educational processes.

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