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Project Teaching*

By WILLIAM H. KILPATRICK, Teachers College,
Columbia University.

There is a difference between the "logical" and "psychological" treatment of any subject. Let us imagine a ~~child so young~~ that he has never seen a dog, and then ~~he~~ sees a dog for the first time. He comes away with a notion (expressed in our words) that a dog is a small white animal of about a certain size. His experience has led him to this notion of what a dog is. We know so much more that it seems wrong to call this a logical formulation; yet relative to the child such it is. The experience while he was going through with it was "psychological" in character, and the conclusion is "logical." In the "logical" then he has summed up his experience with the dog and is prepared to expect certain things of a dog the next time he should meet one.

When the child sees a dog again we will say that it is a large, black, growling dog. The child combining this experience with the preceding; now has the notion that dogs may be black or white, large or small, and kind or cross. He has had two "psychological" experiences and has made two successive "logical" formulations. The second "logical" summed in organized form the two preceding experiences. The first "logical" under the in-

*This is not an article written by Professor Kilpatrick, but a compilation—made by permission—of notes taken by various people who have heard him speak on the subject. We recognize that the account as given is necessarily meager; we believe that it is fairly accurate. In any event, Professor Kilpatrick is not responsible for it in the same sense as if it were the product of his pen.

fluence of the second experience gave way to and was merged in the more inclusive second "logical." As time goes on the boy gets a very complete knowledge of dogs,—a much more inclusive "logical" organization. Finally, if his interest and study of dogs continues, he may sum up the most that science has to offer about dogs. He then has a kind of nth degree "logical," which is the logical of science or logic.

In teaching we too generally take the child at the beginning stage of experience and try to give him the most complete adult formulation. We think that we will save time if we give him the adult formulation right out. This is giving the child predigested knowledge; and predigested knowledge, like predigested food, is not good for growing people. The getting must be largely the result of personal experiences; and if we attempt to give directly the results of logical formulation we fail.

Much of our school work is gone at backwards. We prepare a highly organized course, the product of the adult mind, and thrust it upon the child's immature mind and expect him to profit by it because it is so logical and correct in every respect. All the matter is classified and sub-classified. The pupil goes through this matter in the precise manner in which it is offered. This is not the true method of learning. The things we know that do us the most good were not learned in this way, but in spite of it. Mere familiarity with logical organization need not result in logical grasp or logical thinking. The contrary is even more probable.

Activity is the central notion of experience getting. Is all activity equally worth while educationally? If one person sets up a certain goal to be reached and another strives, the activity of neither party is complete. If an individual sees a thing to be done and then proceeds to do it, and tests himself as to whether he has done it, he has shown a complete activity. In the course of living a project arises to the individual. He feels definitely the need of going ahead with his project. He thinks, plans, and devises. He strives to realize his idea or project by carrying out the mediating steps devised. The result attained tests the accuracy of his thinking and doing. These several successive steps form a complete cycle of activity. It is this complete activity which is most helpful educationally. Whenever an individual starts off on a certain line, and sees for himself what

he is going to do, he is working on a project. The formation of the word gives the clue. A project is something projected, a pro-ject, a line of activity held before one and accepted for execution. Project teaching is teaching by means of projects which the individual thus puts before himself to be done. The aim or purpose of project teaching in science is to get the child to propose to himself things to be done in the science field, and to base the work of instruction upon such projects and the accompanying activity of execution.

In the life of a well developed person we may distinguish four stages of activity:

1. *Physical or bodily movement.* The young baby moves but does not handle things.
2. *Manipulation.* The stage in which the baby handles and fingers things, puts them into his mouth, etc.
3. *Construction and Contriving.* Things are put together or taken apart. Things are made. Thinking is done in connection with doing.
4. *Thinking.* Thinking of a higher order where the interest is the intellectual ordering of thoughts or concepts. Not all reach this stage.

The primary purpose of thinking, biologically considered, is to get out of a difficulty. The most of our thinking perhaps is of this type. We have however acquired a secondary purpose of thinking, namely to satisfy curiosity. It gives us pleasure to think. The primary purpose of hearing was for protection, to learn of approaching danger. Hearing thus is primarily to tell us what to do; but we have developed a secondary purpose of hearing, that is, to hear just because we like to hear, songs, instrumental music, etc. It is this secondary type of thinking which most concerns the scholar and scientific enquirer; tho the forms it takes are the same as of extricative thinking.

Let us consider how a child's projects grow with increasing age. The first time that a child takes a doll she merely holds it and looks at it. This is the end. She has no further desire. When she gets older she notices the dress and wishes it off. She takes off the dress. This is a more complex activity than the first; really two activities, holding the doll, and taking off the dress. She next wishes the dress back on the doll. This adds a third activity. A little later she takes off this dress, and puts

on another dress. She took it off purposely to put on another; which shows an added complexity. Later she takes off the dress and puts on a night dress for the doll is to go to bed. Here are steps which are almost what we call *means*. The end is to put the doll to bed. In order to do this she thinks out the means, she must take off the day dress and put on the night dress. When the child is still older she makes a dress. She may after making many dresses lose sight of the *end* (getting a dress for the doll) which she first had in her mind, and become so interested in the *means* (making the dress) that making doll dresses will become the *end*. She may then make a wardrobe for the doll. She may make a dress for herself and follow this by making a dress for somebody else. She may become a professional dressmaker, and use plans furnished by others. The plans which are now a *means* may interest her so much that she will study until she is able to originate plans. She eventually plans plans for other dressmakers. Here is an activity which began very simple and spread out to involve greater interests. The child differentiated and found interest in a small part of the whole project. Projects vary with the age of the person and differentiate as the person gets older. Among these projects will be some that are predominantly intellectual. In all these activities considered above there has been a progressively higher intellectual activity.

Suppose that a boy desires to make a boat. He may find that the boat will not stand up straight in the water. He begins to ask himself questions. He may study keels. A still older boy will go at things more scientifically and study equilibrium. Each individual experience is thus leading the boy to some new project, each involving more and more thinking if it is to prove most educative. Each again is most educative if it awakens the individual to full activity. Full activity implies and involves a true project. The project supplies an aim and directs thinking. Thinking, to be worth while, must be directed by an aim held by the person who is to do the thinking. In proportion as the person holds this aim he will be able to select data intelligently. Thinking unless it works is not worth anything. In proportion as it is possible for a person to do all of this—in that proportion he is getting educated. The aim then to be educative must be held, gripped, by the pupil, not merely by the teacher. If we assign the next ten pages the child seldom gets sufficiently inter-

ested to ask about it when he is on the street or at home. If he is working on a boat project he will prick up his ears when he hears someone mention boats. Furthermore, the child organizes his thinking more completely when he has something central as a motive and guide. The more times you as teachers can get this sort of thing going the more organization will the child get in your classes. It is the child's project that organizes his thinking. He will think more about it than about your project. When the child sees the bearing of anything it will be the better remembered. One is constantly amazed at the things a child will remember if only he be interested in them. Again a child that has worked through a project has in fact a model of action for use when he meets a similar difficulty in life. He says, "I did that, guess I can do this." He has more self-reliance. The child comes to formulation of experience through these steps. Formulation sums all preceding experience for use in the next situation.

In general science this general conception means that the boy will start out with some project which involves either as end or means the use of scientific material. If there is something in physics that is pertinent to his project he will use it. So with chemistry or botany or electricity. Each succeeding project will add more knowledge of science and should lead more surely to a use of scientific method. With these advances under proper guidance should come an increase of the more purely intellectual element. This is, the projects should become more strictly and exclusively scientific, culminating with increase of maturity in scientific specialization.

Some may feel that no place has been left for a development of scientific technique. As I recall my laboratory experience in physics much of the earlier work was learning the technique of careful measuring and weighing. Are we in advocating project teaching leaving this out of account? Precisely no. Each one learns technique best when he sees the use of the refinement. Otherwise he tends to be impatient of it. When as an adult I began to write my first book, my paragraph structure was sadly defective. Under the stress of felt need I learned in one month more of the principles of constructing paragraphs than I had in a dozen preceding years. So it is generally not only with adults but equally with children and youths.

There have been objections made to the project method. Some think that the method is too slow. The thing, however, that we most wish our children to get is an attitude toward science. One project in the realm of science devised and carried through by a boy himself is worth fifty formal laboratory exercises mapped out by the teacher. The whole attitude is changed. The boy is thence forth on the lookout to use his experience and, to add to it. Again the project method is said to be too haphazard. I should say that what the boy gets in this way he has and holds; what he gets any other way is haphazard and frequently lasts only until examination time. The real difficulty of our plan is to get fruitful projects started. Here we need experimentation; meanwhile I am quite hopeful. But if a fair trial shows that it is impossible for high school boys and girls to get interested in science projects, then I say put science out of the high school. But this means a fuller knowledge of boys and girls, not merely a degree in science. I hope that the time will come when no one will be allowed to teach physics just because he has studied physics. He must know boys and girls and how their minds and spirits behave.

In the project method, then, the child begins to acquire knowledge through ordinary experience. He must organize the more important results of experience into a strategic point of view by which he will control subsequent experiences in the same region. The test of the success in science teaching by the project method is, as I see it, as follows, the more important last:

Have the pupils traversed a fair amount of the more obvious regions of science?

Have they organized some of the more strategic view points?

Have they some familiarity with available sources of information?

Are they curious about scientific matters, proposing questions, each to himself and to others?

Are they disposed to pursue their enquiries carefully (scientifically) and to carry them through to a successful conclusion?

If "yes" is the answer to these questions, the teaching has been successful.