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An Objective Standard in Education.

OF those who deny to education a place among the sciences the name is legion, for they are many. The mere classification as a science is not perhaps of much consequence, but it is useful for the student of education to examine the popular view, and see how far it is justified. The following statement, the words of a former occupant of this chair, will be generally accepted as representing the prevailing opinion:—

"If we take science to mean, as commonly understood, organised knowledge, and if we are to test the claim of any body of facts and principles to be regarded as science by the ability to predict, which the knowledge of these facts and principles confers, can we say that there exists an organised and orderly arrangement of educational truth, or that we can logically, by any causative sequence, connect training and character either in the individual or in the nation? . . . It is very doubtful whether we can say that educational science is yet sufficiently advanced to satisfy these tests."

First, with regard to organised knowledge, there is certainly a great mass of matter available in the subject of education. It is true that there is nothing easier than to show that this matter is not at present well organised. It is only too easy to find examples of contradictions among those who make a study of education and venture to write or speak on the subject. We are told that there is scarcely any important statement made by a writer on education that cannot be met by a direct contradiction in the works of some other educational writer. It has to be admitted that writers on education in the past have been strangely opinionative and dogmatic in view of the very complex and delicate problems they have had to handle. Too frequently they assumed a simplicity in their subject-matter that was certainly not there. Even the massive common sense of Dr. Johnson was not able to keep him from regarding education as a study that had reached its limits long before his time. But between those who regard education as too simple to need any further examination, and those who treat it as so complex as to defy human analysis, there are those who take the view that education is a science like any other, though they admit that there may be room for wide difference of opinion regarding the stage of development it has reached.

At the present moment it is becoming increasingly evident that educational theory is consolidating: it can now be claimed that there exists a great body of educational doctrine that is of general acceptance. It need scarcely be said that there are many and deep differences among the various schools of educational writers. But if we compare any two schools we shall find that the points of agreement far outnumber the points of difference. This was true even in the older times of naïve theory, but is making itself very evident in these latter days. Anyone who has occasion to read all the books on the theory of education as they appear is impressed in spite of himself by the large body of doctrine that is common to them all. It is not that the books lack originality: each writer has his new point of view or his new interpretation of certain phenomena; yet each either baldly states or tacitly takes for granted a great body

of truth that is held to be generally accepted. This body of recognised truth is gradually increasing as the result of collective thinking and the corrections involved in active criticism. Already critics are beginning to find fault with any writer who produces a book—not avowedly a text-book—that professes to deal with the whole range of education. He is reminded that what is now wanted is a special development along certain definite lines. The general principles of education are held to be established and accepted.

In confirmation of what has been said, it may be added that within the past year or two have appeared no fewer than five separate treatises each bearing the same title: "The Principles of Education." These books are mainly for the use of students, and contain what are regarded as the accepted results of educational investigation up to the present date. Their authors obviously recognise the existence of a certain body of truths on which all are agreed. In some of the professions it is customary to speak familiarly of "the books," meaning the standard works to which appeal is constantly being made. If among teachers we have not yet reached this stage, we are obviously far on the way towards it. The books are there, but the profession needs some time yet before, in its own deliberate way, it recognises their importance. By and by it will realise the fact that it has at its disposal material that will enable it to prophesy, and thus fulfil, the second condition imposed upon all who lay claim to scientific knowledge. It is true that in the past there was little diffidence about prophesying: it was the fulfilment that gave trouble. Wolfgang Ratke supplies, if not the first, at any rate the most dramatic application of a control test in the working of educational prophecy. He went to prison because the people of his time did not make allowance for the insufficiency of the body of knowledge on which he based his predictions. There was indeed nothing scientific about the procedure of Ratke. He was at the empirical stage, and could not rise above it. His modern fellows have not quite got beyond the empirical, but they are on their way.

No claim is here made that Education has yet justified her demand to be recognised as a fully developed science; but it may be fairly maintained that she has at least entered upon the stage of scientific method: she is seeking to free herself from mere empiricism. In such a struggle there are at least two possible lines of action.

The first requires some ingenuity, but is natural and pleasant. It consists in superimposing principles upon the facts of the case. The educational theorist invents or assumes certain broad general principles, then proceeds to fit in all the observed facts, and often shows great skill in the process. This method is of very general application. Sometimes it is worked consciously and deliberately, as in the case of Socrates' doctrine of Reminiscence. Here we have the whole scheme of teaching simplified by this superimposed generalisation. Quite frequently, however, the broad underlying principles are not brought to clear consciousness, and are, in fact, sometimes contradictory to each other. Examples may be found in Rousseau. For our present purpose this tendency towards what may be called rational pedagogy is best illustrated in the system of education elaborated by Herbart. Though the metaphysical basis on which he builds is generally regarded as false, it was deliberately adopted by him, and if it is once granted to him, all the rest of his system must be admitted to be built up on strictly scientific principles. It is true that while logically Herbart's pedagogy was built upon his psychology, in point of fact his peda-

gological thinking preceded and dominated his psychological theory. While Pestalozzi sought to psychologise education, Herbart may be said rather to have educationalised psychology. In any case, he supplies us with a system that challenges recognition as scientific, whether the claim be admitted or not.

The other method by which a study may seek to escape from mere empiricism is by dealing with observed results so as to reach the underlying principles. In this method, instead of setting up principles and making the facts square with them, we examine the phenomena and seek to discover the underlying principles. Obviously this at once introduces the experimental method, since no satisfactory progress can be made by mere passive observation. This is the stage we have now reached in educational theory. We are passing from an appeal to experience to an appeal to experiment. Naturally, educational method has always had to stand or fall by its results, but in estimating results there has too frequently been a confusion between cause and effect. So soon as a conscientious analysis of educational problems is attempted, there comes the need of experiment. Certain questions have arisen demanding a definite answer, and the answers supplied must stand the test of practical application. Education is, in fact, called upon to prophesy, and to stand or fall by the results. Now the method of experiment is really a system of tentative prophecy, under rigidly determined conditions. We acquire skill in prophesying by a process of trial and error. We become prophets by prophesying. From all the knowledge at our disposal we calculate that a certain process will give a certain result. We apply the process, and then if the result is not what we expected, we examine all the conditions, seek out the cause of our error, and proceed to another tentative prophecy. By and by we acquire the power of prophesying with confidence within certain recognised limits, and within those limits we may claim to proceed scientifically.

But in the evaluating of results that is necessary in this process of training in prophecy there is need for some recognised standard. Unless this condition be fulfilled there can be no general agreement among investigators. Accordingly, the first step in raising a study to the scientific level is the establishment of such a standard. In the study of education in the past—and it must be admitted that the same is true to a large extent at the present—the standard adopted was in most cases a subjective one. There is a tendency to have everything determined by individual opinion. Certain educational processes are gone through; certain results follow in the lives of the educands. The casual relations involved are arranged by the individual observer to suit his own views. According to some, the battle of Waterloo was won on the playing-fields of Eton; according to others, the battle of Colenso was lost there. We have need of some standard that is independent of private opinion.

Obviously the whole question of the relativity of knowledge is here involved. The educator is too apt to apply to his own case the Protagorean view, and maintain that "man is the measure of all things; of things that are, that they are, and of things that are not, that they are not." Into this antique problem we need not here enter. There is a sense in which the epigram of Protagoras may be justified. Without doubt, for his own practical purposes, the individual is the measure of his universe of experience. But so far as his universe has to do with the universes of others, the individual needs some common standard, something outside of himself, something that others besides himself recognise—in short, an objective standard.

The matter may be illustrated by what took place in the development of certain of the sciences. The secondary qualities involved in the Lockean epistemology—such things as colours, tastes, smells, sounds—lend themselves to a subjective standard; but so long as we confine ourselves to a standard of this kind we cannot be said to treat such matters scientifically. The individual is the sole judge of how a particular sound or colour strikes him, and against his decision there is no appeal. But it seems as if we could not have a science of sounds or of colours based on this individual judgment. Each observer would rely upon his own sensations, and would interpret them in his own way. Fortunately, in the study of physics it was discovered that certain of the conditions of sensation are constant. When we get a knowledge of wave-lengths, and the laws of refraction and reflection, we have passed from the merely subjective sphere, we have an outside standard, we can compare, abstract, and analyse independently of the individual. "C natural" has a definite meaning to science, even if there were not a single ear that could hear the sound. It is true that, in the ultimate resort, we cannot eliminate the individual observer. He is too important in ordinary life, and a great deal of the work of science is done, after all, at his address. How *red* strikes an observer is as important to a man of science as is the exact wave-length that is necessary to produce *red*. The relation between a certain wave-length and a certain sensation is complicated by the individual peculiarities of the sense organs of the living being concerned. In certain respects the science of optics is self-contained, and has a definite objective standard. In certain other respects it depends for its data on individual experiences, and has to content itself with a subjective standard. No doubt it can call in the aid of physiology, a science that has an objective standard of its own, and in this way eliminate a certain amount of subjectivity. But in the last resort there is a corner of the field in which no objective standard can be obtained.

It is true that in pure mathematics we appear to get into a region where the subjective may be practically excluded altogether, but even here the science of space and time is limited by the fact that it can deal with its data only from the point of view of human limitations. And there are certain borderline studies that are mathematical in their essence, yet have a direct reference to our bodily organs. Linear perspective, for example, is usually regarded as a science, indeed, as an exact science. Yet when we look into the matter we find that linear perspective is nothing more than a conventionalised method of treating, in an exact way, the results of individual experience. The whole science is really an objective standard by which the ordinary processes of vision may be compared, analysed, and classified. Perspective tells us what we ought to see. It is not independent of our sense functions, it is only a mode in which the variable subjective is reduced to uniformity by the application of the objective standard. Indeed, in the teaching of art there sometimes arises a curious conflict between the subjective element and the objective. Students who have studied perspective before they are called upon to draw real objects set before them are very apt to draw according to the rules they have learned, instead of observing what is actually before them and reproducing that as it appears to their senses. In other words, they set up the objective standard as paramount. So markedly is this the case that sometimes the study of perspective is forbidden until familiarity with model drawing has been attained. When a teacher urges a pupil to draw

what he sees, and not merely what he knows from the rules of perspective he ought to see, we have an appeal to the subjective standard. The teacher is turning from the science of perspective to the art of drawing.

This illustration is of particular advantage to us in our present work, because it not only exhibits the subjective standard working alongside of the objective, but it introduces the idea of an *exact* science in relation to our human organs. Astronomy is an exact science, and yet the problem of the "personal equation" shows that even here the subjective must be taken into account. The "personal equation" is, in fact, nothing but the elimination by quantitative methods of the disturbing subjective elements. It is by similar methods that we must seek to establish an objective standard in education. The difficulty in this subject is very great. Astronomy and physics touch the subjective only at what may be called the point of application—the point at which they are brought into contact with human life. Their subject-matter is external, and lends itself to objective treatment. In education the subject-matter is human nature, which is so complex and involves such volatile elements that it is almost impossible to reduce its working to fixed laws. The same difficulty obviously applies in psychology. Itself a comparatively new subject, psychology has great difficulty in getting recognition as a science. For this there are two main reasons. To begin with, psychology began life as a branch of philosophy, and scientific men regard with suspicion anything that comes from that quarter. Besides, there was the less reason to make room for the new subject, since it had already a settled place in the hierarchy of studies. The second reason is that which interests us here—the difficulty of establishing an objective standard. The descriptive generalities of Dugald Stewart and Thomas Brown had to give way to something based upon laws that are generally accepted. The line of least resistance in seeking for an objective standard in psychology is to fall back upon a physiological basis. It is generally admitted that nerve action can be referred to an objective standard, and by correlating psychic and bodily phenomena psychologists are able to get a series of recognised principles on the physical side that may be easily interpreted in terms of spirit. Psychophysics has at least a plausible claim to rank among the sciences, and the unbridged gulf between mind and matter is conveniently ignored. As a matter of fact, such a generalisation as the Fechner-Weber law ranks parallel with the laws of linear perspective—that is, it is a law that states in an unjustifiably exact way what ordinarily takes place in the individual experience. While rejecting the materialistic alliance, Herbart, as a psychologist, deliberately set up a mechanical system of ideas as forces, and in this way established at once an objective standard by means of which all mental process may be understood and manipulated. So scientific is his system that he claims that the interaction of the ideas may be calculated in certain cases by a simple application of the rule of three. With Herbart, psychology has certainly been raised to the rank of a science; but unfortunately it has to be admitted that his objective standard has been illegitimately assumed.

Just as psychology utilises physiology in its effort to gain a standing as a science, so education is inclined to use psychology. Frequently we hear psychology described as a science, while education is relegated to a place among the arts. It is natural, therefore, for the educator who wishes to claim rank in science to appropriate the scientific status of his auxiliary science. As a matter of fact, education has captured psychology.

NO. 2242, VOL. 90]

This is only one of many cases in which a profession has taken possession of an abstract study, and in this way enabled the abstract study to make real progress. Theology as a study has gained greatly by the fact that it is a compulsory subject for those who are preparing for a great profession. Astronomy owes a great deal to the support it has received from its practical value to navigators. Physiology would not be what it is to-day had it not become an essential subject in the preparation for the practice of medicine. Physiologists sometimes complain that their subject is hampered by its professors having to waste time in teaching mere medical students; it is well to remember, however, that but for the demands of the medical profession physiology would have been left to the few private investigators who might be able at their own cost to carry on under adverse conditions the work that is now being done in thousands of well-equipped laboratories. In the same way it is greatly to the advantage of psychology that it has become an essential part of the professional training of teachers. The subject is now receiving an amount of attention that it would never have had but for the support of its connection with the profession of teaching. But after all a teacher is not a mere psychologist: education is more than applied psychology. If education is to rank as a science, it cannot be in virtue of its use of another study that itself has an insecure foothold among the sciences. It must establish for itself an objective standard.

Mere quantitative manipulation of the elements of a study, if only carried out on a sufficiently large scale, has a tendency to evolve an objective standard, apart from any deliberate search for such a standard. We may gather something from an examination of a standard of this kind that, unexpected and unsought, evolved itself in the ordinary course of educational administration. What Binet and his colleagues and followers have been trying to do of set purpose was, to some extent at least, accomplished automatically by the working of the system of individual examinations under the English and Scotch codes of elementary education. Binet has drawn up certain tables with the express purpose of testing the intelligence of children at various ages. But we are only at the threshold of investigation work of this kind, and the tests cannot be regarded as satisfactory, either in themselves or in their application. But they have been drawn up with the deliberate purpose of supplying a more or less objective standard of intelligence. Now in the British elementary school codes we have the examination requirements from the pupils of different ages set out in a series of tables each corresponding to one of the seven grades known technically as "standards." The purpose of these tables of requirements was not primarily to determine the intelligence of the pupils, but rather to indicate certain minimum amounts of information that had to be communicated in consideration of a certain money payment. Yet these tables bear a generic resemblance to those of Binet, and in actual practice the "standards" did win acceptance as a test of intelligence. The requirements were perhaps less scientifically determined than are those of Binet's tests, but their practical value was very much greater, because of the extremely wide range of their application.

When the codes had been in working order for a score of years it became evident to thoughtful observers that there had arisen a standard of comparison among pupils in elementary schools that was gradually being recognised all over the country. It was an objective standard as was shown by the fact that each of the standards began to have a meaning of its own, apart from the individual school in which a particular pupil happened to be found. No doubt there were differences

in detail. A Standard III. boy in one school would be found to have greater knowledge and skill than a Standard III. boy in another. But the important point is that the phrase "a Standard III. boy" came to have a definite meaning apart from any particular school. It began to be used absolutely, and not merely relatively. Further, if a boy were found to be in a standard lower than his years warranted, people had no diffidence in drawing their own conclusions regarding his ability. It will be remembered that Binet tells us, somewhat vaguely, that if a boy is a year behind others of the same age who have had the same opportunities, it indicates that he is duller than the others, but not necessarily permanently so. If, however, the pupil is two years behind the normal test for his age there is a presumption in favour of his being inherently and permanently duller than his fellows. All this is very familiar and indeed commonplace to the elementary teachers who were brought up under the code examinations by standards. To tell the truth, M. Binet's tests are regarded with much suspicion by such elementary teachers as have been induced to give them attention. They have the feeling that here we have a university professor working out as something new a belated scheme that has had its day, and in that day done a great deal of damage. They are afraid that the prestige given to the intelligence tests may encourage the re-establishment of the rigid individual examination system from which they have escaped. All the same, experienced elementary teachers do not deny that the old system did at least have the effect of establishing a generally recognised standard. Their belief is that the standard was not worth what it cost.

It is left for Binet's successors to invent a better scheme than he was able to produce, and in this way to establish an objective standard, at least in respect of intelligence. Such a standard is needed in many connections, but there is one special department of educational administration where such a standard is at present urgently required. Nothing better illustrates the groping of education after a scientific basis than the present demand for some means of determining which children are "defective" and which merely dull. So imperative is the need for an objective standard here that it must be satisfied at any price, with the result that the decision is being more and more left to the doctors instead of to the teachers. The cause is not difficult to find. Physiology has already an objective standard, and the doctors are evidently expected to get their results by physical examination. No other explanation is admissible, since they are not only not superior to teachers in their knowledge of the mental reactions of the child, but obviously inferior. At present the argument moves backwards and forwards. Some say: Give the teachers a tincture of physiological knowledge, and then they will manifestly be the best persons to determine the defective stage. Others reply: Give the medical men some little experience of school conditions and the working of the immature mind, and they cannot but be the proper authorities on all questions of intelligence. The important point in this competition for power between the two professions is the implied recognition of the need for an objective standard, and the admission that, at present, such a standard does not exist. Much investigation, experimenting, and verification are necessary before the truth on this particular subject can be reached. But the recognition of the existence of the problem is in itself an indication of progress, and the need for scientific method in working it out is being more fully recognised. From our point of view it is important to note that we are here dealing with a problem that is distinctly educational, and the bringing in of men from another profession does not make it less so. If the doctor acquires the power of dealing with delicate

questions of intelligence, it is because he has learnt to be an educationist if not an educator. Medical men who specialised in this matter would no doubt very soon attain to high skill, since their previous training gives them a very suitable preparation to begin the study of education. Doctors are consulted regarding "defectives" mainly for two reasons. First, these defective children are naturally classed in the popular mind with the mentally deranged, and these have always been regarded as peculiarly suitable subjects for the doctor. Further, there exists, without doubt, the implicit feeling in the public mind that the doctor has definite standards while the teacher has only general impressions. But it has to be noted that this invasion of the field of education by men from another realm of study does not in any way affect the claims of education to rank as a nascent science with needs and methods of its own. If the doctors can supply education with an objective standard, education should be very grateful, but need not abdicate in favour of medicine. Education may use the results of both psychology and physiology without in any way surrendering its claims to be an independent science. We must not, of course, make too much of the distinctions among the sciences. Nothing but error can result from seeking to make each of them rigidly self-contained. So far as education is concerned, what we have to seek is that objective standard that we have conceded to be essential to the recognition of a study as a possible science, and this without falling back on the standards of either pure psychology or pure physiology.

We may learn something from what we have found out about the results of the individual examination system. The general tendency of quantitative methods is to eliminate the subjective element. Even in the case of marking examination papers experience shows that the use of numerical marks tends to objectify results, and to get rid of some at least of the difficulty involved in the personal equation of the examiners. Marking by general impression of a whole paper is much less free from subjective variation. Every individual number set down as a mark implies a fresh exercise of the critical power, and when there are many questions there is a compensating principle at work, inasmuch as each impression is recorded as it is made and the addition of the marks produces a balancing in which the latest impression has not the determining influence it too frequently has when a paper is marked as a whole. If an examination includes many subjects, many examiners, and a great body of examinees, the subjective element in the marking is, to a large extent, eliminated, and we can deal with the results in accordance with what is practically an objective standard. We must not, of course, neglect the fact that after all the whole basis of the results is the judgment of the individual examiner on the material submitted to him. This corresponds to the application to real life of any of the physical sciences. Here, as in many of the other sciences, we have a surd of subjectivity that can never be got rid of entirely. But its disturbing influence can be minimised by the counteracting influences of other forces in the quantitative manipulation of the data.

Of late the quantitative method of dealing with educational problems has been greatly developed. Karl Pearson's product-moment formula has enabled us to make an accurate arithmetical statement of the amount of correlation that exists between series of quantitative data. By the application of this formula, and the simpler formulæ of Professor Spearman, it is now possible to correlate a great many facts that were formerly treated as having only a problematic connection with each other. If these formulæ produce really trustworthy results, we have at our command a means of answering definitely and definitively a great number

of questions that have hitherto been regarded as the more or less legitimate matter for the professional controversialist. The vexed question of "formal training," for example, may be set at rest once and for all by a sufficiently extended series of correlations of the results of pupils' progress in certain subjects. The peculiarity of this method of dealing with correlations is that once we have handed over our facts to the formulæ, the process passes out of our hands altogether. We have only to work out our equations and the results make their appearance. Here we certainly seem to have reached an objective standard.

Such results, however, are not unnaturally regarded with some suspicion. Once the formulæ have been established by mathematical proof they must, of course, be accepted as irrefutable on that side; but their application to educational problems is so mechanical and indeed inhuman that many are unwilling to accept and use them. Some people are doubtful whether, in dealing with human beings, it is desirable, even if it were possible, to have an objective standard that eliminates humanity from all human problems. It has to be pointed out to such critics that all human problems must begin with the individual and end with the individual. All the intermediate process may be carried on in the pure objectivity of quantity, without dehumanising the application of its results. This will be kept in view when we deal with the average.

Apart from the danger of dehumanising our subject, there are two real possibilities of error in the application of the formulæ. First, there is the danger that the investigator may be satisfied with an application to an insufficient number of cases. The second danger is that the subjective element may cause error in the preparation of the data. If the first possible source of error be minimised, the second will be practically removed. Granted a really wide investigation, there is little room for serious error. If a sufficiently large number of cases be examined, and these cases selected under sufficiently varied conditions, the subjective variations will neutralise each other, and a trustworthy result will be produced. It must never be forgotten that the Pearson and other formulæ are merely means of dealing with material already acquired. It is only to this extent that they supply an objective standard. Many of the recognised sciences are in no better case.

The hope of the evolution of education as a science lies in the proper manipulation of the method of experiment. Students of education have always been in the habit of asking questions, but they have not always waited for an answer. Nor have they usually taken sufficient care in making their questions precise. They have not laid down with the necessary detail the conditions implied in the question, and when they have reached some answer they have been too often content either to accept it without any verification at all, or with the support of nothing but a few general considerations that seemed to confirm it. In the newer educational investigations questions are set out in great detail. They are usually limited to one point, and all the relevant conditions are carefully laid down. Various control tests are applied during the progress of the investigation, and every precaution taken against the introduction of interfering forces. Then when a result has been obtained various confirmatory tests are applied. Even when all has gone well so far the result is not regarded as authoritative until the experiment has been repeated with the same results by different experimenters working under different general conditions, though, of course, all the detailed conditions must be precisely the same as in the original experiment.

The questions asked are often of a very practical character. In the current number of *Child-Study*, Mr. W. H. Winch gives an example. The question is whether one gets better results in working "problems"

in arithmetic by (a) direct teaching for a certain period in how to work such problems; or (b) spending the same period in giving the pupils practice in working such problems. Mr. Winch gives a very instructive account of all the conditions under which his experiment was carried out, including all the necessary precautions. The result is that those who had had the teaching scored an average of 11.1 in the final test, while those who had had the practice scored only 9.2: the group that was taught improving on its preliminary record to the extent of 34 per cent., while the group that had been confined to practice improved by only 11 per cent. It is thus demonstrated, at present, that teaching counts for more than practice in the preparation of pupils to do problems in arithmetic. But the fact cannot be regarded as a part of the permanent possessions of the teacher till it is verified by many more experiments in this country and abroad.

We have seen that even at our present stage of advancement there is quite a respectable collection of recognised facts in connection with teaching and education, and that these are in process of organisation. We shall soon have such a volume of well-arranged knowledge as shall meet the first requirement for recognition as a science. But while organisation is imperatively needed and must go on, there is an equally urgent need for new knowledge. There are hundreds of definite practical questions that are being asked by teachers every day, and unfortunately answered according to individual experience, if not indeed according to individual caprice. Some few questions about the memory are now definitely answered, and practical educators have the benefit of the results of experiments; but there are scores of points with regard to memory on which there is still doubt, and yet these are points on which the practical educator must adopt a definite line in his daily work. He cannot postpone his decision: he must do one thing or another, and in the meantime he has no standard. Such investigations as are being undertaken by the committees of this section are helping to increase the total body of knowledge at present available. It is true that hitherto these investigations have been mainly concerned with psychological matters, and certainly our store of psychological knowledge is not so great as to warrant any complaint at the concentration on this aspect. But it is pleasant to note that this year we are having a report on more distinctively pedagogic matters. There could be no more useful subject of inquiry suggested than an investigation into the questions that are most urgently demanding answers at this time among the practical educators of the country. To discover and classify these, and then to correlate them with the various investigations that are being made throughout the world, would be to render a very practical service to the study of education. The truths thus acquired and recorded could be fitted in to the mass already at our disposal, and the result would be a great strengthening of that objective standard that is so essential to the independent progress of our study.

Education ranks with a group of studies that deal with humanity in its various aspects. Psychology naturally is the science that underlies them all, since it is the abstract study of human nature which is their raw material. But politics, economics, sociology, eugenics, all claim to be sciences, and if we probe into their standards we find that they are largely statistical. It is quite possible by careful investigation among the subject-matter of these sciences to organise a system of general principles based upon averages obtained from a very wide field of investigation. These principles are of very general application, though they may not enable us

to prophesy in individual cases. This, indeed, is at the root of a great deal of the criticism levelled at the claims of education to rank as a science. A parent or an education authority presents a boy to an educator and calls for a prophecy. The educator must decline, since he cannot honestly prophesy in an individual case, though he may be prepared to venture on a reasoned statement of what is likely to occur in the boy's educational career. The educator is, in fact, in precisely the same position as a medical man called in to a case. He can prophesy, but only in general terms. In both cases it is the application of general principles to a particular case.

This raises the whole question of the value of the average in matters of education. Psychologists, in addressing teachers, are beginning to warn them that the average is only an abstraction, and really does not exist. We are told that what the teacher has to concern himself with is "the living child here and now before him," and he is accordingly warned against the insubstantiality of the elusive abstract. But this is to confound two distinct things. It is true that the teacher must always deal with a living pupil here and now before him. But in his dealing with that living pupil he has to apply a paid-up capital of knowledge of men and of boys in general. He must seek to understand the living boy by the aid of knowledge previously acquired, and this knowledge is represented by the average. The master may be unable to prophesy with certainty how Jones minor will act under certain specified conditions. But from a knowledge of third form boys in general he can make a guess that is very likely to hit the mark. The teacher who applies his knowledge of the average third form boy to the minor Jones, without modification to suit Jones's case, acts unintelligently; but the possibility of blunders by a dull master does not reduce the value of the knowledge of the average in the hands of one who is capable. The concept of the average boy as it is developed by experience and study in the mind of the master forms a standard by which other boys may be estimated. This standard is partly subjective, partly objective. In so far as the standard is acquired by the personal experience of the master it is subjective. The unreasoned but very effective knowledge of boy nature that enables an efficient master who is guiltless of any acquaintance with educational theory to know how a boy is likely to act in given circumstances results from the training of experience, and is peculiar to its possessor. On the other hand, the knowledge of boy nature that has been acquired by deliberate study and by experiment is something that has an existence independent of the individual. It is objective, or at any rate has an objective bias.

We must distinguish in practice between the average and the type. The average boy may have no existence in reality, he may be a pure abstraction; but the type is concrete, and may be regarded as the embodiment of all the essentials that go to make up the average, with the addition of certain qualities that must be present in some form or other, though the particular form is immaterial. The average is to the type as the concept is to the generalised image. The type may form a very useful standard for masters whose tendency is strongly towards the concrete; but the average has a special and a different value, and in capable hands is more effectively applied because it is of a wider range. To consider a class as made up of types tends to break up the class feeling, and make the master think of his pupils as a mere group of separate individuals. Undoubtedly the master must in certain connections think of his pupils as individuals, but in other con-

nections he must deal with his class as a whole, as a psychological unit.

This introduces one of the most striking developments of modern educational theory. The older psychologists treated their subject as limited to the study of the mature human individual. The introduction of the idea of development led to the founding of a genetic psychology with its consideration of the individual at his various stages. A further advance is marked by the appearance of collective psychology, which carries the study of the individual into his relations with other individuals. Naturally, both changes were of the greatest advantage to education. The first gave scientific guidance to the popular movement known as Child-Study, the second suggested the scientific study of the class as a collective organism. It is true that this collective psychology is at present in its infancy. But while we owe much to the French psychologists with their dazzling exposition, we are glad to turn to our more solid McDougall for the best scientific basis available for a sound collective psychology. The material he has supplied is waiting to be worked up from the educational side. His statement of the relation between the instincts and the emotions and his manipulation of Mr. Shand's theory of the sentiments provide tempting material for the establishment of an objective standard in connection with the training of the individual character and the interaction of individual characters in groups. Naturally, the results must be expressed in averages, and equally naturally there will be a complaint from certain practical educators. What is the use, it will be asked, of information about how classes in general act? What we want to know is how this particular class before which I stand is going to act. But this is to confound the practice of a science with the science itself. There must always be an intelligent intermediary between the principles of a science and their application to the affairs of life. In this respect the nascent science of education differs in no way from those that are more fully developed. The educator who prides himself on being specially practical is frequently very unreasonable in his demands from educational theory. He is rather apt to complain that it does not supply him with sufficiently detailed instructions. What he wants is a series of recipes which, if scrupulously followed, will inevitably produce certain specified results. But such men take a very humiliating view of their profession. So far from seeking this spoon-feeding, they should rejoice that their work demands the exercise of intelligent initiative. Herein consists, in fact, the dignity of the educator's office. He must be master of the organised knowledge that education has acquired, and must have the power of making the appropriate application of that knowledge to every case as it arises. To assist him in avoiding error he is entitled to look for an objective standard at the hands of those who make education their special study, but for the use of that standard he must himself accept the full responsibility.

GEOLOGY AT THE BRITISH ASSOCIATION.

THE proceedings of the Geological Section at Dundee were of exceptional interest, and the attendances were large up to the end of the meeting. The success of the section was due to two or three special features. Many of the papers dealt with the problems of the Highlands and of the Highland border, questions which are full of knotty points, and the men who are engaged in solving these problems were able to assemble in the meeting-room and there