

**EXACT
MEASUREMENTS
IN EDUCATION**

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Exact Measurements in Education by James Leroy Stockton

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EXACT MEASUREMENTS
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THESES

I. Measurement in Education should have for its goal the computation of *work* and *rate-of-work* (power), in the sense in which these terms are used in Mechanics.

II. Scales of *force*, *space*, and *time*, exist, or can be made, for school subjects; and the standard units of these scales of force, and space, and time, should be combined into *standard units* of *work* and *rate-of-work* (power), such units directly corresponding to the *foot-pound* and the *horse-power*. (In this paper units are worked out for penmanship, and illustrated by experimental work involving certain applications of the Thorndike Scale.)

III. *Many* units in many school subjects should

be supplemented by a *single* unit, making possible the computation of *mental work* and *rate-of-mental work* (mental power) in all school subjects. The force involved in this computation is *intelligence*; the space is measured in elements of *expression*. (As there is no adequate scale of *intelligence* uncombined with any mechanical factor, a theory of the necessary scale is ventured.)

IV. In any case, to consider either *force*, *space*, or *time*, *alone*, or to combine them in an arbitrary manner, gives unreliable results. [This is shown, for computations in school subjects, by the penmanship illustration. For computations of mental work, and mental power, experience with the Binet-Simon tests is cited in proof of the contention.]

EXACT MEASUREMENTS IN EDUCATION

I

Most persons do not any longer question the possibility of measurement in Education, because it has become apparent that measurements always have been made, and are continuing to be made. When it is said that a piece of work is good, bad, or indifferent, a measuring scale of at least three steps is evidently being used. If papers are marked A, B, C, D, E, according to the judgment of the examiner, a scale of five steps is being used. This is clearly evident; measurement is a fact in all departments of Education whenever the value of the product is expressed.

There are, however, many conscientious thinkers who still question the degree of exactness to which the measurement should be carried. The common rough measurements which are constantly used do not seem so objectionable as the more exact scientific measurements which are being proposed. It is feared that too much exactness will make Education formal or mechanical.

If this fear were justifiable it would furnish a very strong foundation for a stand against measurement, for modern Education cannot defend formalism. Fortunately, however, the difficulty can be met with the following statements:

(1) *Education, in so far as it can be measured, is a product,*

(2) *Mechanical methods of measuring a product do not require mechanical methods of producing that product.* Handwriting might be measured by the most mechanical means one could imagine, and yet have been produced by the freest, most spontaneous method that exists. The worst that can be said is that mechanical measurement may, in the careless and unthoughtful, tend to produce mechanical methods of production; but pre-supposing reasonable thoughtfulness in its use, nothing promises more for Education than does exact scientific measurement.

In this work progress has been made through the establishment of relatively exact scales in certain school subjects; but the progress has been slow, as it always is in a new field. Confusion, also, is beginning to result, because the plunge into this undiscovered country has naturally been

made with no very definite route marked out in advance, and with no very adequate conception of the extent of the territory to be explored. There is not much evidence that it is realized that the making of scales may be merely a scouting on the frontier — merely the beginnings of roads whose end lies in a more remote country. If this should prove to be true much wandering will be prevented if a return is made to the starting point, and an attempt made, in the light of all past experience, to map the whole route from the beginning to the end. Then if the map shows districts to be traversed in which as yet no road exists, the problem will at least be clear when these sections are reached.

It is the purpose of this paper to suggest that an unexplored district does exist in the field of measurement in Education, and that the making of scales takes the investigator only part way on the road to the final goal. An attempt will be made to show that even with the scales now available, or with other similar ones which may be made, still another step must be taken or Education remains in the same condition as was the science of Mechanics before the time of Watt.