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To cite this article: Cyrus D. Mead (1920) Measurements in Fairy Tale, The Journal of Educational Research, 2:2, 557-559, DOI: [10.1080/00220671.1920.10879087](https://doi.org/10.1080/00220671.1920.10879087)

To link to this article: <http://dx.doi.org/10.1080/00220671.1920.10879087>

Published online: 15 Dec 2014.

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MEASUREMENTS IN FAIRY TALE¹

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Once upon a time there was in old England a very tall king who was about to make a fair princess the queen of his realm. Trouseaus were of as much interest then as now, so the Very Tall King and the Fair Princess went shopping down through the narrow streets of London Town. By and by they came to the Shop of the Medium Sized Shop Keeper.

"I want," said the Very Tall King, "twenty yards of gold brocade." The Medium Sized Shop Keeper immediately drew forth a large roll and began to measure out the twenty yards of cloth in the accustomed manner.

"Hold on there," said the Very Tall King, "don't you know that it is from the point of the *King's* nose to the tip of his fingers that a yard is measured?"

"That is true, your Majesty," said the Medium Sized Shop Keeper, and handing the roll across the counter, he watched ruefully while the Very Tall King measured out twenty great, long yards of gold brocade.

By and by, as time went on, the Very Tall King died and his very short brother came to the throne. He, too, sought a fair princess for his queen, and one day they visited the same Shop of the Medium Sized Shopkeeper.

"I want," said the Very Short King, "ten yards of your whitest satin." The Medium Sized Shop Keeper threw the bolt down upon the counter, folded his arms, and waited.

"I want ten yards," again said the Very Short King.

"Very well, O King, measure it out," returned the Medium Sized Shop Keeper. "A yard, you know, is from the point of the King's nose to the tip of his fingers."

"You are right," replied the Very Short King, and he measured out ten little, short yards of satin.

Such was the yard in merry old England and even today some people have seen the department store clerk measure goods in

¹ Being the introduction to a demonstration of tests before the San Bernardino City Institute, December 16, 1919.

lengths of arm reach from the nose to the finger tips. So yards may come and yards may go, as clerks may be very short or very tall, but is a yard a yard?

A few days ago I stood before an inclosed glass case in the chemistry building of the University of California. My attention was called to a steel-and-brass rod. It was the shape of a miniature railroad "T" rail. A card read: "This is one meter—one ten-millionth of the distance from the earth's equator to the pole." And so meters may come and meters may go, but a meter is a meter regardless of kings and clerks. Yes, a yard is a yard today but it was centuries in the making.

The physical sciences have been made exact and are sciences chiefly in that there has been evolved, for each, definite units of measurement.

At one time, however, man expressed quantity in such terms as "heap much"; but "heap muches" varied. Yesterday the city across the bay voted upon a municipal tax rate of three dollars and eight cents. It may be a question whether or not the city's money will be wisely spent, but each citizen at least knows just how much he is to contribute. Regardless of municipal incompetency and rottenness, we are wont to call this "civilization." However that may be, it took man ten thousand years, or more, in economics to go from "heap much" to three dollars and eight cents.

A long time ago man expressed time by such terms as "many moons." Yesterday some of the boys landed at the Presidio with a flying time from New York of forty-three hours, thirty minutes and fifty seconds. It took man ten thousand years, or more, in chronology to be able to change "many moons" to hours, minutes, and seconds.

At one time number was expressed in such terms as "like the leaves of the trees." Yesterday the registrar said there were 9,457 "campus" students enrolled in the University of California, making it the largest university in the country. The science of definite numerical calculation has changed "the leaves of the trees" to units, tens, hundreds, and thousands, and definite comparisons become possible.

Now we as teachers have long since dealt in yards and meters, dollars and cents, hours and minutes, tens and hundreds; but we still make use of very changeable and indefinite terms. We claim

that a pupil's work is poor, fair, good, or excellent; but what is poor, fair, good, and excellent? Why, you say, poor is 60 percent, fair is 70, good is 80, and excellent is 90. But what is 60 percent? It is not only one thing to one and another thing to another, but it is also different for each of us at different times. Grading as tangible a product as a piece of writing without a handwriting scale and then with one will prove this. One geometry paper marked by a hundred and sixteen teachers of geometry was scored all the way from 28 to 92 percent, and this in a day when the physics laboratory of University Chicago "can rule a piece of polished glass one inch wide with fifty thousand straight and parallel lines equally spaced" and "can measure the five-millionth part of an inch—a distance amounting to one fiftieth of the smallest distance revealed by a theoretically perfect microscope."

For many centuries man has dealt in relatively exact terms in many lines of endeavor, and in so doing he has lifted himself from the stone age to a civilized state. It may have taken him ten thousand years. We in education cannot—probably never can—deal in terms anywhere nearly as exact as those of the physical sciences; but the time we have spent in developing more precise units has only been since 1910 when Thorndike evolved the first scale for handwriting! It is now my purpose to demonstrate the uses of some such scales and standardized tests. Will the class please come forward?