

**PROBLEMS IN THE TEACHING OF
SECONDARY MATHEMATICS: AN
ADDRESS DELIVERED BEFORE THE
NEW ENGLAND ASSOCIATION
OF TEACHER OF MATHEMATICS**

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Problems in the Teaching of Secondary Mathematics: An Address Delivered before the New England association of teacher of mathematics by David Eugene Smith

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DAVID EUGENE SMITH

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SECONDARY MATHEMATICS**

**AN ADDRESS DELIVERED BEFORE THE
NEW ENGLAND ASSOCIATION OF
TEACHERS OF MATHEMATICS**

**BY
DAVID EUGENE SMITH**

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PROBLEMS IN THE TEACHING OF SECONDARY MATHEMATICS

It is not without considerable hesitancy that I venture to address a body of teachers upon some of the great problems that confront us at the present time in the work in secondary mathematics. This hesitancy arises from several causes, prominent among them being the feeling that I shall only be "carrying coals to Newcastle." For surely these problems are already in your minds, and many of you have pondered over their significance and their solution quite as seriously as I, and no doubt with a more satisfactory issue. I hesitate, also, because I can merely state them with no attempt at solution, mindful all the time of the ancient adage referring to questions which a wise man cannot answer. But after all, there is a value in clearly stating from time to time the large questions that confront our guild, for if problems were never formulated they would never be solved, and it is upon associations like this that we must largely depend for the solution of those that I shall venture to lay before you.

I. HAS THE DAY OF SECONDARY MATHEMATICS PASSED?

The first of the great questions that confront us at the present time relates to the very existence of secondary mathematics in our curriculum. To many of us it may

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seem preposterous that the question should seriously be asked. We say to ourselves that if anything is to be blotted out, let it be some language or one of the various manual arts that are from time to time exploited only to find, in most cases, an early resting place in the great educational necropolis of forgotten graves.

But the question cannot be dismissed in any such way as this. Other subjects have been seemingly as well entrenched as mathematics, and yet they have passed away. Formal logic was at one time one of the great features of a liberal education; it gave place, in the secondary school, to formal grammar; but a university course in formal logic is now a rarity, and a high-school course in formal grammar, as it was conceived of a few years ago, is almost unknown. The world seems to proceed as well without these subjects as it did when they held prominent place, and we have to face the question whether it would not get along just as well if algebra and geometry followed them into educational oblivion. The medieval *Computus* was once an essential feature in the education of a learned man; it was apparently entrenched in a position of security; and yet, as I mention it to-day, half of this audience may be ignorant, and excusably so, of even the meaning of the word. Somebody at some time asked the question, "Why should an educated man need to study the *Computus*?" — and the answer came in due time, "There is no reason," and the subject was soon forgotten. Somebody to-day raises the question, "Why should an educated man need to study algebra?" — and we, the teachers of mathematics, must answer. A high school in which I am interested holds its last class in Greek this year — one of the

best-known high schools in the country, a school of five hundred selected pupils, all of whom are hoping to enter college. Shall it be, a few years hence, that this same school shall be teaching its last class in geometry, compelled to drop another ancient and honored subject because it is no longer demanded?

We may say to ourselves that high-school mathematics has always existed, that it is not a college subject, and that it is absurd to talk of abolishing it. But if we say this we forget that the American high school is itself a new institution; that it has no exact parallel in other countries; that other countries select their pupils for secondary work while we seek to educate the mass; that 95 per cent of our high-school pupils do not go to college, and do not hold the intellectual standards held by the boys of our old academies; and that it is comparatively a recent demand of the American college that its candidates must offer any mathematics beyond arithmetic. So when we speak of high-school mathematics we should bear in mind that our high school has not as yet proved its worth, and is even now being weighed in the balance with rather unsatisfactory results, and that precollegiate mathematics is only a recent matter. If a pupil postpones his Greek until he enters college to-day, why should he not postpone his Latin, his algebra, and his geometry to-morrow?

Now this is not a cry of alarm for the sake of temporary effect; it is a succinct statement of the arguments that we frequently hear to-day from the general educator. Up and down this country, before many gatherings of teachers, the question is being vociferously propounded, "Why should the girl ever study algebra?" Even in associations of

teachers of mathematics the question is being asked, "~~Who would stand to-day for the spirit of Euclidean geometry?~~"

And the men who ask these questions hold prominent positions; they are professors in universities, educators of influence, men whom the mass of teachers naturally look to as leaders. The problem is, therefore, a real one and one that we have to face.

But we must not deceive ourselves by thinking that we can successfully meet it by mere opprobrium. We not infrequently hear it asserted that the general educator is usually a man of a low degree of scholarship, that his range of culture is limited, that ~~he was taught Latin so poorly that he believes it can never be taught in any other way,~~ and that he rarely stands for any intellectual ideals; but we must remember that, even if the assertion has some truth, enough people of this type might easily create a Zeitgeist that would not down by any such formula as "Weave a circle round him thrice." These men who attack the ancient culture have been rather recklessly called educational muckrakers, men who seek only the bad and judge everything by that; they have been hysterically denominated pedagogical anarchists, men who destroy without rebuilding; and they have been frequently looked upon as intellectual iconoclasts, those who in their zeal to destroy idols are willing that all the beauties of art, which their dull vision fails to see, should go to the scrap heap. In all these assertions there may be some grain of truth, but no one gains anything in an argument by giving expression to such an attitude of mind. Such an expression merely brings the countercharge that those who hold other views are reactionaries, laudatores temporis acti, unprogressive,

and selfish clingers to their little jobs. The epithet of "old foggy" is as weighty as that of "muckraker."

When we calmly consider the question, we find that it relates to the value of algebra and geometry for the democracy that America, in distinction from the rest of the world, is trying to educate in the high school. What does democracy want of mathematics? And in our America of the dollar we find that the question is often reduced to that of the immediate utility of algebra and geometry. The potential utility does not seem to enter into the consideration of the type of reformer that seems to speak the loudest upon the subject. And here appears to be the real point at issue: one side demands the immediately useful, while the other stands for that which it claims to be potentially so. Can we, therefore, justify our secondary mathematics on the potential side? For surely no one would for a moment claim that the teaching of the immediately practical part of algebra to a mechanic would require more than a month, or that the immediately practical part of demonstrative geometry exists at all, taking these words in their usual popular significance. Such, then, is the first of the large problems that seem to loom up before us. Call it a claim for mental discipline if you please — this is a mere question of fashionable or unfashionable phraseology; it is a claim for serious attention to a vital issue in education.

II. WHY SHOULD NOT ALL MATHEMATICS BE ELECTIVE?

The general educator is usually found to concede that mathematics should be taught in our high schools, but he is frequently heard to assert that it should be elective.