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Education

As my thirteenth year in the educational system comes to an end, like most things, I have been reflecting on what could have been done better. I thought of kindergarten, learning the alphabet with brightly colored caterpillars being used to illustrate letters, mistakenly saying "fiveteen" to the teacher in the second grade, and dissecting a squid while gleefully gulping down caprisun. These are my experiences, no other kid has these exact ones, however I think a more pertinent area of focus would be the experiences that we children did share in a more general sense. Being baffled at the concept of fractions, frantically scribbling during phonetics practices, and being awed by the colossal scale of the solar system and the concept of heliocentricity (maybe that was just me..). I can remember that math always seemed to be the most labored of all the activities. However, once a concept had been covered effectively the idea seemed to become rooted in our minds. This kind of pure, connectionist based reasoning operated outside the realm of mere knowledge, elevated the mathematical teachings to self evident truths, the details of which are not up for debate. These concepts, although tougher at first became second nature once we came to fully comprehend them. Unfortunately, math does not seem to currently maintain this trend of innate understanding as the complexity increases beyond mere addition, subtraction, multiplication and division taught in primary schools. So, I have decided to focus on what I would have changed about my mathematical education.

The best qualities of man are not innate, but emergent. When given the proper setting we can shed our primal tendencies in order to achieve intellectual accomplishments that no other species has. All of these accomplishments have been achieved through a constant accumulation of knowledge from which we can extrapolate more and more. To quote Sir Isaac Newton, "If I have seen further than others, it is by standing upon the shoulders of giants." Mathematics is a field where the progress is especially noticeable. Euclid and Pythagoras spent their lives creating geometry, a subject I, and many others, learned in its entirety in under a year at the ages of around 14 or 15. One can easily imagine that in 1,000 years time society will similarly view the accomplishments of today as rudimentary. However, in order to achieve a deeper and more fundamental grasp of mathematics in the future, we will need to modify and evolve the curriculum of today.

Adding, subtracting, multiplying, dividing, basic algebra and geometry make up the core fundamentals of most people's mathematical knowledge. Ideally, people do not have to think very critically to execute these functions. In thinking about what mathematical functions people are already basically proficient at, I started to wonder what areas need improvement in order to help students more aptly handle later level maths like Calculus. This brought me to the conclusion that exponents and their counterparts, logarithms were being taught in a less elegant manner than they could be. Much like addition and its counterpart, subtraction, or multiplication and its counterpart, division, exponents feature a similar relationship to square roots and logarithms. The similar nature of the relationship would make it easier to introduce these concepts to kids at a younger age than I believe most educators would imagine.

What captures my interest in rearranging the curriculum to accelerate the understanding of exponents is how much I know people struggled to grasp exponents, square roots and

especially logarithms as concepts later on in algebra and the prominence of which exponents are featured in calculus. Exponents are really just multiplication taking place in a different form, so why should they be sectioned off? The same goes for logarithms, they are actually just rearranging the order of the exponent and then have properties exclusively dealing with addition, subtraction, multiplication and division. There is very little new material being presented in either exponents, square roots, or logarithms and I am a firm believer that any concept, if broken down into recognizable parts, can be assimilated.

Provided that the concepts of exponents, square roots, and logarithms were taught as an extension of multiplication and not as a separate ordeal, why do I think a change would be result? Personally I think the difficulty that kids have in appropriating these concepts into their mathematical lexicon is in part due to the weirdness of it all. They do not view them as an extension of the pre existing mathematical concepts, but rather as something entirely new. This rigidity makes learning the concepts slower and, more importantly, mastering the concepts to a baser level, even more so. Imagine a generation of mathematicians equipped with the mental faculties to wield exponents, square roots and logarithms with as much dexterity as us with simple arithmetic. Given the applications of exponential systems in everyday life, including economics, population modeling, viral outbreaks, and physics, one would hope that having a more fundamental mastery of these concepts could further propel the emergent intellect of mankind atop the shoulders of giants.

Education will always lag behind the cutting edge of any field since each subject requires time to properly develop an effective curriculum and suitable teaching methods. Although there is a lag between this progress and its integration into official protocol, we should aspire towards a schooling system as seamless and efficient as humanly possible.