MULTI-LINGUAL EDUCATION HELPS TO STUDY

MATHEMATICS

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Abstract. We explain the empirical observation that multi-lingual education helps to study mathematics.

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Observation. One of the authors (VP), when actively participating in the organizing mathematical Olympiads for schoolchildren, noticed that while top places at these Olympiads were usually taken by kids from specialized mathematical schools, next were usually students from the language schools who started learning a foreign language much earlier than usual. Moreover, students who -- as in some of these schools -- studied several languages at the same time were better more frequently than students who studied only one language.

Idea. So maybe -- he thought -- studying foreign languages, especially a simultaneous study of several foreign languages, can indeed help in future study of mathematics? To test this hypothesis, he explained the observed Olympiad phenomenon to a friendly school principal who got very enthused by this idea and proposed to try it in his school starting with the very early grades. Most teachers agreed to participate in this experiment except for one teacher -- which, in effect, created a control group for this experiment (actually, a good control group, since this was a very good and experienced teacher).

Results. Interestingly, the results were very good; see [4-11]: not only students who first studied languages did much better on mathematics, they even got, on average, better grades on the language tests.

What Needs to Be Explained. How can we explain this phenomenon? To be precise, we need to explain several things:

1) why studying foreign languages first worked better than the usual scheme in which students first study some basic mathematics

2) why studying all the languages at the same time -- e.g., interchanging different language classes every other day -- worked better than the more traditional scheme of first studying one language to some depth and then studying another language.

How We Explain The Empirical Success

1) In [1,2], we show that to increase the efficiency of learning, it is important to start with the most difficult-to-learn part, not with the paper for which the students are ready. The very fact that usually, some elements of mathematics are usually taught earlier than foreign languages makes us believe that for little kids, mathematics is easier than foreign languages. Thus, it is more efficient to start with foreign languages.
2) In [2,3], we explain why interleaving -- when parts of each subjects are studied simultaneously -- works better than teaching one part and then teaching another part. This explains the empirical success of interleaving different foreign languages.

References


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