American Vs. European Math in Elementary Schools

The focus in this paper is going to be about American math versus the European math in elementary schools, with regards to their teaching, testing, and curriculum content. Both the United States as well as European countries instill a core discipline of math from about the age 6, yet international test scores show European countries at the top of the list, leaving the U.S. falling short at 25th out of 30 countries by the time children reach high school [5]. There has been a growing concern that the United States educational system is not enabling its students to perform well academically as students in other nations [12].

Much like in the United States, most European children begin school at the age of 3, in preschool. In the United States, it varies from state to state for the amount of required days children must spend in school. In California, the minimum requirement is 180 days per year [3]. The amount of required school days in Europe varies as well, yet most of them follow the same standard of school days lasting until 4pm, with Saturday morning school included within the school week [4]. Italy, for example, children are required to spend 210 days in school [3].
In the United States, principles and standards for school mathematics guidelines are recommended by the National Council of Teachers of Mathematics. Yet each individual state adopts their own, often very different, set of standards. This is very similar to the countries within Europe, each one is allowed to create their own set of standards.

A study done in Europe showed that almost 100% of future middle school teachers took advanced math courses while they were in school, such as linear algebra and calculus, whereas only about 50% of the future teachers in the United States took those courses [1]. These particular standards emphasize conceptual understanding of math concepts, problem solving skills, and the ability to memorize mathematical procedures. Because American teachers are not as well trained in math as they could be, they tend to mostly focus on procedural learning, as opposed to conceptual learning [3].

In France, in particular, the teachers focus on procedural learning and conceptual learning equally. Procedural learning is simply having students memorize procedures on how to complete math problems, yet the child never grasps the concepts to use in the real world later on. Conceptual learning teaches a set of common, relevant features on how to classify objects, events, or ideas to be related to a life outside of school [3]. Procedural learning teaches students to do well on exams, yet they will lose interest soon after passing their test. With conceptual learning, students will have more of an understanding of the entire process and possibly even stay interested in the subject, as so many children often fail to do. They would learn how to problem solve independently and think about math conceptually, instead of just gaining
the ability to do calculations.

The evaluation of the curriculum has become a focus of concern within United States. The use of standardized tests, some argue, seem to drive a lot of the curriculum [12]. The importance placed on these tests on local, state, and national levels, creates a curriculum where teachers must "teach the test" instead of developing students' creativity and individual thinking skills [12]. The creativity in teaching math in classrooms could come from applying their skills into their outside world, such as with conceptual teaching.

In Frances Fowler's article, "What They Don't Tell Us About European Schools", she discusses European practices in elementary schools that American schools could learn from. One of the values practiced in Europe is an emphasis on building personal relationships between the students and teachers. The average size elementary school in American has about 500 students [11]. In Europe, most elementary schools do not exceed 300 students, which encourages a smaller teacher to pupil ratio in the learning environment than in American schools [11]. Large class size can contribute heavily to deteriorating math skills when children have to turn to their parents for help at home, instead of spending more one on one time learning with their teachers at school [3]. There is no way to define one simple reason why the test scores are so different. There are many contributing factors besides school funding, such as teaching skills. Many teachers in the United States express frustration that they are not provided with the resources necessary to align the standards of the math curriculum with what is being asked of them [12].

In 2001, the United States Congress issued an act known as the "No Child Left
Behind Act”. This Act requires all government-run schools that receive federal funding to administer a standardized test every year to all the students [7]. This entails setting high standards for students, which should, in theory, make them try harder throughout school. It also uses their scores from these tests to determine if the school did a good job teaching the students. These schools are expected to make Adequate Yearly Progress (AYP) in their test scores unless their scores are already satisfactory, for example the 4th graders must do better on the these standardized tests than the previous year's 4th graders [7]. Schools can be penalized for this and forced into correction if these standards are not met.

There was a study done in the last decade known as the Third International Mathematics and Science Study where 500,000 students from 41 countries were tested on their math and science skills, since it's believed that math and science are a common basis for comparing students [2]. The test results showed that the elementary students in America were comparatively poor to the European students. The gap between American and European test scores progressively widened as the students reached middle school, then high school [2].

American and European schools, on average, have a much higher level of education spending money per student compared to most countries, therefore each student should theoretically have an equal education. In 2007, the New York State was reported to have spent an average of $14,119 per student, which was more than any other state in the nation [8]. Each state varies greatly, for example the Illinois state range for operating expenditure per pupil is $4,803 - $23,726. The national average amount spent per year on a student in the United States is $9,666 [8]. In Europe, there
is also a wide range of amounts spent. The average per student spent in England is $9,242 per student, and in Luxembourg, the average is $18,144 [9].

Based off of PISA test scores versus the cumulative education spending, the relationship between the two is minimal when it comes to spending in regards to Europe and American countries [10]. Both countries spend approximately the same amount of money per student every year, yet the European test scores of Math, Science, and Reading, exceed the United States scores [10].

Both in the United States and Europe, the elementary school curriculum tends to be influenced by societal need and political influence [12]. The subject of Math is apt to being an exceptionally hard subject for many children, as well as adults. If American and European children alike do not learn the proper way to become competent in math in elementary school, they will most likely grow up to not be competent teachers of math for future generations.

**Bibliography**


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