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PEDAGOGICAL VALUE OF ABACUS AND ITS USE IN TEACHING AND LEARNING ARITHMETIC IN THE 19TH –EARLY 20TH CENTURY

Abstract :

Under different forms and names, abacus remained a useful computational tool in many countries and cultures over the history of humanity and recently has gained popularity in the context of school reforms. While historians of science are well aware of the fact that some cultures (Roman Empire, China, Japan, Russia, etc.), at certain historical periods, used (and in some cases still use) various types of abacus to perform calculations (from simple ones, like adding up costs of a number of items on the market, to quite complex and sophisticated, like extracting the square roots), its didactical value and implications for students' mathematics learning still remains underexplored. However, the history of abacus is highly relevant to the history of didactical approaches devised to teach basic arithmetic operations: during certain periods, the instrument appeared as the mandatory teaching and learning tool in all classrooms of certain countries only to completely disappear some time later (being often replaced by other tools). Our study examines the didactical debates about the use of abacus for teaching arithmetic in 19th and early 20th century Europe, North America (in particular, USA) and Russia/USSR. In the first half of the 19th century, the abacus became widely used in schools of several European countries, as well as in the USA. For example, the Teachers' Manual of Elementary

Arithmetic (1880), requires the ‘numeral frame’ (this is the name under which the abacus was known in the USA) to be ‘in hands of every teacher’ and suggests that ‘no school-room should be without it’ while providing an illustration of the instrument. According to several sources, the educational use of abacus begins in France after Napoleon’s invasion in Russia (1812), when Jean-Victor Poncelet (1788 – 1867), a French mathematician who spent some time in Russia as prisoner of war, brought back to France one sample of Russian abacus (schyoty, счёты). In fact, it is apparently from the schools of his hometown Metz that the abacus (called in France ‘boulrier’) started to spread out as teaching device in the whole Europe. The French version of abacus was introduced in American schools in 1820s, to gain the peak of its popularity in 1830s, in concordance with Pestalozzi’s ideas of ‘object-teaching’. The use of abacus in French schools for infants (salles d’asile) is another interesting case. During the 19th century special schools for children of 2-6 years of age were created in France. Their development was guided by ideas of increasingly important emphasis on education and schooling which included basics of arithmetic. A large-size abacus was a part of mandatory equipment of every classroom and was used to perform demonstrations of manipulations and operations with (integer) numbers. The fact that the abacus was enthusiastically embraced by European and American educators in the first half of the 19th century leads us to a deeper look into this innovation from the didactical perspective which was not necessarily related to the simplicity and efficiency of instrument itself but rather to the new (at that time) didactical theories that stressed the importance of manipulations with physical objects in learning basic mathematical concepts and operations. In our paper we shall discuss some of these theories, in particular, those found in the works of Pestalozzi, especially his object-teaching method based on the intuitive, visual and hands-on pedagogical perspective which had (and still has) a great influence on educational systems worldwide.