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The École Polytechnique, 1794–1850: differences over educational purpose and teaching practice.

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The École Polytechnique was established in 1794 to give students three years of technical education prior to admission to a more specialized engineering school. In 1799 the years of instruction were reduced to two, and in 1804 the school was militarized by Napoleon. Subjects covered were analysis, mechanics, geometry, physics, and geodesy and machines. The core staff was fairly small, about fifteen professors, assistants, examiners, and a librarian, serving about an average of 120 students during the first decades. Prominent mathematical scientists up to 1850 who taught or examined at the school included Joseph-Louis Lagrange, Gaspard Monge, Adrien-Marie Legendre, Pierre-Simon Laplace, François Arago, Siméon Poisson, Gaspard de Coriolis, André-Marie Ampère, Augustin Cauchy, Augustin Fresnel, Claude Navier, Auguste Comte, Charles-François Sturm, Michel Chasles and Joseph Liouville.

One notable aspect of teaching at the school from its beginning to 1850 was a pronounced emphasis on general theories of analysis and mechanics. In analysis this tendency was very marked in Lagrange’s lectures of the 1790s (which the students reportedly disliked) and was reinforced in the 1820s by Cauchy’s formulation of calculus as a rigorous theory of real analysis. The abstract and theoretical character of mathematics instruction was criticized repeatedly by students and graduates (the latter known as *polytechniciens*) of the school, and Cauchy at one point was forced to cancel a course on existence theorems in differential equations. Gaspard de Prony observed that although students were good with formulae even very strong ones were embarrassed by particular cases. In the 1830s the *polytechnicien* Marshall Georges de Chambray wrote of the “transcendental mathematics” he had been taught as a student, “In my career as an artillery officer, I never found a single occasion to make use of it and I think well that I never occupied myself with it as a relaxation”; he added that he had even forgotten what mathematical subjects had been taught. A few years later Coriolis wrote in a report that in comparison to the routine teaching of theology in seminaries, the teaching of mathematics is prey to an incomparably duller and more cruel routine. In the report leading to the reforms of 1850, Urban Leverrier wrote critically of the teaching of mathematics and mechanics, and in the reforms themselves analysis was simplified and the mechanics made more applied. Liouville and Chasles were two leading mathematicians of the purist persuasion who resigned from the school in opposition to these changes. In the second half of the century the École Normale Supérieure became the leading center of pure mathematics in France, although the École Polytechnique continued to attract brilliant students.

Grattan-Guinness presents a compact survey of the first fifty-six years of the École Polytechnique, with tabular information on the staff, accounts of topics that were covered in analysis and mechanics, discussions of curricular reform and references to the literature. The article is of special interest for its discussion of the kind of mathematics and mechanics taught at the school and as an historical study of the issues that can arise in the teaching of mathematics in advanced technical education. *Craig G. Fraser*

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