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« Mathématique moderne » : A pioneering Belgian textbook series shaping the New Math reform of the 1960s

Abstract :

Dirk De Bock, KU Leuven, Belgium Michel Roelens, University Colleges Leuven-Limburg, Belgium Geert Vanpaemel, KU Leuven, Belgium Recently the New Math phenomenon was the subject of many studies (see, e.g., Barbin, 2012; Kilpatrick 2012), dealing with various aspects of the reform. Belgium was, as well as France and the US, one of the forerunning and leading countries in this international movement. A pivotal role was played by the Belgian mathematician and mathematics educator Georges Papy, but so far, his role remained underexposed in the recent literature on the history of mathematics education. In this paper we analyse Papy's Mathématique moderne (in collaboration with Frédérique Lenger), a groundbreaking textbook series, based on several years of experimentation and intended for the teaching of modern mathematics to 12-18-year olds (Papy, 1963-1967). The first volume of Papy's Mathématique moderne was published in 1963 and marked a revolution in the teaching of mathematics and in the art of textbook design. Papy reshaped the whole content of secondary school mathematics by basing it upon the unifying themes of sets, relations and algebraic structures. Meanwhile, he proposed an innovative pedagogy using multi-colored arrow graphs, playful drawings and "visual proofs" by means of drawings of film strips. During the 1960s, translations of the volumes of Mathématique moderne appeared in European and non-European languages and were reviewed in mathematics education journals of that time. Papy's textbook series influenced the national and international debates and became a major guide for shaping the New Math reform in several countries. We first review the different volumes of this series to gain insight in Papy's viewpoints as revealed though this work. Of particular interest is Papy's approach to geometry. In the

first three volumes (for 12- to 15-year olds) Papy builds up a Euclidean vector plane structure from “intuitive” (synthetic) axioms. This must prepare these students for a second step at the age of 15-16 which is described as a psychological reversal: the structure of a Euclidean vector plane then is taken as a new and “unique” starting axiom for the further development of geometry. Second, we examine the role of Papy and his Mathématique moderne in the international New Math reform movement of the 1960s. So, for example, Papy’s approach played a reconciling role in the dispute between Gustave Choquet and Jean Dieudonné about the ideal way to teach geometry at the secondary level (Félix, 1985). We conclude with a brief discussion of the contribution of Papy’s textbooks on the national reform debates in France and the Netherlands. References Barbin, E. (2012). The role of the French Association of Mathematics Teachers APMEP in the introduction of modern mathematics in France (1956-1972). In Proceedings of the ICME 12 Satellite Meeting of HPM 2012, July 16-20 (pp. 597–605). DCC, Daejeon, Korea. Retrieved from http://hpm2012.onpcs.com/Proceeding/OT6/T6-01.pdf. Félix, L. (1985). Aperçu historique (1950-1984) sur la Commission Internationale pour l’Étude et l’Amélioration de l’Enseignement des Mathématiques (CIEAEM). Retrieved from http://math.unipa.it/~grim/cieaem_files/CIEAEM_histoire_FLucienne_1985.pdf. Kilpatrick, J. (2012). The new math as an international phenomenon. ZDM–The International

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