Chapter 2

Philosophical, multicultural and interdisciplinary issues

Lucia Grugnetti and Leo Rogers

with Jaime Carvalho e Silva, Coralie Daniel, Daniel Coray, Miguel de Guzmán, Helene Gispert, Abdulcarimo Ismael, Lesley Jones, Marta Menghini, George Philippou, Luis Radford, Ernesto Rottoli, Daina Taimina, Wendy Troy, Carlos Vasco

Abstract: School mathematics reflects the wider aspect of mathematics as a cultural activity. From the philosophical point of view, mathematics must be seen as a human activity both done within individual cultures and also standing outside any particular one. From the interdisciplinary point of view, students find their understanding both of mathematics and their other subjects enriched through the history of mathematics. From the cultural point of view, mathematical evolution comes from a sum of many contributions growing from different cultures.

2.1 Introduction

In the 1980s, mathematics educators and didacticians in many countries felt the need to give a more reliable foundation to educational research through philosophical reflection on the processes involved. What philosophy is suitable for this purpose?

Philosophy must explain mathematical thought not only at the level of research, but also as far as teaching is concerned. It must also explain the development of mathematics in the past: philosophy needs history. But what history is suitable? There is a history of documents and a history of ideas. The latter needs the former, but didactics and epistemology need the latter. This means that we must avoid the identification of philosophy of mathematics with mathematical logic. Our philosophy must guide and explain educational choices; it must help in a better planning of teaching. It must be open to new reflections. In this sense it could be considered as being almost equivalent to epistemology (Speranza and Grugnetti 1996).

A cultural perspective on mathematics makes us attend to mathematical histories and to what they tell us about who developed mathematical ideas in different societies (Bishop 1995). Multicultural aspects and interdisciplinary issues become therefore part of epistemological reflections about mathematics education; the relationships between philosophical, multicultural and interdisciplinary issues are very strong. Moreover, the history of mathematics as the history of ideas is strictly linked to (or better, is part of) the history of human beings. In this view we have to analyse the cultural, political, social, economic contexts in which ideas arose.

2.2 Philosophical issues

2.2.1 Historical investigation, evidence and interpretation

Differing views on the nature of historical enquiry

The widely held view of mathematics as a pure subject uninfluenced by outside forces is slowly changing, and this is reflected in the changes in the approach to more general historical study. If we agree that history is that branch of knowledge which caters for society’s needs to understand particular aspects of the human past, then we express our needs by demanding answers to a range of who? what? when? how? and why? questions. However, as soon as we start to investigate, we find that these questions are not at all easy to answer. Traditionally, history is viewed as a study of carefully delimited aspects of the past employing systematic research in all available sources. The approach can be from a social, political or economic point of view, and necessarily employs a general philosophy (for example, structuralism, Marxism, etc.) in its interpretation. More recently, ‘post-modern’ history is seen as a set of processes and power relations linking the past to the present, where the interpretations of events and facts are critically interrogated, the underlying assumptions are revealed, the status of texts are called into question, and where groups of people and their conditions are defined and redefined by those in power.

In a similar manner, there have been changes in the way history of mathematics is undertaken. ‘Internalist’ history of mathematics is recognised by its tendency to see mathematics as a subject isolated from ‘external’ influences and as a progression of ideas which are improving and becoming more abstract and general with time. In the internalist, sometimes called ‘Whiggish’, account the events of the past are seen as instances of steps towards the present more perfect structures. This kind of history tends to interpret the past in terms of modem concepts. More recently, researchers have tried to take a more holistic view, with mathematics seen as a component of the contemporary culture; the historian’s task is then to discover the influences, conditions and motivations (social, economic and political as well as scientific and mathematical) under which problems arose. Admitting these points of view necessarily leads to much reinterpretation of the received wisdom of earlier writers. In the past, most research in the history of mathematics has been carried out by those with mathematical training. In consequence, the interpretation and its