Review of Ogura's History of Mathematics Education

Review

Beginning with this issue, the editorial board of the journal plans to publish not only reviews of new books, but also reviews of books published in the past that have remained significant for researchers, but are not sufficiently well known to the international audience. The purpose of these reviews will be to document the valuable contributions made in our research area in the past.

Kinnosuke Ogura (1932). ***History of Mathematics Education*** **(in Japanese). Iwanami-shoten, Tokyo.**

Kinnosuke Ogura's remarkable book set out, in a unique manner, to trace the development of mathematics education in the western world and in his native Japan over the centuries.

In Japan, the book has proved both a great gateway to research in mathematics education and an informative handbook for those interested in Japanese history. The first edition of this book (356 pages) was published in 1932 and a second edition is still in print. In over seventy years more than twenty thousand copies of the book have been sold. For a book on mathematics education to remain in print for so long is unprecedented in Japan.

Dr. Kinnosuke Ogura (1885–1962) was one of the leaders of Japanese mathematics education from the 1920s to the 1960s and led the movement for the improvement of Japanese mathematics education in the 1920s. His book, *Fundamental Problems for Mathematics Education* (Idea-shoin, 1924), which preceded his book on history, called for developments in Japanese mathematics education to match those that had taken place internationally at the beginning of the twentieth century. It was to have a great effect on Japanese mathematics education. Ogura actively researched mathematics education and the history of mathematics, and was also well known for his research on the theory of science, eventually becoming a president of the History of Science Society of Japan. He published many books and papers; eight volumes of his collected works were also published after his death (Keiso-shobou, 1973–1975).

Ogura's *History of Mathematics Education* is historical research both on mathematics education as a culture and on theories of mathematics education. He depicts characteristics of mathematics education of each era, both in the west and in Japan, by describing the social backgrounds and educational systems; by referencing the thoughts of famous philosophers and educational reformers; by making observations on the status of teachers; and by introducing and analyzing a variety of mathematics textbooks from each era and from various western countries. For example, the following philosophers and educational reformers are mentioned: from Britain, Bacon, Milton, Locke, and Arnold; from Germany, Comenius, Humboldt, and Herbart; from France, Rousseau; from Switzerland, Pestalozzi; from the United States, Franklin; and from Japan, Fukuzawa and Mori.

Viewpoints from which to analyze textbooks are based on Ogura's ideals of mathematics education, namely, "mathematics education is never just to teach 'ready-made mathematics' and this should never be." He contends it is essential that subject materials are selected, syllabi determined and teaching methods designed based on a psychology of learning and an objective analysis of society. Thus, for example, Ogura addresses whether Euclid is far from a starting point for analyzing geometry; whether teaching is practical or not; how much use should be made of symbols; and what the balance between plane and solid geometry should be. He analyzes arithmetic both theoretically and practically in terms of developments from Boethius. The degree of symbolization serves as a viewpoint for analyzing algebra. Other points Ogura considers are how to use graphs in order to integrate algebra and geometry, and how arithmetic, algebra, geometry, and trigonometry are treated separately or integrated.

The book is composed of two parts: four chapters on western mathematics education from the thirteenth century, when universities were first established, to the end of the nineteenth century; and two chapters on Japanese mathematics education during the nineteenth century. The two parts begin at the point when mathematics education was gradually becoming systematized in each culture and end at the beginning of the twentieth century when the international movement for the improvement of mathematics education led, for example, by Perry, Kline, Borel, and Moore had just started.

These six chapters are roughly composed of three sections: general background and characteristics of each era; general situation and analysis of textbooks of each country; and analysis of distinctive textbooks. Analysis is centered on secondary education, but references to primary and university education are also made. The contents of the chapters are summarized as follows.

Chapter 1, "The era of humanist education—focused on the 16th century," begins in the sixteenth century, which is thought of as the birth of modern education. It was the era of the Renaissance and of commercial reform: the aim was to provide necessary social, literary, and artistic literacy for the sons of the new landlord class and the commercial and industrial bourgeoisie. In humanist education, classics were emphasized. Although mathematics received more attention than natural science, only a little arithmetic and geometry were taught. In this chapter educational history back to the birth of universities in the thirteenth century is also mentioned.

Chapter 2, "The development of realistic education—around 1600–1750," describes how humanist education became inappropriate as commercial and industrial trade developed between the sixteenth century and the mid-eighteenth century. In that time, substantial knowledge relating to the real world was only needed by some individuals and, as a result, natural science and mathematics were emphasized more. While many items in applied mathematics were adopted encyclopedically from a standpoint of realism, mathematics as a formal discipline gained gradual emphasis. This type of reform did not reach primary education.

Chapter 3, "A transitional era of education: The establishment of mathematics as a subject around 1750–1840," tells how the French Revolution helped prompt the establishment of mathematics as a secondary school subject, directly and indirectly, between the mid-eighteenth century and the mid-nineteenth century. In that time, the practical value of mathematics and natural science was recognized and the amount of mathematics taught in secondary schools rose. However, neo-humanists emphasized that the value of learning mathematics was not in its practical use, but rather as a formal discipline for training the powers of inference.

Chapter 4, "The era of stagnation of mathematics education: 1840–1900," tells how mathematics obtained its own position as a subject in secondary education and how in those years pure mathematics progressed rapidly. However, improvements in teaching materials and developments in teaching methods were not easily achieved in secondary school mathematics. This was due, for example, to the university entrance examinations in Britain, the tripartite educational system in Germany, and the excessive emphasis on mathematics in France.

From the sixteenth to the nineteenth century, the significance and aims of mathematics education in secondary education were not sufficiently clear and, even in the nineteenth century, mathematics education still had no connection with modern daily life. It was a formal discipline in an old sense, and mathematics education served only as preparation for an entrance examination. Even at best, the discipline aimed only to make more mathematicians, and, of course, it neglected students' mental abilities and growth.

Chapter 5, "Education in the last stage of feudal Japan—around 1800–1872," describes how mathematics was studied in the Edo era: individual tutorial instruction for sons of the samurai class on mathematics problems in Japanese mathematics (*Wasan*); practical arithmetic in feudal clan schools (*Hankou*); and practical arithmetic for ordinary people in temple schools (*Terakoya*). No national educational system was in place. In addition, western mathematics began to be translated into Japanese from the mid-nineteenth century.

Chapter 6, "The foundation age of mathematics education in Japan—1872–1902" tells how a national education system was established. As western mathematics was translated, so Japanese mathematicians began to edit mathematics textbooks in Japanese. Professors Fujiwara and Kikuchi effectively founded Japanese mathematics education through their editing of such arithmetic, algebra, and geometry textbooks. However, since the direction of the content was the same as that for western mathematics education, described in chapter 4, improvements in Japanese mathematics education did not take place until several decades after the international developments of the early twentieth century had begun.

A major feature of this book is the number of figures, photographs, pictures, and tables it contains. There are about 270 figures in its 356 pages, the first being, "An atlas in 1523." The figures include approximately 150 photographs of table of contents and pages of textbooks and 60 portraits. In addition, there are data on school building and teachers, advertisements for textbooks, curricula, class timetables, etc. These illustrations make the history vivid and prevent it from becoming simply an enumeration of dull facts. Furthermore, there are detailed comments on the illustrations that enable Japanese readers to comprehend their meaning even when written in what to us are foreign languages.

Perhaps the outstanding feature is the way in which the book illustrates the variety of textbooks drawn, over the years, from different countries. Through textbooks, children and teachers composed educational activities in the classroom, and Ogura intended to clarify mathematics education as a culture by analyzing its textbooks. Tables of contents and specimen pages of texts by 69 authors were analyzed. Listed by era and country they are:

Chapter 1 (sixteenth century) [Britain] Recorde; [France] Ramus; [Germany] Frisius, Grammateus, Ries, Widman; [Italy] Pacioli, Tartaglia;

Chapter 2 (around 1600–1750) [Belgium] Stevin; [Britain] Barrow, Cocker, Dilworth, Maclaurin, Mather, Newton, Oughtred, Wingate; [France] Blondel, Barrême, Clairaut, Descartes, Hérigone, Le Clerc; [Germany] Francke, Wolff;

Chapter 3 (around 1750–1840) [Britain] De Morgan, Hutton, Simson, Peacock, Wood; [France] Bourdon, Lacroix, Legendre; [Germany] Euler, Kästner; [United States] Colburn, Davies, Pike;

Chapter 4 (1840–1900) [Britain] Casey, Smith, Todhunter; [France] Briot, Méray, Serret, Tannery; [Germany] Henrici, Holzmüller, Kambly, Lübsen, Treutlein; [Italy] Bassani, Enriques, Lazzeri, Veronese; [United States] Chauvenet, Davies, Loomis, Robinson, Wentworth;

Chapter 5 (around 1800–1872) Hasegawa, Sekigichi, Wylie;

Chapter 6 (1872–1902) Fujisawa, Kikuchi, Nagasawa, Robinson, Smith, Tanaka, Terao.

There are many other textbooks mentioned. Some of these textbooks can be seen in libraries of WASEDA University and Tokyo University of Science ("The Ogura Collection").

The reasons why this book has been read continuously for so long are its appeal as a cultural history, and because we cannot understand the origin of modern Japanese mathematics education without an understanding of mathematics education in western culture. Dr. Ogura traced mathematics education in western culture from the sixteenth century in detail and showed that, since the nineteenth century, Japanese mathematics education has owed much to translations of western mathematics textbooks and the influence of Dr. Kikuchi and Dr. Fujisawa, whose mathematics textbooks were so greatly influenced by western counterparts. Ogura's book systematically shows that Japanese mathematics education historically flows from and with mathematics education in western countries, and appears to be the first book in Japan to demonstrate so clearly that mathematics education is a valid scientific discipline.

Lastly, I express my sincere gratitude for Professor Geoffrey Howson's advice.

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