

TSG Agenda

TSG 55: The history of the teaching and the learning of mathematics (number and title)
Class: A

Session 1

1. 14:30-14:40. Alexander Karp: Opening.

2. 14:40—14:55

PAFNUTY CHEBYSHEV AS A MATHEMATICS EDUCATOR

Vasily Busev

Mathematical institute, Russian Academy of Sciences, Russia

Alexander Karp

Teachers College, Columbia University, USA

This paper is a brief resume of a conducted and ongoing study of works devoted to mathematics education by the outstanding Russian mathematicians Pafnuty Chebyshev. Chebyshev was for many years a member of the so-called Scientific Committee of the Russian Ministry of Education, and in this capacity, he systematically participated in the development of mathematics education, which included writing reviews of various textbooks. Some of these materials have been published, but even the existing edition of Chebyshev's so-called complete works contains only few of them (not to mention the fact that even the published works are practically unknown to foreign readers). Meanwhile, an analysis of the judgments of this outstanding mathematician not only makes it possible better to understand his views and characteristic features in the development of Russian education but is also useful for studying the interactions and mutual understanding of research mathematicians and mathematics educators. At present, we are planning to publish a collection of hitherto unpublished works by Chebyshev. The present paper outlines a scholarly study that accompanies the collection.

3. 14:55-15:10

FRÉDÉRIQUE PAPY-LENGER, THE MOTHER OF MODERN MATHEMATICS IN BELGIUM

Dirk De Bock

KU Leuven, Belgium

The work in mathematics education of the Belgian Frédérique Papy-Lenger covers four main periods, roughly coinciding with four decades. Being introduced to the CIEAEM community, the study of student knowledge was a main theme in Frédérique's work during the early and mid-1950s. By the end of that decade, the modernization of secondary school mathematics became central to her thinking and, together with Willy Servais, she developed the first program for teaching modern mathematics. In 1960, Frédérique married Georges Papy and during the 1960s, she assisted her husband in his actions to develop and promote the teaching of modern mathematics. In 1967, the 'experiment Frédérique', aimed at preparing the reform at the primary level, was launched. This pioneering work with children aroused the interest of

contemporary circles of modern mathematics enthusiasts, including the team of Burt Kaufman in the US that, during the 1970s, developed the Comprehensive School Mathematics Project and appointed Frédérique as a director of research. From the 1980s, in the last phase of her career, Frédérique mainly focused on working with disabled children.

4. 15:10-15:20

THE HISTORY OF MATHEMATICS EDUCATION OF TATAR NATION

Ildar Safuanov

Moscow City University

The history of mathematics education of Tatar nation from Medieval to modern times is described. Three stages of the development of mathematical education in Tatar schools are traced: 1) Mathematical education in Arabic language (up to the last decades of the 19-th century); 2) Mathematical education in old Turk-Tatar language with terminology mostly in Arabic (second half of 19-th century and the beginning of 20-th century); 3) Mathematical education in modern Tatar language (from the beginning of the 20-th century, especially after the October revolution).

5. 15:20-15:30

MATHEMATICS AND MATHEMATICS EDUCATION IN THE 18TH CENTURY SPANISH JOURNAL “SEMANARIO DE SALAMANCA”

María José Madrid

Universidad Pontificia de Salamanca

Carmen León-Mantero, Alexander Maz-Machado

Universidad de Córdoba

Old mathematics books and textbooks have always been a relevant source for researchers on the history of mathematics and mathematics education. However, there are other types of documents that can also provide useful information, for example, journals published in the past. Considering so, this study presents an analysis about the contents related to mathematics and mathematics education included in a journal published in Spain in the 18th century. In order to do so, we have made a descriptive analysis using the analysis of content technique. The results show that this journal included different problems, solutions for these problems, job advertisements, etc.

6. 15:30-15:45

INTERWEAVING PAST AND PRESENT — HISTORICAL RESEARCH IN THE FIELD OF MATHEMATICS EDUCATION

José Manuel Matos

Universidade Federal de Juiz de Fora, Brasil and Universidade Nova de Lisboa, Portugal

The text discusses the viability of using school mathematics as an object of historical studies and the position of these studies in the field of Mathematical Education. After establishing conditions for this viability, a review of historiographic procedures and their

application to a History of Mathematical Education is conducted and three examples articulating the two fields are presented.

7. 15:45-16:00

GNOMONICS IN MATHEMATICS SECONDARY SCHOOL EDUCATION ON THE TERRITORIES OF POLAND IN THE 17TH-20TH CENTURY

Karolina Karpińska

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The aim of the paper is to discuss the evolution of teaching gnomonics in secondary schools on the Polish territories in the 17th-20th centuries. The construction of sundials was based on geometric constructions, so it was taught during mathematics lessons – as an example of the application of geometry in everyday life. The paper will compare school curricula, gnomonical issues included in textbooks and general ordinances related to teaching mathematics in secondary schools on the Polish territories. The geometrical constructions, basics of astronomy and measuring instruments which were used for the construction and setting the sundials will be discussed. The article might also contribute to the reintroduction of gnomonics to contemporary school education at the secondary level. It will discuss methods which allow the construction of sundials that students can see today, for example, in parks and on church walls.

8. 16:00-16:15

THE BEGINNING OF MODERN MATHEMATICS IN SPANISH PRIMARY EDUCATION. A LOOK THROUGH TEXTBOOKS AND CURRICULUM

Antonio M. Oller-Marcén

Centro Universitario de la Defensa de Zaragoza

In this work, we approach the first moments of the introduction of the New Math movement in Spain (where it was referred to as Modern Mathematics), which took place in 1965. In order to determine which aspects of Modern mathematics were introduced and how, we analyze official curricular documents and the same series of textbooks edited by the same editorial company before and after 1965.

9. 16:15-16:30

APPROACH OF AN EARLY-1940S JAPANESE SECONDARY MATHEMATICS TEXTBOOK TO TEACHING THE FUNDAMENTAL THEOREM OF CALCULUS

Shinnosuke Narita

Tokyo Gakugei University

Naomichi Makinae
University of Tsukuba

Kei Kataoka
Kwansei Gakuin University

This study examined the distinctive features of how calculus was introduced through Japanese secondary mathematics textbooks during the early 1940s. In 1943, a new series of national textbooks containing “Suugaku Dai 1 Rui [Mathematics Class 1]” and “Suugaku Dai 2 Rui [Mathematics Class 2]” was issued for use in junior high schools as part of the educational reform process. Mathematics Class 1 takes a distinctive approach to introducing the fundamental theorem of calculus; that is, it alternately teaches the phenomena of velocity and distance. Students thus completed activities in which they obtained functions representing velocity from distance and functions representing distance from velocity. In this way, they were expected to discover the inverse relationship between differentials and integrals. The textbook is also characterized by a focus on the geometrical relationship between tangent and area, thereby asking students to think about the relationship between primitive functions and derivatives. By developing the topic in this way, the textbook intends for students to discover the fundamental theorem of calculus. It took a very long time to discover this theorem historically.

Session 2

1. 19:30-19:45.

ARITHMETIC TEXTBOOKS IN CROATIA IN THE PREMODERN PERIOD **Maja Cindrić**

University of Zadar, Department of Teacher and Preschool Teacher Education

The first books in Croatia in which the reader is taught the basics of arithmetic were written in the mid 18th century. *Arithmetica Horvatszka* (1758) by Mihajl Šilobold and *Aritmetika* in the famous Illyrian language (1766) by Mate Zoričić were issued in separate parts of Croatia, one in the part of Croatia under Austro-Hungarian rule and the other in the part under Venetian rule. Even though these were not intended for use in school, through them the authors wanted to teach the general population the basics of numbers and calculation more broadly. This work gives a short analysis of the method of calculation at that time as well as the forms of instruction that the authors gave to readers.

2. 19:45–19:55

MISSING ARITHMETIC METHODS: “ON THE RULES FOR THE MIXING OF ANALOGOUS THINGS”

Bernardo Gómez-Alfonso
Universitat de València (UVEG)

María Santágueda-Villanueva
Universitat Jaume I

The rule of alligation has been a traditional object of teaching in its medial and alternate forms. In this work we realize how the alternate alligation in the arithmetic books has been resolved throughout history. For this, we have traced the object of study in a

selection of relevant textbooks from different periods of the history of the teaching of mathematics. We have found that the most common strategy for mixtures with more than two components has been to reduce the problem to the case of two components. When the alligation is total (the total amount of the mixture is known), the rule is completed either with a rule of three, or by equimultiples as a convenience.

3. 19:55-20:10

THE CALCULATION IN THE FIRST COMMERCIALIZED DECROLY'S GAMES

Pilar Olivares-Carrillo

Dolores Carrillo-Gallego

University of Murcia (Spain)

One of the best known aspects of Decroly's educational proposals are the educational games, described in 1914 in a book, written by Decroly and his collaborator Monchamp, which had seven editions (until 1978). Shortly before its publication, the ASEN house in Geneva commercialized some of Decrolian games, selected by Alice Descoedres, from the J.J. Rousseau of Geneva, which prepared an accompanying booklet. This paper discusses the mathematical contents of the games that, in this commercialization, were included in the "calculation" section and their relationship with the global proposal of Decroly is studied.

4. 20:10-20:20

MATHEMATICAL ACTIVITIES FOCUSING ON JAPANESE ELEMENTARY ARITHMETIC AND SECONDARY MATHEMATICS TEXTBOOKS IN THE EARLY 1940s

Yoshihisa Tanaka,

Hirosaki University

Eiji Sato

Meiji University

Nobuaki Tanaka

Mie University

This study aims to clarify the characteristics of specific mathematical activities and their educational value using related teaching materials. It focuses on the relationship between two test books; "Ordinary Elementary School Arithmetic" and "Mathematics Class 2." Consequently, the authors confirmed the historical background of secondary mathematics education in the early 1940s in Japan and, analyzed the editorial policy of textbooks using "A model of mathematical activity." As a result, the features of these teaching materials are that various problem setting are realized by the change of "Conditions and hypotheses." These are of educational value because they provide an opportunity for children to understand that triangle problem-solving techniques are effective for problem-solving using the stepwise composition with other teaching materials that changed the "conditions and hypothesis." It is also of educational value

because these opportunities allow children to experience a process in the “A model of mathematical activity” from “Do similar cases exist?” to “Generalization and Systematization.

5. 20:20-20:30

DEVELOPMENT HISTORY AND COURSE SETTING OF MATHEMATICS DEPARTMENT IN EARLY UNIVERSITIES IN SICHUAN PROVINCE IN MODERN TIMES (1896-1937)

Zhang Hong

School of mathematical sciences, Sichuan Normal University

Late Qing Dynasty and Early the Republic of China was an important period in the modernization of Chinese traditional mathematics, and Sichuan was one of the earliest provinces in China which has to develop modern mathematics. There are many researchers on Peking University, Zhejiang University, Southwest Associated University, and even the Northwest Associated University during this period. But less discussion has mentioned “Sichuan University, even Universities in Sichuan. In the context of which the educational administrative system changed in China , we discuss the development history and course setting of mathematics department, analyses the historical clues of the modernization of Chinese traditional mathematics from 1896 to 1937, choosing Sichuan University as the main subject.

6. 20:30-20:45

A Probe into Compiling Mathematics Textbooks by Christian Missionaries in Late Qing Dynasty

Li Wei Jun

School of Mathematics, Inner Mongolia Normal University

Before the Chinese compiled mathematics textbooks in the late Qing Dynasty, a large number of mathematics textbooks were compiled and translated by Christian missionaries, called the period of church textbooks, which was the foundation period for the exploration of Chinese mathematics textbooks. The textbooks compiled by missionaries show a different knowledge system and method of traditional mathematics from those in China. These textbooks play a major role in disseminating western mathematics knowledge and promoting the transformation of traditional Chinese mathematics. The style, form and content of the textbooks compiled by missionaries are the compilation of mathematics textbooks. The first attempt was made, which provided examples and references for later Chinese people to compile mathematics textbooks themselves. Meanwhile, the translation and unification of mathematical scientific terminology also contributed a lot to the exchange of mathematics education between China and the West. This paper mainly introduced the activities of Dicowen, Franya and Ville Yali's mathematics textbooks and his activities. They compiled influential mathematics textbooks, described their textbook work and evaluated their contributions.

7. 20:45-21:00 Discussion

Session 3

1. 21:30-21:45

BUILDING AN AMERICAN MATHEMATICAL COMMUNITY FROM THE GROUND UP: ARTEMAS MARTIN AND THE MATHEMATICAL VISITOR

Sian E. Zelbo

The Brearley School, New York

Stern College for Women, New York

The Mathematical Visitor, a nineteenth century American mathematics journal, was published regularly from 1878 to 1881 -- at an inflection point for the American mathematical community. This was the same year James Joseph Sylvester started the American Journal of Mathematics at Johns Hopkins University, an event recognized as marking the beginning of research mathematics in the United States. While the Mathematical Visitor is not new to researchers, it is often mentioned merely as a step in the evolution of American journals rather than as a significant journal in its own right. In fact, the Mathematical Visitor was never meant to produce research mathematics. The journal was instead an early effort at outreach by the country's top mathematicians to cultivate mathematical interest and talent in an era when the country's schools were not yet equipped for that task. Widening the scope in this way allows for a deeper understanding of this important time and also situates this research within a body of international historical research about the relationship between mathematicians and pre-college mathematics education.

2. 21:45-22:00

THE DISCARDING OF THE RULE OF THREE IN THE 1960s:

CHANGES IN ELEMENTARY EDUCATION IN FRANCE AND BRAZIL

Elisabete Zardo Búrigo

Universidade Federal do Rio Grande do Sul, Brazil

In the 1960s, the modern mathematics movement brought about changes in school curricula in different parts of the world. Initially focused on secondary education, the movement also reached mathematics education in the early grades of various countries, including France and Brazil. In both countries, until the 1950s, the rule of three occupied a prominent place in the early grades. It was the culmination of arithmetic study and had multiple applications in everyday life. In both countries, the emergence of the modern mathematics movement, combined with the broadening access to secondary education, led to changes in the goals of mathematics education in the early grades. The combined effect of modernizing ideas and changes in school pathways impacted the teaching of the rule of three. By examining programs and textbooks and adopting a comparative perspective, the author argues that the effects of change were

diverse: in France, the study of functions was introduced in elementary school to replace the learning of the “mechanism” of applying the rule of three; in Brazil, this proportionality study was postponed until the later grades.

3. 22:00-22:15

MATHEMATICS EDUCATION FOR YOUNG WOMEN DURING PROGRESSIVE ERA: HISTORICAL OVERVIEW

Yana Shvartsberg

Pace University

The complexity of gender issues connected to mathematics education and to the lack of women in mathematics-related careers has been well documented. However, extensive exploration of publications on the history of female mathematics education shows a scarcity of comparative analysis and research dedicated to the period of 1890 through 1930, also known as Progressive Era, which was when public education started to become accepted as a necessity for all children in the United States and when the system of public schools available to girls started to take shape. This historical overview aims to trace contemporary reforms and developments facilitated by rapid industrialization, relaxed religious constraints, population growth, and diversification of culture in the cities and municipal centers that could have influenced women’s mathematics education.

4. 22:15-22:30

DAVID EUGENE SMITH (1860-1944) AND HIS WORK ON MATHEMATICS EDUCATION

Alexei Volkov

National Tsing-Hua University, Taiwan

Viktor Freiman

Université de Moncton, Canada

D.E. Smith (1860-1944) is well known as the author of numerous publications on the history of mathematics and of mathematics education and as one of the founders of the National Council of Teachers of Mathematics and International Commission of Mathematics Instruction. In our paper we focus on Smiths early didactical works (1890-1900s) and, in particular, on four short papers published in 1895-6 under the common title "The evolution of method in arithmetic" in which he provided an analysis of works of German scholars E.Janicke, M.Stern, and E.S.Unger who, in turn, based their work on didactical innovations introduced by J.H.Pestalozzi, A.W.Grube and F.A.W.Disterweg. This publication of Smith offers insights into his early interest in mathematics education that defined directions of his work in this field at later stages.

5. 22:30-22:45

COLLEGE ENTRANCE EXAMS IN MATHEMATICS IN RUSSIA BEFORE THE SECOND WORLD WAR: DEVELOPMENT, ROLE, OBJECTIVES

Alexander Karp

Teachers College, Columbia University

This paper is a brief resume of a completed study of college entrance examinations in Russia at the beginning of the twentieth century until the revolution of 1917 and from the second half of the 1920s until the beginning of the war. The study relies on archival materials and manuals published during these periods. The analysis of entrance examinations in mathematics enables a better understanding of changes both in the content of education and in the government policies in the sphere of education.

6. 22:45-23:00 **Alexander Karp**: Discussion. Closing remarks.

Note:

Class A:

- Session 1: 14:30-16:30 Beijing time, July 13th
- Session 2: 19:30-21:00 Beijing time, July 14th
- Session 3: 21:30-23:00 Beijing time, July 17th

Class B:

- Session 1: 19:30-21:00 Beijing time, July 13th
- Session 2: 21:30-23:00 Beijing time, July 16th
- Session 3: 14:30-16:30 Beijing time, July 17th