Polish Mathematics Education Periodicals from 1930 to 1950.

Ewa Dabkowska

Submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy under the Executive Committee of the Graduate School of Arts and Sciences

COLUMBIA UNIVERSITY

2019
ABSTRACT

Polish Mathematics Education Periodicals from 1930 to 1950.

Ewa Dabkowska

This dissertation is devoted to the history of Polish mathematics education and specifically to the development of Polish mathematics education periodicals. This research investigates all mathematics education periodicals that were published from 1930 to 1950, which was a turbulent time for Poland due to World War II as well as foreign influences.

The purpose of this study was to research the status and position of Polish mathematics education periodicals and their changes over the years. In an attempt to accomplish this purpose, the study investigated the objectives, content, and most important topics of periodicals, the reasons for the changes in them, and also explored who were the most prominent and influential authors of the periodicals during the period of 1930-1950. The study examined the articles of the periodicals and categorized them based on similar content, such as teaching methods, teaching aids, instructional practices, curriculum, school mathematics, textbook reviews, and foreign influences. The study also provided brief summaries of several of the articles.

Mathematics education periodicals represent one important side of the professional communication in the field which provides insight into the development of mathematics education, which in turn was an important part of the country’s cultural life. This study attempts to be of help for a general study that would portray how Polish
history of mathematics education fits into and relates to the collective history of Europe. In particular, how it fits into the collective history of other European countries that underwent similar dramatic influences from abroad.

The analysis has shown that Poland’s history of education and Polish mathematics periodicals, in particular, was substantially influenced by internal or external politics and ideologies. Analysis of the periodicals provides a unique opportunity to examine the communication between mathematics educators and, therefore, everyday life in the field and to see who were the most influential figures and what socio-political factors may have influenced those figures into making changes in mathematics education. It should be mentioned that since all of the figures studied in the dissertation were educated during a period in Poland when the country was partitioned, they were influenced by different foreign systems of education, which ultimately had an impact on the formation of the Polish mathematics education system.

In general, the study has shown that Polish mathematics education and Polish mathematics education periodicals were all heavily influenced by the social and political changes in Poland, such as new policies, legislation, ideology, as well as foreign influences from countries such as Germany, Austria, and Russia. These factors worked collectively to shape Polish mathematics education into what it was during 1930-1950.
TABLE OF CONTENTS

Chapter I: INTRODUCTION ........................................................................................................... 1
   Need for the Study ....................................................................................................................... 1
   Purpose of the Study ................................................................................................................... 6
   Procedure of the Study .............................................................................................................. 7

Chapter II: BACKGROUND ............................................................................................................. 9
   A General Description of Poland’s History .................................................................................. 9
      Before the 16th Century ............................................................................................................. 9
      Premodern Times ..................................................................................................................... 10
      Modern Period ......................................................................................................................... 11
   A General Description of Polish Education with Emphasis on Mathematics Education 14
      Before the 16th Century ............................................................................................................. 15
      Premodern Times ..................................................................................................................... 16
      Modern Times ......................................................................................................................... 17

Chapter III: LITERATURE REVIEW ............................................................................................ 27
   General Studies in the History of Mathematics Education ......................................................... 27
   General Studies in the History of Polish Mathematics Education ............................................. 34
   General Research about Mathematics Education Periodicals ................................................. 39
   Research on Mathematics Education Periodicals in Poland .................................................... 49

Chapter IV: METHODOLOGY ...................................................................................................... 61
   Historical Research Methodology .............................................................................................. 61
   Journal Analysis Methodology ................................................................................................. 62
   Rationale for the Time Period (1930-1950) ............................................................................. 64

Chapter V: Analysis of Parametr ............................................................................................... 69
   Teaching Methods ...................................................................................................................... 75
   Teaching Aids ............................................................................................................................. 88
   Instructional Practices ............................................................................................................... 90
   Curriculum ................................................................................................................................. 96
   Textbook Reviews ................................................................................................................... 106
   School Mathematics ............................................................................................................... 111
   Contributors of the Journal ................................................................................................. 116
   Conclusions for Parametr ....................................................................................................... 127

Chapter VI: Analysis of Matematyka i Szkoła ............................................................................ 131
   Teaching Methods ................................................................................................................... 135
   Textbook Reviews ................................................................................................................... 140
   School Mathematics ............................................................................................................... 142
   Contributors of the Journal ................................................................................................. 145
   Conclusions for Matematyka i Szkoła .................................................................................. 149

Chapter VII: Analysis of Matematyka ....................................................................................... 151
   Teaching Methods ................................................................................................................... 157
   School Mathematics ............................................................................................................... 166
   Curriculum ............................................................................................................................... 168
   Textbook Reviews ................................................................................................................... 179
   Contributors of the Journal ................................................................................................. 181
   Conclusions for Matematyka ............................................................................................... 190
ACKNOWLEDGEMENT

My sincerest thanks to my sponsor, Dr. Alexander Karp, for your guidance and advice throughout my research. Thank you for reading my paper over throughout its development and offering me your invaluable feedback.

Thank you to Dr Phil Smith, Dr. Erica Walker, Dr. Pawel Polak, and Dr. Garnett Russel for agreeing to participate in my defense. I appreciate the time you spent reading my paper and offering me your advice, comments, and suggestions.

I would like to express my deepest thanks to my husband, Daniel Stelmach, for proof reading my paper and offering me ideas, encouragement, and unwavering love and support.

I would also like to thank my parents Hanna and Leszek Dabkowski for their unending love and support during this process.

Finally, I would like to thank my beloved furry baby Rommi for laying by my side whenever I researched or worked on my paper. Thank you for pulling me outside with you and making sure I took breaks for fresh air. I love you and miss you every single day.
Chapter I
INTRODUCTION
Need for the Study

Interest in the history of mathematical education in the United States emerged at the beginning of the 20th century. The very first American doctoral dissertations in mathematics education which focused on the history were completed at Columbia University (Jackson, 1906; Stamper, 1906). Attentiveness to the history of mathematics education faded in the years after Jackson and Stamper. A new period of interest in the history of mathematics education began to develop again relatively recently, at the start of the 21st century.

and how to develop a research methodology of the field. According to Karp, the history of mathematics education has a twofold nature; it is historical in terms of methodologies, and mathematical-pedagogical in terms of the object of study. Karp and Furinghetti (2016) attempted to outline main trends, methodologies, and achievements in the research about the history of mathematics education. As the results of their survey show, many aspects of the history of mathematics education still remain practically unresearched.

The history of mathematics education is a complex field which can be approached and studied in many different ways. It may explore subjects like the curriculum, textbooks, teaching aids, the administrative decisions related to the development of mathematics education, people involved in the educational process such as administrators or educators, their bibliographies, as well as their opinions or practices (Karp & Furinghetti, 2016). In the last few years, periodicals have been among the topics of interest.

Many researchers around the globe have explored periodicals from different points of view. Furinghetti (2003) reviewed the journal L’Enseignement Mathématique, which was dedicated to mathematics teaching, from the first year of publication in 1899 to 1914, and Furinghetti (2009) from 1915-1984. Furinghetti described the evolution of the journal on the basis of changes that happened in the world of instruction. The author analyzed subjects like: the editors, the authors, the format of the journal, and the types of articles published. Schubring (2003) illustrated how the emergence of the journal L'Enseignement Mathématique facilitated international communication and cooperation between countries with regard to mathematical education. He showed how profoundly diverse mathematics teaching was in European countries prior to the appearance of the
journal. Hanna (2003) analyzed three of the most prominent journals, *Educational Studies in Mathematics*, *Journal for Research in Mathematics Education*, and *For the Learning of Mathematics*, which were devoted to research in mathematics education from around the world between the years 1900 and 2000. She described their beginnings, purpose, as well as the subject of the articles. Preveraud (2013) explored the content of four American mathematical journals published from 1818 to 1878. He studied the transmission to America of French mathematics education through American mathematics journals. Albree and Brown (2009), Crilly (2004), Despeaux (2002, 2007, 2008) and Costa (2000) analyzed British mathematical journals during different time periods and from different angles.


The history of mathematics education is not equally researched across the world. For example, while the history of Italy, France, and Germany is well explored, there exist some gaps in the history of some other countries. One of the countries, which clearly needs more study, is Poland.

Poland is a country with a turbulent and dramatic history riddled by wars and changing borders. Poland is geographically in the center of Europe, and thus has experienced influences from the east, west, and south. Being located between powerful neighbors such as Russia and Germany, without the presence of natural barriers such as mountains or seas, which would help to repel invasions, the country led numerous battles for its survival. Poland was forced to undergo three partitions, one in 1772, again in 1793
and once more in 1795. The third partition of Poland resulted in the total division of Poland among Russia, Prussia, and Austria, which caused Poland to disappear from the map of Europe entirely. When World War I ended in 1918, Poland regained its independence after 123 years of divisive foreign control. World War II began in 1939 with the German and then Soviet invasions of Poland. Nazis burned down villages and carried out the most horrific mass murder in history; the Holocaust. The Soviets, on the other hand, were deporting thousands of Poles to the USSR to work in labor camps with unbearable living conditions, which led to a high rate of prisoner death.

The period of 1930-1950 was arguably the most dramatic period in Poland’s history. During this period, Poland was an established state, then it was occupied by Germany and the Soviet Union. Then, it was liberated from the Germans during WWII by the Soviet Union, and in the final years of the war the Soviet Union reoccupied Poland again.

Being caught in the middle of not just one, but two great wars, had a significant impact on Poland as a country, the education of its people, and specifically mathematics education. The recent worldwide trend to study the history and development of mathematics education is also present in Poland. Many researchers have made important contributions to the history of mathematics education in Poland and in periodicals specifically. The period of 1930-1950, however, is not sufficiently explored with respect to mathematics education.

Among the literature regarding the history of Polish mathematics education there exists the work of Pardala (2010) who presented a historical overview of Polish tradition in mathematics education as well as the Russian influence on the development of
mathematics education. There is also the work of Dubiel (1992) who described the developments of mathematics teaching from 1918 to 1939.

Duda (2011) presented a historical overview of mathematical journals between 1795-2010 that had a greater importance to Polish mathematics. Dubiel (1989a) portrayed the role of mathematical and pedagogical journals between 1918 and 1939 on teachers’ development. He described the content of periodicals and concluded that they often contained information about teaching reforms, and how the journals helped to improve teachers’ skills and performance as professional educators. Dubiel (1989b) described some of the mathematics and mathematics education journals from 1911 to 1939 with respect to who their editors were, what scholarly material the journals contained, as well as the purpose of the journals. Dubiel (1990) writes about several journals on the subject of mathematics education from 1911 to 1939 in terms of their content and also analyzes some of the articles on mathematics teaching. He describes the changes that took place in mathematics education and what impact and influence it had on Polish mathematical thought and didactics. Cegiełka and Przyjemski (1999) reviewed the journal Matematyka from 1979-1991 with respect to who the editors were, what the table of contents contained and who were the most common authors of the articles. Pogoda (1999) discussed some of the articles about the history of mathematics from one of the sections of the journal Matematyka called Mathematics of the Past and Today during the first 50 years of the emergence of the journal. Wuczyńska (1999) showed how the topics on teaching of mathematics have changed over the course of 50 years of the journal Matematyka by closely examining some of the articles. Wojciechowska (1999) also studied the journal Matematyka by identifying the changes that took place over the same
50 years in terms of the most popular topics about mathematics that were contained in the journal, but she did so in a very general manner.

Even though there has been a growing interest and numerous contributions to the history of mathematics education journals, they still need to be explored more deeply and broadly. Analyzing the differences and similarities between periodicals that emerged in different time frames will help us better understand how social and political changes have influenced mathematics education periodicals in Poland. Studying the period of 1930-1950 will show the evolution of mathematics education journals during this turbulent time period, and finally fill the gap of historical knowledge on the subject.

**Purpose of the Study**

The purpose of this study was to research Polish mathematics education periodicals and their changes over the years. In an attempt to accomplish this purpose, the study addressed the following research questions:

1. What were the objectives, content, and most important topics of periodicals between 1930-1950?
2. What were the changes in mathematics education periodicals across the period 1930-1950 and what were the reasons for these changes?
3. Who were the most prominent and influential authors of the periodicals during 1930-1950?
Procedure of the Study

In order to develop a comprehensive picture of mathematics education periodicals in Polish mathematics education between 1930 and 1950, a historical analysis based on the analysis of all periodicals in mathematics education in Poland that emerged in that time period was conducted.

The periodicals that were analyzed are all the volumes of *Parametr* (first periodical in Poland that was dedicated specifically to mathematics education), which was published from 1930 to 1932 and again in 1939, *Matematyka i Szkoła* which was published between 1937-1939, and the first two years (1948-1950) of the periodical *Matematyka*. These were the only journals dedicated to mathematics education in the period of 1930-1950.

To address the first question, the journals were analyzed using a special system of coding. The content was divided into categories and then articles were placed into the category they belong to. The articles from each periodical were classified into categories such as:

- Teaching Methods
- Instructional Practices
- School Mathematics
- Curriculum
- Textbook Review
- Bibliography
- Other

After being placed into a category, the content was further sub-categorized by the subject of the article, for example algebra, geometry, or trigonometry, as well as if the author is referring to Polish mathematics, Polish teaching reforms, or referring to foreign
ideas. This qualitative study reviewed and analyzed the objectives, content, and most important topics of each periodical.

The three periodicals on mathematics education that were examined emerged in different time frames. The periodical *Parametr*, was published between 1930-1932, when Poland was preparing for the education reform brought on by the Minister of Education Jędrzejewicz, which became known as Jędrzejewicz’s reform. *Parametr* did not come back until 1939, albeit for a very brief period until the German invasion. The periodical *Matematyka i Szkoła* was published between 1937-1939, when the Jędrzejewicz reform was being implemented into the school system. The periodical *Matematyka*, was first published in 1948 and is still being published today. The first two years of the journal were examined so its progress can be compared with the other two periodicals that have only lasted for about two years. The Jędrzejewicz education reforms were cancelled in 1948 by the Polish government. Between 1948-1950, Poland was in recovery mode after the losses and destruction incurred during WWII, the education system included. This period became a time of change in school organization and curriculum. This information, combined with information from question one, should answer how topics of the discussion have changed over time.

To address the third question, a list of the most prominent authors of the periodicals was constructed and their influence on mathematics education was classified into one or more of the categories mentioned above. Finally, an attempt was made to identify their biographies by consulting a system of references and bibliographical dictionaries.
Chapter II

BACKGROUND

A General Description of Poland’s History

The aim of this chapter is to provide the reader with a brief history of Poland, which is important in understanding the historical and political context in which Polish mathematics education in general and periodicals in particular occurred and developed.

Poland is a country with a long and rich history. As Davies Norman (1990) wrote: “I see Poland as an immensely complex phenomenon - both land, and state, and nation, and culture; a community in constant flux, forever transmuting its composition, its view of itself, and its raison d’etre: in short, a puzzle with no clear solution.”

Geographically, Poland is located in the center of Europe. Being located between powerful neighbors such as Russia and Germany, without the possibility to protect the nation utilizing a natural barrier, which would help to repel invasions, Poland led numerous battles for its survival. Its location could be invoked to explain three successive partitions in the late 18th century by its neighbors: Russia, Prussia and Austria, the failed Risings of the 19th century, or the catastrophe of the Second Republic in the 20th century.

Before the 16th Century

The first step in forming what is today known as the nation of Poland, was a settlement in the 6th and 7th centuries, between the Oder and Vistula rivers, one of the Slavic nations, Polan. The baptism of Mieszko I, the first ruler of Poland, in 966 marked the beginning of the history of the Polish state and the inclusion of the state to the Christian European community. Christianity strengthened the country not only internally
but also internationally (Kamiński & Korkuć, 2016). It opened the doors to Latin Christian culture and the establishment of the Polish Church, which played an important political, cultural and social role (Bideleux & Jeffries, 1998).

The period of 966-1370 was a period of growth and economic development, but it was also a time of many crises of internal and external attacks. The time can be divided into three separate periods. The first period, up to 1138, includes the beginnings of the monarchy when the rulers inherited the throne through heritages. The second period, 1138-1320, was a period of political fragmentation in which several branches of the dynasty fought with each other for supremacy and control of a divided country. This coincided with similar division in other Western European countries (Bideleux & Jeffries, 1998). The last period, from 1320-1370, was a period of unification and development of the Polish state (Davies, 1990; Bideleux & Jeffries, 1998).

The next major period began in 1385 with the marriage of Lithuania’s Grand Duke to the Polish Queen, which linked the two countries in a personal union in which each country preserved their national identity. The direct incentive for this union was to defeat their common enemy, the Teutonic Knights (Kamiński & Korkuć, 2016).

**Premodern Times**

The 16th century in Poland is often referred to as the “golden age”. In 1569, Poland and Lithuania engaged in the ultimate union, and they became one country called the Polish-Lithuanian Commonwealth (Rzeczpospolita Obojga Narodow). It became one of largest and most prominent countries in Europe at the time (Kamiński & Korkuć, 2016). United, the Commonwealth won the war against the Teutonic Knights (Zakon Krzyzacki). During this golden age, Poland’s culture, art, architecture and literature
flourished, and was strongly influenced by Renaissance Italy. What distinguished Poland from other European countries in the 16th century was the nobles’ democracy system, which was a unique political system whereby nobles were extended political privileges.

For Poland, the 17th century wasn’t as great as the 16th century. Wars with Russia, Turkey, the Cossack Uprising, and the Swedish invasion are just some of the problems Poland had to deal with. Neighboring states like Russia, Austria, and Prussia were rapidly growing in power and were constantly preventing restoration of the Polish nation (Kamiński & Korkuć, 2016).

Poland went through three partitions in 1772, 1793 and again in 1795. In the first partition, Russia, Austria and Prussia divided among themselves over 200 thousand square km occupied by 4.5 million people. During the second partition, Russia and Prussia occupied over 300 thousand square kilometers of Polish territories. The third partition of the country resulted in the total division of Poland among Russia, Prussia, and Austria. Poland had disappeared from the map of Europe entirely after the third partitioning (Kamiński & Korkuć, 2016). In Russian occupied territories there was a Russification of Polish society and in Prussian occupied territories there was Germanisation and fighting against Catholicism.

**Modern Period**

Although being under powerful foreign control, the Polish people held onto and practiced their culture, often in secret, and they never let go of their desire for independence. Over the years, the Polish people engaged in several battles in an effort to vindicate themselves from foreign rule. One of the revolts by Polish troops was the November Uprising in 1830, which was quelled by the Russians in 1831. The most
persistent Polish uprising occurred in January of 1863 against Russia, which lasted for about 15 months but ultimately failed and resulted in the execution of thousands of people, mass deportations and imprisonments.

The start of World War I in 1914, divided the occupying powers into two opposing camps. When the world of Empires collapsed, Poland proved sufficiently mature to seize its destiny. After 123 years of enslavement, Poland regained its independence in 1918.

After regaining independence, the biggest challenge for Poland was to synchronize three different territories, which were incorporated in the administration of the three partitioning powers for over a hundred years. Despite the difficulties and losses of WWI, the country made rapid progress in reconstruction and regaining sovereignty. Poland was rebuilt with a territory equal to 388 thousand square km, and its population grew from 27 million in 1921 to 35 million in 1939 (Kamiński & Korkuć, 2016).

Poland’s geographical location between the Soviet Union and Germany caused Poland to be regarded as an obstacle in implementing the far-reaching geopolitical plans of those two countries. The German-Soviet Nonaggression Pact signed in 1939, was a death warrant for Poland. It included a secret protocol, which defined a territorial partition of Poland between the two countries.

In 1939, World War II began with the German and then Soviet invasions of Poland. Poland fought the two countries on two fronts, east and west. On the western front, Germans were burning down villages and carried out mass murders of the civil population. The repressions were directed especially against Jews and Polish political, religious, cultural and intellectual elites. At the same time on the eastern front, the
Soviets were deporting thousands of Polish citizens to labor camps in the depths of the USSR, mainly to Siberia. Also, numerous arrests and deportations of intelligentsia, civil servants, public officials and their families were very common. They were forced into slave labor and horrendous living conditions, which led to a high rate of death (Kamiński & Korkuć, 2016).

Despite these tragedies, the Poles’ hope for a final victory against its aggressors was still alive. The country’s authorities and the army were re-constructed in exile. Under the authority of the Republic of Poland, the Polish Underground State was formed and operated on a large scale, which was later called the Home Army (Armia Krajowa).

In 1941, the Germans invaded the Soviet Union and pushed them out of Polish territory. The Soviet Union cancelled the German-Soviet Nonaggression Pact signed in 1939 and, among others, signed a treaty and military agreement with Poland. In 1942, Nazi Germany formed a network of German concentration camps in Polish occupied territories to exterminate Jews. The Nazi German extermination camp, Auschwitz-Birkenau, became the main symbol of genocide that Jews endured under the German Nazis. In the final years of the war, Poland again fell victim to Soviet aggression.

The period of 1930-1950 was arguably the most dramatic and devastating period in Polish history. During this period, Poland was an established state, then it was occupied by Nazi Germany and the Soviet Union during WWII. Later, it was liberated from the Germans by the Soviet Union, but in the final years of the war the Soviet Union reoccupied Poland again. As a result of WWII, Poland suffered enormous losses. Over 15 percent of Poland’s population or about 6 million people died (Curtis & Library of Congress Federal Research Division, 1994). Aside from the human toll, Poland’s territory
decreased by about 20 percent and the overall national wealth decreased by 38 percent (Kamiński & Korkuć, 2016). In post-war Poland, the Soviet communist party controlled the economy, administration, education, religion, media, and all other levels of social life.

The election of Cardinal Karol Wojtyla (John Paul II) as Pope in 1978 brought much pride and enthusiasm to the Poles. The formation of Solidarność (Solidarity), an independent self-governing labor union, under the leadership of Lech Wałęsa, brought back democracy to Poland. In 1981, martial law was imposed on the country by communists and the protests were broken up. The Solidarity movement was not destroyed however. In 1990, during the first free election, Lech Wałęsa was elected president of Poland. This ended a history of Polish government in exile and Poland became a free country.

The 1990’s became a time of political and economic reforms. Poland came back to the arena of western community in 1990 by joining NATO, and then in 2004 it became a member of the European Union.

The author Davies Norman has an eloquent way of describing Poland’s history, he writes: [Translated from Polish] “It seems that the country is inextricably linked to the endless series of disasters and crises, which - paradoxically - are the source of its lush life. Poland is constantly on the brink of collapse. But somehow it always manages to remain on its feet.”

A General Description of Polish Education with Emphasis on Mathematics Education

The history of education in Poland and mathematics education in particular, experienced many ups and downs, which were mainly driven by uncertain political situations of the country. The development of Polish mathematics education is linked to
the development of mathematics education in the world and more specifically Poland’s close neighbors. The process of the rebirth of Polish education was significantly ahead of the reconstruction of the country. This section will give a general overview of Polish education and mathematics education in Poland from its beginnings until the present.

**Before the 16th Century**

The Polish history of mathematics goes as far back as the time when Poland first adopted Christianity in 996. The earliest schools were founded in cathedral churches, whose central focus was to educate priests and monks. The schools in Poland followed analogous patterns of education as the medieval churches of other European countries in that time period (Krutak, 2013).

The rise of city culture, mainly due to the revival of trade, technological and economic progress, stimulated the need for society to articulate a secular aspect of education, and mathematics education in particular. This led to the emergence of universities throughout Europe, which in turn weakened the church’s control of the education system (Pardala, 2010, Hoyrup 2014). In Poland, the demand for learning among secular people led to the development of a university in 1364 in Krakow, which became known as Jagiellonian University. Over the years, the university gained prestigious importance to the world, as its mathematics department flourished and attracted students from many nearby countries (Waltoś, n.d.). Medieval mathematics education in Poland generally followed the pattern of other European Countries (Hoyrup, 2014).
Premodern Times

Up to the 17th century, Poland had no outstanding mathematical achievements, as teaching of mathematics in Polish schools was only at the basic level and practical in nature (Pardała, 2010). The premodern period was a period of strong economic, industrial, and social developments as well as reforms in education. The Protestant Reform, initiated by Martin Luther in 1517, was the movement that gave rise to Protestant churches and the decline of the power of the Roman Catholic Church. These changes influenced European education and viewed education as an instrument that could establish greater integrity and control across the country (Schubring, 2014). In Poland, the non-Catholic schools that emerged were introducing new trends in teaching with an emphasis on secular life and the future public responsibilities of the students. The Catholic order, called Jesuits, fought against the Protestant Reformation by offering free education (IQAS, 2012).

In the 18th century in Poland, the first pioneer of complex reform in mathematics teaching was priest Stanislaw Konarski, who founded the Collegium Nobilium in 1740. His ideas were grounded on the Austrian and Prussian education system, as well as foreign works and handbooks of mathematics (Pardała, 2010). Among other things, the school offered a new curriculum and stressed the teaching of the Polish language. Another initiative of this era was the development of the Cadet’s Knight School for nobility in 1765, for which mathematics was a central part of the curriculum (Schubring, 2014).

The year 1773 was important for Polish education, as the Komisja Edukacji Narodowej (National Committee of Education), or KEN was established, which is
considered to be the first Ministry of Education in the world. The committee established a uniform education system in elementary through to university level schools nationwide. The Polish language became the language of instruction and mathematics was given substantial importance (Pardala, 2010). The National Committee of Education proposed many valuable reforms whose implementation was interrupted by the partitioning of the country between Russia, Prussia and Austria in 1773-1795 which sought to destroy the Polish education system by Germanizing and Russifying it. In 1795, Poland as a country ceased to exist and only regained its independence in 1918, which delayed the growth of national education, and mathematics education in particular.

**Modern Times**

During the period of national partition between Russia, Prussia, and Austria, churches and social institutions were closed, and teaching and publishing works in the Polish language was mostly forbidden. Education in Polish beyond primary level was forbidden. The education for Poles in the partitioned territories greatly differed depending on the educational policies of the controlling government. Of the three partitioning Empires, Polish education suffered the most oppression under Russian rule. In 1863, Polish autonomy in education was lost, and thus a lot of elementary schools that had emerged in the beginning of the century were closed and secondary schools were subject to intense ideological control. Russification through education was the primary goal, Polish history was removed and instead the Russian version of events was taught. Many underground schools started to emerge. From 1866, there existed full Russification of Polish schools, with lectures in Russian with Russian mathematics textbooks and curriculum. From 1873-1890 schools were modeled according to the principles proposed
by the Russian Minister of National Education Dmitry Tolstoy. The education system, just as in Russia itself, was characterized as an “overloaded curriculum and the excessive and petty micromanagement of all aspects of life” (Pardała, 2010). Russification hampered the development of Polish pedagogical thought and the national influence on the character and education system.

At first, Prussian authorities were more tolerant of Polish culture than the Russians were, and thus Poles didn’t resist the assimilation as fervently as they had resisted the Russians. Polish elementary schools continued to function and several secret educational meetings were taking place which were attended by teachers and mathematicians. Among other things, this led to the development of Polish school textbooks (Sadowska, 1999). However, in 1872, Prussia banned the Polish language entirely, even as a foreign language, and Germanisation via the education system became the main goal ever since. By 1886, the Prussian Colonization Commission intended to displace Polish traditions and communities by enabling Germans to settle in areas that were heavily populated by Poles. In time, this would allow the German government to exact more control over the Polish territories, including their education (Parker, 2003).

Under the Austrian partition, Polish culture, language and education suffered the least oppression. Austria permitted the use of native languages in most regions under its control, including Poland. Polish schools already in existence in most cases were permitted to continue functioning with a few changes to the curricula in order to make the schools operate more like the schools in Austria. Poland was allowed to control about 3000 primary schools and 70 secondary schools while under the Austrian partition, which far exceeded what was permitted by the Russian and German empires. In general,
Austrian influence over Poland was relatively docile as compared to the influence and control that was forced upon Poland in areas under Russian and German control (Parker, 2003).

At the beginning of the 20th century, there did not exist any strong mathematics tradition in Poland because of its existing political situation. In spite of the turmoil, the Polish educational system made considerable progress. Since the Russian revolution of 1905, there had been much development in Polish education. It was permitted to speak and teach using the Polish language in governmental schools, and Polish cultural and educational organizations were allowed to operate (Sadowska, 1999). The inspiration that the Meran Program, led by Felix Klein, brought to Europe was also felt in Poland. There was a rebirth of activities of Polish educators and mathematicians to innovate teaching methods of mathematics (Pardała, 2010; Molęda & Piesyk, 1993). The Mathematics-Physics Circle was formed in 1905 and fought for the rights of Polish schools. Its main aim was to improve the teaching of mathematics and to improve teachers’ mathematical-didactical culture.

During the period of occupation in Poland, several periodicals emerged. Before the emergence of specialist journals, several general education journals were published. Journal *Przegląd Pedagogiczny*, published from 1882 to 1905, was devoted to issues of school and home education. Journal *Muzeum*, published from 1885-1939, was devoted to general issues of education, upbringing, and school organization. Dubiel (1990) notes that these journals played an important role in disseminating processes of reforming schools and programs in Poland and other countries.

Later, several journals devoted to specific subjects emerged. In 1911, the
periodical *Wektor* was created which specialized in mathematics and physics subjects. Its main goal was to keep teachers informed about current achievements in the two fields as well as enriching knowledge. The second periodical dedicated to teaching was *Nauczanie Matematyki i Fizyki* which was formed in 1917. Its main goal was to raise the teaching levels in Polish schools. Both of these periodicals have played an important role in the development of mathematics education in Poland. They contributed to the evolution of school organization and curriculum during the country’s independence (Dubiel, 1990; Piotrowski, 1979).

After Poland regained its independence in 1918, one of the main tasks of the education authorities was to construct a uniform national education system out of the separate systems imposed during the partition. The first attempt to improve the education system was with the establishment of the Ministerstwo Wyznań Religijnych i Oświecenia Publicznego (The Ministry of Religious Denominations and Public Education) or WRiOP in 1918, to help organize the Polish education system. WRiOP wanted to create a system which would not be a copy of the Russian, Prussian, or the Austrian systems. Instead, it would be a new system adapted to the social and political reality of Poland, intellectual possibilities of Polish youth, and designed in accordance with the progress of the pedagogical knowledge of teachers. In reality, it was not possible for Poland to completely disregard the traditions of the occupying powers, or to completely free itself from other international influences, as such changes would take time and could not be achieved quickly (Dubiel, 1986).

In April of 1919, the *I Ogólnopolski Wielki Zjazd Nauczycielski*, also known as the *Sejm Nauczycielski* (Teachers’ Parliament) was organized. This parliament played an
important role in the development of mathematics education. The goal of the meetings was to bring together teachers from all over Poland to discuss and work out the WRiOP’s plan to reconstruct the heavily fragmented school system in the country under one unified system. The recommendations coming out of the Teachers’ Parliament were not completely approved of by the WRiOP, which had the final say over any school reforms. Yet, the meetings had meaningful importance because it demonstrated that teachers supported the democratic model of education for all students, regardless of their class (Parker, 2003; Wuczyńska, 2012).

Later in 1919, in an attempt to improve mathematics education, WRiOP created a working document called Naukowy Program Szkoły Średniej (The Educational Programme for Secondary Schools). For several years it formed and dictated the basis of school structure, organization, curriculum, and teaching of mathematics. The mathematics curricula published were influenced by French and Italian programs, but the ideas of the Meran Program however were not included in the Polish curriculum. Discussions and changes of the content and organization of the material presented in the program were continually taking place during the implementation period of 1919-1922 (Dubiel, 1986). As Dubiel (1986) notes, the alterations to the program were mainly influenced by comments and recommendations coming from teachers based on their teaching experiences, or due to the country’s changing economy and importance of mathematics in everyday life.

The education reform of the Minister of Education Jędrzejewicz, or Jędrzejewicz’s reform, implemented in 1933, marked the beginning of the unification of the Polish education system at all levels. It introduced a seven-year compulsory primary
school and established a five-year uniform school system at the secondary level. As Dubiel (1986) noted, the curriculum was still classic, but it was “soaked” with new ideas. An attempt was made to make mathematics teaching more alive, practical, and better connected to reality. The search for new ways to organize teaching materials and new teaching methods was common and led several authors of school textbooks to incorporate the new ideas of the Jędrzejewicz reform into new editions of their textbooks (Dubiel, 1986).

At the time of Hitler’s occupation of Poland in 1939-1945, the Polish school system experienced the most extreme difficulties. Secondary schools and university institutions were forced to close. Several thousand primary schools and hundreds of secondary and vocational schools were destroyed, damaged, or were converted to be used as offices or staging grounds for the Nazi military. During this time, about 9000 teachers and 640 professors were killed. Some primary schools remained open but the education level was very low and children were only allowed to attend for two hours per day. The primary school curricula were deprived of all national content during this period. (Ehrenfeucht, 1978)

In response to the Nazi and Soviet assaults on Polish education and culture, Polish society was forced to organize secret underground educational meetings, as doing so in public meant imprisonment or death. In 1939, Tajna Organizacja Nauczycielska (The Secret Teaching Organization) developed across the country at the elementary, secondary, and university levels. These secret communities were educating about one million children during World War II. As a consequence, Polish culture was kept alive
and children remained literate (Wullf, 1992). Nonetheless, Poland lost about 50% of its mathematicians due to death or emigration during the war (Zelazko, n.d.).

After the war ended in 1945, the Polish education system suffered from a lack of teachers, functional school buildings, supplies, and experts in new and existing fields. There was an enormous need for qualified people in industry and agriculture to be educated in a relatively short time to recover the losses in every aspect of life. The educational system from the early 1930’s was in effect until the new program in mathematics teaching was introduced in 1948-1949 and published in 1949: *The Teaching Programme for 11-Year Secondary Schools* (Pardala, 2010). The education time was shortened from twelve to eleven years; seven years of primary school followed by four years of secondary school. These changes, as well as a lack of adequate student preparation, and a lack of teaching staff, necessitated a change in the teaching curriculum and teaching methods. In particular, poor student performance in mathematics caused the program standards to be lowered. The most difficult problems were either removed or were moved to higher grades (Ehrenfeucht, 1978).

During the era of Soviet control, the Polish education system was strongly ideologized and politicized against Polish tradition. In 1948, Polska Zjednoczona Partia Robotnicza (Polish United Workers Party), the country’s communist party, modeled after the Communist Party of the Soviet Union, gained full control over every aspect of life and education. The school curricula were changed to include the Marxist-Leninist ideology in an effort to instill students with a firm belief in the superiority of the socialist system and to demonstrate that the Soviet Union is Poland’s main partner and ally. The Russian language became a compulsory language. Private schools were closed and
teaching of any religion was banned. Also, the focus of education was to serve a growing industry, and thus the vocational school system was expanded. The educational system was strongly centralized and instituted pro-Soviet curricula and textbooks across the country. In particular, Soviet literature on mathematics education was broadly disseminated in Poland (Pardala, 2010).

In the late 1950’s, discussions about changes to the current system became of interest among teachers, administrators, and mathematicians. The initiators and the leaders of the discussions were Z. Krygowska and S. Straszewicz (Ehrenfeucht, 1978). In 1960, Krygowska organized the meeting of the International Commission for the Study and Improvement of Mathematics Teaching (CIEAEM) in Krakow to discuss the reforms of mathematics teaching. The first change to the primary curriculum was introduced in 1963. Changes in primary school corrected the weaknesses of the previous curriculum. At the secondary level, the main goal was to introduce new topics and to teach old topics such as functions, equations, inequalities, elements of calculus and geometry in a modern way (Ehrenfeucht, 1978). In the last grade of secondary school, students would choose the subject of most interest to them that they would possibly want to continue to study at the university level. The mathematics content was much wider and more intense for mathematically talented students (Ehrenfeucht, 1978).

This new system turned out to be too difficult for students and teachers. The curriculum was too broad and as a consequence it led to passive teaching and learning. Economic crises played a major role in the system’s failure as well. Inadequate teachers’ pay, lack of resources and supplies, and no incentives for new graduates had negatively affected the educational system. During the 20th century, more initiatives in mathematics
teaching had taken place but none seemed to have a significant impact in improving the situation (Molęda & Piesyk, 1993).

The journal *Didactica Mathematicae* (formerly *Dydaktyka Matematyki*) founded in 1980 by Z. Krygowska, played an important role at the international level in the dissemination of ideas in teaching and learning of mathematics. Among others, the journal published achievements of the circles of mathematics didactics in Poland and the Krakow School of Mathematics Didactics (Pardała, 2010).

The end of Soviet control in 1989 brought about new changes to education in Poland. The system of education is now governed by Ustawa o Systemie Oświaty (The Act on the System of Education) of 1991, which was last amended in 2011. In 1997, compulsory education was extended from 17 to 18 years of age and access to education was granted to all citizens. In 1999, Poland and with other European countries signed the *Bolonga Declaration*. The main idea of this agreement was to create a system with comparable and high-quality education standards and transferability of academic degrees between the countries. When Poland became a member of the European Union in 2004, it brought on more changes to education. The new core curriculum based on the Regulations by the Minister of National Education on the Core Curricula for Pre-school and General Education was implemented in 2009. This new system is expected to provide a smooth shift from primary to secondary education (Smoczyńska, Górowska-Fells, Maluchnik, 2012).

The period of 1930-1950 was important to the history of Polish mathematics education because of the numerous changes that occurred, changes that were both forced by other countries as well as changes that Poland implemented on its own when it had the
freedom to do so. In the early 1930’s, Poland adopted the Jędrzejewicz education reform, which was carried out until 1948, but because of World War II it was forced to operate underground. Then, in 1949 *The Teaching Programme for 11-Year Secondary Schools* was adopted to simplify the education, education length, and the education became the subject of Soviet supremacy, infused with the ideologies of Marxism-Leninism. Poland experienced several socio-economic difficulties and hardships during the great wars, which hampered the development of not only mathematics education but education in general.
Chapter III
LITERATURE REVIEW

This literature review focuses on four relevant areas, the general studies in the history of mathematics education, the general studies in the history of Polish mathematics education, the general research on mathematics education journals, and the research on mathematics education journals in Poland. The selected sources contribute to this study either because of their content or because of their methodology. Among the sources that were reviewed for the general studies in the history of mathematics education and the history of Polish mathematics education are summaries and handbooks. For the pieces on research in mathematics education journals, the sources selected represented the most important discussions, and for research on mathematics education periodicals in Poland, all available sources were reviewed.

General Studies in the History of Mathematics Education

This section provides a framework for understanding the methodologies appropriate for studying the history of mathematics education. This section begins with Schubring’s paper (2006), then continues on with Karp and Furinghetti’s (2016), and it ends with the “Handbook on the History of Mathematics Education” where in Part I, Schubring and Karp focus on the history of mathematics education as a discipline of science, examining its scholarly writing and methodology.

In “Reseaching into the History of Teaching and Learning Mathematics: The State of the Art,” Schubring (2006) discusses the history of teaching and learning of mathematics as an interdisciplinary field that intersects with the history of mathematics, history of education, social history, and sociology. Schubring states that the lack of
communication between historians of mathematics education leads to a lack of established shared standards of research, weak methodology and ungeneralizable approaches. He also observed that a lot of current studies refer to only a certain culture, state, or nation. He claims that to improve these limitations, there is a need for comparative studies on the history of mathematics education at the international level that will consider cultural, social, and political aspects. Schubring synthesizes present research in the history of mathematics education into three dimensions. The first one is concerned with modernization of curricula and teaching, transmission of knowledge between regions or cultures and reform movements. The second dimension is concerned with teaching practice, textbooks, and teachers’ preparation. The last dimension concerns cultural, social, and political functions of mathematics instruction. When it comes to historical textbook analysis, Schubring explains that analysis of just one textbook or internal analysis of several textbooks is not sufficient. He argues that the social and cultural context should be incorporated into the analysis to gain a fuller understanding of the changes that occurred. Schubring remarks on textbook analysis will be helpful for our study in terms of methodology.

Karp and Furinghetti’s goal in “History of Mathematics Teaching and Learning Achievements, Problems, Prospects” was to describe the current focus of study in the history of mathematics education, and more significantly, to evaluate which subjects require further investigation, with an emphasis on “pre-college” mathematics education. Taking an expansive approach, they examine the field from the perspective of educators, administrators, and planners. They also inspected the methods of mathematics education and the choices involved in the process (Karp and Furinghetti, 2016).
In terms of the methodology of research, Karp and Furinghetti believe primary sources for the history of mathematics education can be very broad, ranging from mathematics textbooks, administrative memos on curriculum to emails between high schoolers about mathematics. The authors’ main idea was to communicate that the methodology of the subject is historical, while the language of the text studied is often mathematical.

Karp and Furinghetti, similarly to Schubring (2006), refer to resources about politics and economics, as these topics affect the history of mathematics education. They feel that regardless of the subject, the textbook must be contextualized within its time period and place, and validated by other sources.

Karp and Furinghetti also explore one of today’s essential concerns; who learns mathematics. They argue that the model that the past was elitist, while the present allows for universal access is too simplistic, and they claim that Schubring’s work on the current idea of “mathematics for all” should be continued. Karp and Furinghetti believe that a deeper analysis of the factors influencing the past and present is necessary.

Like Schubring (2006), Karp and Furinghetti contend that society, economics, politics, technology, religion, and beliefs, all contribute to the evolution of mathematics education as much as the predominant ideology, but that a comparative international and chronological study needs to be done. They even discuss the challenges of examining the history of mathematics education in developing countries, especially before colonialism where few sources exist and so they suggest an ethnographical approach.

Karp and Furinghetti consider the current conflict between mathematicians and mathematics educators, and their respective influence on mathematics education on an
individual and institutional level. They encourage further study of mathematicians who
become educators and propose questioning the background of these individuals, as their
status implies the status of mathematics at that particular time and place.

In addition, Karp and Furinghetti investigate the methods of mathematics
education. They illustrate that changes in subject content, political, social and economic
circumstances, and technological developments, can all influence the changes that happen
in teaching practices. These factors can affect how lessons are structured, how teachers
and students interact with each other and how tests are implemented. They also stress that
the changes in practice are not always influenced by a change in subject. Moreover, Karp
and Furinghetti point out that informal mathematics education, education outside of the
class, is a much neglected topic of research even though it is and has been widespread.
They ask how this informal system compares to and engages with the formal system.

Karp and Furinghetti recommend other areas that also require investigation
including local, national, and international organizations, and the connection between
them. They believe that periodical publications, seminars, and conferences,
comparatively, are under-researched as is teacher training, a recent construct. In each
recommended area for further investigation, Karp and Furinghetti suggest ways in which
these studies can be done. For example, to analyze changes in the teacher requirements
they suggest to compare and contrast teacher training programs or to analyze licensing
examinations from the past and present, in different countries and discussions that took
place about them.

“Handbook on the History of Mathematics Education” provides a cultural and
historical overview of the history of teaching and learning mathematics, serving not only
as a basis for current research, but also as a starting point for further studies. In Part I, Schubring and Karp focus on the history of mathematics education as a discipline of science, examining its scholarly writing and methodology.

In Chapter I, Schubring begins with a brief overview of the history of research on mathematics teaching and learning, citing studies dating back to the mid-19th century that addressed teaching methods, content, and teachers. He then refers to the late 20th century which saw more in-depth studies that focused on the history of mathematics education on a local and international level. Next, he mentions a trend towards analyzing the nature of teaching. Finally, he moves into the present where the focus is on the national histories of mathematics learning and teaching, with a rise in studies of elementary schools, in addition to the traditional emphasis on secondary schools.

Schubring continues by identifying a few significant turning points in the early 21st century when advances in the field of history of mathematics education shifted from the individual to the institutional. The first was in 2004 at the 10th International Congress of Mathematics Education for which the first international bibliography was developed and put online. The second one emerged a few years later, when the first journal for the history of mathematics education was established, the *International Journal for the History of Mathematics Education*. Schubring then highlights the development of local, national, and international history of mathematics education organizations. In the article “Researching into the History of Teaching and Learning Mathematics: The State of the Art”, Schubring confirms that the research on the history of mathematics education relates with research on the field of history, as well as with research on the history of education, sociology, and the history of mathematics.
In Chapter 2, Karp addresses two primary questions: what does the history of mathematics education examine and how. To answer these questions, Karp utilizes as a guideline Schoenfeld’s three questions about a study: is the author trustworthy; what is the context of the research; and is the research important. Karp points out that while there are only a few studies in the methodology of the history of mathematics education, they are influenced by methods used in both history and mathematics education. As in “History of Mathematics Teaching and Learning Achievements, Problems, Prospects” and in agreement with Schubring, Karp acknowledges the important relationship between the history of mathematics and the society of a particular time and place, in particular the economics, politics, religion, and philosophy, but he suggests that drawing specific connections is a challenge. Karp also states that many historians neglect the variety of factors in the past that contribute to the present circumstances and agrees with Schubring that in the studies about the history of mathematics education there is an absence of clear questions that one must try to answer.

Like Schubring, Karp proposes a broad approach to the history of mathematics education; one must not simply look at textbooks and curriculums but also at the subject matter, the manner of teaching, the teachers, as well as the beliefs towards mathematics and mathematics education, within a single country and in relation to one another. He even cites Schubring’s list of criteria for studies from different cultures and times: the role of mathematics within general education; the relationship between different stages of education; the teacher, process, and texts; the professional role of the mathematics teacher; the content, mathematics’ changing role as a science, as well as the influence of local, national, and international forces.
Karp believes that theorization in general should not come before the real study of facts. He points out that many fields often develop theories first, and the facts to support these theories second, thereby skewing the facts. Karp prefers fact driven, document based research. Karp also raises the question of subjectivity in the history of mathematics education, as opposed to the scientific objectivity of mathematics itself, and so considers the validity of information and data as conveyed by an individual. In addition, he warns that the subject of study should always be considered within their district, city, region, state, and country, and accordingly, one must be careful when attempting to make generalizations and theories.

Karp continues by analyzing the “Historical Method”, where historians of mathematics education utilize primary sources for their research, and he addresses the challenge of choosing sources. As in “History of Mathematics Teaching and Learning Achievements, Problems, Prospects”, Karp identifies the “relics” or tools of mathematics like manipulatives, calculators, blackboards, textbooks, and computers, as viable primary sources, used in conjunction with the “narratives”, people’s stories, biographies, texts, documents such as diaries, poems, or newspaper articles as they relate to mathematics education. However, Karp warns that a cultural and historical decoding is essential when interpreting texts. He also suggests that it is important to look at a variety of sources that provide different perspectives, in order to create a complete picture.

Additionally, Karp contemplates to what extent all the sources are reliable, and how to use sources that are not absolutely reliable. In general, he suggests that each statement of a document, even not completely reliable one, should be specifically explored whether it is true or not. Finally, Karp addresses the myths in the history of
mathematics education, suggesting that sometimes myths arise for political purposes and other times they are a result of oversimplification, as well as to glorify the past, present, and/or future.

**General Studies in the History of Polish Mathematics Education**

This section reviews the general studies in the history of mathematics education in Poland. The history of Polish mathematics education before the 20th century is outside the scope of this study, thus, only works from the 20th century will be discussed. This section begins with Dubiel’s (1992) research about the developments and achievements of mathematics teaching from 1918 to 1939. Then, Ehrenfeucht’s (1978) research which focused on the changes in mathematics education since the late 1950’s. Next, it continues with Turnau (1993), where he provides an overview of mathematics education research in Poland. Lastly, Domoradzki and Stawiska (2015) who presented a biography of some distinguished graduates in mathematics from Jagiellonian University in the interwar period of 1918-1939. The following discussion deals with studies that do not concern the historical analysis of journals but they provide a good example of historical methods that inform this study. The purpose in exploring these studies is not to describe their conclusions in detail, but to rather understand how these studies were structured and how they approached the subject matters.

In the paper “Rozwój i osiągnięcia polskiej myśli dydaktycznej matematyki (1918-1939)”, Dubiel presents an overview of the main developments and achievements in mathematics teaching in Poland from 1918 to 1939. He began his synthesis by first providing a summary of traditional teaching of mathematics in Europe. He described it as a system that emphasized systematic, abstract and deductive teaching. Dubiel goes on to
explain that reductive or heuristics teaching was known but was hardly practiced due to the amount of time required for its teaching. He explains that progress in psychology and pedagogy, the growing range of applications of mathematics, and the opposition against the abstractions were some of the reasons that led to reforms in secondary schools, including reform of the teaching of mathematics at the beginning of the 20th century in Europe.

Dubiel noted that among teachers in Poland there existed a clear interest in new teaching techniques and school reforms coming from abroad. Periodicals were the main means by which teachers accessed information regarding school teaching and education. They provided information about meetings, conferences, reports on literature, and reviews of Polish and foreign books and textbooks. Dubiel then examined the merits of Polish mathematicians and the Mathematics-Physics Circle, which comprised of educators and fought for the rights of Polish schools, on the reform movement in teaching mathematics. He highlights that their attitude towards the teaching reforms in other countries were positive.

Next, Dubiel analyzes the main changes in Polish mathematics education from 1918 to 1939. In 1919, in an attempt to improve mathematics education, The Educational Programme for Secondary Schools was created. Dubiel outlined the main aims, content and teaching methods of this program. For several years, it formed and dictated the basis of school structure, organization, curriculum, and teaching of mathematics. In discussing the reform, Dubiel also refers to how it had influenced the content of textbooks. Lastly, Dubiel investigates important Polish achievements released in the field of teaching and methodology of teaching mathematics during the interwar period. He achieved this by
examining some of the more significant works of the period such as books and articles by relating their content and general aim as well as how they correlate to the new didactical tendencies.

In the article “Programy nauczania matematyki w szkołach średnich w okresie międzywojennym”, Wuczyńska describes programs, their subsequent changes, and social expectations of mathematics education. Similarly to Dubiel (1992), she investigates The Educational Programme for Secondary Schools from 1919 and its subsequent changes, but her report is more comprehensive than Dubiel’s. Wuczyńska begins by giving an overview of events that had a greater impact on the organization of the Polish education system from 1919 to 1939, and mathematics education in particular. Wuczyńska also examines the social expectations of mathematics education. She accomplishes this by comparing the main goals of teaching in each program, and demonstrates how researchers in mathematics education support or disagree with those goals by referring to their articles or talks. Wuczyńska also examines changes in the teaching content as a result of major programs from years 1919 and 1932. She observed that the education in those programs could be divided into three subjects: algebra, geometry, and trigonometry. To examine the syllabi changes between the programs, she created tables for the subjects which depicted how the topics evolved in each grade level. She divided algebra into five categories: algebraic expressions, numbers, equations, functions, sequences, and limits. Geometry was divided into elementary, descriptive, and analytic. Then, Wuczyńska portrays the changes in more depth by supporting her analysis by referring to articles or talks of other researchers.

Turnau (1993) is his paper “Mathematics Education Research” in Poland presents
a short and general evaluation of the mathematics education research in Poland. The research done on the teaching of mathematics in Poland is mainly carried in the department of didactics of mathematics, which is part of the department of mathematics, which in turn affects the problems, methodology, and content of some of the papers to be more mathematical than pedagogical. He notes that the significant part of research in mathematics education is done for doctoral dissertations. Components or summaries of the dissertations along with other papers are published either in the national journal for the didactics of mathematics, called *Dydaktyka Matematyki*, local university publications, or in the mathematics teachers’ journals.

Moreover, Turnau reviewed how varied the interest of Polish researchers is. He does this by presenting some of the names and their affiliations, content area, teaching levels, as well as their national or international reputation. Turnau examines the most preferred methodologies employed by researchers, and his analysis concluded that the most popular methodologies are: written testing, teaching experiments followed by post testing, and individual interviewing. He also notes that qualitative analyses are more common than advanced statistical methods, and that theoretical papers presenting new concepts or ideas are also common.

Ehrenfeucht’s (1978) research focused on the changes in mathematics education in Poland since the late 1950’s. In her paper, she describes the mathematics education system after World War II, then the mathematics curriculum up to 1963, and the present curriculum, up to 1978. The current curriculum analysis is the most detailed and most comprehensive.

Ehrenfeucht begins by providing a summary of the Polish educational system
after World War II. She briefly discussed the types of schools that existed, who was permitted to attend them, and what the conditions in which youth had to study in were. Next, she described the mathematics curriculum from after the war until 1963. She inspected the main objectives of courses in elementary calculus, geometry, and arithmetic, as well as the influence these courses had on students’ mathematical development. Next, Ehrenfeucht explored the curriculum in primary and secondary grades from 1963 to 1978. She listed who the initiators were that introduced the changes in the mathematics curriculum in the late 1950’s. She goes on to explain the new reforms in detail, and provides their main objectives. In her analysis, she also points out if the new changes were in the comfort zone for both teachers and students. Ehrenfeucht went on to examine the classes for mathematically gifted students. She explains how students were placed into those courses, who taught them, how many hours they studied mathematics per week, as well as the nature of the curriculum in these classes. She also offers some criticism about these classes and their effect on students’ development. Next, she moves on to talk about a new initiative, called the Krakow experiment, led by Zofia Krygowska, the Chair of the Didactics of Mathematics of the Higher School of Educational Studies in Krakow. Ehrenfeucht states the main aim, challenges and the outcomes of this experiment.

Moreover, Ehrenfeucht examined teacher education requirements, and concluded that teacher education becomes more demanding with changing school reforms. She lists a few preparation programs and courses for teachers by listing their requirements. Ehrenfeucht emphasizes that an important source of current knowledge for mathematics teachers is the periodical *Matematyka.*
Domoradzki and Stawiska in their study “Distinguished Graduates in Mathematics of Jagiellonian University in the Interwar Period”, present a historical study of some of the more distinguished graduates of mathematics from Jagiellonian University between 1918 and 1939. Domoradzki and Stawiska begin by introducing the reader to the history of Jagiellonian University and to the period of study to show in what conditions those distinguished students studied. Next, they introduce professors of mathematics and the standard mathematics curriculum at Jagiellonian University. Domoradzki and Stawiska then proceed to present biographies of Ważewski, Nikliborc, Bilski, Leśniak, Gołąb, and Krygowska, whom were all distinguished graduates of Jagellonian University. The biographies emphasize their field of study, interests, scholarly and professional achievements, their collaboration and involvements in Polish as well as international mathematics, mathematics education, teacher training, and their influence on Polish scientific and academic life. These biographies are presented in such a way so as to demonstrate to the reader how much passion the students put into mathematics and helping others learn mathematics. They had all studied in difficult circumstances and risked their lives, by committing actions that at the time were illegal. Even with each biography being very detailed and in depth, the author did not compare or contrast the students on any level.

**General Research about Mathematics Education Periodicals**

The aim of this section is not to describe the details and conclusions of each study, but rather to understand how these studies were structured and how the author approached the subject matter. The studies discussed here employ noteworthy methodologies which directly inform the current study. This section begins with De Bock
and Vanpaemel (2015) “The Belgian journal Mathematica & Paedagogia (1953-1974): a forum for the national and international scene in mathematics education.”, then it continues with Preveraud’s (2013) work “American Mathematical Journals and the Transmission of French Textbooks to the USA” and ends with works of Furinghetti (2003), Schubring (2003), and Hanna (2003), all of whom have reviewed the journal L’Enseignement Mathématique.

In “The Belgian Journal Mathematica & Paedagogia (1953-1974): A Forum for the National and International Scene in Mathematics Education”, De Bock and Vanpaemel examine the primary themes of Mathematica & Paedagogia, highlighting the important contributions that the journal made to the improvement of mathematics education in the 1950’s and 1960’s. They start with the origins of the journal which has its roots in the Belgian Society of Mathematics Teachers. They then analyze the structure of the journal, outlining the different sections and evaluating the subject of each section, focusing specifically on those that deal with mathematics education.

De Bock and Vanpaemel continue by examining the essential themes of the articles as the journal evolved. They start in the 1950’s when the journal was unique in its international focus on mathematics education. The authors discuss various teaching aids, a key topic of that time, because the aids were viewed as bridges between intuition and abstraction. They even go so far as to explain the specific aids and how they were implemented in teaching particular aspects of mathematics curriculum. The authors move on to evaluate the 1960’s, when the central topic of the journal became new content for school mathematics, its subsequent debate, and the resulting new philosophy of mathematics education.
De Bock and Vanpaemel then assess the journal contributions of Bunt, Freudenthal, and Krygowska, who offered a different viewpoint than the new philosophy of mathematics education in the 1950’s and 1960’s. Starting with Bunt, the authors first introduce his background, and then examine how his didactical approach compares with the new philosophy. Moving on to Freudenthal, De Bock and Vanpaemel point out how he strayed from the new approach with his broad philosophical vision for mathematics education. Finally, after introducing Krygowska, the authors review the subjects of the four principle articles she wrote for *Mathematica & Paedagogia*.

In “American Mathematical Journals and the Transmission of French Textbooks to the USA”, Preveraud explores how specialized American mathematical journals spread important French mathematics concepts and theories that were published by French mathematicians between 1785-1825 in French textbooks for Ecole Polytechnique. Preveraud focuses on the means and content of this distribution: questions, articles, and courses; the original texts; and the progression of this material in the early 19th century as translated French textbooks were being published in the United States. He also examines the individuals who presented French mathematics in these American journals. In addition, Preveraud studies French impacts on American mathematics.

As Preveraud states, his study interconnects two fields of study on the history of mathematics in the United States, one that deals with the consideration of the scientific journal as a specific way to communicate and diffuse the knowledge in the 19th century, and the other one with influences of French mathematics on American mathematics education.
As a methodology, Preveraud employs a systematic analysis of the journal material as well as their sources. He also investigates how the American journal contributors incorporated French sources into their articles. Furthermore, Preveraud utilizes a prosopographical study, or collective biography, of the American contributors in order to analyze the connection between the requirements of mathematics education in the United States and the French material in the American journals.

The specific journals Preveraud examines are *The Mathematical Diary*, *The Mathematical Miscellany*, *The Cambridge Miscellany of Mathematics, Physics and Astronomy*, and *The Mathematical Monthly*, all of which were published between 1818-1878. Preveraud begins by providing general information about each journal, that is, its publication dates, place of publication, editors, editorial content and number of issues and volumes released. Then, Preveraud explores the structure of these journals, each issue posed questions to the readers and the submitted answers were published in the next issue. Preveraud explains that his method of introducing mathematics through problems rather than research evoked a strong response, attracting young students and promoting a growing mathematics community. He mentions that the journals also included material from French mathematics courses, articles and quotes from renowned French textbooks, and information from French treatises.

Preveraud goes on to explain that the methodology of the American mathematics journals with regard to French textbooks and treatises involved identifying the author and then listing the author and then the title of the French source, occasionally only citing the name of the book. He adds that the contributors also explored mathematical keywords such as calculus, algebra, geometry, etc., so Preveraud also searched for occurrence of
keywords. For the sake of concision, the contributors sometimes abbreviated mathematics terms and problems and suggested referencing the original authors for more complete theories and proofs. Preveraud discarded some French works from the study when they were not directly addressed to education.

Preveraud divided his works into two parts, one that pertains to quotations and the use of French mathematical textbooks in American mathematical journals, and the other one pertaining to quotations and use the of French mathematical treatises in American mathematical journals. For both cases, he created tables that showed the title, author, date of the first publication, and the number of references. Then he went on to explain how the American journal contributors incorporated those French sources into their articles.

Finally, as part of his prosopographical study, Preveraud cites the names of the contributors of the four American journals he investigated, as well as their primary profession, and their place of residence. Most of them were college professors but secondary school teachers and students could also be found. Preveraud obtained details about the authors from the journals themselves as well as Appleton’s Cyclopedia of American Biography, the six-volume collection of biographies of notable people in American history. He analyzed the connections between the authors of the journals’ content and its readers in terms of educational needs. In other words, who used which material and in what combinations? To do so, Preveraud conducted a social networks analysis using UCINET, a software for social network analysis, along with the drawing extension NETDRAW. He also looked at the methodology of studies that applied quantitative studies to provide such information. Preveraud built a thematic network of
contributors by computing common references for every contributor. The results of his analysis show that the spread of scientific tests occurred between mathematicians who knew each other and exchanged within the framework of their professional activities, that is, a thematic sub-network correlates with personal and professional network.

In “Mathematical Instruction in an International Perspective: The Contribution of the Journal L’Enseignement Mathematique”, Furinghetti (2003) examines the mathematics journal L’Enseignement Mathematique beginnings from its establishment in 1899 until 1914, to explain the significant influence the journal had on the rise of an international group of mathematics educators. Her study offers new perspectives on key aspects of the history of mathematics education, including the creation of the International Commission on Mathematical Instruction (ICMI).

Furinghetti (2003) began by inquiring into the two founders and editors of L’Enseignement Mathematique as they strongly defined the journal during this key period. She analyzed the format of the bi-monthly journal in terms of the languages in which the articles were written and the international make-up of the editorial board and the contributors.

Furinghetti investigated the structure of the journal and evaluated the past and current relevance of the material within each category. She argued that the layout remained consistent until 1909 when the journal became linked with the ICMI (International Commission on Mathematical Instruction), and confirmed the journal’s emphasis on nurturing communication between researchers and teachers.

Furinghetti proceeds to classify the themes addressed in the journal in a table with thirty subjects and then applied that information to a chart that includes how many
articles were written in each subject every year between 1899-1909. Furinghetti came up with the classification of articles by reading through the articles. She recorded the array of international contributors and the specific tally for each country, as well as the manner in which the author’s name appeared with the writing. She then noted at the predominance of specific themes and compared their treatment by different authors. Finally, she highlighted the names of famous mathematicians who made contributions to the journal.

Next, Furinghetti explored how mathematicians worked. More specifically, Furinghetti focused on the role psychology played in connecting mathematicians and mathematics educators. She suggested that because the link between psychological themes and mathematics themes was being discussed in the mathematics community at that time, the journal presented articles on the research methods of mathematicians, which they believed would interest young mathematicians. She elaborated by discussing a questionnaire the journal distributed to its contributors and readers, which provided insight into not only the research and methods of the mathematicians, but also how mathematicians felt about their work and their profession. The journal published the analysis of the results of the questionnaire in the form of statistical data, results with comments, and comments from the responder to the questions. She also confirmed the significance of the study in terms of its relevance for mathematics education, epistemology, psychology, and sociology. She expanded the application of the inquiry to schools and students’ achievements in mathematics, as well as to mathematics education as a whole. She cited papers by famous mathematicians that were influenced by the journal’s report.
Finally, Furinghetti addressed how educational reforms deliberated in the journal inspired the formation of the ICMI, which in turn, used the journal to publish its studies. The exchanges that followed in the journal were then presented at ICMI conferences. Furinghetti writes that the journal was a significant breeding ground for new ideas that influenced not only the world of mathematics, but also other disciplines, and the society at large.

In “L’Enseignement Mathematique and the First International Commission (IMUK): The Emergence of International Communication and Cooperation” Schubring (2003) begins by asking to what degree international communication existed in mathematics education at the turn of the 20th century when the second ICM (International Congress of Mathematicians) met. Indicating that up until the end of the 20th century, and the creation of L’Enseignement Mathematique, an international conversation about mathematics education barely existed. Schubring examined the reasons for this lack of discussion, citing examples of some major differences between the European countries and their resulting systems of mathematics education. He provided diagrams and charts of the nature and structure of mathematics teaching in elementary and secondary schools in France in the second half of the 19th century, and pointed to the reform in 1902 that enhanced the prominence of mathematics teaching in France, noting that true change only happened later in 1925. Schubring then moved on to compare the nature and status of mathematics education in France with that of Germany, Italy, and England.

Schubring emphasized how L’Enseignement Mathematique changed the lack of international discourse by publishing articles about mathematics education in a few
countries. This unconventional move inspired international communication and cooperation about mathematics education, which in turn gave birth to the IMUK (Internationale mathematische Unterrichtskommission) /CIEM (Commission internationale de l’enseignement mathematique), now known as ICMI (International Commission on Mathematical Instruction) and ultimately to major reform in mathematics education. *L’Enseignement Mathematique* was the official journal for the entire work of the ICMI. The formation of the ICMI is also examined by Schubring. He listed the necessary conditions for membership, including charts that distinguish between voting and non-voting members. He analyzed the representatives of the member countries and their relationship to mathematics as a means of understanding the work of the ICMI: its initial impact on mathematics in higher education and subsequent impact on mathematics in secondary school education. Schubring also discussed the themes of the first ICMI papers, underlining the focus on the relationship between mathematics and mathematics education.

Schubring concluded by emphasizing the great impact that *L’Enseignement Mathematique* and the ICMI had not only on mathematics education in the school systems, but also in closing the gap between the successful evolution of mathematics and the evolution of mathematics education. He argued that while the potential for unity between the two groups is great, dissension still exists.

In “Journals of Mathematics Education 1900-2000”, Hanna (2003) looks at the development of mathematics education journals in the 20th century, as mathematics education acquired status as a scholarly discipline. To begin her study, Hanna analyzed the online record of *Ulrich’s International Periodicals Directory*, which reports 209
journals from 28 countries. She noted however, that Ulrich’s data is incomplete and ends in 1999, and that it also does not include electronic journals. She indicated how many were refereed and whether the journals are still active or not. Next, Hanna presented a table illustrating the number of journals produced in each country, followed by a graph that shows the number of journals founded in each decade. After briefly mentioning the six journals that existed before 1900, Hanna elaborated further about the graph by discussing the specific journals established in each decade and their countries of origin.

Hanna supplements Ulrich’s catalog by examining a list of periodicals in the Karlsruhe University database, “Zentrum Fur Didaktik Der Mathematik.” She presented a table that shows the additional active journals by country, but also noted that this database excludes when the journal was first published and whether it was refereed. She then provided statistics for the total number of active mathematics education journals as compared with that of mathematics journals. Citing several editorial statements from various journals, Hanna illustrated that apart from a small minority, most of the journals share a similar objective.

In the next section, Hanna closely examined the characteristics of three major international journals that focus exclusively on present research in mathematics education. In reviewing Educational Studies in Mathematics and Journal for Research in Mathematics Education, Hanna investigated how and when were they founded, their policy statement, and the expanding subjects of their articles. She also compared their research methodologies and theoretical contexts, noting greater similarities than differences. She supported these findings with a graph that analyzes the research for each journal, comparing the degree of quantitative to qualitative articles. Hanna then looked at
the origins, policy statement, and subject matter of the unique journal *For the Learning of Mathematics*, highlighting the differences and originality of the disciplines it addresses, as well as the new subjects within mathematics education that it emphasizes. She also cited the subjects the journal ignored in order to explain its distinct approach. Hanna highlighted how the journals spread information and inspire forums which is very important for the professional development of researchers, mathematicians, and educators.

**Research on Mathematics Education Periodicals in Poland**

The aim of this section is not to describe the details and conclusions of each study but rather to understand how these studies were structured and how the author approached the subject matter. This section discusses research employing noteworthy methodologies which directly inform the current study. This section begins with three studies regarding journal analysis by Dubiel (1989a, 1989b, 1990) on Polish mathematical, didactical, and pedagogical journals during the period of 1911-1939, then continues on with the study by Duda (2011) in which the author provides a historical overview of Polish mathematical journals. Finally, the section will conclude with articles written by Cegielka and Przyjemska (1999), Pogoda (1999), Wuczyńska (1999) and Wojciechowska (1999) who analyzed different aspects of the journal *Matematyka* for its 50th anniversary.

Dubiel (1989b) investigated five journals dedicated to teachers of mathematics. The main purpose of this article is to provide a brief summary of the journals and their function in the formation of new concepts in teaching of mathematics.
Dubiel began by providing the general characteristics of the journals. His description includes the duration and place of emergence of the journals tied in a brief historical overview of Poland. He presented each journal individually and when examining journals that were devoted to two areas of knowledge, he only concentrated on the mathematics and teaching of mathematics aspects as this was the main scope of his research. The journals investigated were: *Wektor, Nauczanie Matematyki i Fizyki, Przegląd Matematyczno-Fizyczny, Parametr* and *Matematyka i Szkoła*. Dubiel focused on the main aim of the journals, how often the journals were published, and who the editors and authors of the articles were. He also explored the dominant issues of the articles, as well as what types of articles were mainly published in each section. Structural changes of the journals and the reasons for the changes were also explored.

Dubiel stated that the journals were created with respect to a need to present the changes in the mathematics education system, as well the results of implementing new teaching programs. The teaching reform he referred to is The Educational Programme for Secondary Schools of 1919 and its subsequent changes. Based on the content overview of the journals, Dubiel stated that the journals often contained articles that were evaluating and analyzing the teaching programs in terms of their content, aims, and the possibility of their implementation in the existing school conditions. Dubiel also claimed that journals were fulfilling an important role in disseminating new scientific achievements. He elaborated to show the role of journals on teachers’ development. Dubiel stated that the journals contained articles that were often not available in the literature or were not well illuminated in the textbooks. Dubiel listed the titles of a few articles from the journal to demonstrate that the journals contained articles that were motivating and had practical
ideas that could be used by teachers in the classroom. Dubiel also added that in the journals there exist articles about foreign textbooks on mathematics and mathematics education, foreign changes in the teaching methods and programs, as well as information about important meetings and conferences on mathematics and mathematics education.

A different study by Dubiel (1990) presents a historical-pedagogical study of five journals devoted to mathematics and didactics of mathematics. The aim of his work was to illustrate the main problem threads and development of those journals. His paper is divided into three main chapters: reform movements, characteristics of journals, and analysis of selected articles on mathematics and didactics of mathematics. Dubiel encountered methodological difficulties during his analysis such as a lack of classification of specialist journals, lack of methods to study them, difficulty with the decision of how to present the content of journals, as well as the different historical periods of the journals’ emergence. He described how he overcame these challenges.

The journals he examined are the same journals examined in Dubiel (1989b) mentioned above: *Wektor, Nauczanie Matematyki i Fizyki, Przegląd Matematyczno-Fizyczny, Parametr and Matematyka i Szkola*. For the classification of journals, the three journals that were devoted to two areas of knowledge, he coded them as dual-subject journals, and those on one subject as single-subject journals. Dubiel analyzed the journals by examining their content. He divided the content into the following thematic groups: mathematics papers, methodology of mathematics and its teaching, general and specific problems in mathematics education, some issues from mathematics curriculum, and resources on school practice. He presented his analysis in chronological order. Dubiel explained that the time in which the periodicals appeared is important to consider for
analysis because the journals appeared in different cultural and social conditions. He called this form of analysis “thematic-chronological methodology”. In addition, in case of dual-subject journals, he focused only on articles in mathematics and teaching of mathematics. Due to the different time frame of the emergence of periodicals, he decided to concentrate on school mathematics to ease the understanding of the journals and its deeper analysis.

In the first section, Dubiel discussed the changes that occurred in mathematics education in Poland at the beginning of the 20th century. In his description, the author refers to the reforms, studies or scholars from other European countries and the United States. He also discussed how influences and trends from other countries have shaped Polish projects’ reforms. Dubiel proceeds to explain the role of pedagogical journals in disseminating processes of reforming schools and programs in mathematics in Poland and other countries.

The second section is divided into two parts, the first section contains descriptions of single-subject journals in chronological order and the second part on dual-subject journals in chronological order. The content of this description is essentially the same as Dubiel (1989b) (see above).

The third section is concerned with the analysis of some selected mathematical and mathematical-pedagogical articles. Dubiel divided the content into the following thematic groups: mathematics papers, methodology of mathematics and its teaching, general and specific problems in mathematics education, mathematics curriculum, and resources on school practice. He presented his analysis in chronological order. For the analysis of mathematical papers, Dubiel listed a number of articles from each of the
journals: *Wektor, Przegląd Matematyczno-Fizyczny* and *Parametr*. The other two journals did not publish such articles. He provides a one sentence summary for each article and the articles he picked varied in topics. The analysis of papers on a mathematics-pedagogical nature is more thought out and in depth in terms of its details. In the section on methodology of mathematics and its teaching, Dubiel presented specific topics in the context of various statements given by different mathematicians who presented their views in articles published in the journals mentioned above. Dubiel explored articles that dealt with general and specific problems in mathematics education. He divided them into the following subgroups: goals of teaching and its realization, methods and aids of teaching and studying mathematics, selection and arrangement of teaching content in curriculum, methods for solving word problems, development of interests and capabilities of students, topics on proficiency in basic mathematical skills, and historical issues. For each subgroup, he cites a few articles from different journals and describes what the author wrote about the topic. The next section covered mathematics curriculum which Dubiel further divided into mathematics curriculum for elementary schools and mathematics curriculum for secondary schools. The section on curriculum for secondary schools was then divided into the following topics: numbers, functions, sequences, geometry, and trigonometry. For each section, Dubiel cites relevant articles and describes main ideas presented by the authors of the articles. In the last section, called resources on school practice, Dubiel cites several reports on teaching without going into any detail at all.

Dubiel’s (1989a) article was of a historical nature as well. Dubiel began with an overview of the Polish political and mathematical situation. He described school
programs (The Educational Programme for Secondary Schools of 1919 and its subsequent changes) and cited statements made by mathematicians about them. Then he moved to describe the role of pedagogical journals which discussed all issues associated with school, including issues related to teaching of mathematics. The pedagogical journals that he refers to are: Muzeum, Przegląd Matematyczny, Gimnazjum, Oświata i Wychowanie, Ruch Pedagogiczny, Poradnik w sprawach nauczania i wychowania oraz administracji w szkołach średnich ogólnokształcących i seminariach nauczycielskich and Życie Szkolne, and the specialist journals on mathematics teachings: Parametr and Matematyka i Szkola.

Dubiel outlined the two main aims of his work. The first aim of his work was to investigate the following: the role of journals in promoting ideas contained in the programs of mathematics, in teachers’ development and self-learning, in promoting new ideas, new teaching methods, teaching aids, in presentation of the history of mathematics and mathematicians, the evolution of mathematical concepts, and in informing about periodicals on mathematics and mathematics education from Poland and around the world. Dubiel’s second goal was to define the historical value of these journals with respect to existing literature on mathematics education.

Dubiel answered each of the above inquiries very generally. Often, he would draw some conclusions such as “the journals devote a lot of space for articles on teaching methods… in particular, they informed on teaching methods which flowed to Poland from the West, including the USA” (p. 43) without citing any articles. In other circumstances, Dubiel would cite one or two, but rarely more, articles to support his statements. For example, for the following statement: “The journals encouraged
mathematics teachers to use teaching aids” (p. 45) he cites only one article. Dubiel’s analysis of five pedagogical journals and two journals on mathematics education contained a lot of general statements, which he could have supported by utilizing the rich number of articles available to him.

In “Historical overview of Polish mathematical journals”, Duda (2011) examined several mathematics journals from 1795 to 2010 that had greater importance for Polish mathematics. He only goes into more detail for journals that had greater importance for Polish mathematics, other journals were only briefly mentioned. He divided his work into five periods, and then grouped the journals based on the territory or organizational center that had a greater impact on education and lastly presented them in chronological order within each group. This structure of the paper makes it more transparent to follow.

Duda began by providing a historical overview of the country and formation of organizations or universities for each period. In some cases, he provides a brief overview of the events in Europe. To understand circumstances in which the journals emerged, he showed their evolution on the historical background. His description of journals also contains information about its content, aims of the journal, language of the articles, and authors. His analysis also shows the role of the editors in the evolution of the journals. Duda examined how Polish organizations worked in other countries as well as the journal’s achievements.

In the description of the period after 1952, is where Duda’s own memories can be found, he writes phrases like “after my arrival” or “I remember”. In the summary section, one of the comments Duda made is that there is a lack of thoughtful research on Polish journals. He believed that such research would form valuable and interesting conclusions.
about Polish mathematics, and suggested several ways for how this can be done. He proposes that it can be achieved by evaluating participation and the percentage contribution of Polish mathematicians in the world of mathematics, or estimating the importance of the journal at the international level by checking the presence of titles of Polish articles in a select list or analyzing their impact factor.

Lastly, Duda created a graph which demonstrates the emergence and duration of the journals. The graph displays all the mathematical journals that were published in Poland from 1817 to 2010. The graph reveals how rich and long the Polish list of journals is, many appearing between 1874-1900, then publishing is interrupted by World War II, and some journals resumed after 1952, while some journals ceased to exist. The formation of many new journals can be seen again between 1952-2010. Some of the journals existed only for a short time, while some lasted much longer and some had greater importance for Polish mathematics than others, but Duda’s paper shows that Polish mathematicians were always active in their research.


Wojciechowska (1999) illustrated how mathematics was portrayed over the 50 years of this journal. She classified the papers into three categories: school mathematics, elementary mathematics and popularization of mathematics. She explained the differences of meaning between school mathematics and elementary mathematics. Next, Wojciechowska examined papers on elementary mathematics. She admitted that categorizing some of the articles was difficult. Papers on number theory, elementary
geometry, trigonometry, certain types of equations, as well as notes on questions from Olympiads, and all questions from the “Exercises” section in the journal, would belong to the elementary mathematics group. Wojciechowska proceeded to provide examples of a few works on different topics that were published in the journal, followed by a brief description. Wojciechowska then described the next category, school mathematics. She showed how the topics of articles have changed over the years, because of the school reforms, by listing the most common topics. Finally, in the last category that deals with articles on popularization of mathematics, she cited several articles that belong to this category and described what the author wrote about.

Wuczyńska (1999) showed how the topics on didactics of mathematics have changed over the course of 50 years of the journal Matematyka. Her investigation showed that the articles published in the journals were the reflection of the needs of schools and teachers and echoed trends in the education reforms in Poland and in other countries.

Wuczyńska cited examples of articles from the journal which show that right after World War II, many articles were aimed at helping teachers. They often contained information on how to teach, how to grade, exercises to be used in classes and different forms of teaching aids. She cited papers from the late 1950’s, which showed that articles on international mathematics and reports from international conferences were very common. Some of the more common themes of those articles were the goals of teaching, how to test students’ knowledge, why to teach, and what to teach. Then in the 1960’s, changes in the curriculum brought changes in the types of articles published in the journal Matematyka. Wuczyńska showed this by citing some articles that explored new topics and old ones, but now written in a way such that they reflect the changes of the
curriculum. In the 1970’s, articles that expressed opinions about the mathematics curriculum were quite common. The latter half of the 1970’s brought a second wave of changes to the mathematics curriculum, where again new types of articles were appearing in the journal, but in a smaller volume. Wuczyńska concluded that there were less articles relating to the new curriculum because, generally, there was less enthusiasm and impetus among teachers. Wuczyńska’s paper showed that the journal Matematyka was responsive to the changes occurring in the country and as well as on an international level.

In his article “Historia matematyki w Matematyce”, Pogoda (1999) started by asking the question if mathematics has its own history? He complained that teaching programs and textbooks do not discuss the history of mathematics and even that some people think mathematics does not have its own history. He emphasized that one of the sections of the journal Matematyka is one of the few that presents articles on the history of mathematics. The section of the journal called “Mathematics of the past and today” is the main section that presents the articles on the history of mathematics. Pogoda provided details about what types of history papers were written there by citing several articles about history and also provides their description. He noted that other sections of the journal contained articles with some historical elements. Pogoda provided several examples of articles from the scientific section of the journal that had a historical introduction and articles that discussed specific mathematics problems and included a lot of historical information. The main idea that Pogoda tried to communicate through his article is that the history of mathematics is not only biography and articles containing dates of events, but it can also include ideas, ways of thinking, or evolution of the understanding of different concepts.
Cegiełka and Przyjemski (1999) reviewed the journal *Matematyka* from 1979-1991. Cegiełka and Przyjemski began by listing the locations of the editorial office. It has changed five times between 1970-1991. Then they list the names of the people who were the editors-in-chief and editors as well as the issue of the journal they were overseeing. Next, they list the names of the people who formed the editorial board with the years in which they served. The authors proceeded to say how many copies of the journal were sold on average. They also list the types of articles published in the journal and who wrote the articles for the journal.

Cegiełka and Przyjemski also described the structure of the journal and in brief, the main aim of each section. For each section of the journal they provide the total number of articles written and list the names of the most common authors of the articles in each section. Lastly, they provided the list of articles that were written about important events, mostly biographies of famous mathematicians or mathematics educators. They also provided a list of articles that appear in the 25th and 30th anniversary of the journal.

The above literature review on mathematics education journals in Poland will be used to illustrate the types of questions that need to be explored and the appropriate methodologies that can be employed for the current study. From the above discussion, it is evident that much research has been conducted on the journals *Parametr, Matematyka i Szkoła* and *Matematyka*, which are also investigated in this study, but they have examined each journal separately, without looking at their differences or similarities and without considering the period of 1930-1950. Also, in many instances the articles described above are generally written without going into deeper detail. The research
questions of this study could not been answered based on the works cited in this section.
Chapter IV
METHODOLOGY

This study strives to contribute to the social history of mathematics education. It demonstrated how political, social, and cultural circumstances influenced the development of mathematics education including the content and the way in which it is presented. Mathematics education periodicals provided a good opportunity for communication, representing peoples’ thoughts, how they discuss polemic about mathematics education, as well as direct instructions and governmental orders.

In completing this study, the author followed the methodology offered by De Bock and Vanpaemel (2015) and Furnighetti (2003), but with some differences and changes which were necessary and obvious because of the differences in countries.

Historical Research Methodology

The research design for this study utilizes the methodology of historical research, which communicates an understanding of the past, for the selection, evaluation, analysis, and interpretation of the available sources. This study attempts to portray the findings in the same manner that most historians use when writing, such as descriptions, explanations, arguments, narrations, and comparisons. It also follows the ideas and methodologies of Schubring (2006), Karp (2014), and Karp and Furinghetti (2016).

Schubring (2006) claims that there is a need for comparative studies on the history of mathematics education on an international level that will consider cultural, social, and political aspects. Schubring also states that analysis of just one textbook or internal analysis of several textbooks is not sufficient, and argues that the social and cultural context should be incorporated in the analysis to gain a fuller understanding.
This study considered the available sources between 1930-1950, which was a period fraught with war, social unrest, and shifting political ideology.

Karp (2014) writes about the history of mathematics education and how to develop a research methodology of the field. According to Karp, the history of mathematics education has a twofold nature; it is historical in terms of methodologies and mathematical-pedagogical in terms of the object of study. This study will closely follow Karp’s twofold methodology. As mentioned earlier, the purpose of this study was to research Polish mathematics education periodicals and their changes over the years.

Keeping in mind the arguments of Schubring (2006) and Karp (2014), the periodicals were examined in terms of their mathematical-pedagogical content and the sociopolitical context in which they emerged. Analyzing the similarities and differences between periodicals that emerged in different time frames helped us understand how social and political changes have influenced mathematics education periodicals in Poland.

In addition, Karp and Furinghetti (2016) make a strong case for the investigation of the methods used in mathematics education, as well as an investigation into the mathematics educators who were active during this time period, as their status can suggest the status of mathematics during this time. This study analyzed the methods used by several educators in all of the sources, and provides a brief biography of the more active and influential authors, gaining the additional dimension of insight desired.

Journal Analysis Methodology

The journal analysis methodology closely aligned with the methodology used by De Bock and Vanpaemel when they studied “The Belgian Journal Mathematica &
Paedagogia (1953-1974): A Forum for the National and International Scene in Mathematics Education.” De Bock and Vanpaemel’s study examined the primary themes and highlighted the important contributions that the journal made to the improvement of mathematics education during the journal’s publication. They started by examining the origins of the journal, then they analyzed the structure of the journal, outlined the different sections, and evaluated the subject of each section by focusing specifically on those that deal with mathematics education. In a similar fashion as De Bock and Vanpaemel’s study, this study will examine the available journal sources and identify the primary themes, structure, sections, subjects, important contributions, and evaluations based on the context of the available sources.

The journal analysis methodology in this study also borrows some approaches utilized by Furinghetti (2003) when she analyzed the mathematics journal L’Enseignement Mathematique from its establishment in 1899 until 1914. She begins by inquiring into the founders and editors of the journal and how they may have influenced the journal. She continues by analyzing the format of the journal and how often it was published. Furinghetti also investigates the structure of the journal and proceeds to classify the themes addressed in the journal in a table which shows how many articles were written in each subject. Furinghetti came up with this classification of articles by reading the articles to gain an understanding of their span. Next, she determined the predominance of specific themes and compared their treatment by different authors. In this study, the journals were read and the authors and editors were identified. The format, structure, and themes were analyzed and classified into a table very similar to that
of Furinghetti’s. The study also examined the predominance of specific themes as well as in what context the authors write about them.

This study employed some of Dubiel’s (1990) strategies when he investigated the five existing journals dedicated to teachers of mathematics between 1911 to 1939. Dubiel beings by providing a brief summary of the journals and their general characteristics. The description includes the duration, and place of emergence of journals, tied into a brief historical overview of Poland. Dubiel presented each journal individually and focused on the main aim of the journals, the frequency of publication, and who the authors and editor were. He explored the dominant issues of discussion in the articles, as well as types of articles most commonly published in each section. Dubiel examined structural changes of the journals and explained what the reasons for the changes were. Like Dubiel’s study, this study provides brief summaries of journals and articles in the context of the aim, frequency, place of emergence, dominant issues, and structural changes made in the journals during their publication.

**Rationale for the Time Period (1930-1950)**

The period of 1930-1950 was arguably one of the most dramatic periods in Polish history. During this period, Poland was an established state, then it was occupied by Germany and the Soviet Union. It was then liberated from German control during WWII by the Soviet Union, and in the final years of the war the Soviet Union occupied Poland again. As a result of being caught in the middle of not just one, but two great wars, this had a significant impact on Poland as a country, as well as its education and specifically to this study, mathematics education. Much information was lost during this time period
due to the physical destruction of the country as well as the secrecy in which education was conducted.

The period of 1930-1950, however, is not sufficiently explored in terms of mathematics education. Even though there has been a growing interest and numerous contributions to the history of mathematics education journals, they have to be explored more deeply and broadly. Analyzing the differences and similarities between periodicals that emerged in different time frames helps us better understand how social and political changes have influenced mathematics education periodicals in Poland.

The periodicals that were analyzed in this study are all the volumes of *Parametr*, which was published from 1930 to 1932 and 1939, *Matematyka i Szkoła* which was published between 1937-1939, and the first two years (1948-1950) of the periodical *Matematyka*. The periodical *Parametr* was published between 1930-1932, when the country was preparing to implement the education reform of the Minister of Education Jędrzejewicz, which became known as Jędrzejewicz’s reform, then the journal resumed in 1939 but only for a very brief period. The periodical *Matematyka i Szkoła* was published between 1937-1939, when the Jędrzejewicz’s reform was being implemented into the school system. The periodical *Matematyka*, was first published in 1948, when education became subject to Soviet supremacy, infused with the ideologies of Marxism-Leninism. *Matematyka* is still being published today but this study will only examine the first two years of the journal, so that its progress can be compared with the other two periodicals that have also only lasted for about two years. This information combined with information from question one will answer how topics of the discussion have
changed over time. Refer to Timeline 1 for a visual representation of the major events during this time period.

The three journals that were selected were the only journals published in mathematics education during the time period of 1930-1950. With such a limited pool of sources, it would be prudent to use all of them in the study to gain the best insights and understanding possible. The researcher obtained the journals by contacting the National Library of Warsaw in Poland. The journals were scanned and emailed to the researcher in their entirety.

The articles of the journals were chosen for review, or not chosen, based on the following criteria. Articles of the journal that are less than 1 page in length or articles that are not related to mathematics education have been excluded from the study for convenience. These short articles were mainly announcements such as, summaries of meetings of congresses, summaries of teachers’ meetings, or book introductions. By not considering them, obviously the scope of the study is somewhat limited as even short papers can provide some information and some background. All of the remaining articles were explored, but for the discussion below the author had only selected the most representative ones, that is, topics which the author had identified as having the same
theme, tone, and conclusions as other articles. Rather than present all of the articles, a few noteworthy articles were selected for discussion.

The researcher first categorized the articles based on the table of contents of the journals utilizing the ideas of Furinghetti (2006). The categories varied somewhat between journals, and were determined based on the content of the individual journals. The content was further sub-categorized by the subject of the article, for example algebra, geometry, or trigonometry, as well as if the author was referring to Polish mathematics, Polish teaching reforms, or referring to foreign ideas. This qualitative study reviewed and analyzed the objectives, content, and most important topics of each periodical. The researcher showed how the authors shared opinions or had opinions that were at odds with one another in respect to specific ideas or categories derived from the journals.

Articles were analyzed and discussed in chronological order, within its sub-category, as they appear in the journal, to provide some insight into how the topics of discussion evolved over time. Articles that can be considered outliers, such as articles on topics that were not written about by any other authors, were not discussed in the study.

The researcher identified all the authors of all the journals and identified the most published and influential authors and provided a biography for these authors. The information for the biographies was mainly obtained from the Internetowy Polski Słownik Biograficzny (iPSB) (The Online Polish Biographical Dictionary) (http://ipsb.nina.gov.pl/) or Polski Słownik Biograficzny (PSB) (Polish Biographical Dictionary). The online version does not contain all entries, so both versions have been referenced. Some of the volumes of the PSB were available at the Columbia University Library and have been referenced, otherwise the volumes that were not available at
Columbia University Library were obtained from the Warsaw Library in Poland. Słownik Biograficzny Matematyków Polskich (Biographical Dictionary of Polish Mathematicians) was also referenced, and was obtained from the Warsaw Library in Poland.
Chapter V

Analysis of Parametr

The journal *Parametr* was founded by Antoni Marian Rusiecki in 1930. He was an instructor of mathematics at the Ministry of Religious Denominations and Public Education (Ministerstwo Wyznań Religijnych i Oświecenia Publicznego) in Warsaw. He co-edited the journal along with Stefan Straszewicz who was a professor at the Warsaw University of Technology. Rusiecki and Straszewicz authored many of the articles in *Parametr*. Later, their biography will be presented along with the analysis of some of their articles. *Parametr* was the first journal in Poland that was dedicated specifically to mathematics education. The target readership of the journal were teachers of mathematics, those who were concerned with the teaching of mathematics, as well as students interested in mathematics. The main aim of this journal was to improve the quality of mathematics instruction in Polish schools.

*Parametr* was published by the St. Wojciech Publishing firm in Poznań, Poland. In the preface of the journal, the publisher explains that Rusiecki persuaded them to underwrite the publication of this journal. They willingly took his initiative as a public service for Polish schools, not as a source of income. In the first issue, the publisher explained the aims of the journal in the following terms:

“The genius of Polish mathematics has brought, in the present years, Polish mathematics to the leading position in the world science. Yet, complaints about the unsatisfactory results in the teaching of mathematics in Polish schools are common. We are not going to analyze the causes of this phenomenon; It's enough that we recognize the need to fix this area of Polish life...We believe that *Parametr* will fill in the existing gap in Polish educational publishing and it will contribute to raising the level of mathematics education in Poland. The journal will discuss any issues related to didactics of mathematics in elementary education, high school, vocational schools and teacher training schools. It will also contain a section for older students.” (pg. 1)
Parametr was published from 1930-1932, and then again in 1939, and was published until the start of World War II. In total, three volumes of the journal had been published. Volume I was published in 1930, Volume II in 1931 and 1932, and Volume III in 1939. The journal was to be issued monthly with a break for summer recess. The journal was not released on a regular basis. From the editorial notes, it is clear that Rusiecki was mainly responsible for publications. Due to his other responsibilities, Rusiecki points out that he often could not keep up, and as a result many issues were not released on time.

The first volume consisted of ten issues with a total of 400 pages. The table of contents of each issue in the first volume included the following sections: articles, bibliography, corner without title, sections with problems for readers, solutions to problems and a summary of the content in Lingua Peano, an artificial language developed for an international scientific discourse by mathematician Peano (Rusiecki, 1931). Five of the ten issues of volume I contained sections titled the section for youth, from the past, professional news and overview of publications. Seven of the ten issues of volume I contained a section called chronicle and two issues contained miscellaneous notes.

In the second volume, there was a change in the way the material was organized. The editors created a new journal, called Młody Matematyk (Young Mathematician), which was distributed together with Parametr. Młody Matematyk was first published in 1931, and was targeted toward high school students and institutions that educated teachers. The student-oriented content from Parametr, such as section for youth, most of the section with problems for readers, and solutions to problems was moved to Młody Matematyk. The second volume of Parametr also had the section from the past,
professional news, and overview of publication removed entirely. The editors do not provide an explanation for the changes and removals, perhaps there was nothing to report that pertained to these sections. There was a total of 488 pages in Volume II of Parametr and Młody Matematyk.

The four issues of the third volume, a total of 96 pages were published from 1939 until the start of WWII, but this time with a new aim devoted to teaching of mathematics in elementary schools. The format of the journal was similar to Volume II of Parametr, but without Młody Matematyk. Instead, it contained an extra section called physics corner, which appeared only in the first two issues, and the sections from the past and reader’s comments which only appeared in the third issue.

The categorization of papers, throughout all the volumes, was not rigid and sometimes the same type of paper was published under different headings. To get a better view of the nature of the journal the content published under the various headings will be examined.

ARTICLES: This section contained a variety of papers that one might expect to find in a standard mathematics education journal. Among others, there are articles related to school mathematics, teaching of mathematics, mathematics curriculum, and classroom practices. This section typically contained the majority of the articles in the journal.

SECTION FOR YOUTH: This section was dedicated for students. The articles were mainly about school mathematics.

FROM THE PAST: This section consists of aphorisms, book reviews and biographies.
PROFESSIONAL NEWS and CHRONICLE: These sections included all types of news about upcoming mathematical meetings and conferences. We also find reviews of mathematics courses for teachers, mathematics curriculum, books, overviews about meetings and speeches presented during the meetings, and information about the awards received by Polish mathematicians.

BIBLIOGRAPHY and OVERVIEW OF PUBLICATIONS: These sections were devoted mainly to providing information about new books and journals, as well as their table of contents. The Bibliography section also contains many detailed book reviews.

CORNER WITHOUT TITLE: This section contained various mathematical trivia such as pictures or rhymes.

PROBLEMS, SOLUTIONS TO PROBLEMS and MISCELLANEOUS NOTES: These sections contained problems from different areas of mathematics, exercises that relate to the content of the articles, exercises from mathematics courses for teachers, and exercises from mathematics competitions.

THEMES

To examine the themes explored in the journal, all articles longer than one page have been classified in Table 2 under the following categories:

- Teaching Methods (articles related to the process of teaching and learning mathematics)
- Instructional Practices (articles describing the course of the lesson)
- School Mathematics (articles that describe mathematics concepts, proofs of theorems, results of research of authors of the articles)
- Curriculum (articles reviewing the school program in general or articles describing specific problem areas of the curriculum)
- Conference / Book / Textbook Review (articles in this category include books reviews, course of the meetings and conferences, and speeches delivered during the meetings and conferences)
Within each category, articles will be divided further into sub-categories of similar themes. Next, the content of the articles will be analyzed in the light of the author’s statements. The content of some articles was not related to any of the categories, and thus they were excluded from examination.

Table 2. Number of articles longer than 1 page that appeared in the journal, classified by theme, and their distribution

<table>
<thead>
<tr>
<th>Categories</th>
<th>Sub-Categories</th>
<th>Volume 1</th>
<th>Volume 2</th>
<th>Volume 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching Methods</td>
<td>Arithmetic</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>General Teaching</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Methods</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Geometry</td>
<td>2</td>
<td>12</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Teaching using Word</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Teaching Aids</td>
<td>3</td>
<td>4</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Instructional Practices</td>
<td>Arithmetic</td>
<td>2</td>
<td>3</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Algebra</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Geometry</td>
<td>2</td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Teaching using Word</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School Mathematics</td>
<td>Arithmetic</td>
<td>9</td>
<td>22</td>
<td>3</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>Algebra</td>
<td>3</td>
<td>9</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Geometry</td>
<td>4</td>
<td>10</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Curriculum</td>
<td>Arithmetic</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Algebra</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>General Problems</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Textbook/Book/Conference</td>
<td>Various Themes</td>
<td>3</td>
<td>7</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Reviews</td>
<td>Examinations</td>
<td>2</td>
<td>1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Foreign Textbooks</td>
<td>2</td>
<td>4</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Polish Textbooks</td>
<td>4</td>
<td>5</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Total number of articles</td>
<td></td>
<td>46</td>
<td>61</td>
<td>20</td>
<td>127</td>
</tr>
</tbody>
</table>
Out of the 127 articles that satisfy selection criteria, 77 have been analyzed below. All of the articles in the journal were written in the Polish language. There were no collaboratively written articles. The articles were mainly written by secondary school teachers and some representatives of postsecondary institutions, few of whom were well-known Polish mathematicians. Most of the authors of the articles were likely invited to submit their papers by the editors of the journal who knew most of them personally. The Authors of the Journal section introduces the most prominent and most influential authors of the journal.

There is no discernable pattern in the length of the articles. Some articles are quite long and thoroughly elaborated while others are rather short and more general. On average, articles about school mathematics were the longest. They varied from 2 to 25 pages, but most of them were in the range of 6 to 8 pages. The articles about teaching methods range from 2 to 12 pages but most of them were about 4 to 6 pages long. Articles about instructional practices were slightly shorter, ranging from 2 to 9 pages, with most of them being between 2 to 5 pages. Articles from conferences and textbook reviews range from papers slightly longer than a page to 20 pages, with the majority being between 4 to 6 pages. Articles on curriculum were on average 5 pages long.

Articles were analyzed in chronological order within their categories. Without intending to review all the articles, noteworthy articles and those that discussed the same topics or issues were selected to see how these discussions evolved over time. Some of the articles of famous Polish mathematicians and mathematics educators were examined as well as the authors who had contributed the most articles to the journal.
Teaching Methods

Several articles raised various problems relating to teaching methods in mathematics, and were typically written by teachers of mathematics. The authors of the articles often encouraged teachers to examine and reflect on their own teaching methods. This section contains articles that relate to general teaching and learning methods for mathematics and articles that describe teaching methods for specific areas of mathematics such as arithmetic, geometry, teaching using word problems, and articles on the use of teaching aids.

In the interest of restructuring the process of learning and teaching in Polish schools, several articles were devoted to new teaching methods developed in Poland as well as other parts of the world. The articles discussed the potential benefits and pitfalls of using these teaching methods. It appears that there was no agreement as to what the best teaching method for mathematics is. Teachers were constantly looking for innovative ways to teach. The first volume contains the work of Sierzputowski (1930), who promoted the heuristic method of teaching, while in the second volume Neapolitański (1931a) favored supervised study, Witeszczak (1931) recommended group work, and Frycz (1932) described his experiences with teaching according to the Dalton plan. Hornowski (1939) on the other hand, believed that there is no single catch-all method that works everywhere.

We will begin our discussion with remarks given by Sierzputowski, who supported the heuristic teaching approach, which is understood to be a method in which the students’ role is to be an independent discoverer and the teachers’ role is to guide the students in their work through appropriate selections of textbook, questions, and
exercises. Sierzputowski (1930) stated that it is important to teach sound mind skills rather than skills that only enable students to solve problems without much of an understanding behind the solution. He asked teachers to reflect on what they think the purpose of teaching is. Referring to a dispute which prevails in Poland between supporters and opponents of heuristic methods, Sierzputowski concluded that this method has more advantages than disadvantages. He pointed out that heuristic methods have been popular and were primarily used in the West since the middle of the 19th century. In Poland, where the classes were crowded and there was a lack of school facilities and teachers, there was limited use of the heuristic method. The main goal of Sierzputowski’s article was to encourage teachers to use the heuristic method in their classes. He pointed out that the heuristic method requires a lot of preparation from teachers, such as a detailed lesson plan, precise initial questions, exercises, and problems. To help teachers with their lesson preparation, Sierzputowski wrote a series of arithmetic and geometry textbooks. To gain a better sense for the structure of the textbook, he provided a sketch of one lesson on fractions.

The heuristic method was initiated by H.E. Armstrong in England in the early 20th century. This technique of instruction became very popular in the United States with the work of George Polya. With his book *How to Solve It*, published in 1945, Polya contributed to the revival of heuristics. It contains detailed descriptions of the various heuristic methods which Polya condensed to a few general principles of problem solving.

Another teaching method recommended by Witeszczak (1931) was group work. In his opinion, this method develops students’ intelligence, willingness to cooperate, as well as independent reasoning and critical thinking skills. He suggested that through the
use of group work, educators can stimulate more interest in students during the class. To illustrate this method, he provided a report from his lesson on arithmetic. Witeszczak cautioned that through the use of group work, the teacher will not be able to cover many examples during the class but that he will teach students how to think. He referred to the words of philosopher Rousseau, that even though the teacher will not be able to fully develop students’ minds, he will teach students how to reason critically.

The issue of teaching methods in mathematics were also common topics of discussion during the professional meetings. During the mathematics session of the meeting of the Society of Teachers in Secondary Schools and Universities (Towarzystwo Nauczycieli Szkół Średnich i Wyższych) in 1930 in Warsaw, Neapolitański gave a talk in which he introduced listeners to the new American teaching methods called supervised study. The report from his speech was later published in the journal Parametr (Neapolitański, 1930a). Neapolitański explained that under the supervised study method, the teacher acts as a guide who teaches students proper techniques for independent thinking, and indicates ways and methods to overcome difficulties associated with learning the material. He provided an example of a lesson with the use of this method. Lastly, Neapolitański observed that among some of the advantages of supervised study is the fact that constant observation of students during their work allows teachers to become familiar with the students’ character and accurately assess their progress, or lack thereof.

During the meeting of the Second Polish Mathematical Congress in 1931 in Vilnius, Frycz (1932) shared his own experiences in teaching mathematics according to the Dalton plan, a system designed to allow each student to have an educational program adopted to their own needs, interests, and abilities. This talk became a foundation for his
paper published in *Parametr*. Frycz (1932) claimed that teaching according to the Dalton plan in Polish schools is rather impossible. Among some of the reasons, he lists overpopulated classes and a lack of necessary teaching aids. After his unsuccessful attempts to cover all the material in time during his lessons, Frych suggested modifications to the Dalton plan. One of Frych’s modifications to the Dalton plan is that the students are expected to grade each other’s work, such as homework and tests. The student is supposed to study as much as possible from the textbook, and in case of any questions, the student should ask the teacher questions in class the next day. The teacher is responsible for organization, supervision of students’ work, as well as clarifications of difficult or incomprehensible material. He stressed that the key to success of this modified Dalton system is to develop in students the feeling of importance and awareness of the difference between real and fake friendship on their school success when peer grading each other’s work. Honest peer grading allows students to check and learn from their mistakes, and education should be in the best interest of friends.

While *Parametr* had some authors recommending specific methods, others did not share the same opinions. For example, Hornowski (1939) had a different opinion about teaching methods for mathematics than authors mentioned above. He believed that there is no universal or dominant method which should be imposed on, or by, teachers. Hornowski argued that the choice of the best method should be left for each teacher to decide for himself. He believed that teachers work best and are most effective if they use the method of teaching that they prefer, even if it’s not the method that is the most popularized by new pedagogical findings. The author suggested exercising caution when evaluating methods, and especially new methods. He also advised that the introduction of
new teaching styles be very slow and with caution, because those experimental changes, deficiencies, and failures are going to reflect on the students. He also emphasized that teachers’ responsibility is to adhere to certain teaching principles, most notably student independence and awareness of the student in the learning process, regardless of the method they choose to teach. The goal of Hornowski’s article was to inspire educators to use methods that they are most comfortable with to make them the most efficient and effective teachers they could possibly be for their students, which can translate into a higher level of student success.

*Parametr* had authors writing articles about the development of mental thinking in students as opposed to drills and memorization. After describing the types of mental thinking, Neapolański (1930) characterized the didactical and methodological conditions upon which mental teaching should be based. He pointed out the importance of mental thinking in shaping arithmetic proficiency and mastering basic arithmetic skills. He complained that mental thinking is underestimated and not popularized in textbooks and school programs and thus that’s why teachers often do not incorporate this during their lessons. He believed that fundamental arithmetic skills should be taught as early as elementary school, as it helps students become independent and proficient working with numbers in later stages of their mathematical education. In his article, Neapolański provided several sample exercises for teachers to use and he hoped that it will encourage teachers to use mental thinking exercises more often in their classes.

Krantz (1930) expressed a similar opinion to Neapolański. Krantz referred to the work of famous Swiss pedagogue and educational reformer Pestalozzi, who emphasized mind training as a teaching goal. Krantz supports the statement “student, by thinking,
should learn how to do arithmetic, by doing arithmetic, should learn how to think” (pg. 325). Krantz criticized teaching arithmetic proficiency through memorization of formulas, mechanical rehearsal, and steps to solve problems. He believed that this teaching style makes students thoughtless in solving problems and causes them to become uninterested in the subject. He supported his statements by providing examples of conversations between the teacher and the student. In one of them, the student asks the teacher whether he should perform addition or subtraction in the given problem. In another conversation, the teacher gave a lesson on subtraction and gave several word problems on subtraction but the last one on addition. The student said that he performed subtraction in all the problems because he thought that all the problems for the day are going to focus on subtraction. Krantz hoped to raise the awareness of teachers to the outcomes of teaching by memorization without understanding. Krantz concluded that by giving students-imposed formulas they don’t understand, students become lazy and helplessly wait for the teacher’s help. Krantz believed that students should be taught how to think critically and logically, which will lead students to make educated decisions and do independent work. In an attempt to achieve this, Krantz suggested that instead of solving problems with ready data and questions, to instead assign text that contains some basic information for which the student himself could create a problem, formulate questions, search for data, and find a solution.

Racinowski (1939) supported Neapolitański’s and Krantz’s articles by suggesting the use of mental arithmetic games to help support the development of mental thinking further. He described several examples of games which can be done either in class, the playing field, or school gymnasium. One example is a game called “Boom”, where
participants gather around in a circle and one at a time begin counting by 1 until someone in the circle reaches a multiple of a pre-agreed upon number such as 5 as well as its multiples. The players would count 1, 2, 3, 4, and then the 5th player would have to say “Boom” instead of the number 5. Failure to say “Boom” at the correct time results in disqualification from the game, and the last player remaining would be the winner.

Racinowski concluded that arithmetic lessons which incorporate games such as “Boom”, can be enjoyed by students even in after school hours, because they often see it as a fun experience which can be done with friends. The goal of Racinowski’s article was to provide teachers with ideas about how they can teach proficiency in mental arithmetic through the use of games. He believed that through these types of activities students become more engaged and reach proficiency faster.

Jeleńska (1930) raised attention to an issue pertaining to mental thinking in solving word problems. Her goal was to make teachers realize that the pace of thought is different for every person, and if we want all our students to learn in our classes, we should teach in such a way that we make it possible for everyone to learn. Jeleńska wrote that usually, less mathematically talented students have difficulty in understanding the problem as a whole, and are not able to define important parts of the problem. Due to this, they do not keep up during the class and they are forced to copy problems from the board with little or no understanding. She referred to these students as having no mathematical culture. To exemplify the importance of this situation, she compared them to people who have no musical culture. She believed that it is just as difficult for a person who has no musical culture to recognize or play a melody without practice or understanding, as it is for someone with no mathematical culture to solve mathematics
problems with an understanding. Jeleńska suggested that when solving problems on the board, we should keep the entire solution, step by step, on the board. After solving the problem, she suggested designating a student to read the solution steps from beginning to end with reasoning. She emphasized that this last step should not be neglected by the teacher, as it helps students to grasp the thought process.

In another one of her articles, Jeleńska (1931) wanted to emphasize the role of the teacher in the process of problem solving by students. She formulated a rule that teachers should not go over the solution of a problem with students until the students have taken their best attempt at solving it first. After students have attempted to solve the problem, she recommends that students’ reasoning be checked by the teacher. She pointed out that if students are not able to solve problems on their own, then the teacher should not assign more problems which they can’t solve. She provided an example in which she demonstrated how to introduce students to solving harder problems.

Racinowski (1930) wrote about the importance of developing functional thinking, which promotes student interest in mathematics. Racinowski analyzes the importance of the development of functional thinking, which is an ability to independently reason and generalize about relationships between various quantities and their results. He believed that the first phase of functional thinking should be nurtured in elementary grades while teaching arithmetic. He stated that the arithmetic examples provided in textbooks such as $12+1=13$, $12+2=14$, $12+3=15$, and $14 \times \frac{1}{2} = 7$, $28 \times \frac{1}{2} = 14$, $42 \times \frac{1}{2} = 21$, which are normally seen as boring examples for the students because they do not have content, can stimulate the student’s interest if the teacher is able to lead the student to ask the question “why?” Racinowski claimed that by asking students to justify such relations, it teaches
them to reason and predict. Racinowski’s goal was to encourage teachers to change their teaching method, to make dry examples interesting and alive. He believed teachers who complain about the lack of time for such teaching, are just making up excuses. He argued that it is more beneficial for the student to cover less exercise questions with more understanding, than to cover more exercise questions with less understanding.

A common issue raised by a few authors in the journal was the problem of introducing new mathematical concepts. We will begin by discussing the article written by Bielecki (1930). Bielecki emphasized that teaching new mathematical concepts through the use of definitions is wrong and difficult to comprehend for students. He demonstrated concepts in calculus can be introduced to students, not by giving them definitions with several unknown terms, but using facts already known them. Bielecki pointed out that teaching, where everything is “assumed”, invokes a student’s unwillingness towards the subject because they don’t understand the meaning and purpose of what they learn. Bielecki said: “no wonder then, that for many people mathematics seems to be a collection of arbitrary and unjustified things”. He turned to ask teachers to emphasize the role of intuition in their lessons and to be sensible and goal oriented in teaching.

Krasiński (1930) discussed the difficulties and most common mistakes made by students studying new concepts in geometry, as well as what teachers can do to help students better understand these concepts. Krasiński's aim was to provide some rules that the teacher should adhere to while teaching. One of the basic difficulties is for the student to distinguish the difference between perimeter and area. For example, to teach about the area and perimeter of a rectangle he suggested using different sizes of rectangles and to
ask students to identify some rectangular shapes in the classroom. He described in detail how to achieve these goals, so that definitions are understandable to the student. He also urged teachers to revisit these concepts for better material mastery by students.

Zarzecki also shared his thoughts about teaching geometry concepts. Zarzecki (1930) described a method of drawing figures which he believed should be used by teachers to teach the basics of geometry. According to Zarzecki, simply watching objects or touching them is not enough for students to learn basic geometry. Zarzecki assured that drawing geometric shapes has a positive effect on students and raises their interest in the subject. He considered this to be one of the factors of successful teaching of geometry. Furthermore, Zarzecki suggested that the drawings should be done with precision. Thus, it is necessary to have good drawing tools such as a well-articulated pencil, set square, ruler, and compass. He pointed out that students attain accuracy through the practice. He believed that drawings made with precision stimulate students’ geometric abstract thought process to a much higher degree than sloppy hand-drawn figures possibly could.

The issue of students struggling with new concepts was also discussed during professional meetings. For example, many students often found irrational numbers to be a difficult topic to grasp. Nikodym’s (1930) presentation during the meeting of the Society of Teachers in Secondary Schools and Universities in 1930 was on the topic of irrational numbers, and was later printed in *Parametr*. Nikodym’s aim was to provide teachers with an alternate way to teach irrational numbers. He believed that the difficulties encountered in the teaching of irrational numbers stem from the incorrect scientific and didactical treatment of Dedekind’s theorem. Nikodym proposed modifications to Dedekind’s theory to overcome these teaching difficulties. Before providing the theorem to the students, he
suggested that the teacher carefully explain the meaning of words such as “set” and “empty set” and complete a series of exercises that cover constructing different sets satisfying certain conditions. He believed that this approach will make it easier for students to understand the definition for irrational numbers.

Hoborski (1932) built upon this topic further when he delivered a speech during the mathematics seminar for secondary school teachers in Krakow in 1931, about the teaching of irrational numbers in secondary schools, which was later published in *Parametr*. He began by providing an overview of the history of irrational numbers and Dedekind’s theory, as well as different attempts that were made to modify it. He attempted to show which method is most appropriate for the average student in secondary school. Next, Hoborski proceeded to demonstrate how students are introduced to irrational numbers in Polish schools, and his own experience of teaching irrational numbers using Dedekind’s Theory. Among existing theorems, Hoborski believed that Dedekind’s theorem is the easiest but is still too difficult for the average high school student. In conclusion, he suggested modifying the current way of teaching irrational numbers, or at least moving it to higher level classes because it is too abstract and not comprehensible by most students at the high school level. He believed that the current approach in teaching irrational numbers will bring fruitless results in the long run.

Racinowski (1931) covered the topic of teaching new concepts as well by writing an article about the importance of stimulating a student’s imagination during the lesson. He emphasized that we should not teach by providing definitions, but instead stimulate students’ minds using concrete examples and activities first and foremost. For example, to teach fractions, he suggested to first introduce students to this concept by using real
world examples, this way they will be able to visually and intuitively imagine it.

Racinowski believed that textbooks don’t introduce the topic of fractions properly, and thus he cautioned teachers to not follow the textbook too strictly when teaching fractions. One of the major mistakes he presented is the fact that textbooks introduce fractions by first defining a half, which is an even part and a special case of fraction. Also, textbooks introduce the definition of a fraction as a new number without any prior exercises and without defining any need for a new number such as a fraction.

The topic of teaching fractions was also explored by Okołowicz (1939). In particular, he wrote about the methods used to multiply fractions. The main aim of his paper was to provide teachers with a different approach to teaching this topic as he believed his method is relatively easier and more comprehensible for students. He provided several real word problems and demonstrated how they can be introduced in the classroom to help students master the topic. Okołowicz believed that real world application problems are more meaningful in understanding the idea of multiplication of integers with fractions, and fractions with fractions.

Among the journal, are authors attempting to attract students to the study of mathematics. It was often emphasized that word problems should reflect topics that are of interest to students, and we should introduce them to these topics before giving them word problems about them so that they can imagine the entire scenario in their minds. Zarzecki (1930) wrote: “Before starting to solve a certain group of word problems, we should determine the field to which these issues relate, and introduce students to this field”. He suggested that it is good to start with problems that are known to students such as games, home life, school life, or trips. He believed in the importance of creating
fantasies in the minds of students before giving them word problems to solve. Zarzecki believed that problem solving begins with understanding the context of the problem, as it is the key to being able to define important parts of the problem, develop a strategy to solve the problem, and lastly to formulate and state the solution. Zarzecki stated that if we properly develop certain types of problems so that our students will be able to perform the appropriate operations, then they will be able to come up with other ideas and questions themselves.

Millerówna (1931) agreed with Zarzecki (1930) that problems discussed should be known to students and that they should refer to things like school life, trip expenses, or some purchases. Referring to a book written by Kühnel, a German pedagogue and mathematician, Millerówna supported his statement that exercises contained in textbooks do not prepare students for solving mathematical problems that they may encounter in everyday life. She also agreed with Kühnel that a student, who is able to solve mathematics problems in class, may be helpless in solving a real-life mathematical problem because real-life problems do not provide us with ready data nor formulated questions. Millerówna attempted to point out the need for providing students with exercises that will motivate them want to ask questions. Millerówna concludes that, in Polish schools, preparation for solving real life mathematics problems is neglected. To correct the current situation, she suggested teaching problem solving, how to gather the data, and how to formulate questions about the data.

A relevant issue regarding solving word problems was addressed by Rusiecki (1930a). He discussed exercises that lack adequate information. The purpose of Rusiecki’s (1930a) article was to make teachers and students more comfortable and
willing to solve problems that require setting conditions and making assumptions. He suggested that these problems are like mathematical problems that people face in everyday life because they lack certain data and thus require making assumptions. The author provided several examples of these types of problems and explained how these problems should be approached. Rusiecki strongly believed that these types of problems develop critical thinking skills the best.

In a separate article, Rusiecki (1939) discussed problems with familiar content. He said that it is not enough to assign problems with familiar content to the student. He suggested that the basic condition for solving problems is to understand the situation described in the problem. Students need to recognize what they are looking for in the given problem. Rusiecki believed that if we stimulate students’ imagination, we will help them capture the relation between the values given in the problem. This can best be achieved by stimulating the student's imagination to such an extent that they will put themselves in the role of the situation described in the problem. He hoped that teachers will use this teaching approach in their classes as according to him, it teaches efficiency in problem solving skills in class and in real life.

**Teaching Aids**

Significant importance was not only given to new teaching methods, but also to teaching aids, which enhance the teaching and learning process of mathematics. Several articles in the journal *Parametr* pertain to the use of teaching aids for various levels of mathematics. The purpose of placing these articles in the journal was to popularize some recently invented or constructed didactical tools. These articles were highly welcomed by the editors of the journal. Rusiecki writes: “The simpler the teaching aid the better as it is
the easier to use… Despite all the doubts that the new thing brings, we encourage to give it a try. We are delighted by every effort made in the field of teaching.” (Rusiecki, 1930c, pg. 213). These articles were written by teachers who had a desire to share their own ideas and experiences with new teaching aids they had created, improved upon ones already in existence, or to evaluate those created by others.

Among the tools that were evaluated was the ellipsograph created by Wasilewicz, a Polish artist and sculptor. Rusiecki (1930b) shared with readers that this tool received a patent and it was approved to be used in schools. The construction of this tool incorporates the compass and so it will be less expensive and thus more accessible to people. Rusiecki described the construction of Wasilewicz’s ellipsograph and demonstrated how to draw an ellipse using this tool. In comparison to existing ellipsographs, Rusiecki thought that Wasilewicz’s ellipsograph makes drawing of ellipses much easier and more enjoyable.

Another tool that Rusiecki (1930c) reviewed was the abacus with vertical wires developed by Karwowski. The author’s goal in this article was to encourage teachers to test in practice, and evaluate the advantages and disadvantages of utilizing the abacus. Rusiecki began his article by first explaining the purpose of the abacus, the various models that exist, as well as how Karwowski’s improved model differs from others and why it is superior. Rusiecki proceeded by demonstrating several addition and subtraction examples utilizing Karwowski’s abacus. Rusiecki’s article about Karwowski’s abacus attracted the interest of Łukasik (1932a) who attempted to improve the Karwowski abacus model even further. Łukasik (1932a) described how his revision of the model works. He believed that his model is even better because it is easier to use than those
currently in existence, including Karwowski’s model. He concluded that arithmetic using his model is almost the same as the currently adopted way of doing arithmetic.

Also, among the tools evaluated were commonly used tables. Buzniak (1930) explained how tables for numbering decimal, integer, and fractional numbers were a valuable tool for teaching about numbers. He described how the tables work and how easily they can be used in class. From his own experience, he concluded that it keeps students interested and paying attention so they become more independent and concentrated. Krasiński (1931) also evaluated tables, and in his article, he described a table used for finding a common denominator. He pointed out that one of the advantages of using the table for finding a common denominator is the fact that it only contains what is necessary for finding the common denominator and makes learning easier. Krasiński provided instructions on how to construct such a table and presented several examples through which students should become comfortable with using it. Krasiński made some general statements about the importance of teaching aids in teaching and learning. He said that: “Value of the teaching aids should be assessed primarily based on what they provide to student who handles them; what can be demonstrated using it to the whole class is of minor importance here”. Krasiński believed that while there are many teaching aids available, it is important to choose one that will be easy to use and can be held in the student’s hand.

**Instructional Practices**

Several authors of the journal *Parametr* have written articles describing the course of the lesson they taught, what they covered, and the activities that were conducted during the lesson. Among the articles, there are articles that relate to areas
such as arithmetic, algebra, and geometry. The main aim of these articles was to provide teachers with some successful didactical practices as well as to share some ideas about how certain topics can be taught. These articles did not go into rigorous detail about any of the theoretical background of the subject nor did they provide any suggestions on how to implement those lessons within larger program areas.

Several authors devoted their articles to sharing their successful instructional practices of introducing new concepts using real life examples. For example, Rusiecki (1930d) outlined his lesson about division, which incorporated real life examples into the lesson. Students in his class had to think about how to divide various currency notes evenly amongst a few people. He began by assigning a problem in which currency notes of ones, tens, and hundreds, would evenly divide into three, and then proceeded to more complicated cases where some money had to be changed to divide equally among three people. After real life examples, he demonstrated to his students how to perform long division on paper. The aim of this lesson was to demonstrate the beauty of long division in real life problem solving. Rusiecki wanted his students to learn the concept before learning the algorithm so that it does not feel to them that it is just a mechanical operation. Teaching in this manner, students learn procedure based on the conceptual knowledge, and they also see its usefulness.

Szablewska (1931) wrote her article about how she taught introduction to division with emphasis on the use of concrete examples. In her lesson, she used chestnuts to show the difference between dividing “into” and dividing "among". After explaining how to mathematically express division, Szablewska assigned word problems involving division. Referring to the book *Methods of the First Years of Teaching* written by Jeleńska on,
Szablewska recommended that teachers go over the solution step by step with their students. She also encouraged teachers to assign problems where students will come up with word problems themselves.

Another author, Stala, shared his experiences in teaching elementary arithmetic using real life examples. In his article, Stala (1931) presented the course of four lessons devoted to the detailed study of the number 6 from different points of view (this approach is often called monographic study) and he outlined precisely how each lesson is conducted. Stala wrote that this article is intended to help teachers who have difficulty teaching arithmetic in the lower grades. He stressed that a key role is played by the selection of appropriate teaching aids. Every lesson begins with a review of the material from the previous lesson. He introduced new concepts with real life scenarios that students must imagine, and then he asked each of the students to place in front of themselves the appropriate number of sticks that reflect the situation described by the teacher. Next, the teacher uses other teaching aids, such as paper circles, fruits, flowerpots, or any other objects that are were available to illustrate the concept. After the use of teaching aids, he followed up the lesson with written activities of the concepts just studied. The remaining lessons are constructed in a similar fashion, with the only difference being in the way of adding and subtracting with the use of the number six. At the end of the article, Stala stated that exercises contained in textbooks are constructed in such a way that they do not require a student to think. Instead, he suggested using some of the exercises provided by him in his article. After many years of teaching practice, he believed that his exercises are more appropriate, because they teach independence, mental resourcefulness, and are more interesting to the student.
Several authors emphasized not only the use of real-life examples, but also active participation by all of the students during the lesson. For example, Mościcki (1932) described the course of seven lessons on the topic of multiplying fractions. He wrote his article because he believed that even if students know how to multiply fractions, they do it thoughtlessly, not realizing the importance of the operation itself. He believed that the reason for this is due to the way we teach. Mościcki wanted to show teachers an effective way, using practical examples, in which one can teach this topic. He divided teaching into three sections: calculation of the area of squares and rectangles, whose measures are expressed in terms of fractions; calculation of the cost of goods when the weight and cost are expressed in terms of fractions, and calculation of parts from parts. Mościcki assigned word problems to solve and asked students to create some word problems on their own for the given numbers. During his lesson, all the students were participating and taking an active interest.

Racinowski (1932) also supported active participation by students. Racinowski’s lesson on finding the area of a circle is characterized by using figures and shapes cut from cardboard, their weight, and their comparison. In the lesson, students were first asked to cut a triangle, a rectangle, and then a circle using specific length relationships. The second task involved weighing the objects and comparing them. Students were able to estimate the area of the circle, without knowing the formula, based on the area and weights of the triangle and rectangle. Lastly, with the help of the teacher, students were able to derive a general formula for the area of the circle based on the results of this hands-on activity. Racinowski’s goal was to familiarize teachers with different methods
to help them build a lesson plan on the topic of the area of a circle that would also increase the level interest from their students.

Active participation by students is something that Hornowski (1932) greatly advocated in his article, in which he provided details from his six lessons on the Binomial Theorem. During each lesson, he called on students to come up and write the calculations on the board. During the first lesson, he covered the expansion of binomial expressions by direct multiplication, and by the use of Pascal’s triangle properties. Hornowski did briefly mention Pascal and his achievements. After that, with the help of students, he generalized the binomial expansion. During the next class, he covered how to find each binomial coefficient using factorial notation. Then, he showed the proof of the Binomial Theorem and lastly, he spent three hours on practicing the use of the Binomial Theorem. Hornowski stated that he called on “stronger” students to come up to the board when the concept was new. However, all students seemed to be comfortable asking questions, as he wrote that even weaker students were actively participating and asking questions during the lesson. Hornowski’s main goal was to demonstrate to teachers that with the participation of students one can efficiently cover the Binomial Theorem.

In Parametr, several authors encourage experimentation with new ways of teaching, especially if the currently utilized methods of teaching are not bringing about the desired outcomes. The articles mentioned below provide teachers with an incentive to try and experiment with innovative ideas. The goal of Stattlerówna’s (1930) article was to share her experience with teaching about geometric figures. She presented a different way to form a cube from cardboard that diverged from normally used methods with a cross-shaped template. Stattlerówna began her lesson by giving out already assembled
cardboard cubes. After specifying its characteristics, she suggested that students take the figures apart. As she expected, her students claimed that the template would be of a cross shape. When the students took their cubes apart, they were all astonished by the different shapes of templates they had. She let them experiment further by instructing them to look for more template shapes that would make a cube. Stattlerówna was satisfied with the outcomes of her lesson because she claimed that she broke the habit of using cross-shaped templates to create cubes. She also believed that this teaching style deepens students’ understanding of templates and facilitates abstract thought of geometric figures.

Much like Stattlerówna, Wilkowski (1930) presented his unique way of teaching the properties of triangles. Wanting to maximize the interest of his students, he brought a triangle made from a cardboard box to class and asked students to draw the same triangle. He then asked students what information they would need from him in order to construct this exact triangle. They started by drawing triangles while only knowing one side, then one angle, then one side and one angle, then two sides, then two sides and one angle etc. Experimenting in this way, students were able to arrive at the correct conclusions on their own. All students were actively participating by drawing different types of triangles, asking questions and formulating conclusions. Students were given an opportunity to experience drawing triangles with various types of information, instead of just being given dry facts to memorize. Wilkowski wanted to show teachers that if they make lessons interesting, they can achieve great results. Wilkowski’s (1932) second lesson about the similarity of triangles was designed in using the same thought process and level of student involvement.
Some general remarks for successful lessons were shared by Jeleńska (1939). In her article, Jeleńska addressed the issue of assessing the purpose and value of a lesson. She wrote this article for current and future teachers to emphasize that it is critical for the teacher to have clear goals for the lesson as well as to have a game plan in place to achieve these goals. For future teachers she recommended not concentrating on the performance of the student, but to make sure that students have a clear understanding of the meaning and the structure of the lesson.

**Curriculum**

Several articles in *Parametr* referred to specific problem areas of the Polish mathematics curriculum, or they discussed general issues related to the curriculum. These articles pointed out the positive and negative characteristics of the mathematics curriculum, and often offered some ideas to fix current problems. The authors refer to programs from foreign countries to illustrate how they are different and to share that knowledge with colleagues.

Some authors have expressed their opinion about the selection and arrangement of the teaching content and teaching goals in mathematics classes. Cwojdziński (1930) devoted his article to issues related to the selection of teaching content. He stated that the usefulness of the school depends entirely on making the right choice for teaching material. As Cwojdziński wrote “the first issue is what to teach, and then how to teach”. He emphasized that when choosing the appropriate teaching material, one should ensure that the content is instructive and useful in a practical profession or in later education. Cwojdziński stated that curriculum should not include content that is too abstract and should not hinder intellectual development. For such content, Cwojdziński considered
irrational numbers, based on Dedekind’s cut and axioms of geometry. As another weakness of the current program, Cwojdziński pointed out the fact that derivatives are not part of the program. He believed that it will help in studying a larger variety of functions. In his article, Cwojdziński referred to other countries to show how such issues were handled there. For example, he said that in England, America, and Germany, irrational numbers are not part of the curriculum of secondary schools. He cited the works and statements of several French and German professors to portray the situation in foreign countries. Cwojdziński hoped that Polish schools will recognize foreign trends and take their success into account when making changes to the current curriculum.

Additional remarks on the subject of teaching functions were offered by Kulczycki (1930). He suggested that what should be taught in each grade, as outlined in the current program, and what is actually being taught in each grade, are two different things. Kulczycki stated that the Polish algebra program from 1919-1921 was modeled by the ideas of Felix Klein, a German mathematician and mathematics educator. Klein’s teaching reforms for mathematics were very popular at the beginning of the 20th century in many European countries, especially in Germany. The concept of a function as a dependency relation was the key concept of the reform and was considered as a unifying concept in mathematics. Kulczycki noted that Polish programs recognized that the concept of functions is fundamental, but they have limited its study to only linear and quadratic functions. Thus, Kulczycki claimed that Polish programs do not implement the ideas for which the program was created as they fail to accustom students to “discover functional dependencies”. Kulczycki believed that the study of functions in secondary school does not portray the meaning and benefits of functions variability. He stated that
studying the concept of functions will only be beneficial if further study will be based on it, and if it will explore different varieties of functions. According to Kulczycki, it is necessary to emphasize the meaning of new concepts so students can make connections between what they are studying. He believed that extending the study of functions to those other than linear and quadratic, will help achieve the desired purpose of the program.

Few other authors claim that some topics are not adequately emphasized in the school curriculum. For example, Neapolitański (1932) stated that divisibility rules, finding factors, the greatest common factor, and the least common multiple are not sufficiently emphasized in school. The goal of his paper was to bring up the quality of teaching about divisibility, to show the useful elements of the divisibility rule, and to showcase some of its applications in arithmetic. He pointed out that these topics are not emphasized enough in schools and that students solve exercises very mechanically without understanding the meaning of the assigned problems. Neapolitański provided several examples, which he believed can improve the quality of teaching and understanding of these topics. One of the improvements he recommended is for students to be given the opportunity to think and to ask the teacher questions. Teachers should not give out the information to the students in a simple lecture setting, but instead should create an environment which allows students to arrive at the conclusions themselves.

A subject not sufficiently addressed in school practice, according to Gabriel (1939), is the subject of geometric shapes in oblique projection. He believed this situation was the result of either underestimation of the practical value of such exercises or in the inadequate knowledge of the topic. Gabriel hoped that hints he provided in his article
would aid teachers to teach this topic, as he believed that drawing is based on imagination and reasoning. According to Gabriel, every student, even those without artistic abilities, can become good at drawing when given proper instructions on how to do it.

Sadziewiczowa expressed her opinion regarding the content selection for elementary school. In her article, Sadziewiczowa (1931) wrote that elementary school should introduce a student into various fields of knowledge in such a way as to allow the mind of the student to be more receptive to knowledge in the future. She provided several examples demonstrating how to teach in this fashion. The act of teaching should not only enrich the content, but also the perceptiveness, ingenuity, thinking, and scientific imagination of the students. She expressed the importance of the studied information being interesting to the student and that it also stimulates their desire to learn. The editors of the journal *Parametr* encouraged teachers to examine the book written by Sadziewiczowa and Daszewska for more examples of the teaching practices like the ones mentioned by Sadziewiczowa in her article.

Sierzputowski (1932) offered his remarks on problems related to teaching arithmetic in the lower grades. In his opinion, puzzle-like exercises should be excluded from the school program. Instead, he suggested that exercises related to real life should be included. He claimed that students should be introduced to a variety of problems gradually, so they are easier to understand for the student. Sierzputowski believed that it should be desirable to provide “curiosity” questions, but only those that will arouse students’ interest. He suggested the type of problems students in different grades should be assigned. The main aim of his article was to emphasize the importance of keeping the
difficulty of problems to a moderate level. He believed that puzzle-like problems hinder students’ mathematical development and interest in the subject because of their difficulty.

While content selection was very important, as demonstrated by the authors above, the idea that teachers should closely follow the development of their students was being popularized by Muhułowicz (1931). In his article, Muhułowicz states that teachers should closely follow their students’ development of the concept being taught, and direct their teaching based on how that development is going. Muhułowicz goes on to share his experiences and thoughts about teaching proportions. The main goal of his article was to demonstrate the natural development of the concept of proportions from elementary school to high school. He stated that students should first understand this concept intuitively, based on concrete examples and activities, so that in later learning periods the formulas will have more meaning and will be easier to grasp for them.

Jurgielewiczówna’s (1931) article about her teaching experience at the teacher seminars supports Muhułowicz’s idea of following student development. Jurgielewiczówna admitted that she was never satisfied with the results of her teaching when she provided students with proofs because it was too abstract for them and when she taught the continuation of that course, students would not remember anything that they learned before. When Jurgielewiczówna changed her teaching style, from abstract to more practical and technical, her students became more interested and eager to work on assignments and exercises. In teaching this way, and by following the development of her students, she was able to cover what was in the school program with increased student performance. She believed that more abstract and theoretical concepts should be introduced in later grades, after students become fluent with basic facts. The aim of her
paper was to make teachers aware that flexibility in their teaching styles can have a profound impact on their students’ performance in class.

In *Parametr*, several authors criticize the methods of teaching certain topics that were suggested by the school program. Rusiecki (1930g) reviewed algorithms for multiplication and division. His article contains historical information referring to previously used methods for multiplication and division both in Poland and in other countries. He also listed records of written multiplication and division algorithms which appeared in textbooks. Rusiecki opposed the multiplication algorithm suggested by the school program because it required more thinking and more work than a well-known algorithm used years earlier for multiplication. He provided an example to demonstrate the differences between the algorithms and why the earlier algorithm is superior. He cites old Polish textbooks to demonstrate that the multiplication method he favors had been in use for a very long time. He also cited French and German textbooks to show that they had been using that method as well. The division algorithm, on the other hand, was constantly being changed in Polish textbooks. After showing several kinds of adopted division algorithms from the textbooks, he favored the English division algorithm. He suggested replacing the school program’s division algorithm with the English method since it’s easier to use. He wrote this article with the intent that when the new curriculum changes will be taking place, the multiplication and division algorithm he suggested would be implemented into the curriculum.

*Parametr* published a course of presentations with remarks about the goals of mathematics teaching presented by Stallerówna (1932) and Hornowski (1932a) during a meeting of the Mathematical Committee of the Second Pedagogical Congress in July of
1931 (Komisji Matematycznej II Kongresu Pedagogicznego). Stallerówna (1932), discussed the teaching goals, course objectives for arithmetic and geometry, and actions needed to implement and achieve the teaching goals in primary schools. Among the teaching goals, Stallerówna listed gradual development of quantitative and spatial imagination, development of functional thinking, ability to make correct generalized conclusions and being able to justify them. Stallerówna suggested that to achieve these goals teachers should, for example, make the use of the child environment and their innate activity by directing them to counting, measuring, building etc. Similarly, Hornowski (1932a) discussed the teaching goals in high schools, the educational importance of mathematics and program conditions that must be considered in order to achieve teaching goals. The report from his speech was then published in the journal. Hornowski’s (1932b) article contains extensive thoughts and observations for each of the questions he was exploring. To name a few of the teaching goals, he lists developing students technical and arithmetic proficiency, quantitative and spatial imagination, mathematical thinking, understanding the importance of mathematics applications in the real world. To achieve these goals, Hornowski suggested that high school curriculum cannot follow the goal of the higher institutions but must fulfil its own tasks. It should in fact, make connections with other subjects like physics or chemistry. He also believed that the content of mathematics programs should be reduced, it is better to learn less but with better quality and understanding. Simultaneously, students are expected to master the studied material.

It is interesting to note that later in 1939, when the Jędrzejewicz reform had been implemented for several years, Hornowski wrote a series of articles that were devoted to
various reflections on the goals of teaching and content selection for teaching of mathematics in primary schools (Hornowski, 1939a; Hornowski, 1939b; Hornowski, 1939c). Hornowski (1939a) acknowledged that mathematics is the subject of common complaints both among students, teachers, parents and administrators. He emphasized that material goals of teaching mathematics are understood and accepted by society, but formal ones are less clear, even for educated people. Hornowski notes that this misunderstanding mainly comes from ignorance of the specific characteristics of mathematics as a science and as a school subject. Hornowski stated that these two objectives are complementary. He believed that it is not possible to achieve materialistic goals, that is, proper mastery of material with efficiency and proficiency, without proper formal development. Hornowski also believed that mathematics shapes the personality and character of the student. Then, he emphasized that one of the most important responsibilities of a mathematics teacher is to accustom students to neatness, consistency, and care, as a requirement of the subject. According to Hornowski, the work of the teacher should serve as a shining example of organization and consistency through their own work.

In his second article, Hornowski (1939b) wrote about the selection of the content in the mathematics curriculum. He believed that the content selection should compromise both the material and formal teaching goals. He argued that the content being taught should present practical examples discussed in a logical way that would interest young students but also be of some use in their everyday lives. Hornowski stated that the textbooks used in class offer practical exercises that should be geared towards older students, and which don’t necessarily interest, or were found confusing, by younger
students. The content of the exercises often needed to be explained to younger students
before the actual mathematics exercises could be solved with understanding. Hornowski
understood that the Ministry of Religious Denominations and Public Education created
their curriculum to help students become aware of the economic needs and goals of the
country, however he believed that the content of the textbooks is often too difficult for
the students to understand. He concluded this article by pointing out the importance of
making sure that the presented material be adapted to the students’ abilities and interest.

In his third article, Hornowski (1939c) discussed the stages of teaching and how
one can achieve the teaching goals set for the program. He stressed that teachers should
not rush while teaching, and especially when introducing new concepts to the class.
Students need time to absorb new material so rushing through it can only serve to be
detrimental. Once again, Hornowski highlighted the importance of understanding the
material being studied. The main goal of Hornowski’s articles was to show that both the
student and the teacher must work together in order for the student to succeed at learning
the material.

Hornowski (1939a, 1939b, 1939c) attempted to demonstrate that it is not always
possible to achieve all the goals of the program. Sometimes it may be because the
program is too demanding, difficult, or it may be due to other things like the uniform
final examination, that must be given priority, and thus there is no time to cover
everything, or to cover it in enough depth and detail. His articles offer guidance for the
teacher and they point out the positive and negative characteristics of the mathematics
curriculum.
Hornowski also had important remarks on the topic of high school examinations. Hornowski (1930, 1932c) devoted two articles to issues related to exit high school mathematics examinations, which in Poland are called *matura*. Hornowski (1930) wrote about the inconsistency of problems in the exams as they were not standardized. His criticism was mainly that the problems range from very easy to so complex that even very good students do not know how to approach them. He provided several examples of the varying difficulty of the problems from previous exams. He stated that it unfair to assign problems of different difficulty to different students. Hornowski thought that this diversity of problems creates the impression that the objectives of the exam are not clear. He also pointed out that the exams contain problems that are not part of the curriculum. Hornowski said that this causes a feeling of panic not only among students but also among teachers as there is no clear strategy for preparing students for exams questions outside of the curriculum. The aim of this paper was to present the types of standardized problems that should be given to students during the examination. Hornowski believed that the exam should be designed such that the average student can not only pass, but actually do relatively well on it.

Hornowski’s second article is a continuation of observations from his first article. Hornowski (1932c) wrote this article to the Board of Directors who design the exit examinations. He pointed out flaws of the exam by citing specific questions from the test. He hoped that the Board of Directors will take his comments into consideration and will make the next version of the test more uniform and with less flaws.
Textbook Reviews

The journal *Parametr* contains a section with reviews of various Polish and foreign mathematics textbooks. The main aim of the Polish textbook reviews was to introduce teachers to existing Polish textbooks, to show how the textbooks present their material, and how they align with the mathematics program. These reviews also helped teachers become familiar with different methods of teaching specific topics. The main aim of foreign textbook reviews was to introduce Polish teachers to foreign mathematics programs, teaching methods, as well as the successes and difficulties in mathematics teaching in other countries. Several of the authors’ textbook reviews are briefly showcased below.

Hornowski (1930a) briefly reviewed an algebra textbook from 1929 for fourth grade gymnasium written by Z. Chwiałkowski titled “Algebra”. He explained that one of the main advantages of this textbook is the fact that it is closely aligned with the mathematics curriculum published in the Educational Programme for Secondary Schools by the Ministry of Religious Denominations and Public Education (see Chapter II). Hornowski stated that the textbook is written clearly, concisely, and systematically and contains many varied exercises. Hornowski also believed that the author uses great examples to introduce new concepts and is able to present them such that they are appropriate for the fourth-grade gymnasium students. One of the disadvantages, Hornowski stated, is that some parts the textbook contain exercises that are too complex for fourth grade students. He also believed that some definitions should have been introduced later in the textbook, due to the level of difficulty. Despite minor flaws,
Hornowski’s opinion was that this algebra textbook is one of the best textbooks available with regard to richness of content and it satisfies the mathematics program requirements.

Rusiecki (1930h) provided a brief overview of the set of trigonometric exercises by H. Pniewski published in 1929. Rusiecki believed that Pniewski’s work deserves to be more widely known by teachers because of its excellent quality of exercises. Rusiecki said that the problems are ordered from easiest to hardest difficulty and offer enough exercises to develop problem solving skills using trigonometric identities and to master the arithmetic techniques. This set of exercises also contains solutions to most of the problems and questions from the exit examination.

Krasiński (1932) reviewed a book written for teachers by A. Rennert called “Monograph of the First Ten Numbers” published in 1930. The book is 40 pages long and is written in the form of a detailed lesson plan for teaching about the first ten digits. Rennert wrote this textbook to facilitate the work of the teacher. Each digit is presented using different approaches, teaching aids, and games. Krasiński stated that Rennert asks strange questions and uses gloomy statements in the book. He also believed that some numbers could have been introduced more carefully to the reader. Krasiński suggested that teachers should familiarize themselves with the content of the book before reproducing the author’s suggested methods of teaching in the classroom.

Krasiński (1932a) also reviewed a 112-page textbook titled “Arithmetic for First Year of Elementary Schools” by M. Makowski which was published in 1930. The review was very general and without much depth. Krasiński simply listed the content of the textbook and how the author presents the content. He also noted that the textbook is written with respect to the trends of teaching that were contemporary to that time. To
introduce new concepts the author made use of drawings with real life examples. Krasiński does not provide his opinion on the teaching approaches demonstrated in the textbook as the purpose of this review was to introduce teachers to the content of the textbook.

Several foreign textbooks have been reviewed in Parametr. The main aim of these reviews was to introduce Polish teachers to foreign mathematics programs, teaching methods, as well as the successes and difficulties in mathematics teaching of other countries. Kulczycki reviewed the majority of foreign textbooks that are contained in the journal. The textbooks he reviewed were of German, French, or American origin.

Kulczycki (1930a) reviewed a 455-page algebra textbook titled “Algebre, Classe de Mathematiques” written by E. Borel and P. Montel, who were French mathematicians. The book was published in 1929 and was written in accordance with the changes to the mathematics curriculum in France in 1925, which unified the mathematics curriculum in gymnasiums and is also when mathematics became a fundamental and compulsory subject for all students. Kulczycki wrote this review because Borel’s “Algebra” textbook from about 30 years earlier was of significant importance to teaching in all of Europe and in Poland in particular. Kulczycki asserted that many authors of that time modeled their textbooks on Borel’s ideas. Kulczycki highlighted that this textbook is characterized by an easy and straightforward fashion of presenting the material, and it avoids matters that are too general or too abstract for the students. An updated edition of this book has been developed by Borel and Montel and was published in 1926. In 1929, due to changes in the curriculum, Borel and Montel published another algebra book, “Algebre, Classe de Mathematiques” and this is the book Kulczycki wanted to inform the readers about.
Kulczycki summarized that the textbook is easy to follow, it avoids generalizations and abstractness. The main advantage of this new textbook is that it also contains a review of the material from the lower grades, which Kulczycki stated is great for review purposes and for preparation for the exit examinations. Kulczycki noted that in Poland there are no textbooks written in this way. He hoped that the content and design of the textbook will interest Polish teachers and that it will appear in Polish translation as well.

Kulczycki (1930b) reviewed an extensive book about a new methodology for teaching mathematics called “Methodik der Mathematischen Unterrichts” written by German professor P. Maennchen and published in Germany in 1928. Kulczycki stated that it contains many interesting teaching approaches that often differed from approaches popularized in Polish textbooks. Kulczycki pointed out that the fashion in which the book is written showed that the author is very experienced, as it contained many well thought out examples and tips. Kulczycki noted that Polish mathematics programs are not as advanced as they are in Germany. Thus, he only reviewed the parts of the book that were also in the Polish school program, as he believed this would interest readers and teachers the most. He reviewed the sections on arithmetic, algebra and elementary geometry. Each description contains a summary of information that is covered in the book along with some examples. In each description, he portrayed the author’s thoughts about each topic and his recommendations about what to cover and what methods to utilize to teach about each topic in each grade. Kulczycki observed that the author’s teaching goal is to stimulate students’ ability to discover. Kulczycki tried to avoid providing his opinions about Maennchen’s ideas and only stated what he believed to be appropriate for Polish schools, as well as what he believed would not be successful if implemented.
Kulczycki (1931) devoted his next review to a book written by E. R. Breslich, titled “The Teaching of Mathematics in Secondary Schools, Volume I. Technique.” in 1930 on the subject of teaching mathematics in secondary schools in America. Breslich was a professor of Teaching of Mathematics at the School of Education in the University of Chicago. Kulczycki stated that American books about teaching should be interesting for European readers because of the cultural differences between the countries and continents. He believed that American books often present different teaching methods in an easier and unique way as well as subjects that Polish textbooks often do not emphasize. Breslich wrote this book in order to help improve the teaching of mathematics in America because he noticed that many American students were not able to master the course material. Similar trends were observed in Poland and Europe but no action was being taken to solve this problem. Kulczycki noted that educators in Europe were not taking any action because they were hoping that in the near future, the schools would be attended by students who are more prepared for the coursework and who will be able to meet the requirements of the system. American educators on the other hand, worked to improve their teaching methods to meet the needs of the students. Kulczycki noted that Breslich’s attitude towards teaching is more concentrated on pedagogical aspects rather than mathematical. Topics covered in Breslich’s book include tests that help measure the students’ knowledge of the material as well as how the teacher should interpret the results to improve their teaching. One of the most important things that Breslich stressed is that every teacher should have clear lesson goals before they even begin teaching. Kulczycki listed the teaching methods that Breslich discussed in his book and pointed out that Breslich recommended to combine different teaching methods during the lesson, as each
method has its own benefits. In his book, Breslich offered his advice about how to motivate students to study mathematics, how to teach students to study mathematics, how to teach students to listen to the lecture with understanding, and how to read the textbook with an understanding. Overall, Kulczycki wrote very briefly about all the ideas mentioned by Breslich, just enough to interest readers to reach for the book, and have them reflect on their own teaching methods.

**School Mathematics**

*Parametr* was a platform for the exchange of mathematical findings and ideas among mathematicians and teachers. The topics of these articles varied widely and covered different areas of mathematics, such as arithmetic, algebra and geometry. Some of the articles included the results of research conducted by the authors.

Several articles were devoted to so-called “discussion” problems, that is problems whose solution leads to linear equations, quadratic equations with one parameter or it requires testing algebraic or trigonometric functions. Polish school programs from 1922 put an emphasis on these types of problems (Wuczyńska, 2012).

In his first article, Cwojdziński (1930a) outlined in great detail, how to create examples of quadratic equations in one variable with a rational discriminant. Cwojdziński devoted this article to help teachers create such quadratic equations based on the formulas he provided in his articles. Cwojdziński’s second article is a continuation of his first paper (Cwojdziński, 1930b). He provided even more formulas to create quadratic equations in one variable with a rational discriminant. Cwojdziński emphasized that he would prefer that such a need did not exist but that is only possible if these “discussion” problems are given less emphasis in the school curriculum. Cwojdziński believed
problems with practical applications or problems that help students understand higher mathematics are of bigger importance to students and should have more emphasis in the curriculum.

Straszewicz wrote several articles in which he outlines the difficulties encountered in solving certain geometry problems. Straszewicz (1930) devoted this paper to so-called “discussion” problems in geometry. The subject matter of his article is the logical issue occurring in algebraically solving geometric problems. He discussed the conditions that need to be satisfied when solving problems and he demonstrated how to check for each condition. Straszewicz stated that some of the important topics he mentioned in his article are not covered in any textbook and he stressed the importance of these aspects. The main aim of his article was to provide some valuable tips that teachers should keep in mind when encountering such geometry problems. Straszewicz’s article had aroused the interest of several mathematics teachers, and they asked him for examples of the problems he discussed in the article. As a result, his first paper became a fundamental precursor for Straszewicz’s subsequent paper, which he wrote to answer the questions teachers had posed him. In the second paper, Straszewicz (1930a) provided solved examples on how to apply the methods he mentioned in his first article into school practice.

Straszewicz (1930b) wrote this article about the relationship between the elements of a triangle. He proved that systems of trigonometric relations between sides a, b, and c of a triangle and its opposite angles A, B, and C, respectively, are equivalent. He pointed out that the theorems given in geometry textbooks lack the necessary conditions for these systems to hold. In his proof, he placed emphasis on these necessary conditions.
Straszewicz’s article illustrated the importance of detail, and the attention to detail, in mathematical proofs.

In general, during the years of 1922-1929 in Poland there was much emphasis placed on “discussion” problems. Cwojdziński (1930) stated that these “discussion” problems came to light in Poland from France, but by the late 1920s it was evident even in France that they had reached a peak. These problems met with criticism in Poland due to how much time was being devoted to them while neglecting other types of problems. In an effort to make solving such problems easier, a table was created to make solving the problems a routine procedure.

Among the articles about school mathematics, there are also articles directed toward student readers. Cwojdziński’s (1930c) motivation in writing this article was to help future students who will be taking mathematics examinations in solving strategies for problems on sequences. Cwojdziński provided methods to facilitate solving such problems. He began his paper by providing a few examples and the most common mistakes made in finding the formula for a given sequence or for finding the next term of a sequence. Subsequently, he presented several possible methods for finding the formula for a given sequence.

Rusiecki (1930e) contributed several articles to the area of arithmetic. He wrote papers about decimal approximation and shared his knowledge and insights on the subject with his readers. Rusiecki stressed the need and importance of decimal approximation accuracy. He supported his statements by providing relevant practical examples and cited French literature devoted to the arithmetic of decimal estimation. By referring to this work, he cited cases from which the need for the approximation arises.
He also provided the rules for correct rounding when multiplying and dividing numbers. Rusiecki’s second article is a continuation of the ideas he discussed in the first paper. Rusiecki (1930f) went into even greater detail about the degree of accuracy of the decimal approximation. He explained the difference between decimal approximations by excess and defect, the absolute error, tolerance of error and more. His work also contained many general rules explained in detail using mathematics symbols and specific examples.

Not only were there articles written by teachers of mathematics published in the journal *Parametr*, but also the works of famous Polish mathematicians such as Sierpiński, Steinhaus and Tarski. These mathematicians and their contributions to mathematics are presented in the section *Contributors of the Journal*. Below is a brief description of the articles they had published in *Parametr*.

Sierpiński only contributed one article to *Parametr*. In his article, Sierpiński (1932) communicated valuable information about mathematical induction to both the teacher and student. He began by providing a few statements which were true for a certain number of natural numbers, but not for all of them. He emphasized that the given statements cannot be proven true for all natural numbers by selecting and showing their truth, even for a large number of natural numbers, because the next term could prove to be false. In this way, Sierpiński introduced mathematical induction, the most commonly used mathematical proof technique to establish truth of a given statement for all natural numbers. He provided several examples along with proofs by induction. Sierpiński also noted that infinite sequences are often defined by mathematical induction. Among the examples he covered are Pascal’s triangle and Fibonacci numbers. He also discussed
backward induction, induction for all real numbers and transfinite induction, which is an
eXTension of mathematical induction to well-ordered sets.

Steinhaus contributed two papers to *Parametr*. In his first article, Steinhaus
(1932) discussed various functional scales and their applications. He began by
introducing the metric scale. Then he showed how to use three metric scales to construct
and use a nomogram, a two-dimensional diagram that shows the relationship between
measurements. He also discussed projection scales and its applications. In his second
paper, Steinhaus (1932a) demonstrated how to use a longimeter, an instrument which he
developed to measure the lengths of curves on maps. Longimeter is a transparent sheet
with three square grids consisting of perpendicular lines spaced at equal distances of
3.82mm, two of which are rotated with respect to the first one by rotations of 30° and 60°
respectively. The number of intersections of the curve with the lines of the longimeter
gives the approximate length of the curve in millimeters.

A very well-known Polish mathematician, Tarski, had three of his papers
published in the journal. Tarski’s (1931, 1932) articles were devoted to elementary
geometry, and sparked much interest among mathematicians. The goal of his articles was
to inspire mathematicians and teachers to work together to uncover new findings in
mathematics. He achieved this goal by encouraging readers of the journal to respond to
his questions and conjectures. Tarski ended this article by posing several questions,
problems, exercises, and conjectures which aroused the interest of several
mathematicians. Soon after, Moese (1932) solved Tarski’s conjecture, and his solution
was published in the journal *Parametr* (Moese, 1932). Moese’s work was fundamental in
understanding Tarski’s second paper (Tarski, 1932). In his third paper, Tarki’s (1932a)
presented an alternative approach to the standard definition of the circumference of a circle and its properties.

**Contributors of the Journal**

The majority of contributors of the articles came from Poland. Usually at the beginning of the article, the authors first and last name along with the city from which the article was submitted can be found. Among the contributors were secondary school teachers, university professors, and well-known mathematicians. Individual articles were authored by a single person, and articles written by women were uncommon. The following is a brief biography of the authors who had a major influence on the journal or Polish mathematics.

A substantial contributor to *Parametr* was Antoni Marian Rusiecki. He was the founder, editor, and main contributor of the journal. Rusiecki was born in 1892 in the southern part of what is current day Poland. Rusiecki received his secondary education in Warsaw, Poland. He initially attended the Polytechnic Institute in St. Petersburg to study shipbuilding, and then he transferred to the University of Kiev to study at the Department of Mathematics and Natural Sciences, which he graduated from in 1916 (Królikowski, 1991-1992). As soon as Rusiecki finished his education, he became heavily involved in Polish schools. Rusiecki earned his teaching experience by teaching at secondary institutions in Kiev, Bialystok and Warsaw. He also organized and taught seminars for teachers (Królikowski, 1991-1992). One of the important positions that he held that had a major impact on the development of mathematics education in Polish schools was as an instructor at the Ministry of Religious Denominations and Public Education (MWRiOP), where he was responsible for development and administration, as well as running teacher
training courses throughout the country (McFarland, McFarland & Smith, 2014). He was a member of the Polish Commission for Mathematical Curricula and Textbooks at MWRiOP (Królikowski, 1991-1992).

One of Rusiecki’s interests was to popularize mathematics and he did so by being strongly involved in editing mathematical journals. In 1930, he founded and co-edited the journal *Parametr* with Stefan Straszewicz. Rusiecki authored many articles that also greatly varied in their subject matter. Among his articles, are those that related to teaching methods, articles discussing curriculum, textbook reviews, as well as articles about school mathematics. He also became a founding editor of the journal *Matematyka: Czasopismo dla nauczycieli* in 1948. Together with Straszewicz, Rusiecki was also involved with the organization of the Polish Mathematical Olympiad and was a member of its Main Committee for several years.

Rusiecki was a participant at a few congresses of mathematicians, such as the First Congress of Polish Mathematicians in Lwow, as well as the Second Congress of Polish Mathematicians in Vilnius. It is likely that Rusiecki met other prominent mathematicians of the time at these congresses such as Sierpiński, Tarski, and Steinhaus, all of whom later published articles in Rusiecki’s journal *Parametr*.

Rusiecki authored and coauthored a series of mathematics textbooks for primary schools and books for teachers on the subject of teaching methods for mathematics. The National Library Catalog in Warsaw contains over 200 textbook entries which Rusiecki authored or co-authored, many of which were updated editions of previous textbooks. Many of his textbooks were published and used in Polish schools in the 1930s and then again after the war and even after his death. Rusiecki passed away in Warsaw in 1956.

Stefan Straszewicz was an important figure to the journal *Parametr*. He was the co-founding editor as well as a major contributor of articles to the journal. Straszewicz was born in 1889 in Warsaw. In 1905, due to his participation in a school strike, he was expelled from secondary education in Warsaw. As a result, he continued his studies independently, and in 1906 he passed the high school exit examination, and received his secondary education diploma from Białystok. In 1914, he obtained his doctorate in mathematics from the University of Zurich. Straszewicz worked at the university as a researcher until 1919 while simultaneously teaching mathematics at Zurich secondary school. Upon his return to Warsaw in 1919, Straszewicz worked in two secondary schools and lectured in the National Pedagogical Institute until 1923, and the Free Polish University (Wolnej Wszechnicy Polskiej) until 1939 where Straszewicz became acquainted with Alfred Tarski and the two became colleagues (McFarland, McFarland & Smith, 2014). He taught at the Warsaw University of Technology in 1920 and was appointed a professor at the Warsaw University of Technology in the Engineering Faculty in 1928. Not too long after that, he became the dean of the faculty (1932-1935) and later the vice-president (1938-1939) (Lakoma, n.d.).
From 1926 to 1939, Straszewicz was the chair of the committee on mathematics at the Ministry of Religious Denominations and Public Education. He chaired the Polish Commission for Mathematical Curricula and Textbooks for Primary and Secondary Schools. He became involved in the development of curriculum, and in teacher training and supervision nationwide. Straszewicz was also a member of the Main Council of Higher Education in Poland (Piłatowicz, 2006-2007, McFarland, McFarland & Smith, 2014). Straszewicz authored and co-authored over 200 mathematics textbooks for elementary and secondary level schools, many of which were updated editions of previous textbooks and were used by many generations of students.

Straszewicz was heavily involved in editing mathematical journals. He was an editor of the journal *Mathematical and Physical Review (Przegląd matematyczno-fizyczny)* from 1923 to 1925, a journal devoted to instruction at the secondary level. From 1932 to 1939, he edited the journal *Parametr* to which he also contributed several articles. His articles were mainly related to school mathematics and a few of the articles were book reviews. From 1937 to 1939 he was a member of the editorial board of the journal *Matematyka i Szkola*. He was also a member of the editorial committee of the journal *Matematyka* which was first published in 1948.

At the beginning of World War II, he was forced to leave Warsaw. Upon his return to the country in 1942, he taught at the State Higher School of Technology and became the president of the clandestine University of Technology. He helped to rebuild the Warsaw University of Technology after it had been shut down and damaged during the war. He served as the chair of the Mathematics Department from 1945 to 1960, and
then became the vice-president of the university from 1948 to 1951. From 1945 to 1951, he also lectured at the University of Warsaw (Lakoma, n.d.).

In 1949, he founded the Polish Mathematical Olympiads along with Rusiecki, which had many of its laureates become famous mathematicians (Piłatowicz, 2006-2007). Straszewicz was a member of the Polish Mathematical Society, and became its president from 1953 to 1957, and then in 1969 he became an honorary member of the society. Straszewicz was involved in international scientific societies. He was a member of the International Commission of Mathematical Instruction (ICMI) and was the vice president from 1962 to 1966. He also participated in many international conferences and congresses representing Poland and as the head of the National Polish Commission. Straszewicz passed away in Warsaw in 1983.

Sierpiński, Tarski, and Steinhaus weren’t published as prolifically nor were they as involved with *Parametr* as Rusiecki and Straszewicz were, but their work had a major influence on Polish mathematics.

Wacław Sierpiński was born in 1882 in Warsaw, where he also received his secondary education, and began studying mathematics at Warsaw University in 1900. He moved to Krakow to continue his education at Jagiellonian University, from which he graduated with a Doctoral degree in 1906. In 1908, Sierpiński obtained his habilitation degree at Lwów University. He received a doctor’s degree *honoris causa* from 10 universities (Schinzel, 1966-1997).

Sierpiński was an Austro-Hungarian citizen and as such he was interned by the Russians during World War I as an enemy alien and spent eight months in the Russian town of Vyatka (Domoradzki & Stawiska, 2018). In 1915 he was permitted to move to
Moscow, thanks to the efforts of mathematicians in Moscow. In 1918, Sierpiński returned to Poland where he resumed his teaching at Lwów University for one semester. In the fall of 1919, he was appointed professor and the Chair of the Mathematics Department at Warsaw University and a couple of years later became dean of the Faculty of Philosophy. During the German occupation of WWII, Sierpiński was formally employed as a bookkeeper by the department of the City Hall in Warsaw and participated in clandestine teaching. In the fall of 1945, he moved back to Warsaw and resumed his prewar teaching career.

Sierpiński was the president of the First Polish Mathematical Congress in Lwów (1927), the president and organizer of the First Congress of Mathematicians of Slavic Countries in Warsaw (1929) as well as the Third Polish Mathematical Congress in Warsaw (1937), and also represented Polish mathematics at many of the International Mathematical Congresses. Sierpiński met and was in contact with several other important figures at these congresses such as Rusiecki, Straszewicz, Tarski, and Steinhaus. It is likely that Sierpiński was asked to publish some of his articles in Parametr by Rusiecki and Straszewicz as a result of their interactions at these congresses. He published some of his articles about school mathematics in the journal Parametr and Matematyka.

Sierpiński had written hundreds of articles, many monographs, books and textbooks. It was evident that Sierpiński was not indifferent to matters pertaining to education. In 1930, he co-authored a series of seven textbooks for algebra, arithmetic, and geometry courses for elementary and secondary schools. These textbooks were written in accordance with the guidelines of the Jędrzejewicz reform. Some examples of the textbooks include: “Arytmetyka i Geomertia, dla klasy V szkoły powszechnej”

Sierpiński died in 1969 in Warsaw.

Alfred Tarski was born in Warsaw in 1901, and he too had a significant influence on Polish mathematics. From 1918 he studied mathematics and philosophy at the University of Warsaw and obtained his doctorate degree in 1924. Since then, he was employed as a secondary school teacher and held minor teaching positions at Warsaw University until 1939. He became well known during this period for his work in set theory and logic. In 1939, he travelled to Harvard University in the United States to attend a Unity of Science meeting. Due to the start of World War II in Poland, he remained in the United States. He held a number of temporary university positions at Harvard University, the City College of New York, and the Institute for Advanced Study at Princeton. In 1942, Tarski joined the Mathematics Department at the University of California at Berkeley where he was given tenure in 1945 and became Professor of Mathematics in 1948. He spent the reminder of his career there and became professor emeritus in 1968. He continued to teach at Berkeley until 1973 and supervised doctoral students until his death in 1983. (Gómez-Torrente, 2017).

A book by McFarland, McFarland, and Smith (2014), contains biographical and historical information about Tarski’s life, including his contributions to the journal Parametr and Matematyka i Szkoła. The authors have translated and discussed the three articles on school mathematics and fourteen exercises in the journal’s problem section that Tarski had contributed.
Tarski is recognized as one of the greatest mathematical logicians with broad mathematical interests. He contributed to set theory, measure theory, topology, geometry, classical and universal algebra, algebraic logic, various branches of formal logic and metamathematics. He wrote many articles, a few textbooks and monographs, among which are: Geometry (1935), Introduction to Logic and to the Methodology of Deductive Sciences (1936), A Decision Method for Elementary Algebra and Geometry (1948), and Cardinal Algebras (1949).

Hugo Steinhaus, a famous mathematician who greatly contributed to Polish mathematics, was born in 1887 in Jasło, Poland, which at that time was a part of Austria-Hungary. Steinhaus was homeschooled until the age of 9. He graduated from secondary school in 1905, which he only attended for one year. That same year, he began attending the University of Lwów where he studied mathematics and philosophy. After a year, he transferred to the University of Göttingen in Germany after speaking with Stanisław Jolles, a professor of Polytechnic in Charlottenburg. At the time, the university of Göttingen was considered the world capital of mathematics and is also where Steinhaus was awarded a doctorate degree in mathematics with distinction in 1911. Steinhaus obtained his habilitation degree at Lwów University in 1917 and three years later became an Associate Professor in the Mathematics Department at University of Lwów. Steinhaus was one of the founders of the famous scientific center called the Lwów School of Mathematics (Duda, 2004-2005).

During World War II, he participated in secret teaching programs where he taught mathematics to children. After the end of the war in 1945, Steinhaus traveled to Krakow where he was elected a member of the Polish Academy of Learning. Later that year,
Steinhaus moved to the University of Wroclaw and stayed there until 1961 (Duda, 2004-2005).

In 1929, Steinhaus co-founded a new journal called *Studia Mathematica*, which was mainly devoted to functional analysis. In 1931, he became a member of the editorial board of *Mathematical Monographs*. From 1947, he became a part of the editorial committee of the journal *Colloquium Mathematicum*. In 1953, he founded the journal *Zastosowania Matematyki* (Applications of Mathematics). Steinhaus published several books, among which is the well-known *Mathematical Snapshots, Orzeł czy reszka?* (Head or tails?), *Czym jest a czym nie jest matematyka?* (What is and what is not mathematics?). He made contributions to a wide range of mathematical areas, including geometry, functional analysis, probability theory and statistics, and theory of trigonometric series (Duda, 2004-2005). Steinhaus died in 1972 in Wrocław.

Among the contributors to *Parametr* are secondary school teachers and professors who are worth mentioning because of the volume of articles they had published in the journal. Kazimierz Cwojdziński was born in 1878 in Poznan. He attended gymnasium in Poznan and received his secondary education at Siemens-Oberrealschule in Charlottenburg, Berlin. Cwojdziński completed his college education in mathematics in Zurich and Berlin. While he was studying, he was employed as a mathematics teacher at a technical college in Berlin. After completion of his college degree he moved to Poznan, where he continued to work as a teacher in gymnasium. In 1924, Cwojdziński obtained his doctorate degree in Mathematics from Poznan University. From 1928, he taught higher mathematics in the field of chemistry at Poznan University. He was also a
mathematics teacher in secondary schools in the Poznan school district and the head of
the Mathematics Center in Poznan (Wachułka, 2003).

During the German occupation of WWII, Cwojdziński participated in clandestine
teaching. From 1945, Cwojdziński became a professor at the Engineering School in
Poznan and worked with a team of mathematicians at the Department of Architecture of
the Faculty of Civil Engineering. He also taught mathematics and mathematics education
at the University of Poznań (Wachułka, 2003).

Cwojdziński published his works in many different journals, including
Wiadomości Matematyczne, Muzeum, Parametr, and Matematyka. He also published
several works in the German journal Archiv der Mathematik und Physik. Cwojdziński’s
articles in the journal Parametr and Matematyka related to either secondary school
curriculum or school mathematics. In his articles he discusses issues related to curriculum
and offers some valuable thoughts. He also contributed a few articles on school
mathematics, some of which have been discussed under the school mathematics sections.
Cwojdziński died in 1948 in Poznan.

Stefan Kulczycki was born in 1893 in Zakopane, Poland. Kulczycki contributed a
great number of articles to the journal Parametr. In 1910, Kulczycki graduated from the
Trade School of Merchants in Warsaw and from 1911 to 1914 he studied mathematics at
Jagiellonian University. In the years 1914 to 1917 he fought in the Austrian army. Due to
paresis of his hand, he was released from service in the army which gave him an
opportunity to resume his studies. In 1918, Kulczycki graduated by passing the teacher's
examination.
Kulczycki obtained his teaching experience at the secondary level by working at several secondary schools in Tomaszów Lubelski and Warsaw. From 1922, he worked as an assistant, then adjunct lecturer and lecturer at the Warsaw Polytechnic. In the years 1925 to 1934 he lectured at the College of Education (Wyższe Kursy Pedagogiczne) in Warsaw and between 1934 to 1935 he became an instructor of mathematics at the Ministry of Education (Marczewski, 1971).

During the German occupation, he participated in secret university teaching. From 1945 to 1950, he taught mathematics at the Warsaw Polytechnic and was the Chair of the Department of Mathematics at the State College of Education (Wyższa Szkoła Pedagogiczna) from 1950 to 1956. In 1956, he moved to the University of Warsaw, where in 1958 he became the Chair of the Department of Elementary Mathematics and History of Mathematics.

Kulczycki’s interests included the development of mathematical thought and problems of didactics of mathematics. He co-authored several textbooks, some of which were with Straszewicz, for elementary and secondary schools such as: Nauczanie geometrii w klasach VI i VII w szkole podstawowej (Teaching of geometry in grade VI and VII in elementary school) (1952), and Nauczanie geometrii w liceum (Teaching of geometry in secondary school) (1954). Kulczycki was interested in non-Euclidean geometry and published a Non-Euclidean Geometry book in both the Polish and English languages. Kulczycki published several articles in the journal Parametr and Matematyka i Szkoła. He was also a member of the editorial committee for the journal Matematyka i Szkoła. His contributions to the journals were mainly in review of foreign textbooks and his observations and comments were about Polish curriculum and teaching methods. His
Conclusions for Parametr

In the beginning of the 20th century, Poland found itself in a new socio-political environment and needed to construct a uniform national education system out of the existing fragmented and separate systems imposed during the partition. The main aim of the Ministry of Religious Denominations and Public Education plan was to create an education system that would be free from foreign influences, and more importantly a system that will not resemble the characteristics of the Russian, Prussian, or Austrian systems during the partition. With the Polish education system still weak and underdeveloped due to the large differences between partitions, Poland could not immediately cut itself off from the international influences of the past.

Some Polish mathematicians and teachers were educated outside of Poland before it regained its independence, others were educated in Poland while it was under foreign rule and run by foreign education systems. Countries such as Italy, France, Germany, Austria, and Russia all had some level of influence as their ideas and trends permeated into educating Polish teachers and mathematicians of the time. In turn, this influenced the development of the education system in Poland because it was the aforementioned Polish teachers and mathematicians that were helping to shape the education system in Poland once it had regained its independence.

The Educational Programme for Secondary Schools of 1919-1922 and the Jędrzejewicz reform of 1932 were the first major movements geared at constructing a
uniform Polish education system. The journal *Parametr*, founded in 1930, had published many articles that were in line with the social and political reality of the country. During the time between the two reforms, works on the subject of improving mathematics education were common.

Due to the fact that there was little to no references and literature for mathematics teachers to gain ideas from, there existed a need for the dissemination of ideas which the journal *Parametr* appeared to fulfill. Articles that were published in the journal were written by the representatives of Polish mathematics and teachers of secondary institutions that were very well known for their active participation and interest in reconstructing Polish mathematics education at that time.

In terms of new teaching methods, it is clear that authors of the journal were well acquainted with international trends. The early 1930s brought forth discussions of new methods of teaching from other countries such as the Dalton plan, heuristic method, supervised study and more. The main drive for the search of new methods, as is evident in articles by several authors in *Parametr*, was in large part due to the fact that in this time period the Polish education system was finally free from foreign control to undergo reform and unification under The Ministry of Religious Denominations and Public Education guidelines. The Ministry’s plan did not force teachers to use a specific method in their classrooms nor did they favor any particular method. As a result of this freedom, there are several articles in *Parametr* that evaluate and promote different teaching methods.

The promotion of active participation by students, and the need for developing students’ independence in learning was highly evident in the literature. Some authors
were opposed to the old methods of teaching through lecture and memorization where students were passive recipients of knowledge, and instead they wanted to modernize teaching methods to make students more active in the classroom by stirring their imagination and creating an environment where the students want to participate and ask questions during the lesson.

In the process of reconstructing the mathematics curriculum, emphasis was also placed on the selection and arrangement of the teaching content appropriate to the level of students’ knowledge and interest. Importance was stressed on real life applications instead of simple cut and dry theoretical mathematics. It was advised that the curriculum should closely follow students’ development and should not be made too abstract so as to keep the students interested, engaged, and participating in the lessons. Teachers believed these changes should be made due to the current social and political atmosphere in post-war Poland, they wanted what students were learning in school to be more applicable to the needs of everyday life and thus make their lives and assimilation to the new environment easier. Foreign trends in mathematics teaching in America, England, and Germany were also recognized and some authors in the journal suggested that these trends be taken into account when developing the Polish curriculum.

The teaching aids shared by some of the authors in Parametr were seen as a bridge between intuition and abstraction. Sharing of instructional practices, based on the authors’ own teaching experiences, were commonly written in the journal. Its main aim was to familiarize others with successful didactical practices. The main aim of the textbook reviews section of Parametr was to introduce teachers to foreign mathematics programs, teaching methods, and the successes and difficulties in mathematics teaching
in other countries. A secondary aim of this section may have been to help influence the changes that were undergoing in Poland’s mathematics education system. These textbook reviews were published alongside articles that were suggesting changes to teaching methods, practices, and curriculum. Textbook reviewers in the journal wanted to present textbooks that could either be adopted by Poland’s mathematics program or at least incorporated in part. These were textbooks that the reviewers believed could solve some of the issues and difficulties being faced by the mathematics education system in the early 1930s. These reviews were being published in the journal around the same time that the Jędrzejewicz reform was being discussed and while The Ministry of Religious Denominations and Public Education was holding meetings to create an education system.
Chapter VI

Analysis of Matematyka i Szkoła

The journal Matematyka i Szkoła, was first published in 1938 in Poland by the Society of Teachers in Secondary Schools and Universities (Towarzystwo Nauczycieli Szkół Średnich i Wyższych). The journal was edited by Bronisław Bielecki, a secondary school mathematics teacher, in collaboration with other teachers of secondary school and representatives of higher education Stefan Kulczycki, Jan Leśniak, Tadeusz Sierzputowski and Stefan Straszewicz. The journal was devoted to issues related to elementary mathematics and its teaching in secondary schools. In the first issue, the editors wrote that the purpose of the journal was to exchange thoughts between all those who had an interest in the teaching of mathematics in secondary schools. The editors also mentioned that the journal would publish articles that provide scientific illumination into issues related to the teaching of mathematics in secondary schools, articles on didactics and methodology of elementary mathematics, articles about the history of mathematics, book reviews, materials for classroom practices, mathematical problems, chronicle, and cosmography notes.

The first issue of the journal Matematyka i Szkoła was written in November of 1937, but wasn’t published until January 1938. According to the initial announcement, it was supposed to go out three times a year, but in issue 2-3 from June 1938, it was announced that it would appear four times a year. In total, five issues were published, with a total volume of about 200 pages. The last issue appeared in April 1939. Publication of the journal was interrupted by the start of the Second World War.

The table of contents of each issue contained sections called articles and bibliography. Four issues contained a chronicle section, one of the issues did not. To get
a better view of the nature of the journal, the content published under each heading will be examined.

ARTICLES: This section contained a variety of papers that one might expect in a standard mathematics education journal. Among them, there are articles that related to different topics in school mathematics, a range of topics in teaching of mathematics, as well as school curriculum.

BIBLIOGRAPHY: This section provided reviews of new mathematical books and textbooks.

CHRONICLE: This section included various news briefs about past and upcoming mathematical meetings and conferences, new books and journals, and changes to final examinations.

THEMES

To examine the themes explored in the journal, all articles longer than one page have been classified in Table 3 under the following categories:

- Teaching Methods (articles related to the process of teaching and learning mathematics)
- School Mathematics (articles that describe mathematics concepts, proofs of theorems, and results of research of authors of the articles)
- Conference / Book / Textbook Review (articles in this category include books reviews, course of the meetings and conferences, and speeches delivered during the meetings and conferences)

Within each category, articles will be subdivided into similar content categories, and then the content of the articles will be analyzed in the light of the author’s statements. The content of some articles was not related to any of the categories, and thus they were excluded from examination.
Table 3. Number of articles longer than 1 page that appeared in the journal, classified by theme, and their distribution

<table>
<thead>
<tr>
<th>Categories</th>
<th>Sub-Categories</th>
<th>Volume 1</th>
<th>Volume 2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching Methods</td>
<td>Algebra</td>
<td>4</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Geometry</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>School Mathematics</td>
<td>Algebra</td>
<td>7</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Geometry</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Textbook/Book/Conference Review</td>
<td>Various Themes</td>
<td>11</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Foreign Textbooks</td>
<td>5</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Polish Textbooks</td>
<td>4</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Total number of articles</td>
<td></td>
<td>22</td>
<td>4</td>
<td>26</td>
</tr>
</tbody>
</table>

Out of the 26 articles that satisfy our criteria, 17 were selected for review below.

All of the articles were written in the Polish language. Collaboratively written articles were very rare. In the note from the editors in the first issue, it is clear that articles in the first issue were mainly submitted by members of the methodological centers organized by the Ministry of Religious Denominations and Public Education, mainly from Krakow Center. Straszewicz, a member of the editorial board, was the chair of the committee at the Ministry of Religious Denominations and Public Education at that time, and thus he was likely acquainted with most of the authors and invited them to submit their papers to the journal. Later, the group of authors of the articles was expanded to teachers of secondary schools and mathematicians working in post-secondary institutions. The *Authors of the Journal* section will introduce the most prominent and influential authors of the journal.

In the *articles* section of the journal there are published articles that related to school mathematics, teaching of mathematics, and mathematics curriculum. This section contained all the articles with only one exception, in the fourth issue from 1938, there exists the work of Steckel, a professor of mathematics, who provided 61 problem exercises which varied in topic and difficulty from arithmetic and algebra. These
problems were divided into problems for high school students, for mathematics circles, and mathematics teachers. Steckel mentioned that a continuation of problems would appear in the following section, but for unknown reasons they never did. Instead, in the next issue in the *chronicle* section (Issue 1, 1939), there are sets of mathematics problems that appeared on the high school examination in 1938 and the beginning of 1939 in Warsaw schools.

The length of the articles varies slightly depending on the category. In general, the journal published some articles that are quite long and thoroughly elaborated while others are rather short and more general. Articles about teaching methods are usually about four pages long, with one being ten pages long. Articles that were published as a result of talks given at conferences and professional meetings were on average the longest among all articles. They were on average 13 pages long, with the exception of one article being only four pages long. These articles were usually about teaching methods in geometry and algebra. Articles about school mathematics were of varied length. There were some as short as one page, four pages long, and even 16 pages long. Articles that reviewed books were usually less than three pages long.

The articles selected for analysis will be reviewed in chronological order within their categories. Without intending to review all the articles, noteworthy articles and those that discussed similar topics or issues were selected to gain insight into how these discussions changed over time. Articles by famous Polish mathematicians and mathematics educators as well as those who have contributed the most articles to the journal have also been examined.
Teaching Methods

There are several articles that raised various issues relating to teaching methods in mathematics and were typically authored by teachers of mathematics. In this section of the journal, there are articles that relate to general teaching and learning methods for mathematics as well as articles that describe teaching methods for specific areas of mathematics such as algebra and geometry. The authors of the articles share their experiences and offer recommendations about how to approach teaching topics they discussed in their articles and encouraged other teachers to examine and reflect on their own teaching methods.

A frequent topic of discussion in the articles was in regard to concepts that students found difficult to master because they were too abstract. The authors often diverged from traditional approaches utilized in textbooks in an effort to achieve better student performance. The discussion will begin with remarks given by Czarkowska (1938) who describes her experience in teaching about limits in secondary school. In the article, she listed the possible ways to introduce the concept of limits and stated her opinion about which approach fits better into the school program. Czarkowska identified two options for teaching the elementary introduction of limits, one using the Cauchy method, as written in the textbooks, or another method based on the concept of the lower and upper bound of the monotonic sequence. Czarkowska said that Cauchy's definition is logically too complicated, which in turn results in students experiencing difficulties with the use of this definition. In her opinion, students often make mistakes due to not having a clear understanding of simple statements. Moreover, she pointed out that Cauchy's
definition cannot be formulated in simple everyday language, and this hinders the student's intuition. Czarkowska suggested that the Cauchy sequence is desirable for complicated nonmonotonic sequences, and since those are not studied on a secondary school level, she advocated for the use of the second definition instead. The main goal of Czarkowska’s article was to share her didactical practices with other teachers in the hope that teachers would also recognize the need to teach students using methods that are easier to grasp to minimize memorization without understanding of the studied concepts.

Matulewicz (1938) demonstrated an elementary way of deriving an equation of a tangent line to a circle. He noted that the mathematics program does not cover the concept of the derivative of a function, and so one cannot teach finding the equation of a tangent line through the use of the derivative. Thus, he demonstrated how to obtain such an equation without using concepts outside the school curriculum. He noted that such procedures can also be extended to finding a tangent line to other conic functions. The purpose of Matulewicz's article was to demonstrate to teachers that they can conduct a lesson about finding the tangent line to a conic function without the need for derivatives, but instead through the use of elementary mathematics concepts.

In another one of his articles, Matulewicz (1939) focused on a teaching method that led to a better understanding of concepts in geometry as well as the development of spatial imagination. Matulewicz believed that improvised models, such as models folded from rods, rubber cords, flat pieces of cardboard, or wire mesh, can greatly facilitate the learning process for students of new concepts and the visual understanding of three-dimensional geometry. Matulewicz added that the experience gained with the models should be further reinforced by drawing models on paper. He claimed it is worth giving
such examples during the class as it facilitates the shaping of spatial imagination in students. Matulewicz provided several problems that teachers can assign during the class with the use of the cube model.

Recommendations for changes to the teaching of geometry were proposed by Hoborski during the meeting of the Methodological Society of Mathematics organized in Krakow in 1933 (Hoborski, 1938). Hoborski’s talk became a foundation for his paper published in *Matematyka i Szkoła*. Hoborski (1938), began by providing theoretical remarks about the evolution of concepts in geometry, and offered his suggestions about how the topic of transformations should be covered in secondary schools. Hoborski suggested making better use of geometric transformations such as translations, rotations, symmetry, and similarity. He provided examples of possible ways each transformation can be used in studying different geometric concepts. Hoborski believed that these ideas are easier than the axiom methods widely used in textbooks because it does not strive to use abstract ideas but it rather develops and shapes students’ imagination.

During the meeting of the Methodological Society of Mathematics organized in Lwów in 1938, Patryn provided his reflections pertaining to teaching geometry. Patryn (1939) stressed that the second semester of geometry class is fundamentally based on the knowledge obtained in the first semester. Due to this fact, he stated that there is a need to review the previously studied material about similarity of triangles from the first semester to ensure that it is thoroughly mastered by students. Patryn suggested that the review should contain well selected problems in which students will not only gain proficiency in proving similarity of triangles, but also some practical and useful information which should broaden the students’ interest in the subject. The goal of his article was to provide
a number of interesting problems for review regarding similarity of triangles that teachers were welcome to incorporate into their lessons.

Attempts to further interest students to study mathematics were common. Among the articles of *Matematyka i Szkola*, extracurricular activities were among the topics that sparked interest during conferences. During the Third Polish Mathematics Congress, Steckel (1938) gave a speech focused on issues related to teaching gifted students. He shared his own experiences and offered his insights into activities designed for gifted students. Among his suggestions were optional exercises, mathematics circles, and extracurricular readings. Steckel believed that the best opportunities for maintaining and developing the mathematical abilities of gifted students, is to offer optional exercises during the class or to assign them as homework. Steckel advised that it is best if these exercises are connected with topics studied during the lesson and that their solution has some easy and instructive interpretation. He provided several examples of such problems from his own lessons. Among the exercises, he also suggested assigning problems for generalizing given formulas, theoretical problems, problems with the use of a particular solution, etc. Other activities discussed by Steckel were mathematics circles, or extracurricular activities which allowed for the enrichment of mathematical knowledge by studying concepts outside the school curriculum. He believed participation in such extracurricular activities, if properly organized, extends, deepens, and reinforces students’ knowledge, and prepares them for independent work. He briefly listed possible activities and topics to cover during a meeting of the mathematical circles. Lastly, as a valuable component of learning, he also listed extra-curricular readings. Steckel believed
that optional readings should be assigned for gifted students as they can help students to become more independent learners.

Wilkowski (1939) built upon the topic of extracurricular activities further when he delivered a speech during the meeting of the Methodological Society of Mathematics organized in Poznan in March of 1939. In his speech, he shared his experience in running extracurricular activities, and a report of his speech was then published in the journal (Wilkowski, 1939). Wilkowski (1939) shared his first failures during these activities and also shared how he was able to overcome those failures. He explained that the main reason for the failure was the poor selection of topics. He believed that topics should stimulate students’ curiosity, willingness to work independently on optional problems, and should also relate to other subjects. Thus, Wilkowski found success in achieving these goals when he introduced students to the topics of differential and integral calculus. He said that students enjoyed these topics because they were new mathematical concepts for them, in which he exemplified its practical applications. Wilkowski described the course of such activities, as well as the expectations of the students. After all, this is an extracurricular activity, so the students need to be interested enough to attend in the first place. He admitted that his teaching is different from curriculum requirements because he often replaced rigorous definitions with conceptual views and he approached rigorousness in stages so his students could gain a deeper understanding of the concepts being studied. This article is intended to serve teachers by offering them ideas about how to organize extracurricular activities and keep their students interested and coming back.
Textbook Reviews

Matematyka i Szkoła contains a section with reviews of various Polish and German mathematics textbooks. The main aim of these reviews was to introduce teachers to existing Polish and foreign textbooks, to explain how they present their content, and how they can be utilized in the classroom. Below is a brief description of several of the authors’ textbook reviews.

Łempicka (1939) presented a brief introduction of what was at that time a very popular book by Steinhaus called Kalejdoskop Matematyczny. This book was also translated and published in English in 1938 under the title Mathematical Snapshots. Over the next 60 years, this book was revised several times and published in many other languages. Łempicka believed that this book is excellent as a supplement to diversify mathematics learning, because it was rich with puzzle-like, and mind-entertaining problems from different areas of mathematics. Łempicka pointed out that the problems in this book are enriched with illustrations and diagrams as well as many problems that have content related to other subject areas, which is usually appreciated by students. She suggested that teachers use some of the problems from this book to liven up the routine exercises they assign to students. For example, teachers can assign them for homework to be done individually or in groups, or even as optional problems for gifted students. Łempicka also noted that problems contained in the Kalejdoskop Matematyczny are great to use during the mathematics circle meetings because they are not overly complex and certainly have interesting content. Łempicka’s general review served to inspire teachers to reach for this book and potentially incorporate some of the material into their lessons.
Stanisław Krystyn Zaremba, son of a famous mathematician Stanisław Zaremba, followed in his father’s footsteps in studying mathematics and published two of his articles in the journal. Zaremba (1938, 1938a) presented an overview of books published by the Mathematical and Physical Circle in Krakow in 1932 called the Library of the Mathematical and Physical Circle of Students of Jagiellonian University (Biblioteczka Kółka Matematyczno-Fizycznego Uczniów Uniwersytetu Jagiellońskiego) edited by W. Wilkosz, professor at Jagiellonian University. Zaremba stated that these books were mainly intended for college level students and those who wish to complete or strengthen their knowledge of mathematics. Zaremba (1938, 1938a) summarized several volumes of these books by providing information about their content, the main theories that they presented, as well as how the material is presented in terms of its difficulty, that is, what level of preparation is required to understand the content. Zaremba’s articles served as an incentive for teachers, educators, and autodidacts to get acquainted with the volumes of the book in which one has an interest.

Kulczycki (1938) described the content of a German handbook for teachers, Mathematik im Dienste der national-politischen Erziehung, ein Handbuch für Lehrer (Mathematics in the Service of National Political Education, a manual for teachers), edited by A. Dorner and issued at the request of the German Association of Mathematical Societies in 1935. Kulczycki informed Polish readers about the current trends in the German handbook. This handbook contains about 300 problems whose content is based on German general-educational and political considerations. The handbook contains mathematical problems relating to military, war, politics, statistics, biology, population and more. Through the content of the problems, the handbook is meant to make everyone
aware that mathematics is indispensable for a thorough understanding of the knowledge and inner workings of the nation. Kulczycki abstained from offering his personal opinion about this handbook.

Wojtowicz (1938) provided a one-page general review of a German book called

*Das Grenzgebiet der elementaren und höheren Mathematik in ausgewählten Kapiteln dargestellt (The relationship of elementary and higher mathematics presented in selected chapters)* by Kommerell published in 1936. The book is 249 pages long and is about the connection between elementary and higher-level mathematics. Kommerell’s book arose from his teaching experience at teachers’ seminars as he recognized that young teachers fail to appreciate the connection of elementary and higher mathematics once they are indulged in university studies. Wojtowicz briefly described the content of each of the three sections of the book noting that the author demonstrated known facts in a new, interesting and informative way. Wojtowicz was also delighted by how the author uses methods of elementary mathematics to explain advanced concepts. Wojtowisz stateed that schools often do not appreciate and neglect the use of elementary mathematics, and its relationship with higher mathematics. He suggested that Kommerell’s book should be available in every library for teachers so they can familiarize themselves with his ideas and use it in their teaching.

**School Mathematics**

*Matematyka i Szkoła* served as a platform for the exchange of mathematical ideas among mathematicians and teachers. Articles in the school mathematics category related either to concepts in algebra or geometry. The authors who contributed their articles about school mathematics were mathematicians and teachers of mathematics at the
secondary and university level. Some of the articles about school mathematics were brief and general while others offered extensive and detailed information.

The discussion below will begin with a brief, two-page long paper written by Steckel. Steckel (1938a) wrote his article on the subject of finding rational zeros of a polynomial with integer coefficients. He illustrated a proof for finding all possible zeros of a polynomial function with integer coefficients and then demonstrated how to find zeros of a polynomial using one specific example of a polynomial of fourth degree. Steckel suggested that this topic is suitable for use during extra-curricular activities such as mathematical circle meetings and hoped that his remarks will be of use to teachers.

Gołąb and Leśniak (1938, 1938a) devoted their two extensive articles to matters relating to contemporary definitions of fundamental mathematical concepts of functions and equations. The aim of the first article was to provide definitions to fundamental concepts of mathematics such as functions and equations on an intuitively understandable level. In the second article, the authors provided insights about how to introduce these concepts in secondary school (Gołąb & Leśniak, 1938a). They stressed the importance of providing students with clear examples before and after introducing any new concepts. The authors also provided examples to demonstrate possible ways to introduce functions and equations during the lesson. Gołąb and Leśniak pointed out that in school textbooks in Poland, France, and Germany, one can find different definitions for a function and an equation. They cited a few different examples and briefly compared them. Gołąb and Leśniak's purpose for writing their articles was to familiarize teachers with different ways that these concepts can be taught and to point out the importance of introducing intuitive examples before the definitions.
An article illustrating the development of the concept of a fraction and its teaching was illustrated by Malecki (1938). His article was published in the journal as a result of his speech, which was delivered during the meeting of the Methodological Society of Mathematics in Krakow. Malecki distinguished two ways of introducing fractions in school practice, formal and practical. The formal definition is understood as “quotient of two whole numbers” while the practical is understood as “part of a whole”. He provided a general overview of each method and assessed them in terms of their didactical value. Malecki stated that the formal definition of a fraction is not enough in school practice. He stated that the fact that students know how to add two fractions does not mean that the students will know how to solve practical problems such as adding lengths or weights which are expressed as fractions.

During the conference of the Methodological Society organized in Równem, Chwojnik delivered a speech in which he illustrated the developments of mathematics in the distant past. An extensive report of his speech was later published in Matematyka i Szkoła (Chwojnik, 1938). Chwojnik (1938) described the history of the development of algebraic equations in antiquity. He began his remarks with the developments coming from Egypt, Greece, and India. Chwojnik portrayed the difficulties encountered by mathematicians in these ancient civilizations when they attempted to solve problems. Obviously, they did not know about the algebraic techniques which had developed later, and which seem so simple to mathematicians today, so they had to use their intuition and ingenuity. This article served as a historical source of information for those interested in the origins of algebraic equations as well as what methods early mathematicians used to solve these problems.
**Contributors of the Journal**

There were 23 distinct authors who had contributed their work to the journal. The majority of the authors of the journal had contributed only one article. Six authors contributed two articles and one contributed four articles. There were only two papers that were co-authored. The majority of authors were mathematics teachers at the secondary level, but there were also some authors who were teachers at the university level or they were mathematicians. The editors of the journal were not the main contributors of the articles. Only two out of five editors had published an article in the journal. Below is a brief biography of some of the authors who have played a key role in the development of the journal *Matematyka i Szkoła* and Polish mathematics.

We will begin by first introducing the editorial committee. For the biography of Stefan Kulczycki and Stefan Straszewicz, the editors of the journal *Matematyka i Szkoła*, see section *Contributors of the Journals* in *Parametr*. Stefan Kulczycki was introduced in *Parametr* because he was one of the authors that contributed a great number of articles. Stefan Straszewicz, on the other hand, was the co-editor and the author of a few articles in the journal *Parametr*. Bronisław Bielecki, the founder of the journal *Matematyka i Szkoła*, was born in 1883 in Czerwony Dwór. After completing his studies at the Polytechnic in Riga, he was employed as a teacher at secondary institutions in Warsaw. In the interwar period he was an instructor at the Ministry of Religious Denominations and Public Education (Piotrowski, 2003). Together with Straszewicz, Rusiecki, Cwodziński, and others, he was a member of the Polish Commission for Mathematical Curricula and Textbooks at MWRiOP (Grotowska, 1932). In 1937, he founded the journal *Matematyka i Szkoła*. He was also the editor for the publisher Obiektywne
Sprawdziany Wiadomosci. The National Library Catalog in Warsaw contains 29
textbook entries which Bielecki authored or co-authored, many of which were updated
editions of previous textbooks. Among them are Algebra Elementarna (Elementary
Algebra) (1955) and Trygonometria: dla kl. 10 i 11 (Trigonometry for grades 10 and 11)
first published in 1950 and then updated many times according to the education reforms.
Bielecki also translated Feller's well-known book *An Introduction to Probability Theory

Jan Leśniak, also a member of the editorial committee, was born in 1901 in
Ropczyce, in the south-eastern part of Poland. He attended gymnasium in Jasło and
completed his secondary education with distinction in 1919. After that, he began to study
mathematics at Jagiellonian University, where he later became an academic assistant at
the Mathematical Seminary. In 1928, Leśniak passed an examination for teaching in
secondary schools and earned a teaching position at the gymnasium in Krakow. At the
same time, he lectured about topics in elementary mathematics at Jagiellonian University,
and from 1930 lectured about didactics of mathematics at the Pedagogical Studies of
Jagiellonian University in Kraków (Wachułka, 2003).

In 1939, Leśniak was arrested by the Gestapo, and transported to a concentration
camp. He was released in September of 1940, and returned to Krakow to teach
mathematics at the School of Trade and Industry. After the war, he returned to his pre-
war job in the gymnasium and lecturing at Jagiellonian University. For several years, he
was the head of the Methodological Center in Krakow. The meetings and conferences
organized by the Methodological Center gathered both mathematicians and teachers of
mathematics to discuss mathematics as well as issues related to the teaching of
mathematics (Nowecki, 1984). In 1947, he obtained a doctoral degree in mathematics from Jagiellonian University and he started working at the Higher College of Education (Wyższa Szkoła Pedagogiczna) in Krakow. Later, Leśniak obtained his habilitation degree and in 1963 he was appointed as Professor of Mathematics at Jagiellonian University in the Faculty of Mathematics, Physics and Chemistry (Wachułka, 2003).

Leśniak published his work in the following Polish journals: Poradnik Pedagogiczny, Roczniki Wyższej Szkoły Pedagogicznej in Krakow, and Matematyka. He was the author or co-author of several textbooks such as: Algebra: dla klas 8 szkół ogólnokształcących (Algebra: for 8th grade secondary school) first published in 1958 and then edited several times; O funkcjach jednej zmiennej (Functions in one variable) (1971); Kształcenie nauczycieli matematyki w wyższych szkołach pedagogicznych (Education of mathematics teachers at the higher pedagogical schools) (1962). Leśniak died 1980 in Krakow.

Tadeusz Sierzputowski, a member of the editorial committee, was born in 1888 in Mrozy, a town located in east-central Poland. After graduating from the Real School in Warsaw, he moved to Zurich to study at the University of Zurich. In 1910, Sierzputowski graduated from mathematical studies at the Philosophy Department from the University of Zurich. During his studies, together with Straszewicz (see chapter V) and a few other mathematicians, he organized and participated in a mathematics circle which gathered Polish students from Zurich University. Upon his return to Poland, he earned a teacher’s diploma and became a high school teacher of mathematics and physics and taught at the gymnasium in Włocławek, Łódz, and Warsaw (Piotrowski, 1996-1997).

Sierzputowski was a co-founder and editor of a series of books called Biblioteczka
Matematyczna (The Mathematical Library) and co-editor of the journal Matematyka i Szkoła. From 1922, he was a member of the management board of the Książnica-Atlas publishing company and became its vice president in 1925. For a few years, he was a member of the Main Board, and from 1930 he was the head of the Mathematics Section of the Society of Teachers in Secondary Schools and Universities (Towarzystwo Nauczycieli Szkół Średnich i Wyższych) (Piotrowski, 1996-1997). The National Library Catalog has 59 textbook entries published between 1920 and 1937 by Sierzputowski. He published a series of school textbooks mainly for arithmetic and geometry courses at the elementary and gymnasium level. He also authored a number of articles in pedagogical journals. Sierzputowski died in Warsaw in 1947.

The author that contributed the most articles to the journal with a total of four, was Samuel Steckel. In 1927, Steckel taught in gymnasium in Kielce and in 1936 he taught in Białystok. Steckel was a member of the Polish Mathematical Society from 1927. He participated in many Mathematical Congresses, including in Lwow, in Vilnius (1931). He also presented during the meetings of the Mathematics Congress, about subjects related to the didactics of mathematics which was his interest (Pawlikowska-Brożek, 2003). He authored numerous publications. Among his works are the four articles he published in the journal Matematyka i Szkoła and one article that he published in Parametr. His articles vary in topics and include his comments and observations regarding teaching methods, such as how to increase student interest, organizing extracurricular activities, teaching gifted students, and he also wrote articles about school mathematics. A series of his textbooks published between 1929-1950 titled Algebra, were approved by the Ministry of Education as textbooks for high school mathematics.
Conclusions for Matematyka i Szkola

By 1938, when Matematyka i Szkola was first being published, the Jędrzejewicz reform had already been in effect for a few years. While much progress had already been made, there were still certain aspects of the mathematics teaching system that some believed should be improved upon in order for it to be able to reach its goals more efficiently. The journal itself, as well as meetings organized by the Methodological Societies of Mathematics throughout Poland, made the expression and discussion of such ideas with other interested parties easier. The journal did not publish a lot of articles, but the ones that were published were important for mathematics and represented the heightened state of interest in mathematics teaching at the time.

Articles of the first issue of the journal were submitted mostly by members of the methodological centers which were organized by the Ministry of Religious Denominations and Public Education mainly from Krakow Center. Stefan Straszewicz was the chair of the committee at the Ministry of Religious Denominations and Public Education during this time, and it is very likely that he knew most of the authors and requested that they submit their articles and papers to the journal. Later, teachers of secondary schools and mathematicians working in post-secondary institutions outside of Krakow were also invited to publish their articles in the journal.

A subject that was frequently covered by the articles involved improving the inadequate teaching methods being utilized to teach various mathematical concepts. The authors would provide what they believed to be superior methods of teaching certain concepts, which were less formal and more focused on the students’ intellectual development. A second very popular topic of discussion was extracurricular activities for
students. It was widely believed that extracurricular activities could greatly enhance the learning experience for mathematics students. Similar trends are observed in talks given by teachers at congresses such as the Third Polish Mathematics Congress.

The textbook reviews in *Matematyka i Szkoła* focus exclusively on reviewing Polish and German textbooks. The published reviews appear to support other articles published in the journal, in the sense that they preferred fewer formal methods and focused more on introducing concepts through elementary mathematics whenever possible. There are a few reviews of German textbooks in this section that exemplify superior methods of teaching particular concepts, and as such the journal appeared to support a foreign influence in its discourse for improving the methods of teaching these concepts in Polish schools.

The period in Poland when the journal *Matematyka i Szkoła* was being published, was a period when Poland had control over decisions regarding its education system. The government, as well as teachers and mathematicians, were focused on improving the system through the introduction of reforms and open discourse in journals such as *Matematyka i Szkoła*. Some of the articles in the journal do mention German methods and textbooks but it was more so for the purpose of improving bits and pieces of the current system, but not to replace the system completely. In general, it is clear from the articles of *Matematyka i Szkoła*, that many teachers and mathematicians were enthusiastic about contributing their thoughts, ideas, and experiences in an effort to improve the level of mathematics teaching.
Chapter VII

Analysis of Matematyka

The journal Matematyka was first published in 1948 by the Polish Mathematical Society on behalf of the Ministry of Education. The journal was founded and edited by Bolesław Iwaszkiewicz together with the editorial committee members: Stanisław Gołąb, Jan Leśniak, Edward Marczewski, Antoni Marian Rusiecki, Stefan Straszewicz, Tadeusz Ważewski, and Kazimierz Zarankiewicz. The journal is still actively being published today. Only the years 1948 to 1950 will be examined so the progress of the journal Matematyka can be compared with the journal Parametr and Matematyka i Szkola, both of which had only lasted for about two years.

In the first issue of the journal, the editorial committee stated that the journal was designed to popularize mathematics. The journal was intended to serve teachers who teach different mathematics courses at various levels of education. The main goal of the journal was to broaden teachers’ knowledge and to assist them in their teaching practices by including articles that delve into everyday school matters.

In the fourth issue, the editors summarized the three main aims of the journal. An important goal of the journal, in conjunction with mathematics teachers, was to raise the level of mathematics teaching to ensure that school graduates have real and concrete mathematics knowledge. The editors highlighted the importance of this goal as the country was preparing for the Six-Year Plan, which was a governmental plan for economic development and foundation of socialism in Poland. This plan was concentrated around the development of heavy industry, which meant that there will also be a demand for skilled workers in industry with a strong mathematical background. The second goal of the journal was to discuss issues related to organization and teaching
techniques as well as ideas on how to improve the teaching level in mathematics. The editors encouraged teachers to share their experiences about topics such as elimination of deficiencies in the preparation of students, ways to reinforce the knowledge, how to repeat larger bulks of material, how to use textbooks, how to check homework assignments, what difficulties are stumbled upon during the implementation of a specific class program, and how to awaken students’ interest in mathematics. The third goal of the journal was to publish articles that would suggest improvements regarding organization of work in didactic-scientific centers and regional centers. Thus, the editors encouraged colleagues to share their experiences and ideas and improvements they believed would have a positive impact on such centers.

The editors had also published notes that introduced readers to the resolutions passed by the Polish United Workers Party in 1948, which controlled Polish education, and excerpts from the speech given by the president of Poland, Bolesław Bierut during the meeting of the Central Committee of the Polish United Workers Party in 1950. Both notes highlighted the main goals of the Six-Year Plan and how important it is for everyone, including students, to know this plan. The main purpose of these notes was to show the enormity of the task that falls upon schools and teachers to implement the foundations of socialism. It was expected that mathematics teachers use numerical data, and fill in the content of word problems, such that they fall in line with the expectations of the Plan. It was also advised that in order to improve the level of teaching and teaching methods, teachers should follow the Soviet Union’s education system.

From 1948 to 1950, three volumes of the journal Matematyka were published. Among the three volumes, there were a total of twelve issues consisting of 720 pages.
The first issue of Volume I was published for the months of September and October in 1948. The journal was published regularly on a bi-monthly basis with a break for summer.

The table of contents of each issue contained sections titled *the science, mathematics formerly and today, didactics, chronicle, reports and bibliography, problems, and correspondence*. To get a better view of the nature of the journal, the content published under each heading will be examined.

**SCIENCE SECTION**: This section consists of articles related to school mathematics and articles about mathematics topics beyond the traditional mathematics program.

**MATHEMATICS FORMERLY AND TODAY**: This section includes several papers illustrating the history of mathematics, the development of mathematics concepts, the present state of mathematics, and biographies of great mathematicians.

**DIDACTICS SECTION**: This section contains a variety of papers that one might expect to find in a standard mathematics education journal. Among others, there were articles related to teaching of mathematics, mathematics curriculum, and classroom practices.

**CHRONICLE**: These sections included various news about upcoming mathematical meetings and conferences, mathematics circles, and Olympiads.

**REPORTS AND BIBLIOGRAPHY**: This section mainly provides information and reviews about new books and textbooks in mathematics.

**PROBLEMS**: This section contains a variety of mathematics problems and their solutions. Often these exercises came from mathematics Olympiads.
CORRESPONDENCE: This section contains the exchanges of thoughts from readers about teaching, their inquiries, and comments about the content of the journal.

THEMES

To examine the themes explored in the journals, all articles longer than one page have been classified in Table 4 under the following categories:

- Teaching Methods (articles related to the process of teaching and learning mathematics)
- Instruction Practices (articles describing the course of the lesson)
- School Mathematics (articles that describe mathematics concepts, proofs of theorems, results of research conducted by the authors of the articles, or articles illustrating the history of mathematics)
- Curriculum (articles reviewing the school program in general, or articles describing specific problem areas of the curriculum)
- Textbook/Book/Conference Review (articles in this category include book reviews, course of the meetings, conferences, and speeches delivered during the meetings and conferences)
- Biography (articles describing a person’s life, experiences, and achievements)

Within each category, articles will be subdivided into similar content categories, and then the content of the articles will be analyzed in the light of author’s statements. The content of some articles was not related to any of the categories, and thus they were excluded from examination.
Table 4. Number of articles longer than 1 page that appeared in the journal, classified by theme, and their distribution

<table>
<thead>
<tr>
<th>Categories</th>
<th>Sub-Categories</th>
<th>Volume 1</th>
<th>Volume 2</th>
<th>Volume 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching Methods</td>
<td>Arithmetic</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Algebra</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>General Teaching</td>
<td>4</td>
<td>14</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Methods</td>
<td></td>
<td></td>
<td>7</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Geometry</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Teaching Aids</td>
<td>1</td>
<td>1</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Instructional Practices</td>
<td>Arithmetic</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Geometry</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>School Mathematics</td>
<td>Algebra</td>
<td>7</td>
<td>3</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Geometry</td>
<td>3</td>
<td>10</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Historical</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Curriculum</td>
<td>Arithmetic</td>
<td>3</td>
<td>6</td>
<td>11</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Algebra</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Geometry</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>General Problems</td>
<td>1</td>
<td>5</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Foreign Curriculum</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Textbook/Book/Conference</td>
<td>Various Themes</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Reviews</td>
<td>Books for teachers/journal</td>
<td>1</td>
<td>7</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Foreign Textbooks</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Polish Textbooks</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Biography</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Total number of articles</td>
<td></td>
<td>19</td>
<td>39</td>
<td>37</td>
<td>95</td>
</tr>
</tbody>
</table>

Out of the 95 articles that satisfy our criteria, 38 were analyzed below. All of the articles were written in the Polish language. There were no collaboratively written articles. Articles were written by secondary school teachers, teachers of post-secondary schools as well as well-known Polish mathematicians such as Sierpiński and Steinhaus who were known for their contributions to mathematics, and Krygowska, known for her work in mathematics education. Some of the editors of the journal had also contributed a
vast number of articles to the journal. Other authors were likely invited to submit their papers by the editors of the journal who knew them personally. The *Authors of the Journal* section introduces the most prominent and most influential authors of *Matematyka*. In the journal, there are articles that were reprints of articles from Russian journals. The main goal of these articles was to show that the problems discussed in the journal *Matematyka* were also discussed in foreign journals.

The length of the articles varies depending on the category. Some articles are rather short and more general, and some articles are quite long and thoroughly elaborated. In general, it is hard to notice any patterns in the length of the articles as the articles within the same category varied greatly in length. Articles on the subject of curriculum tend to be the longest. They vary in length from 2 to 13 pages long, with most articles being longer than 5 pages. Articles about school mathematics varied from 2 to 11 pages, with most of them in the range of 4 to 6 pages. Articles about teaching methods range from 1 to 10 pages, but most of them were about 3 to 4 pages long. Articles about instructional practices were not as common and they were on average about 5 pages long. Articles that were published as a result of talks given at conferences and professional meetings varied in length from as short as 1 page to 12 pages long with the majority being longer than 5 pages. Book review articles were usually about 2 pages long.

Articles will be analyzed in chronological order within their categories. Without intending to review all the articles, noteworthy articles and those that discussed the same topics or issues have been selected to see how these discussions evolved over time. Articles of famous Polish mathematicians and mathematics educators as well as those who have contributed the most articles to the journal have also been examined.
Teaching Methods

There are several articles that raised interesting problems relating to teaching methods in mathematics, and they were typically written by teachers of mathematics or the editors of the journal. The authors of the articles often encouraged teachers to examine and reflect on their own teaching methods. Several articles were aimed at helping teachers with matters of fundamental importance, such as how to teach, how to liven up the lesson, and how to increase the interest of students.

The discussions will begin with an article written by Wakulicz (1948). Wakulicz (1948) shared his general teaching experiences and hoped that his remarks would make the teaching of mathematics easier for teachers. In his article, Wakulicz emphasized that the goal of teaching mathematics should not be to teach by memorization of tricks and rules without much of an understanding. He believed that teachers should teach such that what students learn in class, they should also be able to apply to problems they encounter in their everyday lives. Wakulicz pointed out that the most common mistake teachers make is that they don’t spend enough time explaining theoretical aspects of topics being studied, but instead proceed directly to solving problems. This in turn, leaves students solving problems mechanically without much of an understanding. Wakulicz believed that automaticity in basic arithmetic operations is needed and that it can be achieved through frequent and numerous exercises, but to have a good understanding beyond elementary operations one needs quality of examples and appropriate explanation.

Wakulicz is particularly in favor of the supervised study method and believed that the method should be used in classrooms, as it allows students to work at their own level and pace. In the supervised method, students are under observation by the teacher, who’s
purpose is to act as a guide. Students are placed into groups of similar talent and preparation, so that the teacher can provide as much effective feedback as possible. Different groups would work on problems of different difficulty, and students are evaluated based on their progress. The greatest challenge Wakulicz faced in implementing the supervised study method was the fact that during the first couple of lessons students of all talent levels were helpless, because they all were used to the commonly used teaching methods at that time where students spent the majority of their class time copying examples from the board, and where little mental work was expected from them. However, once the students became familiar with the method, it proved to be more effective.

The political and economic situation of Poland at the time required people to be educated in a relatively short time to recover the losses after the war in every aspect of life. There are several articles in which authors opposed formalism in teaching mathematics. It was recommended that meaningless rote memorization be eliminated from teaching practices. Iwaszkiewicz (1948) described formalism as excessive automation in solving problems without a thorough understanding. Iwaszkiewicz stressed that automation is essential for elementary operations, but it is not sufficient for thorough understanding and readiness to solve problems in the most effective fashion. He emphasized that a student should not only know how to solve a problem, but should also know how to answer questions about the problem such as whether it can be solved differently and why one way is better than another. Examples provided by Iwaszkiewicz about the most common ways of solving problems by students, showed that students can master arithmetic skills without the consciousness and ability to choose the most
appropriate method to solve the given problem. Iwaszkiewicz emphasized that the goal of teaching should not only be to develop automaticity in students, that is, arithmetic proficiency through mechanical rehearsal, but also teaching with an understanding and an ability to choose the most appropriate way to solve problems. Iwaszkiewicz also provided some examples along with how they can be used to develop activity in students and fight against formalism. For example, he stated that it is important that teachers emphasize the connection between concepts being studied such as when teaching about fractions, percentages, and permilles. The next important aspect which Iwaszkiewicz wrote about is the appropriate didactic preparation of students for new activities. For example, if the teacher assigns a word problem for which he expects students to write a mathematical equation, the teacher should first introduce students to the terminology. In other words, the teacher should first explain the difference between “the sum of quantities” and “the result of the sum” before assigning activities that require the use of this terminology.

Iwaszkiewicz also discussed formalism in writing. He believed that a proper form of writing is essential because it teaches students systematicity and it facilitates understanding and assimilation of arithmetic operations. Iwaszkiewicz believed that the process of writing should be accurate, detailed, and comprehensive until the student masters the understanding and the technique of solving such problems. Once the student masters solving problems, Iwaszkiewicz suggested some trivial steps should be omitted, but the writing should still be easy to follow. Lastly, Iwaszkiewicz wrote about the formalism in language. He believed that language used by the teacher should be precise and the same should be expected from the students. Iwaszkiewicz highlighted that teachers should not tolerate language that is excessively simplified by the student because
it sometimes can mean completely different things than what students meant to actually say.

Krygowska (1950), very well-known for her contributions to mathematics education in Poland and abroad, recommended the functional method for teaching mathematics. Krygowska defined the functional method as teaching “from reality to abstraction and from abstraction to practice”. In her article, Krygowska explained that the transition from concrete thinking to abstract, requires properly organized teaching that is based on the natural process of shaping concepts in the student’s mind. Krygowska explained that the functional teaching method departs from memorizing thoughtless formulas and solving problems without a thorough understanding of them. She also characterized the functional method as teaching that is, on one hand, based on methodological foundations of mathematics as a science, and on the other hand, as close as possible to the natural process of the students’ ability to think and express themselves. She provided several examples of how the functional method can be used for teaching definitions, theorems, and word problems. The main purpose in functional teaching is to provide students with definitions that are mathematically correct, but in a language appropriate to the students’ level, and which will contribute to the development of students’ abilities. For example, Krygowska suggested that instead of using the following formal definition for adding two rational numbers: “The sum of two rational numbers with the same sign is a rational number, whose absolute value is equal to the sum of the absolute values of the given numbers, and the sign is the common sign of these two numbers”, to instead change it to the operational definition: “To add two rational numbers with the same sign, add their absolute values and use the common sign in the
answer”. She strongly believed that the operational definition is formulated at a level which student can understand and recall better. Krygowska believed that using the functional teaching method helps students to overcome difficulties associated with transitions from reality to abstract thinking.

Formalism was a topic of discussion abroad as well. Fiodorow’s (1949) article is a reprint of his article from the Russian journal, Teacher’s Newspaper (Учительская Газета) (Issue 4, January 19th, 1949). In his article, Fiodorow stated that teachers do not use enough varied examples when introducing new topics. He believed that when students are taught theory in separation from practice and vice versa, their learning becomes very mechanical. Fiodorow stressed the importance of teaching students how to read and utilize the textbook. He believed that teachers often teach using simpler terminology and typical examples, and they turn away from assigning readings from textbooks and more advanced exercises. Fiodorow encouraged teachers to show students how to effectively use their textbook with an understanding, how to take notes, and encourage students to work on more advanced problems. Fiodorow believed that the diversity of problems contained in textbooks along with the ability to individually work with the textbook can enrich the student’s perception, comparison, and ingenuity skills, and it makes the learning less mechanical.

The topic of formalism was further explored by a Russian teacher, Goldenblat, in the journal Mathematics in School (Математика в школе) (Issue 1, 1949). Goldenblat (1950) presented excerpts which the author had presented in his original article published earlier in the Russian language. According to his opinion, formalism in teaching mathematics is when mathematical knowledge is rigid and bookish, which is when
students can solve typical problems mechanically from the textbook but are helpless when it comes to solving simple real-life application problems. Goldenblat stated that one way to combat formalism is to teach students such that they learn how to apply the theoretical ideas they learned into practice. Goldenblat provided several examples from one of the classes he observed during an arithmetic lesson. When students were asked to multiply 125*793*8, they would perform the calculation on paper by multiplying numbers from the left to the right, instead of using the commutative law of operations and mentally multiplying the numbers in this order 125*8*739. Through the examples he provided, it is evident that students understand fundamental laws of operations but have a hard time using them in practice. Goldenblat provided several examples for an arithmetic lesson which can be used in class to teach students how to efficiently solve such problems utilizing mental skill.

Sienkiewicz (1950), a Russian teacher, shared his observations from school practice regarding how one can fight formalism in school. Sienkiewicz’s article was originally published in a Russian newspaper called Teacher’s Newspaper (Учительская Газета) (Issue 88, November 4th, 1950), and had been translated into Polish and published in the journal Matematyka. Sienkiewicz strongly emphasized that mental thinking is a powerful tool in the fight against formalism. He believed that teachers should not require detailed solutions for problems that could be done quite easily through mental thinking. He thought that teachers should teach students that time is very valuable and they should work to obtain their solutions efficiently without the use of much time and energy. He believed that teachers place too much emphasis on the details of written solutions, which makes students uninterested and not willing to do the exercises because
the act of showing obvious details becomes tiring and repetitive. Mental thinking should be emphasized in arithmetic, algebra, and geometry classes whenever possible. Sienkiewicz suggested that there would be a sign on the wall in class that says: “all, what you can, do it in your memory”.

The importance of emphasizing mental thinking in arithmetic classes was discussed by Bogucki (1949). Similarly, to Sienkiewicz, Bogucki (1949) believed that teachers expect too many written details from students. Bogucki noted that students spend the majority of their time during the lesson on creating their notes, in particular, copying examples from the board. This makes students’ notebooks often look like a copy of their textbooks because of its similar content. He believed that if students spend a significant amount of their class time copying examples, then they are certainly not going to learn fluency in arithmetic, at least not in the classroom. Bogucki recommended an American teaching approach in particular, called the Winnetka Plan. One of the main attributes of the plan in teaching mathematics is not requiring unnecessary writing from students. Based on the Winnetka Plan and his own experiences, Bogucki suggested to create workbooks for elementary grade students which he strongly believed will lower the amount of writing to a minimum and thus, save some time during the lesson for actual learning with an understanding, instead of the students wasting their time and attention copying examples from the board without much mental exercise. In addition, workbooks will allow every student to work and learn at their own pace.

Several teachers wrote articles in which they shared what are, according to them, the best methods to teach specific topics. These articles are written with the goal of providing teachers with ideas on how they can approach the topic differently than it is
shown in the textbooks. Leśniak wrote several articles in which he shared his teaching approaches that are adapted to students’ abilities. Leśniak (1949) devoted his article to common mistakes experienced by students and how to assist students in understanding the order of operations. Leśniak advised the use of the functional method, also promoted by Krygowska, to teach the order of operations. For example, Leśniak believed that instead of teaching the distributive property by providing students with the definition, teachers should first use examples with numbers so that students themselves can arrive at the correct answers and definitions. Leśniak (1949a, 1949b) devoted his two articles to share methods of introducing the fundamental concepts of a function. To introduce the definition of a function, Leśniak uses a “function machine”. He also used the function machine to demonstrate how to add, subtract, and find the composite of functions. He believed that this practical application of introducing students to new concepts makes it easier for the students to understand it.

Among the articles are also those that offered suggestions about how to make lessons more interactive and interesting for students. In an article written by Iwaszkiewicz (1948a) he shares his ideas about how to make students more active participants during the lesson. Iwaszkiewicz suggested teaching about algebraic expressions by assigning puzzle like problems, and then asking students to come up with their own examples instead of using typical textbook problems in which students are asked to solve given algebraic expressions for some values. In one of his puzzles, he would ask students to: “Think of a positive integer, multiply it by 2, add 1 to the result, then multiply that number by 5, then add 3. Tell me your number, and I will tell you what number you thought of.” He would repeat this puzzle several times to students and then
finally would ask them to represent this “puzzle problem” using algebraic expressions. Iwaszkiewicz believed that these types of problems make students more interested, more engaged, and their algebra skills will improve as a result of the increased interest. He also observed that his entire class was actively participating during the lesson. Iwaszkiewicz’s goal in writing this article was to familiarize teachers with different methods to teach the topic of algebraic expressions, while raising the engagement level of their students.

The topic of importance of diversification of exercises was explored by Racinowski (1948). In his article, he described how he taught arithmetic in his class. Instead of teaching arithmetic operations by assigning ready-made problems with operations to solve, he instead wrote the problems without operation signs and asked students to find them. Students were able to see that sometimes it is possible to get the same solution with the use of different symbols or using the symbols in a different order. Instead of just giving his students problems to solve, Racinowski would first introduce students to where these problems were coming from in real life, which would raise students’ interest levels in the lesson. For example, in one scenario, he said that the problems are coming from historical documents which were faded and thus hard to read. He also suggested to his students that if they are interested in this type of work, they might want to go to Egypt or Babylonia and explore ancient monuments and clay tablets with faded writing. Racinowski believed that through this type of teaching students become more fluent in solving problems and it can rouse students’ interest in mathematics, as well as liven up lessons.
School Mathematics

The journal Matematyka served as a platform for the exchange of mathematical ideas among mathematicians and teachers. The articles varied in topics and covered different areas of mathematics. The purpose of the articles was informative. Authors often shared various ways to introduce different types of theorems and their proofs. Some of the articles were brief and general while others offered extensive and detailed information.

Many articles relate to the area of geometry. A topic of frequent discussion was triangles, as they were given significant emphasis in the mathematics curriculum at the time. In his work, Gołąb (1948) shared his knowledge of the geometry of a triangle. He began with the history of the development of the geometry of triangles noting that the French and Germans had the greatest influence on the development of triangle geometry. Next, he described some of the properties of a triangle and stated by whom they were discovered. He completed his article by suggesting a few other things about triangle geometry that would be interesting and worth exploring. In another article by Gołąb (1949), which is a report from his presentations during the Mathematics Teachers Conference for Vocational Schools in Warsaw in March of 1949, he presented certain concepts from the history of geometry and also showed, contemporary to that time, trends and developments in the research in geometry.

More properties of triangles were explored by Gorlewski (1950). He demonstrated how one can derive Heron’s formula for the area of a triangle, which yields the area of an arbitrary triangle in terms of the lengths of the three sides. For his proof, he inscribed a circle within a triangle which allowed him to partition the triangle into six
smaller triangles and then calculate its area, and thus derive Heron’s formula. The goal of Gorlewski’s article was to share an interesting way to derive Heron’s formula with the readers of the journal. Cwojdziński (1949) devoted his paper to the discussion of perspective triangles. He explained how several theorems are derived. The main aim of this article was informational, to broaden teachers’ knowledge about the properties of triangles.

Topics in geometry were further explored by the teacher Ławrynowicz. Ławrynowicz (1950) shared what he believed to be an easy way to derive formulas for the volume of a cone, cylinder, sphere, paraboloid, ellipsoid, and hyperboloid. Ławrynowicz stated that students in geometry courses are only provided with formulas without their proofs. He thought that his article contained information that could be used during mathematics circle meetings, and he hoped that teachers would make use of it. Jaśkowski (1949) also devoted his article to solid geometry. He began his paper by providing an overview of teaching geometry and provided several definitions and theorems along with his remarks. The aim of this article was to share some of the knowledge and interests of Jaśkowski with respect to this topic.

Sierpiński, a famous Polish mathematician, gladly published three of his articles in the journal *Matematyka*. In one of his articles, Sierpiński (1950) presented an algebraic solution to the problem proposed by Fermat. The problem stated to find a right triangle with sides that are natural numbers such that the hypotenuse is a square and the sum of the two perpendiculars is also a square. Sierpiński’s (1950a) article is a report from the talk he gave for the winners of the First Mathematics Olympiad in June of 1950. This extensive article presents the history of the theory of numbers, one of the oldest branches
of mathematics. He demonstrated what concepts from number theory have been proved and by whom, as well as what is still unknown and attempts to prove these unknown facts. In his last one-page article, Sierpiński presented modifications and explanations to a certain paradox about sequences that had been presented by another professor during the meeting of Polish and Czechoslovakian mathematicians in Prague in 1949 (Sierpiński, 1950b).

**Curriculum**

Several articles in *Matematyka* referred to specific problem areas of the Polish curriculum, or they discussed general issues related to the curriculum. These articles point out the characteristics of the mathematics curriculum and often offer insight about how to fix current problems. The authors also refer to programs from foreign countries to illustrate the differences and to share their knowledge with colleagues.

The journal contains articles that familiarize readers with the changes to not only mathematics education, but also the entire school system in general during that time period. The very first article in the journal is an excerpt from the speech given by the Minister of Education S. Skrzeszewski during the meeting of administrators in Warsaw in April of 1948, in which the author outlined the changes to be made to the school system in the years 1948-1949. The most notable change was that the education time was shortened from twelve to eleven years; seven years of primary school and four years of secondary school. Skrzeszewski (1948) explained that the reason for the changes were social and economic. There was a belief that extending school for even a year, pushed the youth of working-class families away from school. The main idea was to make school accessible for more students, not only the elites and wealthy. Also, Skrzeszewski
explained that after long discussions during the meeting there was a firm belief that it would be possible to cover the necessary parts of the curriculum to prepare students for life and higher education without much harm or negative consequences by the shortened time period.

More about the socio-political and economic factors that influenced changes in the school system were explored by Kartasiński (1948). Economic difficulties resulting from the tough living conditions after the war, a shortage of qualified teachers, and a lack of textbooks were just some of the problems faced in the reconstruction process of the school system. Kartasiński explained that the shortening of primary school by one year required the development of a new teaching program and thus, there was a need to modify existing teaching methods for geometry and algebra. The main aim of primary school would be the preparation of the majority of its students for vocational school and the rest of the students for general high school level education.

One of the main goals of the mathematics education system was to make students aware of the economic and social situation stemming from the process of reconstructing the country. Wachuła (1949) wrote an article in which he showed how the country’s plans for reconstructing the economy can be incorporated into the mathematics teaching. In his article, Wachuła referred to the so-called Three-Year Plan (1947-1949), created by the Polish government to rebuild the country after the devastation from WWII, and the Six-Year Plan (1950-1955) to build the basis of socialism in Poland. Wachuła emphasized that word problems should form a bridge between school and everyday life. By providing a number of examples for use during the lesson, the author presented how numerical data from both economic plans can be utilized in word problems. The content
of these word problems concerned the production of goods such as sugar, footwear, nitrogen fertilizers, wool, cotton, steel, or coal. Wachuła stated that the problems should be demonstrated in a variety of ways, that is, using different tables and diagrams. He believed that the skills students would gain while working on such problems would help them in their everyday lives, such as when they read about economic reports in newspapers. The author claimed that word problems with economic content arouse students' interest and allow them to follow the progress and development of the state's economic life.

In her article, Zajączkowska (1949) wrote about certain aspects of teaching mathematics in high schools. In her opinion, the goal of teaching mathematics should be aligned with the goals of teaching other subjects and the goals of the school. Zajączkowska believed that the mathematics program should be designed in such a way that its relatively easy to understand for the vast majority of students. Due to the fact that school was more accessible to all children, a lack of qualified teachers, and often inadequate preparation of students coming from village primary schools, Zajączkowska stressed that the school curriculum should be adapted to the needs and real conditions of school work to achieve realistic results, that is, to educate the whole body of students. She pointed out that students entering high schools are not well prepared because they are often taught by teachers who are not qualified and for whom mathematics was once difficult. Zajączkowska believed that teachers should not be blamed for this situation, but the program and textbook should be adapted to the current situation in the country. Another important issue Zajączkowska mentioned is grades. She believed that there is a tendency of not assigning failing grades to students. She believed that promotion to the
next grade should not be granted to those who have not mastered the material, and in particular if it was due to the student’s laziness. Zajączkowska stated that in-class exams often cause a lot of stress, not only for weaker students but also for the better ones, and thus she proposed that teachers offer students other opportunities to show their mastery of the subject or lack thereof, such as calling on students to answer some questions during the lessons.

Two articles written by Iwaszkiewicz (1949, 1950) described in detail the characteristics of a new mathematics program called *The Teaching Programme for 11-Year Secondary Schools*. Iwaszkiewicz noted that among the main goals of the reform was the importance of working towards the common good of socialist society. In the new reform, mathematics was given an emphasis. Despite the decrease in education length by one year, there was an increase in the number of hours devoted to mathematics. Iwaszkiewicz wrote that the increased number of hours for teaching mathematics should result in a constant improvement of the level of teaching and results of teaching as well as stimulate teachers to increase their effort and efficiency. Iwaszkiewicz explained that an increase in the number of hours for teaching mathematics is partly due to the poor preparation of students entering vocational schools and general high schools. Yet, he emphasized that the main reason in putting mathematics on the forefront of other school subjects was the need for workers with an adequate mathematical background due to economic developments and improvements in production techniques. Iwaszkiewicz also discussed the requirements for teachers. Teachers are expected to transfer knowledge to students such that it is understandable, strictly aligned with the mathematics program and textbook without any shortcuts or simplifications. Teachers were also expected to teach
how to draw conclusions, formulate judgments, as well as improve logical thinking skills. Theoretical knowledge acquired by students should support logical thinking and be combined with practical application skills. Iwaszkiewicz emphasized that teaching should be free from formalism. To highlight the importance of the development of logical thinking skills, Iwaszkiewicz (1950) quoted Lenin, the founder of the Russian Communist Party and the first head of the Soviet state, “We have no need of cramming, but we do need to develop and perfect the mind of every student with a knowledge of fundamental facts. Communism will become an empty word, a mere signboard, and a Communist a mere boaster, if all the knowledge he has acquired is not digested in his mind” (p.22). Iwaszkiewicz stressed the importance of the teaching content to be based on the Six-Year Plan in order to educate politically conscious students with a friendly relationship to the Soviet Union, and with an enthusiasm for the development of socialism.

Some of the authors in the journal had focused their attention on the subject of teacher preparation in connection with the ongoing reform on higher education. In the note from the editors of the journal, it is evident that teacher preparation was a current topic of discussion in Russia and thus two articles which had been originally published in the Russian journal for teachers had been translated and published in the journal Matematyka. Potocki’s article had been originally published in Teacher’s Newspaper (Учительская Газета) (Issue 61, August 6th, 1948). Potocki (1949) pointed out that students graduating from mathematical pedagogical institutes have no idea how to apply the mathematical education obtained in college into their teaching practice. Potocki wrote that in the pedagogical institutes, where students are prepared for teaching in secondary
schools, there is absolutely no emphasis on the connection between higher level mathematics and topics at the elementary level. Potocki pointed out that among teachers there is a belief that one can forget concepts of higher mathematics as they graduate from mathematical pedagogical institutes since they will not have to use it in teaching at secondary level schools. Potocki argued that institutions educating future teachers should emphasize the connection of higher mathematics with elementary mathematics and other disciplines. Potocki believed that new teachers who can see these connections can better communicate mathematical ideas and inspire mathematical interest in their students.

The topic of teachers’ preparation was explored further by Matyszuk (1949). Matyszuk’s article had first been published in the Russian Teacher’s Newspaper (Учительская Газета) (Issue 73, September 17th, 1948). Matyszuk believed that the main weakness of the program for teachers at pedagogical institutions was that teachers do not get enough preparation in what they will need for their future careers. He pointed out that there is too little time devoted to elementary mathematics and teaching methods for elementary mathematics and insufficient exploitation of higher mathematics to justify concepts of elementary mathematics. Another failure in the preparation of teachers is the lack of knowledge about the history of the subject. Matyszuk believed that the history of mathematics is not only necessary for teachers themselves so they can have a deeper understanding of mathematical concepts, but also to liven up their lessons by providing their students with some interesting historical facts and context.

Bogucki (1950), a former student from the teachers training institution in Poland and a teacher at secondary school, shared his opinions about his preparation for teaching after the completion of his education. Bogucki’s view is closely aligned to the opinions of
Potocki (1949) and Matyszuk (1949). Bogucki stated that even though he was a very good student, after having begun teaching in primary school he felt he was not adequately prepared to teach fundamental arithmetic concepts to others. For example, he felt that he was not able get students to fully understand the concept of multiplication or division of fractions, because he himself could not remember it clearly. But as Bogucki pointed out, the teacher training institution did not prepare him for this; the last time he was taught arithmetic was when he was in primary school. Bogucki believed that teacher candidates should be primarily taught what they will be teaching in schools, of course in a broader sense and from different points of view. According to Bogucki, this is not what teacher candidates are currently being taught and this is why so many teachers including himself are lost in their first years of teaching.

In the journal Matematyka, there is a number of articles that were focused on direct help for new teachers in basic matters. An article written by Parzykoń (1950), discussed how to successfully outline the schedule of the teaching material for the whole year. When creating the schedule, Parzykoń recommended taking into account the number of hours for the course throughout the year, material to be covered, approximate hours recommended for each topic, the textbook to be used, students’ level of preparation for this course, teaching aids needed, additional activities such as reviews, exams, and going over homework. Lastly, Parzykoń stressed that teachers should constantly control the implementation of the plan and be prepared to make changes if any problems arise. Parzykoń explained in detail how to manage each of the recommendations she provided. She also presented a very detailed sample schedule for fifth-grade mathematics. Parzykoń’s article is a great aid to assist new teachers in planning their schedules.
Several authors have discussed extracurricular activities and their impact on student interest in mathematics. Krygowska (1950a) pointed out that for the sake of getting the best teaching results among the majority of students, a lot of attention not only during the class but also during the discussions among educators during conferences, is given to the students who struggle with the subject. Krygowska warned not to neglect the gifted students, because they may become uninterested in the subject. She suggested that one way to allow gifted students to broaden their knowledge and interest them more in the subject is by giving them the opportunity to engage in mathematics circles.

Krygowska’s article acts as an encouragement for teachers who have experience running such activities to share their experiences about how they organize mathematical circles, what topics they discuss, what topics seem to interest students, what topics hinder their interests, and what teaching methods they use. Krygowska pointed out that so far the methods of running mathematical circles have not received much attention and were run without much thought, thus she believed that the exchange of experiences between teachers in this manner will help to facilitate the work and activities, which will ultimately benefit the students.

In the next issue of the journal, there is an article which seems to be a response to Krygowska’s article about mathematics circles. Tryukówna (1950) devoted her article to sharing her observations from running mathematical circles in a general high school in Krakow. Tryukówna explained that she was assigned to teach a group of girls interested in mathematics and thus she took advantage of this situation and formed a mathematics circle so she could deepen their knowledge and interest further. The meetings took place every week and students were voluntarily attending the meetings without any attendance
being taken. The students were self-motivated and where eager to work on new assignments. During each meeting, students were sharing the papers that they were assigned to work on and there was plenty of time for discussions and problem solving. Tryukówna cited several books from which she gathered problems and ideas, among them was the journal *Matematyka*. Tryukówna’s students also participated in teacher’s conferences, either by giving presentations of their work or by listening to presentations given by teachers. Tryukówna believed that mathematics circles had extended and deepened students’ mathematical knowledge, they learned how to independently read and understand some mathematical concepts, and their mathematical language became more precise and in-depth.

Among the articles found in the journal, there are also articles in which authors describe foreign mathematics programs. Teitelbaum (1948) shared his observations and impressions which he gained while working in Soviet schools. He wrote this article with the intent of familiarizing Polish teachers with the Soviet school system as he believed that many years of experience of Soviet teachers would be of great help in resolving the problems facing Polish education. Teitelbaum’s article described the organization and programs of Soviet secondary schools. Among the main attributes of Soviet schools that Teitelbaum listed are uniform organization, curriculum, teaching methods, requirements expected from the students, and only one textbook. Teitelbaum also described the types of lessons that are conducted in Soviet schools. There are lessons that are aimed at checking students’ knowledge from the previous class and introduction of new material, lessons that are aimed at consolidating and deepening students’ knowledge, lessons aimed at reviewing covered material, and lastly, lessons aimed at checking students’
knowledge. Teitelbaum pointed out that the teachers’ lesson plans are always being checked before the lesson to make sure they are appropriate. Teitelbaum believed that although this may seem tedious, this was one of the factors that contributed to an increase in the level of teaching in Soviet schools, even though it was during a period of school development and poorly qualified teaching staff. Teitelbaum also wrote that Soviet schools were designed to educate all students. This means that the curriculum needed to be designed and implemented by the teacher in such a way that it can be understood by everyone in the class. The main emphasis in teaching is placed on teaching such that what is taught can be applied to practical applications in real life. The school program included arithmetic, algebra and geometry with trigonometry. Mathematics in Soviet school was a fundamental subject and a lot of time was devoted to teaching it. Teitelbaum compared Soviet mathematics curriculum with Polish curriculum from before the second World War in hopes that such acquaintance will help in solving the problems facing Polish education. Teitelbaum noted that Soviet curriculum had less topics and the total number of hours devoted to each topic was significantly larger. Also, teachers rarely complained about not having enough time to cover the designed program. The main emphasis in teaching is placed on technical mastery of operations and the ability to apply them to different problems and life examples. Teachers were also constantly broadening their education and skills.

Zarankiewicz (1950), introduced readers to the teaching of mathematics in the United States. He described the different levels of the education system, the number of years spent at each stage, and the curriculum and level of teaching mathematics. Zarankiewicz pointed out that the mathematics curriculum is not uniform across the
United States that one high school can have a more advanced program than another high school. He stated that in better schools, the curriculum is more advanced than in worse schools. In general, the level of education in the majority of schools, both elementary, middle and high schools, is rather low. One of the reasons for the low level of education is inadequate teachers’ preparation and qualifications. Zarankiewicz also described characteristics of American universities and concluded that they differ significantly from European ones. One of the characteristics of American universities is that they raise its students in the “American Spirit”, which means that schools prepare their students for social life and train them to lead future businesses. In the United States, the higher education system is made up of College and Graduate School. “University” terminology is used for schools that have Graduate Schools. Typically, during the first two years at College, students learn what students in Poland learn in high school. Graduate School is similar to university lectures in Poland except that in the United States students are encouraged and permitted to stop the professor during the lecture to ask questions. Zarankiewicz stated that from 1300 universities in the United States, only a little over 100 universities are comparable to universities in Europe. In regards to mathematics, the teaching level and students’ preparation level in the majority of universities is low. However, there are some universities, like Princeton University, where the mathematics level is very high. Zarankiewicz, writes that the high level of mathematics at Princeton University is due to the very best and famous professors from around the world who teach and research there. Below Zarankiewicz's article, the editors of the journal put together some excerpts from Russian journals to share more details about American schools with the readers. An
article published in *Математика в школе* (Mathematics in school) (Issue 1, 1949), by Diepnam, shows that American school programs are free from ideological influences and so they do not adequately prepare its students for the workforce, instead they instill in their students the value and power of “money”. An excerpt from a note published in the *Teacher’s Newspaper* (Учительская Газета) from 1947, shows that the American education administrators did not want to approve the use of textbooks that contained real life examples because the content was often too depressing for the students.

**Textbook Reviews**

In the journal *Matematyka*, there are only a handful of reviews of Polish and foreign mathematics books and textbooks. The reviews are very brief, on average about two pages long. The main aim of these reviews was to introduce mathematicians and those interested in mathematics to existing mathematics literature. Presented below, are several of the authors’ reviews published in *Matematyka*.

Słupecki (1949) presented a very brief summary of the content of the 387-page book written by Mostowski called *Logika Matematyczna* (Mathematical Logic) for university level mathematics logic course. Słupiecki believed that this book fills a very significant gap in Polish textbook literature as it is the most comprehensive textbook of that time in this field. Słupecki stated that due to the impressively expansive and varied content of the book, the reader will not only have a richer amount of knowledge in mathematical logic but will also understand its philosophical value and significance for mathematics.

In her article, Jeleńska (1949) reviewed a short book written by Maćkowiaków called *Jacek liczy* (Jacek counts). This book is written in the form of a psychological
observations report carried out by the parents of their five year old son. Jeleńska believed that arithmetic teachers and psychologists should read the observations in this book with great interest. Yet, Jeleńska did not agree with many comments made in the book and to support her opinion she cited other authors. She believed that the book contains many matters important for mathematics but they require a much broader discussion than in this book.

In the time period analyzed for the journal, there was only one review of a foreign book published in the journal. Bi (1948) briefly reviewed the book *Mathematics Can be Fun*, originally written in Russian by Yakov Perelman and translated into Polish by Józef Hurwica in 1948. The book is 159 pages long and the table of contents is quite diversified. The subjects range from a collection of conundrums and mathematical stunts to useful practical problems on counting and measuring. Bi recommended this book for every teacher as he believed the content of the book to be superior. He thought that this book would make mathematics lessons more revitalized and more students would become interested in mathematics and thus the level of teaching mathematics would also increase.

The journal contains one reproduction of a part of a foreign book. Maurice Cornforth’s introduction to the book titled *Science versus Idealism* has been published in the Polish language (Cornforth, 1950). The author of the textbook criticized anti-materialist theories, which according to him try to limit the scope and power of the human mind. Materialism is the theoretical foundation of Marxism-Leninism which was infused into the curriculum of Polish schools. The editors of the journal explained that the reason for publishing a reproduction of the introduction of the book in *Matematyka* is
because of the excellent characterization of the meaning and importance of science as a tool for understanding the objective world, the mathematics related domain of the author’s interest and his materialistic position.

**Contributors of the Journal**

There were 60 authors who had contributed their work to the journal and the majority of them had only published one article in the journal. Eight authors had contributed two articles and three authors had contributed three articles. There were also two authors who had contributed four articles and two authors contributed six articles. The editors of the journal were the main contributors of articles. The authors of the articles were either mathematics teachers at the elementary or secondary level, university professors, or mathematicians. The authors who had played a key role in the development of the journal *Matematyka* and Polish mathematics are presented below.

This section will begin by introducing the editors of the journal. For the biography of Antoni Marian Rusiecki (co-editor of the journal *Parametr*), and Stefan Straszewicz (co-editor of the journal *Parametr* and *Matematyka i Szkoła*), see section *Contributors of the Journals* in *Parametr* and for information about Jan Leśniak, who was a member of the editorial board in *Matematyka i Szkoła*, see section *Contributors of the Journals* in *Matematyka i Szkoła*.

Bolesław Iwaszkiewicz was the founder of the journal *Matematyka* and one of the authors that had contributed the most articles to the journal. Iwaszkiewicz was born in 1902 in Kiev. In 1911, he began his studies at the Gymnasium of the Society for Supporting Polish High Schools in Kiev. He relocated to Warsaw in 1919, and in 1921 he graduated from secondary school by passing his maturity examination. From 1921 to
1928, he studied at Warsaw University, where he obtained a masters of philosophy in mathematics and then a diploma for teaching at the secondary school level (Piotrowski, 2003).

Iwaszkiewicz began teaching in secondary schools in 1924. From 1934 to 1936 he was a school inspector in the Warsaw school district. From 1925 to 1934 he became an assistant at the Department of Theoretical Mechanics at the University of Warsaw. From 1937 to 1939 he was in charge of Polish minority education in Germany. During WWII he lived in Radom, in east-central Poland. From 1945, he was associated with the town of Wrocław where he worked as an inspector of secondary schools and was also in charge of the organization of secondary education in Dolny Śląsk. In 1950, he began lecturing at the University of Wrocław and the Wrocław Polytechnic. In 1952, Iwaszkiewicz was appointed as a deputy professor at the Department of Mathematics at Wrocław Polytechnic, then from 1955 as a docent and from 1954 to 1958 as prorector of the Wrocław Polytechnic. He also participated in the work of the Program Commissions of the Ministry of Education and in the Mathematical Olympiad.

From 1958 to 1969, Iwaszkiewicz was elected the president of the town of Wrocław. In the period between 1961 to 1971, Iwaszkiewicz was a member in the Sejm of the Polish People's Republic, he was a member of the Presidium of the World Peace Council and many other social organizations (Piotrowski, 2003).

In 1948, Iwaszkiewicz founded the journal *Matematyka*, and was its chief editor until 1969. During the years the journal was examined, from 1948-1950, Iwaszkiewicz was one of the two most frequently published authors, he contributed six articles to the journal. His articles varied in topics but were related to teaching methods in mathematics
and curriculum, which often contained political subject matter (see the Teaching Method category and the Curriculum category for details). The National Library Catalog in Warsaw contains 118 textbooks for algebra, arithmetic and geometry authored or co-authored by Iwaszkiewicz. Iwaszkiewicz died in 1983 in Wroclaw.

Stanisław Gołąb, member of the editorial committee, and contributor of six articles to Matematyka, was born in 1902 in Travnik, Bośnia. He passed his maturity exam in 1920 in Krakow and from 1920 to 1924, he studied at the Department of Philosophy at Jagiellonian University and passed his teacher's examination in 1926. Beginning in 1922, he taught at the Department of Mathematics of the Mining Academy in Krakow. After receiving a scholarship from the Ministry of Religious Denominations and Public Education to study abroad, Gołąb traveled to Delft in the Netherlands where he continued his studies in differential geometry from 1928-1930. He completed his doctoral dissertation in the Netherlands and defended it at Jagiellonian University in 1931. A year later, Gołąb obtained his habilitation degree at Jagiellonian University (Pawlikowska-Brożek, 2003; Domoradzki & Stawiska, 2015).

In 1939, Gołąb was arrested by the gestapo and imprisoned. After his release, he returned to Krakow in 1940 and participated in secret teaching. In 1946, he returned to his job at the Mining Academy in Krakow and in 1948 he became a Professor and the Chair of the Department of Mathematics. In 1949, he became the Chair of the Department of Differential Geometry at the State Mathematical Institute and worked there until 1972. From 1955, Gołąb was also the Chair of the Department of Geometry at the Department of Mathematics, Physics, and Chemistry of the Jagiellonian University. He retired in 1972 (Pawlikowska-Brożek, 2003; Domoradzki & Stawiska, 2015).
Gołąb’s main field of interest was differential geometry as well as the history of mathematics. He published over 250 works, including a monograph, 14 scripts and textbooks. Gołąb joined the editorial committee for the journal *Matematyka* in 1948. During the first two years of the journal’s existence, he published six of his articles. Gołąb also co-authored two articles with Leśniak for the journal *Parametr*. The topic of Gołąb’s articles varied in subject matter, some were promoting new methods for teaching specific topics, others were on school mathematics, often related to geometry. Gołąb died in 1980 in Krakow.

Tadeusz Ważewski was born in 1896. After completing his secondary education in Tarnów in 1914, he began studying at Jagiellonian University in Kraków from which he graduated with a mathematics degree in 1920. From 1920 to 1921, Ważewski taught mathematics at the gymnasium in Krakow. Then, after receiving a scholarship from the French government, he studied in Paris from 1921 to 1923 and in 1924 he obtained his doctoral degree in mathematics at the Sorbonne. Next, Ważewski moved back to Krakow and from 1924 to 1926 worked as an assistant at the Department of Mathematics of the Mining Academy and lectured at Jagiellonian University. In 1926, he became deputy professor at the Department of Mathematics at Jagiellonian University and after receiving his habilitation in 1927 from Jagiellonian University, became an associate professor of mathematics in 1933 (Pawlikowska-Brożek, 2003; Domoradzki & Stawiska, 2015).

In 1939, Ważewski was arrested by the gestapo and was taken to a concentration camp. After his release in February 1940, he returned to Krakow to teach at the School of Business as well as a clandestine university until 1945. In 1945 he became a professor at Jagiellonian University and the chair of the Department of Mathematical Analysis until
1967. In the years 1949 to 1972 he was the Chair of the Department of Differential Equations of the Institute of Mathematics of the Polish Academy of Sciences (PAN).

The subject of Ważewski’s research were problems in the field of set theory, topology, and mathematical analysis. He is also known as a leading specialist in differential equations not only in the country, but also abroad. He created the Krakow school of differential equations. Ważewski has published over 100 works.

Ważewski was a correspondent member of the Warsaw Scientific Society, a member of the Polish Academy of Learning (PAU), and a member of PAN. He was also a member in the General Board of Polish Mathematics Society (PTM), where he served as a secretary for a few years and then as the president from 1959 to 1961. In 1967 he also became an honorary member of PTM and received a Doctor honoris causa degree from Jagiellonian University. For many years Ważewski edited the journal Annales Polonici Mathematic (Pawlikowska-Brożek, 2003; Domoradzki & Stawiska, 2015). He was also a member of the editorial committee of the journal Matematyka and between 1948-1950 Ważewski contributed three articles to the journal. Ważewski died in 1972.

Edward Marczewski (Szpiłrajn) is a distinguished mathematician who had been a member of the editorial committee of the journal. Marczewski was born in Warsaw in 1907. After graduating from gymnasium in 1925, he began studying mathematics at the University of Warsaw. In 1932, Marczewski was awarded a Doctor of Philosophy degree in Mathematics under the supervision of Sierpiński. At the same time, he began working at the University of Warsaw as a junior assistant and made his way up to becoming a lecturer. His work at the university was interrupted by the war. From 1939 to 1941 he was a docent at the Department of Geometry at the University of Lwow. In 1941, when
he returned to Warsaw, he participated in secret teaching under the alias Marczewski, which he permanently accepted. In September of 1944, the Germans sent him to a labor camp in Wroclaw. From 1945 he began working at the Scientific Group of the City of Wroclaw and was its most active member. In 1945, he received his habilitation from Warsaw University. From 1945 to 1969, Marczewski worked at Wroclaw University, first as an Associate Professor then Professor, and from 1951 to 1967 as the director of the Mathematical Institute, and from 1953 to 1957, as the rector of the University of Wroclaw. In 1948 he helped in organizing the State Mathematical Institute (PAN) and he was one of the organizers of the Wroclaw branch of Polish Mathematics Society (PTM) and the IV Congress of Polish Mathematics in Wroclaw. Marczewski was the president of the General Board of Polish Mathematics Society (PTM) from 1957 to 1959 (Pawlikowska-Brożek, 2003).

Marczewski was the founder and the editor of the mathematical journal *Colloquium Mathematicum*. He published about 100 mathematical papers mainly in *Fundamenta mathematicae, Colloquium Mathematicum* but also in many foreign journals. His interest was in set theory, general topology, theory of real functions, theory of analytic functions, theory of probability and general algebra. He conducted research together with Sierpiński and Steinhaus. He was also the editor of the journal *Matematyka* since it first appeared in 1948. He published around 50 articles about the history of mathematics, biographies of mathematicians, and his reflections about mathematical culture (Pawlikowska-Brożek, 2003). Marczewski received many recognitions, among them were the degree of doctor *honoris causa* from Wroclaw University, honorary membership of the Polish Mathematics Society and Wroclaw Science Society, and
membership in the Institute of Mathematics of the Polish Academy of Sciences.

Kazimierz Zarankiewicz, was an editor of the journal and an author of four articles in the journal from 1948 to 1950. Zarankiewicz was born in 1902 in Częstochowa. After graduating from the gymnasium in Będzin in 1919, he studied mathematics at the University of Warsaw. In 1923, Zarankiewicz earned a Doctor of Philosophy degree under the supervision of Sierpiński and in 1929 his habilitation degree. In 1924, Zarankiewicz became a mathematics assistant at the Warsaw Polytechnic and worked there until the academic year of 1930-1931 when he went to work with mathematicians from Vienna and then Berlin (Kolankowski, 2003).

After returning to Poland, Zarankiewicz lectured at the University of Life Sciences (Wyższej Szkole Gospodarstwa Wiejskiego) in Warsaw. In 1937, he became a deputy professor at the Mathematics Department of the Warsaw University of Technology. During the occupation he participated in secret teaching. After the Warsaw Uprising, he was transported to a labor camp in Germany, and then at the end of the war he returned to Warsaw where in 1946 he worked at the Warsaw Polytechnic as an Associate Professor, and in 1948 became Professor (Kolankowski, 2003).

He published 45 papers and articles, including two textbooks. He was interested in topology, graph theory, complex functions theory, and number theory. Zarankiewicz was a member of the editorial committee of the journal Matematyka, for which he also published four of his articles. Among his articles are papers on school mathematics, review of a textbook and a review of the mathematics education system in the USA. Zarankiewicz also had a lot of interest in astronautics, so much so that he organized and
was the president of the Polish Astronaut Society. Zarankiewicz died in 1959 during the plenary meeting of the International Federation of Astronautics in London, which he chaired (Kolankowski, 2003).

Zofia Krygowska, known for her superior work in mathematics education in Poland and abroad, published four articles during the period of 1948-1950, which placed her among the authors who had contributed the most articles to the journal. Zofia Krygowska was born in 1904 in Lwow. After completing gymnasium in Krakow in 1923, she studied mathematics at the Department of Philosophy at Jagiellonian University and for some time at Warsaw University. When she passed her teacher’s license examination, she worked at elementary and secondary schools in Krakow. In 1931, Krygowska received the masters of philosophy degree in mathematics from Jagiellonian University. From 1939 to 1944, Krygowska taught and organized secret teaching in Krakow. After the war, Krygowska resumed her teaching at high school. From 1948 to 1952, she was the head of the Methodological Center in Krakow. In 1950, Krygowska was awarded her doctorate degree from Jagiellonian and from 1950 till the end of her life, Krygowska was a professor at the Pedagogical College in Krakow. From 1958 to 1971, she was the chair of the Department of Methods of Teaching Mathematics in the Pedagogical College (later became known as the Department of Didactics of Mathematic). Krygowska was the initiator of the post-graduate studies in didactics of mathematics. In 1977, Krygowska received the diploma of Honoris Causa Doctor from the Pedagogical University (Sękowska, & Węglowska, 2003; Domoradzki & Stawiska, 2015).

Krygowska authored of many articles which were mainly published in journals devoted to didactics of mathematics. She was also an author or co-author of books on
teaching mathematics and its methodology as well as textbooks for secondary school mathematics. Among her co-authors were Straszewicz and Kulczycki (see chapter V). Krygowska took an active part in the international movement of modernizing the teaching of mathematics. She conducted a series of TV lectures for teachers which were broadcast by the Polish central television. She participated in many national and international congresses and conferences devoted to the problems of teaching mathematics and teacher education. She organized the International Meeting of the Commission for the Study and Improvement of Mathematics Teaching (CIEAEM) in Poland. She was a member of CIEAEM for many years, then its President, and from 1974 its Honorary President. She served on many international editorial committees of journals dedicated to didactics of mathematics. Among others, she was a member of the Scientific Council of the Inter-University Teacher Training and Research Center in Krakow, the Polish Mathematics Society, and the International Team of Mathematicians for Curriculum, Textbook and Teaching Methods of Mathematics. Krygowska ran seminars and lectured abroad on issues related to didactics of mathematics. Krygowska was a founder and editor-in-chief of the the journal Didactica Mathematicae (formerly Dydaktyka Matematyki) which played an important role on an international level in the dissemination of ideas in teaching and learning of mathematics. She was also a member of the editorial committee of the journal Matematyka and Wiadomości Matematyczne. Krygowska died in 1988 (Sękowska, & Węglowska, 2003; Domoradzki & Stawiska, 2015).
Conclusions for Matematyka

After World War II, Poland was subject to strong Soviet influence and control. The Polish education system quickly became strongly ideologized and politicized against Polish tradition. Moreover, the devastation and loss of life as a result of the war severely strained the Polish education system. It suffered from a lack of teachers, school buildings, and teaching supplies. The government reacted by issuing the Three-Year Plan and Six-Year Plan to put the country on a path of reconstruction with a basis of socialism. There existed a strong need for qualified people in industry and agriculture to be educated in a relatively short time to recover the losses in every aspect of life. By 1948, the Polish United Workers Party gained full control over every aspect of life and education. The Ministry of Education introduced The Teaching Programme for 11-Year Secondary Schools, whose main goal was to prepare students for the economic needs of the country and to make them politically conscious socialist citizens. The school curricula adapted Marxist-Leninist ideologies in an effort to instill students with a firm belief in the superiority of the socialist system and to demonstrate that the Soviet Union is Poland’s main partner and ally.

The journal Matematyka was founded the same year, 1948, as these major changes in the education system were occurring. It is clear that, the journal was being influenced by socio-politics since it published transcripts of speeches of the President and reports from meetings of the Polish United Workers Party, which expressed the problems that existed in the Polish school system, and demonstrated that politicians were directing the development of the solutions. Several authors wrote their articles with regard to the socio-political and economic factors that had influenced the education system. These
articles exemplified the importance of education in rebuilding the country so that it can recoup the losses from the war and continue to grow with a strong foundation.

Among the goals of *Matematyka*, was to raise the level of mathematics teaching such that graduates have real and concrete working mathematics knowledge that would be necessary in order to prepare for the Six-Year Plan, a government plan for the expansion of heavy industry. The influence of the socialist ideologies is evident in most articles. The authors would often refer to the Six-Year Plan, and present new teaching methods or resources that would facilitate the implementation of the goals of the plan. According to the program, teachers were expected to closely follow the curriculum. They were even given special instructions by the program, outlining what content matter they could and could not discuss in the class. There were many articles published in the journal to provide teachers with ideas, inspiration, and even textbooks, that would help teachers satisfy the requirements of the program. There was a very strong pushback against formalism in teaching of mathematics which was in line with the socialist agenda of the time. According to the program, the material practiced should be based on data about economic reconstruction, industrialization, increasing efficiency, or just about anything else pertaining to economy or development. There existed a continuous and noticeable mention of topics in the context of the socialist economy in the journal, the goal being to help prepare young people for assimilation into their adult social and political lives.

*Matematyka* had published articles from Russian journals that were translated into the Polish language on the topics of formalism, school practice, curriculum, teacher preparation and more. Once again, the idea was to promote socialist ideology on the
readers of the journal. In the textbook review section of the journal there are reviews of Russian textbooks, which often used practical problems with less emphasis on formalized mathematics. Textbooks that were not Russian were also reviewed, but only those that were in line with the Marxism-Leninism ideology and which did not stress formalism. Anything that was not of Russian origin or went against Soviet or socialist ideologies was criticized by the authors of the articles or via footnotes to articles written by the editors of the journal.

Most of the editors and major contributors studied or worked at Warsaw University, Krakow University, or Wroclaw University at some point in their lives. It is likely that they met each other at these universities and eventually worked together to edit and maintain the journal Matematyka. The journal evidently became a platform for the dissemination and discussion of changes to the mathematics program that would be in-line with socialist ideologies for education. The journal welcomed comments from readers and encouraged open discussions on all topics. It was clear that the editors as well as other authors were in support of the socialist ideologies regarding the teaching of mathematics. The editors that contributed articles, such as Iwaszkiewicz, Golab, Leśniak, Zarankiewicz all wrote articles that aligned with the changes to the curriculum in mathematics.

In general, the socio-political atmosphere in Poland during the years from 1948-1950 was heavily influenced by Soviet and socialist ideologies. It is evident in almost all aspects and sections of the journal Matematyka, with very little, if any, support for any other method or ideology.
Chapter VIII
Discussions and Conclusions

This study has shown that Poland’s history of education was often influenced by internal or external politics and ideologies, which shaped the nature and development of education. It could be argued that all countries had undergone political and ideological influences in their educational history, be it by neighboring countries like Russia for Poland, or even by countries overseas such as the United States.

The results of this study support general statements on the history of mathematics education. Schubring (2006) states that the history of teaching and learning of mathematics as an interdisciplinary field, intersects with the history of mathematics, history of education, social history, and sociology and that there is a need for comparative studies on the history of mathematics education at the international level that will consider cultural, social, and political aspects. Karp and Furinghetti (2016) also state that society, economics, politics, technology, religion, and beliefs, all contribute to the evolution of mathematics education as much as the predominant ideology, but that a comparative international and chronological study needs to be done. That is to say that there should be studies done which would compare the education histories of different countries.

Analysis of periodicals provides a unique opportunity to observe the communication between mathematics educators and also governmental authorities. One can read about the topics on which people agree and disagree, see how some ideas are given explicitly, which could later result in specific development of mathematics education materials.
The researcher observed some similar features in the development of Polish periodicals explored in this study as compared to an Italian periodical presented in “The role of a journal on teaching mathematics and sciences issued at the beginning of the 20th century in professionalizing Italian primary school teachers” by Furinghetti and Somaglia (2018). Among these, is the fact that the editors of the journals had much influence over what content the journal published. The journals were a platform for communication between teachers, supported by the Ministry of Education, and were affected by major historical events such as war, or changes in the political atmosphere.

At the same time, some characteristic features of Polish journals are quite different at least from the Western European journals – among these features is explicit ideologization of the subject as presented in the journal Matematyka. Matematyka did exhibit resentment toward influences from abroad, especially from the West. These aspects of the Polish journal are similar to what was observed in Soviet periodicals (Karp, 2007). Hostility toward the West existed in the propaganda and ideology of the journal Matematyka just as it did in Soviet periodicals.

In general, more studies are needed to understand how Poland’s history of mathematics education periodicals fits into or relates to the collective history of Europe. These studies could explore the changes in the centers of influences as well as general patterns of development. This work attempted to be of help for such a general study.

**Answers to the Research Questions**

The answers for the research questions which guided this study are given below.

1. *What were the objectives, content, and most important topics of periodicals between 1930-1950?*
**Parametr**: 1930-1932, 1939

The objectives of *Parametr* were to fill a gap in Polish educational publishing, to raise the level of mathematics education in Poland, and to improve the quality of instruction. *Parametr*’s table of contents contained sections titled: articles, section for youth, from the past, professional news and chronical, bibliography and overview of publications, corner without title, problems, solutions to problems, and miscellaneous notes. The themes of these sections pertained to teaching methods, instructional practices, school mathematics, curriculum, and textbook reviews.

Poland needed to reconstruct a uniform national education system out of the fragmented and separate systems that remained after the partition. The Ministry of Religious Denominations and Public Education wanted a system that was as free from Russian, Prussian, or Austrian influences as possible. With Poland’s education system so heterogeneous, the government needed to react quickly to unify the system under one doctrine. The Educational Programme for Secondary Schools of 1919-1922 and the Jędrzejewicz reform of 1932 were the first major movements geared at constructing a uniform Polish education system. The journal had published many articles that were in line with the social and political reality of the country. During the time between the two reforms, works on the subject of improving mathematics education were common. Some of the most important topics of discussion were on the topic of new methods of teaching from other countries such as the Dalton plan, heuristic method, and supervised study.

The education system of Poland faced growing pains in the sense that large scale changes were being implemented by the new programs and reforms, but some of their features had proven ineffective, or not as effective as they could have been. In an attempt
to improve the effectiveness, several teachers published articles in the journal regarding instructional practices and teaching aids, subjects which the other journals did not delve into very deeply at all when compared to *Parametr*. Many authors published in the journal supported the idea of moving away from abstract ideas and rote memorization in the teaching of mathematics, and instead offered other methods of instruction that incorporated more elementary mathematics into the lessons. The reason for this shift was due to the fact that many students were not mastering the material being presented.

*Matematyka i Szkoła*: 1938-1939

The objectives of *Matematyka i Szkoła* were to exchange thoughts between all those who had an interest in the teaching of mathematics in secondary schools and it was devoted to issues related to elementary mathematics and its teaching in secondary schools. *Matematyka i Szkoła*’s table of contents contained sections titled articles, bibliography, and chronicle. The themes of these sections pertained primarily to teaching methods, school mathematics, and textbook reviews.

When *Matematyka i Szkoła* was first being published in 1938, the Jędrzejowicz reform had already been in place for some time. Many improvements had been made country-wide, but there were still certain aspects of the mathematics teaching system that some authors believed should be improved upon in order for the system to be able to reach its goals to the fullest potential. Thus, many articles in the journal were devoted to attempts and proposals at improving insufficient teaching methods within the system. A common topic in the articles was extracurricular activities, how they could be improved, and their importance in the development of gifted students. A resistance to the use of
abstract instruction and meaningless rote memorization was a common theme among the articles in order to help students master the course content. Overall, it is clear from the articles of *Matematyka i Szkoła*, that many teachers and mathematicians were enthusiastic about contributing their thoughts, ideas, and experiences in an effort to improve the level of mathematics teaching by improving the parts and pieces of the program that were deficient.

*Matematyka: 1948-1950*

The main objectives of *Matematyka* were to popularize mathematics, to broaden teachers’ knowledge, and to assist them in their teaching practices. The journal was also of a political nature, in that it was intended to make teachers soviet style teachers who teach mathematics at various levels of education. In the fourth issue, the editors summarized the three main aims of the journal. To raise the level of mathematics teaching to ensure that school graduates have real and concrete mathematics knowledge. To discuss issues related to organization and teaching techniques as well as ideas on how to improve the teaching level in mathematics. To publish articles that would suggest improvements regarding the organization of work in didactic-scientific centers and regional centers. *Matematyka’s* table of contents consisted of the following sections, the science, mathematics formerly and today, didactics, chronicle, reports and bibliography, problems, and correspondence. The themes of these sections pertained to teaching methods, school mathematics, curriculum, and textbook reviews under a soviet socialist theme.

*Matematyka* was first published in 1948 when Poland had fallen under strong Soviet influence and control. The Polish education system quickly became strongly
ideologized and politicized against Polish tradition. The Ministry of Education introduced *The Teaching Programme for 11-Year Secondary Schools*, the main goal of which was to prepare students for the economic needs of the country and to make them politically conscious socialist citizens. The school curricula adapted Marxist-Leninist ideologies in an effort to instill students with a firm belief in the superiority of the socialist system and to demonstrate that the Soviet Union is Poland’s main partner and ally.

The influence of socialist ideologies is evident in most articles, as the authors would often refer to the Six-Year Plan, a government plan for the expansion of heavy industry, and presented new teaching methods or resources that would facilitate the implementation of the goals of the plan. Raising the level of mathematics teaching such that graduates have real and concrete working mathematics knowledge, that would be necessary in order to prepare for the Six-Year Plan, were commonplace. The journal provided teachers with ideas, insights, and even textbook recommendations, that would help teachers satisfy the requirements of the program. It was clear that several authors were opposed to formalism in the teaching of mathematics, a position which was also strongly developed in the Soviet Union. There existed a continuous and noticeable mention of topics in the context of the socialist economy in the journal, the goal being to help prepare young people for assimilation into their adult social and political lives.

2. *What were the changes in mathematics education periodicals across the period 1930-1950 and what were the reasons for these changes?*

All three journals analyzed offered teachers, mathematicians, and anyone else interested in the subject, a platform to express their thoughts, ideas, concerns, and
experiences. They were created to fill gaps in educational publishing and to raise the
level of mathematics teaching and education in Poland at the elementary and secondary
level. All the journals encouraged open discussions about ideas or issues pertaining to
any mathematics topic. The articles were aimed at improving their current education
system. There was a clear resistance against formalism and rote memorization in many
articles from all journals analyzed. However, the analysis chapters showed that Polish
mathematics education and journals in particular were under strong political and social
influences.

After Poland regained its independence in 1918, the country’s education system
consisted of three different systems, a result of the partitioning of the country between
Russian, Prussia, and Austria. Poland needed to unify its education system, and so the
government introduced The Educational Programme for Secondary Schools of 1919-
1922, and the Jędrzejewicz reform of 1932. Parametr was founded by Antoni Marian
Rusiecki and Stefan Straszewicz in 1930, during a time in Poland when country-wide
changes to the education system were being made. It published articles pertaining to
elementary and secondary school mathematics during the first two years of publication
1930-1932. Parametr was published by the St. Wojciech Publishing firm in Poznań,
which willingly took this initiative as a public service for Polish schools, not as a source
of income. Parametr published authors’ ideas, thoughts, suggestions, and experiences
regarding their teaching, and authors proposed changes in their articles that should be
made to the current system in order to improve it. Parametr ceased publishing in 1932,
due to the editor Rusiecki, not having enough time to act as editor of the journal. The
journal returned briefly in 1939, only publishing 4 issues. Parametr was forced to cease its publications due to the German invasion of Poland in 1939.

Since Parametr was not being published in 1938, Straszewicz and several others worked together to found and edit Matematyka i Szkoła in 1938. It was published by the Society of Teachers in Secondary Schools and Universities. The journal Matematyka i Szkoła was aimed only at the secondary school education level. When Parametr returned in 1939, it only published articles pertaining to elementary school mathematics. It appeared as though Rusiecki and Straszewicz chose to only publish articles regarding elementary school education in Parametr, because Matematyka i Szkoła, had already been in existence and it focused on secondary school mathematics education. This way, each journal could focus their resources on one level of education, and on the specific needs of the students and teachers at each respective level.

Matematyka i Szkoła emerged in a much more convenient socio-political landscape than Parametr did. At the time of the first publication of Matematyka i Szkoła, the new education system had been in place for some time, and many aspects of the system had been worked out. However, there were still some areas of the system that were lacking, which the journal’s authors expressed and discussed in their articles. Matematyka i Szkoła was a much smaller journal than Parametr. Some of the authors supported methods and textbooks from Germany, which shows that they were open to foreign influences in their search for solutions to problems in the system, but there were not many discussions about ideas or textbooks from other countries. Articles in Parametr on the other hand, demonstrated much more interest in ideas from other countries, as several authors wrote articles discussing teaching methods, teaching aids, practices, and
textbooks from other countries such as Italy, France, Germany, United States, England, Austria, and Russia. Clearly there was less space in the journal devoted to foreign ideas over the few years that separated *Parametr* and *Matematyka i Szkola*.

The journal *Matematyka* was founded by Bolesław Iwaszkiewicz together with the editorial committee members: Stanisław Gołąb, Jan Leśniak, Edward Marczewski, Antoni Marian Rusiecki, Stefan Straszewicz, Tadeusz Ważewski, and Kazimierz Zarankiewicz. It was published by the Polish Mathematical Society on behalf of the Ministry of Education. After World War II, Poland underwent significant changes due to the influence of Soviet and socialist ideologies, and that in turn had affected the education system and influenced the content in the journal *Matematyka*. The education system quickly became politicized against Polish tradition. World War II had devastated Poland, it suffered from a lack of teachers, functional buildings for schools, and supplies necessary for teaching. The government responded by issuing the Three-Year Plan and Six-Year Plan, which were intended to put the country on a path of reconstruction with a basis in socialism. In 1948, the Polish United Workers Party controlled every aspect of life and education. The Ministry of Education introduced *The Teaching Programme for 11-Year Secondary Schools* in 1949, whose main goal was to prepare students for the economic needs of the country and to make them politically conscious socialist citizens. The school curricula adapted Marxist-Leninist ideologies in an effort to instill students with a firm belief in the superiority of the socialist system and to demonstrate that the Soviet Union is Poland’s main partner and ally. The journal *Matematyka* was first published in 1948, just before the new teaching program was being put into place and while under the strong influence of Soviet socialism.
Among the objectives of *Matematyka*, was to raise the level of mathematics teaching such that graduates have real and concrete working mathematics knowledge that would be necessary in order to prepare for the Six-Year Plan. Authors would often refer to economic data from the Six-Year-Plan in their articles, and would present new ideas, teaching methods, and textbooks that would help to raise the efficiency of education and help to satisfy the goals set by the plan. A significant amount of the content was of Russian origin, including translated articles from Russian journals, reviews of Russian textbooks, and literature which was aligned with the Marxism-Leninism ideology. Articles which were in support of methods or ideas outside of these ideologies were still published, but would often contain footnotes by the editors criticizing the ideas and methods as not being the best solutions. The analysis of *Matematyka* has shown that the socio-political situation in Poland during the years from 1948-1950 was heavily influenced by Soviet and socialist ideologies and is also evident in the journal, with very little, if any, support for any other ideology.

Since *Parametr* and *Matematyka i Szkoła* were published in a different time period, they did not experience any Soviet or socialist influence as compared to the journal *Matematyka*. The influences of the first two journals were in most part domestic, and any evident foreign influence that did exist was not of a compulsory nature. During the time of *Matematyka* however, the Soviet and social influences and changes imposed were compulsory.

In general, it is clear that the reasons for the changes in the thematic content of the journals were due to changes in the government and social ideologies of Poland between 1930 and 1950. In the 1930s, when Poland had sovereignty over its systems, it issued
programs and reforms aimed at improving the education system, which authors would then analyze, discuss, and offer their recommendations in regard to. In the late 1940s, there is another major shift in the government and social ideology of Poland, and the content of *Matematyka* changed along with it.

3. *Who were the most prominent and influential authors of the periodicals during 1930-1950?*

   Arguably the most influential authors of the periodicals between 1930-1950 were Stefan Straszewicz, Antoni Marian Rusiecki, Bolesław Iwaszkiewicz and Bronisław Bielecki. Rusiecki and Straszewicz co-founded the journals *Parametr* and *Matematyka*, they also edited the journals and published many of their own articles in them. Straszewicz was also a founding editor of *Matematyka i Szkoła*, along with Bronisław Bielecki. Bolesław Iwaszkiewicz was the founder of the journal *Matematyka*. It certainly is possible that if not for these men, the three journals may never have come to exist. All four men were employed by the Ministry of Religious Denominations and Public Education during this period, and as such must have been in support of the ministry’s rules and regulations. There is no doubt that the ideologies of the ministry influenced these men, which in turn influenced the journals in kind.

   Other figures such as Stefan Kulczycki, Jan Leśniak, Tadeusz Sierpulowski, Stanisław Gołąb, Edward Marczewski, Tadeusz Ważewski, and Kazimierz Zarankiewicz also played important roles in the journals as co-founders, editors, and contributing authors. Without their contributions and support, the journals would not have been as rich in content and discussion as they were. These men must have been in contact with one another, either at schools, universities, or at meetings of congresses.
Since all of the figures mentioned were educated during a period in Poland when the country was partitioned, they were influenced by different foreign methods and ideas. Some went abroad to study due to the fragmented political and social landscape. The Russian language was compulsory in schools which may have made some people venture abroad for their education. In 1919, the people who left to study abroad began to return to Poland to study and teach at Warsaw University and Jagiellonian University. Some of these students and educators would later become the authors of articles published in the journals, and their experiences and viewpoints from abroad were often represented in their articles. As such, it can be argued that these figures brought with them some of the best aspects of foreign systems and ideas and tried to fit them into the system in Poland.

The journals published the works of famous Polish mathematicians such as Wacław Sierpiński, Hugo Steinhaus and Alfred Tarski, which had a major influence on Polish mathematics as a whole. By doing so, the journals certainly added credence to their publications, as many readers of the journals were interested in what Sierpiński, Steinhaus and Tarski were writing about. Sierpiński, Steinhaus and Tarski were certainly in contact with figures like Rusiecki and Straszewicz at Polish Mathematical Congresses, which may have given Rusiecki and Straszewicz the opportunity to network with them and publish some of their works.

Among the authors of the journal were many teachers of mathematics at elementary and secondary level, instructors at higher institutions, and mathematicians. Those that had completed doctoral degrees in mathematics also expressed great interest in the teaching of mathematics by earning their teaching certificates and being involved in teaching at secondary institutions. They also published textbooks, which demonstrates
they were concerned with the way in which material was presented to students as well as the type of exercise problems that they were assigned.

The journals together published many authors among them. However, the authors that had the most articles published among the journals were Kazimierz Cwojdziński, Stefan Kulczycki, Samuel Steckel, and Zofia Krygowska. The subjects their articles encompassed included teaching methods, school mathematics, curriculum, and textbooks reviews. Without these authors, the journals would have been noticeably smaller publications with less quality and variety than they were.

Limitations of the Study

A limitation of this study stems from the lack of information about the journals – specifically, the information about many of the authors is very limited or even not available. Not all archives were available to the researcher, and some of them may have been destroyed either during the war or sometime after. Meantime, some of the influential figures of the mathematics education journals were also heavily involved in several journals devoted to other topics. To gain a deeper understanding about the true influence of these figures in Poland would require research into the extent of their activities and involvement in other journals from the same time period. To name just one important limitation of the sources, this researcher had no access to the editorial funds and exchange of letters between the authors and editors as well as between editors and other parties supporting the journal, there are no letters available from the Ministry of Education to the journals although it is very likely that they existed. It is unknown how the papers submitted to the journals were changed. It would be of great interest to consult archives of the communist party which could have some discussions or guidelines.
regarding the content of the journals. Since all the information is not available, in many cases it is not possible to know exactly how things happened, why they happened, or who may have caused them to happen.

Another limitation of this study was the difficulty in classifying articles as many articles contained information that often pertained to more than one category. Some articles had content related to multiple categories, so the researcher used her best judgement in placing the articles into the appropriate category. For convenience, papers of less than one page in length were excluded from the study - mainly announcements, doing so obviously somewhat limits the scope of the study, as even these short papers provide some information and background.

It would be of interest to compare the discussed materials with the materials in general educational journals or with the periodicals on teaching other school subjects (as it was discussed some materials in Matematyka were taken from the Soviet general educational newspaper addressed to all teachers rather than to teachers of mathematics only). These and other issues deserve special studies.

**Recommendations for Further Studies**

A new study can continue the line of exploring the above studied journals in many different ways. The problems for the readers section in the journals are worth investigating. It would be interesting to explore what type of questions where published, who were the authors of the questions and the authors of the answers to those questions. It would offer a chance to understand the audience of the journals better.

One may consider examining the journal Matematyka for a longer time period to see how its content and influences changed throughout the years of the Cold War. Life
under Cold War conditions deserves further study since mathematics education was engrained in everyday life. An interesting time to examine *Matematyka* would also be in the 1980s, when Poland became free from Soviet control as well as after 2004, when Poland became a member of the European Union. Were there socio-political changes imposed on the education system of Poland during the years of 1980 and 2004? One could research the changes in the teacher training programs to see if they contributed to changes in the topics of articles in the journal over the years, as after all, the articles were being written mostly by teachers who went through these training programs.

When Poland had sovereignty over its own facilities, the founders and editors of journals, as well as Polish mathematicians had utilized the journal as a place for the free exchange of ideas, but this was not the case when Poland was under Soviet rule. Thus, it would be of interest to research how the editorial board had changed, and what were the reasons for these changes, were the reasons political? What happened to those editorial members, were they pushed out? Was there a new group created that would much more strongly support the Soviet ideologies? In general, it would be of interest to explore the lives of the contributors of the journal deeper – which would help to understand the processes of changes in the groups of mathematics educators better.

This study provided a chronicle of the development of periodicals of Poland, a country with a history of dramatic events. It would be of interest to examine and compare other countries which underwent similar dramatic events, for example, it would be of interest to examine how the development of journals was influenced in Hungarian mathematics education.
Mathematics education periodicals represent one important side of the professional communication in the field. It may be of interest to generalize the approach and look at other forms of communication – for instance – explore professional meetings, conferences and congresses at this time attempting to identify the most important hot issues and controversial problems. This study would ideally identify connections with the publications in the periodicals offering additional insights to our understanding of their role.
REFERENCES


Cwojdziński, K. (1930). Rozmyślania nad programem szkoły średniej. [Thoughts about the secondary school program]. Parametr, 1(7), 258-266.

Cwojdziński, K. (1930a). Sposoby tworzenia równań kwadratowych o jednym parametrze zmiennym, których wyróżnik ma pierwiastki wymierne. [Formulas to
create quadratic equations in one variable with a rational discriminant]. *Parametr* 1(1), 14-18.


Cwojdiński, K. (1930c). Kilka słów o ciągach. [A few remarks about sequences]. *Parametr* 1(8), 300-305.


Krański, W. (1930). Kilka słów o sprawach, związanych z obliczaniem pola prostokąta. [A few words about the issues associated with the calculation of the area of the rectangle]. Parametr, 1(6), 201-208.


Łukasik, F. (1932b). Prostokatne mnozenie a przekatnym dodawaniem. [Rectangular multiplication with diagonal addition]. Parametr, 2(8-10), 214.


Racinowski, S. (1930). Kilka uwag o t. zw. przykładach rachunkowych. [Several remarks about the so-called arithmetic examples]. Parametr, 1(3), 81-85.


218
Sadzeiczowa, M. (1931). Wprowadzenie dziecka w dziedzinę wiedzy ścisłej. [Introducing children to the field of scientific knowledge]. *Parametr*, 2(1), 4-8.


Straszewicz, S. (1930b). Uwaga o podstawowych układach związków między elementami trójkąta. [Remarks about the basic relationships between the elements of the triangle]. *Parametr, 2*(4-5), 95-98.


Wuczyńska (Sieniawka), K (2012). Programy nauczania matematyki w szkołach średnich w okresie międzywojennym. [Mathematics teaching programs in secondary schools in the interwar period]. Antiquitates Mathematicae, Vol 6, pp 2-37. doi:10.14708/am.v7i0.573


Zarzecki, A. (1930). Treść i pytanie w zagadnieniach z tekstem słownym. [Content and question in verbal word problems]. *Parametr, 1*(1), 3-8.