The Order of Jesuits and the discussions on the Mathematics presence in the *Ratio Studiorum*

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ABSTRACT

The teaching of Mathematics in the *Ratio Studiorum* is the focus of the research that lends support to the discussion of this article. It is a qualitative investigation, based on the Thompsonian concept of Depth Hermeneutics. The *Ratio Studiorum* is a set of norms that have as objective to unify the pedagogical procedures from Jesuits, that is, a pedagogical method and educational ideology of the organization of studies of the schools and universities of the Order. The Society of Jesus was founded by Inácio de Loyola in 1534 for missionary purposes and total obedience to the Pope. Soon after the first years, the Order focused its actions on education, becoming its main apostolate. As for the proposed curriculum, in the final writing, the *Ratio* had no Mathematics in the Lower Studies, being the focus the literary and humanistic formation. In higher studies, we find Mathematics along with other philosophical disciplines, focusing on the formation of philosophers. In the organization of the curriculum, Mathematics is considered as an auxiliary resource for the teaching of other disciplines, such as Physics, Geography and Astronomy. After the restoration of the Order, in 1814, the sciences and, among them, Mathematics began to be prioritized. This is evidenced in the new version of *Ratio*, when these disciplines gain prominence due to the scientific advance of that time.

Keywords: Mathematics Education. *Ratio Studiorum*. Jesuit pedagogical organization.

A Ordem dos Jesuítas e as discussões sobre a presença da Matemática na *Ratio Studiorum*

RESUMO

O ensino de Matemática na *Ratio Studiorum* é o foco da pesquisa que dá suporte à discussão deste artigo. Trata-se de uma investigação qualitativa, baseada no conceito Thompsoniano de Hermenêutica Profunda. A *Ratio Studiorum* é um conjunto de normas que têm como objetivo unificar os procedimentos pedagógicos dos Jesuítas, ou seja, um método pedagógico e ideologia educacional da organização dos estudos das escolas e universidades da Ordem. A Sociedade de Jesus foi fundada por Inácio de Loyola em 1534 para fins missionários e total obediência ao Papa. Logo após os primeiros anos, a Ordem concentrou suas ações na educação, tornando-se seu principal apostolado. Quanto ao currículo proposto, na escrita final, a *Ratio* não teve Matemática

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nos Estudos Inferiores, tendo o foco na formação literária e humanística. Nos estudos superiores, encontramos a Matemática juntamente com outras disciplinas filosóficas, focando na formação de filósofos. Na organização do currículo, a Matemática é considerada como um recurso auxiliar para o ensino de outras disciplinas, tais como Física, Geografia e Astronomia. Após a restauração da Ordem, em 1814, as ciências e, entre elas, a Matemática começou a ser priorizada. Isso é evidenciado na nova versão da *Ratio*, quando essas disciplinas ganham proeminência devido ao avanço científico dessa época.

Palavras-chave: Educação Matemática. *Ratio Studiorum*. Organização pedagógica jesuíta.

INTRODUCTION

The article deals with an investigation into the presence of Mathematics in the *Ratio Studiorum*, also called "Study Plan" for the Jesuit schools. It is a kind of collection of norms and rules, with the purpose of unifying the pedagogical procedures of the Jesuits in front of the great number of schools entrusted to the Order. It covers 467 rules that cover activities related with education.

The Society of Jesus was founded on August 15, 1534, by Inácio de Loyola and six other students, with a missionary purpose and total obedience to the pope. Ignatius was chosen as the first superior of the group and sent his companions to various countries of Europe, placing education at the center of his actions as an important and priority apostolate.

Thus, this historical research focuses the teaching of Mathematics in the educational proposal of the Jesuits, aiming to approach aspects with foundation in the Thompsonian concept of Depth Hermeneutics. These aspects will provide the support for the analysis of the data and the historical and social context in which they were produced.

About Depth Hermeneutics, Thompson (2011, 365) says that

> [...] is a broad methodological framework that comprises three main phases or procedures. These conditions are provided for a period, for example, by means of a complex interpretation process.

Analyzing the curriculum, we find the Lower Studies and the Higher Studies. The Lower Studies, six years in duration, were intended for literary and humanistic education, with the teaching taught primarily literary and classical, not including Mathematics. The three-year Higher Studies were integrated by the Philosophy and Sciences courses, also called the Arts course, involving Logic, Metaphysics, Ethics and Mathematics.

In the development of the article, we will focus initially on aspects of the Order of Jesuits, their creation and their objectives. In the early years, education was not in the Company's initial projects, but a few years after its founding, education was already one of its key ministries, focusing heavily on education and school creation. With the need to

manage these schools, the Order established a unique project of action in all its schools – the *Ratio Studiorum* – which was a normative document prepared for this purpose.

In this way, the present article presents and discusses aspects of the *Ratio Studiorum*, in which Mathematics Teaching is investigated and discussed. In the final version of the Ratio, Mathematics was considered an auxiliary teaching for other disciplines, such as Physics, Geography and Astronomy.

THE ORIGIN OF THE ORDER OF THE JESUITS

The Society of Jesus is a Catholic religious order, officially founded in 1534 by Santo Inácio de Loyola[1]. It is an Order that strictly follows the teachings of the Church and has full fidelity to the Pope. Popularly, they are called Jesuits and, likewise, "the soldiers of Christ".

This is explained by the military background of its founder, as well as the fact that these religious pilgrims in any region of the world, living in the most extreme conditions. Schmitz (2012, emphasis added), in an interview with my Master's thesis, states that "The initial idea was to find something that could help humanity, that it would be useful, without a specific goal, to 'chalk up'. We fill in gaps from the beginning and continue to be today".

The Company was created in a period of struggles of ideas and social upheavals related to the events and movements of that period. Among them are the Renaissance[2], the Protestant and Catholic Reform, and the expansion of commerce.

These events led to changes in the European mentality and, consequently, new repercussions in the religious field. The church, then, was challenged, enabling a rupture in Christian unity, initiating the Protestant Reformation of Martin Luther, provoking reforms in religious ideas, leading to a split in the Christian world.

THE RATIO STUDIORUM: ITS ORIGIN AND MATHEMATICS

In the early years, education was not in the Company's projects. In fact, Ignatius of Loyola expressed reservations about this. But a few years after the founding of the

[1] **Iñigo Lopes de Loyola**, known as Inácio (1491-1556), became an orphan from a very early mother and from a father at the age of 16. For his education, he was sent to the house of the Contador Mayor of the Catholic kings of Spain and later to the house of the Duke of Nájera. He begins a military career that ends at the castle of Pamplona, where he is wounded. In recovery and rest, he feels a strong divine call and decides to dedicate himself to the religious life. He studied theology in Alcalá and Salamanca and later completed his studies in Paris, where he prepared his companions and with them founded the Society of Jesus.

[2] **Renaissance** is the term used to identify the period in the history of Europe approximately between the end of the fourteenth century and the end of the sixteenth century.

Order, education was already one of its main ministries and had become the apostolic mission, according to Bohnen, in an exclusive interview with my PhD thesis (2015, emphasis added):

> The first formula of the institute that founded the Jesuits, of 1550, practically prohibits the dedication to the magisterium. There, St. Ignatius was much sought after, for he was the first general, so they asked for a Jesuit of all that was a song for the colleges. In addition, they had the confessors in the courts, they also asked, then they founded colleges, and Santo Ignacio saw that this would be a great work. He founded the Order of the Jesuits to be free, "Peronia Peragrare" (who walks by everything), and by the colleges they would be prisoners of some form. Then he began to realize the importance of the colleges and began to found them, everywhere, and in the second formula of 1555 there is something about teaching. But in the first constitution it was implicitly forbidden. (BOHNEN, 2015, emphasis added)

Initially, the colleges are houses for studies and training of young candidates to the Company, and are not objects of teaching to external. They are not educational centers but places that offer accommodation and food to follow religious careers. Over time, the colleges have become space for all (internal and external). It was a place where the word of God was known, where students prepared for their own salvation and others, as well as preparing for a life in a changing society.

In a short time, these domestic exercises of the inmates began to be equally allowed to external disciples, to help them in their studies and at the same time in the spirit. This custom was, over time, approved by the Constitutions and, according to Rosa (1954), gave rise to the first form of private education.

Franca corroborates this idea by stating that:

> The institution of colleges for students not belonging to the Order did not enter Inácio's primitive plan, but soon it was imposed upon him as an almost indeclinable necessity and an effective instrument of Christian renewal much in harmony with his lofty purposes and with the spontaneous inclination of Inácio. The foundation in Goa by S. Francisco Xavier of the first college for external ones in 1543 and the donation of 1544 of S. Francisco de Borja then Duke of Gandia for opening in that city of a college, transforming, in 1547, in University or General Studium, they have embarked upon the new Order on the path of their educational mission. (FRANCA, 1952, p.7)

The forties, in the sixteenth century, was very important for the Company, since it was the scene of the first educational experiences, mainly through the founding of the colleges. At first, only of formation, for future Jesuits, opening, later, for external students.

The Jesuit colleges became with time one of the main expressions of the Company. With these experiences, we realized that education was not only a fit medium for human and spiritual development, but also an effective instrument for the defense of the faith, strongly attacked by the reformers in this period.

With the creation of the college of Messina[3] and the work of the Jesuits sent by Inácio for such mission, the number of students increased considerably. A decision of enlargement or non-school education directly for the expressive growth of the schools of the Society of Jesus in several regions. Faced with this, as houses and colleges had to assume common characteristics, such as administration and methodology. The search for a unique and universal project culminated in a promulgation of *Ratio Studiorum*.

The first experience in trying to establish a pedagogical regulation in the Society of Jesus came about with the founding of the college of Messina in Sicily in 1548. According to Leonel Franca (1952), it was in this college that the "modus parisiensis"[4] was used for the first time, what was followed by the teachers in the organization of the studies, in the matter of repetitions, disputes, interrogations and declamations, influencing the rules of *Ratio Studiorum*.

The *Ratio Studiorum*, or "Study Plan," was a handbook to assist teachers and leaders in the daily routine of colleges. It consisted of a series of rules or practical guidelines intended for all those involved, proved, discussed and adapted to the purposes of the Jesuit colleges.

This pedagogical model, the Ratio, was developed for more than fifty years, through educational experiences begun in 1542 with the foundation of the first colleges of the Company. Starting from these common pedagogical experiences and adapted through a constant interchange, the final version of the Ratio appears, according to the characteristics of the "Education of the Society of Jesus" (1998), becoming the first educational system of this type that the world knew.

In 1599, correcting all the misunderstandings and pertinent observations, Claudio Aquaviva, the definitive edition of the *Ratio* was promulgated until the *Institutio Studiorum Societatis Jesu*[5], a law to be followed in all the establishments of the Jesuits. It was a common basis that would support the Order's work in all its establishments.

The final version of the *Ratio Studiorum* aimed at the formation of the Christian man, according to Christian faith and culture. As a teaching method, it established the curriculum, orientation and administration of the educational system to be followed,

[3] For the nascent institution, the founder sent a knob of priests of rare value, Jerônimo Nadal, rector and professor of Hebrew; Pedro Canísio, of Rhetoric; André Frusios, of Greek; Isidoro Bellini, of logic; João Batista Passerini, Anidal Du Coudret and Benedito Palmio, respectively, of the 3rd, 2nd and 1st Grammar Classes.

[4] Modus parisiensis, a pedagogy to be developed initially by St. Ignatius in his colleges. This is the educational tradition at the University of Paris. The method was not exactly a code. It was more a practice that took care of the academic life of the student and his process of education. (CODINA MIR, 1968).

[5] Manual (method) of study of the company of Jesus.

consisting of a pedagogical method of the Jesuits that standardized the teaching and guided the colleges and their teachers.

According to Neto, Maciel and Lapolli (2012), the curriculum was presented in two distinct parts, lower studies and higher studies, also called classes, as observed through the following chart:

CHART 1 – Presentation of the curriculum (classes) .

COURSES	SUBJECTS	GOAL	DURATION TIME
Higher Studies	- Rhetoric - Humanities - Grammar	It was intended for literary and humanistic formation.	6 years
Lower Studies	- Philosophy and Science - Logic - Metaphysics - Ethic - Mathematics - Physical and human sciences	Formation of philosophers	3 years

Source: Arbitrated Articles, p.277.

In lower studies, classes were intended for literary and humanistic training, which was fundamentally characterized by literary and classical teaching. Already the higher studies were integrated by the courses of Philosophy and Sciences, also denominated of course of Arts, involving Logic, Metaphysics, Ethics and Mathematics. For the authors, the *Ratio Studiorum* also presented in its proposal three other courses, explained in chart two, being a secondary and two higher.

CHART 2 – Courses and subjects: Secondary and higher education.

COURSES	SUBJECT	DURATION TIME
Secondary humanities course	Consisting of 5 classes 1. Rhetoric 2. Humanities 3. Higher Grammar 4. Medium Grammar 5. Lower Grammar	5 years extending one more
Superior of Philosophy	Logic, Sciences, Cosmology, Psychology, Physics, Mathematics, Metaphysics, Moral Philosophy.	3 years
Superior of Theology	Theology, Scholastic, Moral Theology, Sacred Scriptures, Hebrews, Canon Law, Ecclesiastical History.	4 years

Source: Arbitrated Articles, p.278.

The curricular proposal of the humanities secondary course consisted of five classes, and for the student to have access to the level immediately after that, he would have to demonstrate through evaluations that he had acquired the knowledge transmitted. By its constitution, it was destined to the literary and humanist formation. The second was aimed at more academic training; and the third, the formation of parents.

This plan of study offered to all the colleges of the Society a fixed curriculum and a coherent and graduated set of objectives and methods in all its classes, almost without alteration, until 1773, when the network of Jesuit institutions scattered throughout the different continents. According to Franca (1952), in 1814, Pope Pius VII restored the Society of Jesus, with the Catholic Church once again wanting to count on the work of the Order and the benefits of its educational experiences.

With the reopening of the colleges and the new demands of a transformed world, due to the 40 years of absence of activities, it was necessary to revise the Ratio, adapting it to the new realities and challenges, especially about curriculum and methodology. According to Santo Inácio, from its earliest days, the curriculum should adapt to the circumstances of places, time and people, factors that should prevail strongly in this new version of the *Ratio*.

Accordingly, some of the basic principles have remained valid, and it is necessary, according to Schmitz (1994), to adapt them to current times so that they can achieve the expected results. However, these adaptations did not change the essence of the principles, highlighted by its founder, because all the educational activity of the Order is derived from the basic principles established by it, even if the cultural and pedagogical realities of each country are very different.

THE RATIO STUDIORUM AND THE TEACHING OF MATHEMATICS

The sixteenth century with the great transformations that occurred in this period was fundamental for the flourishing of Sciences, among them Mathematics. The Order of the Jesuits came at a time when the world, and especially Europe, was undergoing profound changes. Religious dominance began to be contested, as new ways of seeing and interpreting the world are envisioned in this period.

According to Romeiras (2015), the Company has distinguished itself strongly by investing in the scientific training of its members, among them the teaching of Mathematics. This fact was of great importance for the development of the history of European and Eastern education.

The study of the natural sciences, according to Romeiras (2014), arises in the colleges and universities of the Society to prepare "the spirit for Theology" serving to have "perfect knowledge and practice". Although the formation of the Jesuits consists of the humanities, philosophy and theology, the natural sciences and mathematics occupied a prominent place in their colleges and universities.

This interest in these areas of teaching, according to Romeiras (2014), was present since the first college, that of Messina, when Geronimo de Nadal established the teaching of Mathematics for two years, even proposing an extension of the Philosophy course to four years and Mathematics for three years. In the Roman College (1551), for example, a Philosophy course of three years and five semesters of Mathematics was proposed. This college served as a guideline for all the schools of the Society until the final writing of the *Ratio Studiorum* in 1599. At this college, it was established that all students would have a Mathematics class in the second year of Philosophy. In addition, the students with aptitude for this discipline were recommended studies through private lessons.

Scientific education intensified due to renowned mathematicians and philosophers of the Company engaged in extracurricular activities, allowing their students to advance their studies in these areas with greater depth. Romeiras (2014) affirms that these spaces were frequented by the best students of each college. Therefore, the Academies of the Order represented the most relevant spaces for advanced studies in Mathematics and Natural Sciences in the first three centuries of existence, encouraging students to deepen their studies. These academies contributed to the discussion of relevant topics in this period, in several areas, among them Mathematics.

In the field of Mathematics, since the creation of the first college, there was interest in introducing lessons in Mathematics valuing its teaching. Already in the sixteenth century, these discussions occurred inside and outside the Company regarding the importance of teaching mathematics. For Fuentes (2012), among the defenders, stands out initially Nadal, in the College of Messina, following Martin de Olavé, Baltasar Torres, later supported by Clavius.

Several factors led to discussions regarding the introduction of mathematics in the Company's colleges. Initially, teachers lacked the skills to teach the lessons; moreover, there was resistance from philosophers who did not value publicly the usefulness of this discipline. According to Fuentes (2012), the teaching of Mathematics should be limited to what would be convenient to the teaching of Theology, a factor that prevailed in the final edition of the Ratio, regarding Mathematics teaching.

One of the defenders as to the necessity of its use in the curricula of the colleges is the priest Cristovão Clavius (1538-1612). According to Romeiras (2015), Clavius headed the Academy of Mathematics of the Roman College since 1581, being one of the main proponents of the insertion of Mathematics in the curriculum of Jesuit colleges. With the work developed in this area, Clavius, by creating groups of astronomical research studies and mathematics in schools, aroused in the Company's colleagues the taste for Mathematics, that is, it gave rise to a generation of mathematicians in the Order.

For Fuentes (2012), Clavius' ideas regarding the introduction of Mathematics in the *Ratio* appear in his first version (1586), and in the definitive version there is no record as to the mention of him in relation to his proposals[6]. The introduction of Mathematics teaching

[6] For more information, see Las Matematicas em la Ratio Studiorum de los jesuítas, Jesús Luis Paradines Fuentes, ILUIL, vol. 35 (No. 75) 1st Semester 2012 – ISSN: 0210-8615, pp.129-162.

in the study plans of the final version of the *Ratio* is directed to the discussions of Nadal and Torres, who are the first ones to promote a proposal regarding their insertion in the curricula of the Company's colleges. Another aspect highlighted by Fuentes (2012) is the inclusion of Mathematics in the final version of the Ratio, being a secondary discipline, given in a year during Natural Philosophy.

The teaching of Mathematics in the final version of the *Ratio* was linked to the Philosophy course, which lasted for three years, with six hours of daily classes, three hours in the morning and three hours in the afternoon. The subjects were: dialectical, logical, physical and metaphysical. Philosophy, taught by the Society of Jesus, consisted in the moral and scientific formation of intelligence, having as reference Aristotle, and this being followed in an unquestionable way.

> In the course of Philosophy, almost totally occupied by comments on Aristotle's books, certain incursions were also made in the field of Mathematics specifically in Arithmetic, Geometry and Perspective in the 2nd year and in the Sphere in the 3rd year. (CARVALHO, 2001, p.350)

For the author, the teaching of the sphere seems to have appeared only in the last decade of the sixteenth century, but the discussions concerning the teaching of mathematics in the colleges of the Society appear since the foundation of the first college. Regarding the Philosophy course, Ignatius wrote in the VI part of the Constitutions that theology was the highest rank in the Company's Colleges as a way of preparing students for the other courses to be traveled. Science, in general, was only a means to theology, which consisted of the main good.

In article 20 of this rule, Franca (1952, p.54) refers specifically to Mathematics when it refers to students and time. According to the author, in the second year of the course, all students of Philosophy will attend Mathematics class for three quarters of an hour. In addition, those who have the most inclination and capacity for similar studies exercise lessons after the course.

Regarding to specific rules for the Mathematics teacher, Franca (1952) highlights three paragraphs. In the first one, we highlight authors, time and students of Mathematics. To physics students, according to the author, the teacher explains in the class three quarters of an hour the Elementos de Euclides.[7] After two months, when the students are already

[7] Os Elementos, from Euclides, written around 300 BC, composed of 13 books or chapters, brings together the knowledge of geometry, algebra and arithmetic. It is a work that was widely publicized, being the most edited book after the Bible. He brings together the mathematical knowledge of his time, and his greatest contribution lies in the axiomatic presentation of this knowledge.

[10] The lecture is the key point of the Ratio's didactic system. It is an early lesson, that is, an explanation of what the student should study, whose method and applications vary according to the students' intellectual level. The lecture, in its purpose, is less informative than formative; not to communicate facts, but to develop and activate the spirit. With a lively understanding, the student is exercising, not so much the memory, but also and especially the imagination, the judgment and the reason. Observe, analyze words, periods, paragraphs; summarizes passages, compares; criticizes; acquires habits of study; develops the desire for further investigations to form the criterion of personal appreciation (FRANCA, 1952, p.35).

somewhat familiar with these expressions, he adds some subjects of Geography, sphere or other subjects that they like to hear, and this happens simultaneously with Euclides, on the same day or in alternate days.

In section two, this document deals with problems, and every month or at least every two months, in the presence of an auditorium of philosophers and theologians, one of the students solves some famous problem of Mathematics and then, if it seems well, advocate the solution. Finally, in item three, the author speaks in repetition, and once a month, usually on a Saturday, instead of lecture,[10] publicly repeat the main points explained in the month.

A pertinent observation is dealt with in Rule 44 of the *Ratio* of 1591. According to Clavius, teachers prepared to teach classes of this content would be taught, since, according to experience, taught to the Jesuits, the lack of such a quality for mathematics would entail students not attracting this discipline (SMOLARSKY, 2002).

In view of this, according to Franca (1952), it can be observed that scientific matters, especially Mathematics, were present in the study programs of the Society of Jesus from its earliest days. With the publication of the *Ratio*, since its final constitution, the teaching and diffusion of this discipline in all its schools has been divulged.

With the creation of the Academy of Mathematics of the Roman College, providing the advanced formation of scientific subjects, some Jesuits with talent stood out in these areas. Therefore, this college played an important role in scientific teaching and in the field of Mathematics. In this place, practically all the teachers of this discipline were formed who, later, worked in the schools of the Jesuits, in different countries.

In addition to the rules and norms, the Ratio presents the levels of teaching (Theology, Philosophy and Humanity) and the disciplines that students should follow. In chart three, one observes the curricular organization of *Ratio Studiorum*, as presented by Franca (1952 p.27-28).

CHART 3 – Ratio Organization.

I - Curriculum of Theology of 4 years	Scholastic theology - 4 years	Two professors, each with 4 hours per week.
	Moral theology - 2 years	Two professors with daily classes or a teacher with two hours a day.
	Sacred Scriptures - 2 years	With daily classes. Hebrew - 1 year, with two hours per week.
II - Philosophical Curriculum	1st year	Logic and introduction the sciences, a professor, 2 hours a day.
	2nd year	Cosmology, Psychology and Physics - 2 hours a day. Mathematics - 1 hour per day.
	3rd year	Psychology, Metaphysics, Moral Philosophy - Two teachers, 2 hours a day.
III - Humanist Curriculum	Corresponds to the high school. Covers 5 class.	1 - Rhetoric. 2 - Humanities. 3 - Higher Grammar. 4 - Medium Grammar. 5- Lower Grammar.

Source: Franca, 1952, p.27-28.

In relation to the daily routine of classes, Ratio suggests five hours of class per day, morning and afternoon with two and a half hours in each period. In the sixteenth-century curriculum, according to Franca (2012), Sciences, such as Mathematics Astronomy and Physics, were included in the curriculum of Philosophy. Therefore, regarding the Sciences, Ratio preferred to refer him to the Philosophy course or to the College of Arts, as the larger colleges were called. At the end of the literary formation of the humanist course, the young man began to study the sciences already constituted: Mathematics, Astronomy and Physics.

Another aspect to be highlighted is that the Jesuit colleges followed the development in the different regions, adapting to the particularities of each one and, mainly, following the main events of humanity in the different areas of knowledge. According to Franca (1952), from their schools came names in the most varied fields of Sciences, such as: Descartes, Galileo, Buffon, Bossuet, among others. Therefore, we can say that *Ratio* was able to organize and systematize what was best at the time.

Analyzing the document, we observed that the teaching of Mathematics started from the basics of Arithmetic and gradually progressed to Geometry, where they then studied the Elementos de Euclides. According to Bicudo (2009), the importance of the study of the Elementos de Euclides is explained by the philosopher Immanuel Kant, who in 1783 writes that to know what Mathematics is, it is enough to look at the Elementos de Euclides. Mathematical knowledge becomes important for the formation of philosophers and theologians in the period in which the Jesuit doctrine flourished.

After the period of suppression of the Order, with the reopening of colleges and the new demands of a transformed world, due to the 40 years of absence of activities, a revision of the *Ratio* was necessary, adapting it to the new realities and challenges. Recognized with great teachers and educators, the newly restored Order spread throughout Europe, America and Asia, mainly taking up colleges and missions. New vocations emerged, as did a growing number of religious, houses, and, above all, schools. Adaptation and improvement of teaching methods were necessary. For Rosa (1954).

> [...] the new school´s conditions and the profound changes of the times always indicated more urgency to adapt and perfect the old methods or *Ratio Studiorum*. This need had already been perceived by the priests of White Russia, who remedied it about the progress of physics. Many of these facts explained due to the difficulties occasioned by the new laws and diversities of customs and nations. (ROSA, 1954, p.317)

Priest João Roothaan, as soon as he took over the general command, began the work of elaborating the revision of the *Ratio,* being in a slow way and through good trials and experiments. To this end, he appointed a commission consisting of seven members, representing Italy, France, Spain, England, Sicily, Austrian Galicia and Germany, who, according to Rosa (1954).

> [...] they worked out a new order or division in Theology, which would give more time to living and current affairs; in Philosophy, insisted on Physics and Mathematics; in lower schools, gave greater importance to living languages, without damage of the classics, specifically of the Latin. (ROSA, 1954, p.318)

Facing this, Franca (1952) observed that:

> In Philosophy, three years of Mathematics, one compulsory and two facultative for the well-endowed and a course of experimental Physics. In the humanities, there were more important changes. The vernacular language was elevated to the category of major discipline in the curriculum alongside Latin and Greek. As secondary but autonomous subjects, history, geography and elementary mathematics were

> introduced, and it was up to the Prefect of studies to give them the number of classes according to local requirements. (FRANCA, 1952, p.25-26)

Therefore, the changes introduced are directed to the organization of the curriculum. Administrative, methodological and disciplinary issues have remained largely unchanged. The first version of the new Ratio underwent a period of adjustment under the Company's appreciation of its validity. Its official promulgation has become somewhat late. This, according to Rosa (1954), is explained by the instability of governments, the diverse needs of different nations, and the intense care for the improvement of scientific methods.

According to Franca (1952), at the secondary level, due to the variety of curricula in different countries, it became impossible to shape the colleges of the Company to the uniqueness of a study plan, as was verified with the *Ratio* of 1599. What one has it been observed that the colleges of the Society remain faithful to the general principles and orientations of the *Ratio,* but are adapted to the requirements and regimes of each country in relation to teaching. This seems to be quite clear to Schmitz when he states in an interview that,

> [...] the model is the Jesuit model and this is until today, it is always in focus, because it represents the basic idea of how and what are implanted, what are the values you need to instill, how are you going to make it people come to perfection, academic excellence, that is, always reach the peak. (SCHMITZ, 2012)

Therefore, since the early days of the Company, education was not revolutionary and not so innovative. She has always sought to organize and systematize what was best in her time. It was not intended to break with the current school traditions, nor with unpublished contributions. It aimed to adjust to the demands of each period, seeking satisfaction with the perfection that was possible.

Regarding the validity of the *Ratio,* at present, we believe its applicability is very difficult due to the new times and challenges that are imposed. However, some things remain and others have become obsolete, but the basic principles remain as inspiration and valid for the schools of the Jesuits, since the necessary adaptations do not change their essence.

According to Schmitz (1994), all educational activity must be derived from these basic principles established by St. Ignatius in the Constitutions and in the book of spiritual exercises, which are the basis of all Ignatian thinking.

FINAL CONSIDERATIONS

The Company of Jesus appears in 1534 with Santo Inácio and immediately confronts problems that were present in the world, such as the social movements that broke out in

that period, among them the Reformation. With the apostolate of education, the Society of Jesus expands throughout Europe, leading, through its colleges, a religious project that was made explicit primarily by the education and training of young people.

With colleges, the need arises to give them some norms that would serve to guide them in their activities. The *Ratio*, to be promulgated, became the common basis for the work of the Jesuits in all their establishments for the formation of the Christian man, according to Christian faith and culture.

Regarding the teaching of Mathematics, it was always present in Jesuit colleges. This happened since the first college, that of Messina, when Geronimo de Nadal established the teaching of Mathematics for two years, later extending to the Roman College, which offered a course of Philosophy of three years and five semesters of Mathematics. This model of the Roman College will serve as a guide for all the schools of the Company, until the final writing of the *Ratio*.

Studies of the natural sciences, among them Mathematics, appear in the colleges and universities of the Society to prepare "the spirit for Theology" serving to have "perfect knowledge and practice". Although the formation of the Jesuits consists of the humanities, philosophy and theology, the natural sciences, among them mathematics, occupied a prominent place in their colleges and universities, intensifying strongly after the suppression of the Order in the eighteenth century.

Several factors led to discussions about the introduction of Mathematics in the Company's Colleges, among them the lack of qualified teachers to teach the lessons, as well as the resistance of philosophers who did not give public value to the usefulness of this discipline. For the Society, the teaching of Mathematics should be limited to what would be convenient to Theology.

In view of this, after long discussions about the presence of Mathematics in the *Ratio Studiorum* in its first version, this was linked to Philosophy, as a preparatory knowledge for the teaching of Physics, being a secondary discipline, being defined that all students would have a class of Mathematics in the second year of Philosophy. Already to the students with aptitude for this discipline, additional studies were recommended, through lessons. This systematics slowly advanced for two centuries until the suppression of the Order in 1773.

After the restoration of the Society of Jesus, the Jesuits sought to restore philosophical studies by emphasizing the teaching of science, prioritizing Mathematics, Physics and Natural Sciences. This is clearly verified in the new version of *Ratio Studiorum*. It is worth emphasizing that the guiding principles continued to be valid, adapting them to the new times, to reach their results, but the adaptation did not change the essence of these principles.

The principle of adaptation has always been defended by Santo Inácio, not only in teaching but, in general, in all the practices which he has regulated and carried out. According to priest General Claudio Aquaviva, on the occasion of the promulgation of the first *Ratio*, it was stated that it was not a definite and finished thing, because, according

to the priest, that would be impossible. Rather, it was an instrument to aid in difficulties, giving the whole Company a united perspective on the changes that had affected and influenced Jesuit education since Inácio's time.

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