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The Bachelor of Mathematics for Teaching[3]Curricula at UFMG: professional knowledge in a story of the Supervised Curricular Internship courses (1971 - 1987)

Os Currículos do Curso de Licenciatura em Matemática da UFMG: saberes profissionais em uma história das disciplinas de Estágio Curricular Supervisionado (1971 – 1987)

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Abstract

In this article, we will discuss the professional knowledge and curricula of Mathematics teachers' training. It aims at developing a historical understanding of the curricular reforms of the Bachelor of Mathematics for Teaching at the Federal University of Minas Gerais (UFMG), pointing out the movement of construction of the professional knowledge of teaching in the 1970s and 1980s. This research followed a qualitative approach, discussing the curriculum reforms of 1971, 1975, 1980, and 1987. The sources are documents from institutional archives, the meeting minutes of the Mathematics Course Council, and information from other research related to these discussions. The analysis is related to the Supervised Curricular Internship courses in the curricula of the Bachelor of Mathematics for Teaching at UFMG. As the main results, we highlight the construction of space and time in the curricula for the knowledge proper to teaching mathematics, and in the attribution of institutional responsibilities and perspectives for teacher training.

Keywords: Curricular Reforms; History of Mathematics Education; Mathematics teachers' education; Professional Knowledge.

Resumo

Neste artigo apresentaremos algumas discussões sobre os saberes profissionais e os currículos na formação de professores de Matemática. O objetivo deste trabalho consiste em elaborar uma compreensão histórica das reformas curriculares do curso de Licenciatura em Matemática da Universidade Federal de Minas Gerais (UFMG), apontando o movimento de construção dos saberes profissionais da docência, nas décadas de 1970 e 1980. A pesquisa seguiu uma abordagem qualitativa, discutindo as reformas curriculares de 1971, 1975, 1980 e 1987. As fontes utilizadas foram os documentos presentes em arquivos institucionais, as atas de reuniões do Colegiado do curso de Matemática e informações de outras pesquisas que tangenciam tais discussões. A análise está relacionada às disciplinas responsáveis pelo estágio curricular supervisionado nos currículos do curso de Licenciatura de Matemática da UFMG. Como principais resultados, destacam-se os movimentos de construção de espaços e tempos nos currículos para saberes próprios à docência de matemática, na atribuição de responsabilidades institucionais e perspectivas de formação de professores.

Palavras-chave: Formação de professores de Matemática; História da Educação Matemática; Reformas Curriculares; Saberes profissionais.

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Introduction

There are many factors to be considered when we turn our attention to the curricular reforms of mathematics teacher training courses in different historical times. These factors have shaped the formative process by being, directly or indirectly, related to the teacher one wanted to train, establishing subjective positions in the direction of an education one wanted to promote. In addition, a historiographical study of these curricular reforms can contribute to the understanding of the production process of the knowledge proper to the teaching of mathematics, raising educational ideals and discourses that support certain practices over time. For this purpose, we present some discussions about the knowledge and curricula in the training of mathematics teachers presented in Vilela's Master's thesis (2020).

The research aimed at developing a historical understanding of the Supervised Curricular Internship course at the Federal University of Minas Gerais (UFMG) and their roles in mathematics teachers' education. The study was historiographically oriented to micro-history using documental sources such as curricula, meeting minutes, seminar texts, course descriptions, syllabuses, class record books, and others. The time frame goes from 1968, the year of *Reforma Universitária* (University Reform), to 1994, when the first evening Bachelor of Mathematics for Teaching of the UFMG curriculum was approved. A moment when an important curricular discussion happened, the last one registered before *Lei de Diretrizes e Bases* (Law of Guidelines and Bases in English) of 1996. As the main results, we found in the *ICEx* discourse the concern with teachers' education noted by the number of curriculum proposals and reforms. The Institute's role was to prepare the student to deal with mathematical content, with the internship being in charge of *FaE*. On several occasions, *FaE* has demonstrated the need to create subsidies to guide the execution and a policy establishment for supervised curricular internships in Bachelor of Mathematics for Teaching.

Given this context, the objective of this work is to elaborate a historical understanding of the curricular reforms of the Bachelor of Mathematics for Teaching at UFMG pointing out the movement of construction of the professional knowledge of teaching in the 1970s and 1980s. We took 1971 as the starting point because this year's curriculum was the first to effectively follow the changes established by the University Reform of 1968. As a final milestone, the year 1987, when the 1987 Curriculum was implemented, counted on the studies of the Council Commission for the Reform of the Curriculum, bringing significant changes to the formative process. During the analysis period, there were four curricular reforms - 1971, 1975, 1980, and 1987 - which will be presented and discussed throughout this article.

We will use the official curricular documents and the Council of Didactic Coordination of the Undergraduate Course in Mathematics meetings minutes as sources. [3]

[3] From this point on, I will refer to the "Council of Didactic Coordination of the Undergraduate Mathematics Course" only as "Council of the Mathematics Course" or "Council."

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(*Universidade Federal de Minas Gerais*, 1968 - 1987), and the Course Political Pedagogical Project (*Universidade Federal de Minas Gerais*, 2007), located in the Institute of Exact Sciences (ICEx) of the University. Besides the mobilization of these sources, another contribution to the development of this discussion is the master's dissertation by Samira Zaidan (1993).

From this perspective, this work is characterized as historiographical. For Garnica and Souza (2012, p. 24), "historiography is the study of the changes and permanence of things in the flow of time." Moreover, it is inserted in the research field of History of Mathematics Education, which, according to the authors, exercises understanding of the different forms of mathematics participation in school cultures, which involves the training and performance of teachers. We emphasize that we do not intend to judge the veracity of the sources. They will be shown as they are presented in the documents in order to develop a history of the Bachelor of Mathematics for Teaching Curriculum at UFMG (1971 - 1987).

In the next section, we address the professional knowledge of teaching in mathematics teachers' education, according to Valente, Bertini, and Morais (2018). Subsequently, the Curricular Reform of 1971 shows some impacts of the University Reform of 1968. Thus, the Curricular Reform of 1975 followed the Minimum Curriculum established in the legislation. In the other section, we bring the Curricular Reform of 1980, with the alteration of some existing course programs to make them more suitable for teachers' education. Thereafter, the Curricular Reform of 1987, and it is possible to note dissatisfaction regarding the formative process. Finally, we will make some notes on curriculum reforms and the professional knowledge of teaching.

The professional knowledge of teaching as practices of teaching how to teach

The studies interested in which mathematics should be present in teachers' education, according to Valente, Bertini, and Morais (2018), are divided into two categories: those that defend mathematics - considered single superior mathematics, the same for different levels of education, being present in several courses in the formative process - and the other that believes in multiple mathematics. The authors point out that multiple mathematics from the perspective of mathematics education has several considerations. To them, "they are all historically and culturally situated. We are interested in the analysis, over time, of how this mathematics emerges and transforms, specifically, that historically and culturally worked on teachers' education" (Valente, Bertini, and Morais, 2018, p. 78). As well as the authors, we consider the existence of diverse mathematics and turn our attention to understanding them historically in the context of teachers' education. In this regard, the authors deal with *mathematics to be taught*, which is knowledge connected to the disciplinary field, and *mathematics for teaching*, a knowledge linked to teacher training.

The *knowledge to be taught*, according to Valente, Bertini, and Morais (2018, p. 78-79), "refers to the knowledge produced by university courses, by the different scientific fields

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considered important for teacher training." *The knowledge for teaching*, on the other hand, "is specific to *teaching*; it is related to the knowledge required to exercise the teaching profession. Both types of knowledge constitute the professional knowledge of teaching[4]. The authors indicate, for instance, that the specific courses of Bachelor of Mathematics Degrees considered hard are responsible for the *knowledge to be taught*, and the pedagogical courses of a non-mathematical nature, such as teaching practices and internships, are the courses of *knowledge for teaching.*

According to the authors, since the beginning of the 20th century, there have been efforts to include the *knowledge for teaching* in the training of secondary teacher education; but one does not note a continuity due to the autonomy of the universities of the chair professors. Valente, Bertini, and Morais (2018) highlight that the courses of *knowledge to be taught*, which were under the responsibility of the professors who taught them, were considered the basis of teacher training. On the other hand, the discussion of the *knowledge for teaching* courses was the responsibility of the departments/faculties/educational institutes, being distant from the others, which were considered solid and composed the core of the specific courses of each undergraduate program. The authors point out that historiographical research makes it possible to analyze, in different periods, which knowledge is considered in the training of teachers who teach mathematics. Official teaching documents, textbooks, exams, pedagogical magazines, and others are important types of sources for the investigative process.

For Valente, Bertini, and Morais (2018), when we inquire about the knowledge involved in each historical time, the answers obtained can be distinct. The non-mathematical courses, the pedagogical ones, even if institutionalized, such as teaching practice and internship, have not received epistemological emphasis as *knowledge for teaching*. In this article, we will highlight the courses responsible for the supervised curricular internship in the curricula of the Bachelor of Mathematics for Teaching at UFMG during the reforms of the 1970s and 1980s, observing what the authors mention. The set of courses responsible for the internship, which had different nomenclatures over time - Teaching Practice; Mathematics Teaching Practice; Mathematics Teaching Practice I; and Mathematics Teaching Practice II - were the focus of Vilela's Master's research (2020).

In the scope of these discussions, we mobilize the idea of *teaching how to teach* practices. It is characterized, according to Vilela and Fernandes (2020, p. 132-133), "as an intentional and organized set of actions that, in the spaces, times, materialities and regulations that configure teacher training, seek to incite, modify or normalize ways of teaching mathematics, producing senses of being a teacher." These practices are immersed in their processes of constitution and circulation in the organization of curricula that focus on

[4] Besides choosing Brazilian authors, we highlight that the knowledge we mention refers to the Research Team's studies in the History of Educational Sciences (ERHISE) of the University of Geneva, Switzerland, coordinated by Prof. Dr. Charles R. H. Schumann. Rita Hofstetter.

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pedagogical knowledge domain directed to teacher training, announcing professional knowledge of teaching.

In the following sections, we will present the curriculum reforms of 1971, 1975, 1980, and 1987 pointing out some issues in the documents analyzed, such as the curricular grids and their highlights, the discussions regarding the reformulation processes, the legislation in force, the teacher to be trained, the courses responsible for the supervised curricular internship, and others. Afterward, we will make some points about these Reforms and the possible movements of construction of spaces and times in the curricula of knowledge proper to mathematics teaching.

The 1971 Curricular Reform

The 1971 curricular reform started to be under discussion since the University Reform of 1968 (Law no. 5.540, 1968), representing a profound change in the institutional reference of the academic community members. One of the most significant changes was the creation of Departments, with Schools and Faculties no longer being subdivided into chairs. After the University Reform of 1968, the Bachelor of Mathematics for Teaching at UFMG came under the responsibility of different academic units. The mathematics courses were attended at the ICEx, and the pedagogical ones at the Faculty of Education (FaE), both located on the *Pampulha* campus in Belo Horizonte.

The 1971 Curriculum was one of the outcomes of the 1968 University Reform. The Council of the Mathematics attempted to define a curriculum for the students who had started the course in 1969 and 1970, that is, during the period between the University Reform and the curriculum approval. It suggests possible indecision about the curricular structures of the Bachelor of Mathematics for Teaching in face of the institutionalization of the 1968 Reform, which was also a landmark for the University in terms of the implementation of the break with the 3 + 1 model.

In 1939, Decree-Law No 1,190 was published, which provided the formation of the Bachelor of Mathematics for Teaching, creating the National Faculty of Philosophy. The teacher training generated the system that would become known as 3 + 1 (three plus one), in which, at the end of the three-year Bachelor of Mathematics, the student could choose to take the Didactics course, earning the title of a graduate with an emphasis in teaching. However, the Opinion CFE 292/62 - *Conselho Federal de Educação*, 1962 (Federal Council of Education, 1962), of November 14, 1962, established that the pedagogical courses of the minimum curricula for the Bachelor of Mathematics for Teaching should be taken in four years, throughout the course, and no longer concentrated only in the last year, as in the 3 + 1 model. In consulting the documents made available by the Council, we found the curricular grid that went into effect in 1971 arranged in two cycles.

In the 1st Cycle, composed of four semesters, the courses offered in the Bachelor of Mathematics and Bachelor of Mathematics for Teaching degrees were present. At that time, the Bachelor of Mathematics for Teaching was held in conjunction with the Bachelor of

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Mathematics. Only in the 2nd Cycle, also composed of four semesters, did the student opt for one of the modalities, occurring their separation. In the case of the Bachelor of Mathematics for Teaching, the 2nd Cycle contained courses with mathematical and others with pedagogical content. Table 1 shows the curricular grid with the courses of the 1st Cycle.

Table 1 - Undergraduate Curriculum in Mathematics - 1st Cycle: Bachelor of Mathematics for Teaching and Bachelor of Mathematics Degree (1971)

SEMESTER	DENOMINATION	C. H. COURSES			PREREQUISITES
		Classes	Practice	Total	
1st	Differential and Integral Calculus I	75	30	105	–
	Analytic Geometry and Introduction to Linear Algebra	75	30	105	–
	Computer Programming	–	60	60	–
	Physical Education A	–	30	30	–
2nd	Differential and Integral Calculus II	60	30	90	Differential and Integral Calculus I
	Numerical Calculus	45	30	75	Analytic Geometry and Introduction to Linear Algebra
	General Physics I	60	45	105	Differential and Integral Calculus I
	Physical Education B	–	30	30	–
3rd	Differential and Integral Calculus III	45	30	75	Differential and Integral Calculus II
	Geometric Design - Descriptive Geometry	45	30	75	–
	General Physics II	60	45	105	General Physics I
	Algebra I	45	30	75	Differential and Integral Calculus I
4th	Differential and Integral Calculus IV	60	30	90	Differential and Integral Calculus II
	Probability and Statistics	45	30	75	Differential and Integral Calculus II
	General Physics III	60	45	105	General Physics I
	Algebra II	45	30	75	Algebra I

Source: Documents made available by the Council of Didactic Coordination of the Mathematics Undergraduate Course

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The proposal of a Bachelor of Mathematics for Teaching sharing the curricular grid with the Bachelor of Mathematics Degree in the first four semesters did not allow the undergraduate to take pedagogical courses from the start. The proposed course load for the 1st Cycle was 1,275 hours, with some courses having a distinction between the classroom and practical hours. In an excerpt from the 2nd minutes of the Council meetings, held on September 3, 1969, when mentioning the Bachelor of Mathematics for Teaching cycle, it emphasizes that this would be composed of pedagogical courses, emphasizing that these were the responsibility of the Faculty of Education. In the minutes, there is no mention of any relationship between the courses taught at ICEx and those at FaE, namely there was no connection between these units, the Institute's role is focused on preparing the student exclusively for mathematical content and the pedagogical courses being the sole responsibility of FaE.

The occurrence of pedagogical courses only from the 5th term on, after the basic cycle, is justified in the documents by the demands that pedagogical content courses make on the student, requiring certain maturity, which was not yet reached in the basic cycle. This, in turn, had a set of courses considered fundamental, which demanded great effort from the student. Although no explanations other than "student maturity" are given, there is a possibility that the curriculum still somewhat resembles the 3 + 1 model. Table 2 presents the 2nd Cycle courses in the Bachelor of Mathematics for Teaching mode, with their names, total course load, divided into "classes" and "practice", and the prerequisites.

Table 2 - Undergraduate Curriculum in Mathematics - 2nd Cycle: Bachelor of Mathematics for Teaching (1971)

SEMESTER	DENOMINATION	C. H. COURSES			PREREQUISITES
		Classes	Practice	Total	
5th	History of Science I	45	_	45	Differential and Integral Calculus III or General Physics II
	Foundations of Elementary Mathematics I	60	60	120	Algebra I or Differential and Integral Calculus II
	Didactics I	60	_	60	_
	Educational Psychology I	60	_	60	_
	Structure and Function of High School Education	60	_	60	_
6th	History of Science II	45	_	45	Differential and Integral Calculus IV or General Physics III
	Foundations of Elementary Mathematics II	60	60	120	Algebra I or Differential and Integral Calculus II
	Didactics II	60	_	60	_
	Educational Psychology II	60	_	60	_

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	Introduction to Education	60	–	60	–
7th e 8th	Teaching Practice	–	45	45	Didactics I
	Study of Brazilian Problems I	30	–	30	–
	Study of Brazilian Problems II	30	–	30	–
	Optional Courses and/or Seminars	–	–	–	–

Source: Documents made available by the Council of Didactic Coordination of the Mathematics Undergraduate Course

In the 2nd Cycle, it was proposed that the students would take courses of mathematical and pedagogical content, at the ICEx and FaE, respectively. The course load for the 2nd Cycle was 795 hours, i.e., less than that proposed for the 1st Cycle. Most courses with prerequisites depended on the ones taken in the 1st Cycle. The 7th and 8th term courses are not presented separately. The total course load for the diploma-granting is 2,070 hours.

The course of Teaching Practice is offered in the 7th or 8th term, in other words, only at the end of the Bachelor of Mathematics for Teaching. Its course load was 45 hours, accounted for only with practical hours, without classes, which were dedicated to the theoretical part, corresponding approximately to only 2.17% of the total course load of the course. This course load was less than the one foreseen in the CFE 627/69 Opinion - *Conselho Federal de Educação*, 1969a (Federal Council of Education, 1969a), of June 13, 1969, which required 5% of the course load intended to be supervised internships.

The pedagogical courses: Didactics I; Psychology of Education I; Didactics II; Psychology of Education II; Introduction to Education; and Teaching Practice, proposed in the 2nd cycle of the Bachelor of Mathematics for Teaching, corresponding to 405 hours of the course, that is, 19.57% of the total course load, this percentage is higher than the course load established in CFE 672/69b Opinion - *Conselho Federal de Educação*, 1969b (Federal Council of Education, 1969b), of September 4, 1969, in which 12.5% of the course load of the Bachelor of Mathematics for Teaching should be destined to pedagogical courses. In the next section, we will look at the 1975 Curriculum. Based on the percentage data, the predominance is notable and, consequently, the valorization of courses focused on *the knowledge to be taught*, while the courses focused on *knowledge for teaching* fulfilled a low percentage.

The Curricular Reform of 1975

The 1975 Curricular Reform started being drafted in 1973, was presented and discussed in 1974, but underwent some changes in 1975. Table 3 shows the 1975 curricular grid for the Bachelor of Mathematics for Teaching taken from the documents made available by the Council.

Table 3 - Bachelor of Mathematics for Teaching Curriculum (1975)

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SEMESTER	COURSES	CLASSIFICATION	COURSE LOAD	PREREQUISITES
1st	Differential and Integral Calculus I	CM	120	–
	Analytic Geometry and Linear Algebra	CM	90	–
	Computer Programming	OB	75	–
	Physical Education A	CM	30	–
2nd	Differential and Integral Calculus II	CM	90	Differential and Integral Calculus I and Analytic Geometry and Linear Algebra
	General Physics I	CM	105	Differential and Integral Calculus I or Analytic Geometry and Linear Algebra
	Physical Education B	CM	30	–
	Descriptive Geometry I	CM	60	–
3rd	Algebra	CM	60	Differential and Integral Calculus I
	Differential and Integral Calculus III	CM	90	Differential and Integral Calculus II
	General Physics II	CM	105	General Physics I
	Numerical Calculus	CM	75	Differential and Integral Calculus I and Computer Programming
4th	Differential and Integral Calculus IV	CM	60	Differential and Integral Calculus III
	Statistics and Probability	OB	75	Differential and Integral Calculus I
	General Physics III	CM	105	General Physics II
	Geometric Design	CM	45	–
5th	Fundamentals of Elementary Mathematics A	CM	90	Algebra and Differential and Integral Calculus I
	History of Exact Sciences A	OB	45	General Physics III or Differential and Integral Calculus I
	Structure and Functioning of Elementary and High School	CM	60	–
	Educational Psychology: Development and Learning	CM	90	–
6th	Didactics	CM	60	–
	Fundamentals of Elementary Mathematics B	CM	90	Algebra and Differential and Integral Calculus I

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7th	History of Exact Sciences B	OB	45	General Physics III or Differential and Integral Calculus I
	Introduction to Education	CM	45	–
	Study of Brazilian Problems A	CM	15	–
8th	Mathematics Teaching Practice	CM	120	Didactics
	Study of Brazilian Problems B	CM	15	–
	Elective	–	105	–
	Optional	–	75	–
	Optional	–	60	–
	Optional	–	60	–
	Optional	–	60	–

Source: Documents made available by the Council of Didactic Coordination of the Mathematics Undergraduate Course

When comparing the 1975 curricular grid with the 1971 curriculum, we notice that there is no longer a distinction between the courses common to the Bachelor of Mathematics and the Bachelor of Mathematics for Teaching Degrees, such as the basic cycle (1st Cycle) and the formation cycle (2nd Cycle). Despite this, most of the courses under the responsibility of ICEx continued to be offered in the first semesters. The pedagogical courses were offered from the 5th term on. The course load is now presented as total, without distinction of hours for classes or practices. The courses have been given a new classification: Minimum Curriculum (MC), Compulsory (OB), Elective or Optional (OP).

The course load of Differential and Integral Calculus I, Computer Programming, and Mathematics Teaching Practice have been increased. Conversely, the courses of Analytic Geometry and Linear Algebra, Differential and Integral Calculus IV, Fundamentals of Elementary Mathematics A and B, and the Study of Brazilian Problems A and B had their course load reduced. The Algebra and Educational Psychology courses, which used to be offered in two semesters, are now offered in only one, that is, they had a considerable reduction in course load. The justification for this reduction in the course load of some pedagogical courses is not recorded in the documents analyzed, but they totaled 315 hours of the course, that is, 14% of the total course load, remaining higher than the 12.5% predicted by the CFE Opinion 672/69.

The course covering the curricular internship has changed. One of them was the change in nomenclature: in the 1971 curriculum, the course was called Teaching Practice; in 1975, it was renamed Mathematics Teaching Practice. In addition, it has been classified as a course in the Minimum Curriculum. The biggest difference was in the course load, which went from 45 hours to 120 hours, which comprised approximately 5.33% of the total course load. Thus, the 1975 curriculum met the requirements of Opinion No 627/69 regarding the course load of this course.

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According to Zaidan (1993), a significant change occurred in the Bachelor of Mathematics for Teaching curriculum at UFMG in 1975. Through students' demands, the Foundations of Elementary Mathematics A and B courses were included, in which one discussed the main topics of the secondary school subject Mathematics. However, we can note that these two courses were already present in the 1971 curriculum, but we do not know under what conditions they were proposed.

On May 30, 1974, during a meeting of the Council, one raised the matter of the Bachelor of Mathematics for Teaching being practically the same as those of the Bachelor of Mathematics, and there was a need for courses offered by the department that would facilitate the application in Elementary and High School teaching since those offered were lacking in student integration and seminar proposals. However, nothing was decided and the subject left for another time.

To complete the 1975 curriculum, 2,250 hours would be required for a Bachelor of Mathematics for Teaching, from that 120 hours were dedicated to the Mathematics Teaching Practice course, which comprises approximately 5.33% of the total course load. Thus, the 1975 curriculum met the requirements of Opinion No 627/69 regarding the course load of this course. The pedagogical courses totaled 315 hours, or 14% of the total course load, remaining higher than the 12.5% foreseen by Opinion No CFE 672/69.

On May 30, 1978, at the Council meeting, changes in the curricula of the Mathematics course were discussed. The Bachelor of Mathematics for Teaching was kept for the same period of 4 years, but some courses were introduced, making some optional courses compulsory. As for the changes in pedagogical courses, Professor Ana Maria Salgueiro Caldeira, representing FaE, was asked to consult the Departments and inform the Mathematics Course Council at a later date. In the next section, we present the 1980 Curriculum.

The Curricular Reform of 1980

On September 9, 1978, the Council filed the proposals for changes in the Bachelor of Mathematics and Bachelor of Mathematics for Teaching curricula and forwarded them to UFMG's higher bodies. On the 25th of the same month, the Board found that these were very deep changes, requiring time to analyze the inconsistencies. Thus, the new curriculum was unable to take effect in 1979.

According to the Political Pedagogical Project, the changes were intended to give the students a better fit in their professional and cultural training. In the Bachelor of Mathematics for Teaching curriculum, more mathematical courses of interest to the modality were added, changing programs of previous existent courses to make them more adequate for the training of Secondary Education. Specifically, these courses were called Foundations of Elementary Mathematics A, B, and C, and were allocated to the first three semesters of the undergraduate course.

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Another proposal was regarding the Bachelor of Mathematics for Teaching Curriculum: the basic cycle courses would be taken in the 5th semester. It was favorable to students who already started teaching at the beginning of the course but ended up letting an overload of credits to the end, which could increase the number of dropouts or retentions. According to Zaidan (1993), the curricular reform of 1980 separated the modalities of Bachelor of Mathematics for Teaching and Bachelor of Mathematics already at the beginning of the course. The author reinforces the idea of introducing new courses and changes in the programs of some existing courses to teach students topics from the Elementary and High School mathematics program.

Table 4 shows the 1980 Bachelor of Mathematics for Teaching Curriculum. The courses Foundations of Elementary Mathematics A and B were offered in the first semester, but with different course loads. The pedagogical courses such as Educational Psychology/Development and Learning; Didactics; Introduction to Education, and Mathematics Teaching Practice continued to be concentrated in the last two terms.

Table 4 - Curriculum of Bachelor of Mathematics for Teaching (1980)

SEMESTER	COURSES	CLAS-SIFICA-TION	COURSE LOAD	PREREQUISITES
1st	Fundamentals of Elementary Mathematics A	CM	90	_
	Fundamentals of Elementary Mathematics B	CM	60	_
	Computer Programming	OB	75	_
	Physical Education A	LE	30	_
	Analytic Geometry and Linear Algebra	CM	90	_
2nd	Differential and Integral Calculus I	CM	120	_
	Algebra I	CM	90	_
	Physical Education B	LE	30	_
	Fundamentals of Elementary Mathematics C	CM	60	_
3rd	Differential and Integral Calculus II	CM	90	Analytic Geometry and Linear Algebra and Differential and Integral Calculus I
	General Physics I	CM	105	Analytic Geometry and Linear Algebra or Differential and Integral Calculus I
	Numerical Calculus	CM	75	Differential and Integral Calculus I and Computer Programming
4th	Differential and	CM	90	Differential and Integral

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	Integral Calculus III			Calculus II
	General Physics II	CM	105	General Physics I
	Statistics and Probability	OB	75	Differential and Integral Calculus I
5th	General Physics III	CM	105	General Physics II
	Geometric Design	CM	45	_
	Differential and Integral Calculus IV	CM	60	Differential and Integral Calculus III
	History of Exact Sciences A	OB	45	Differential and Integral Calculus III or General Physics III
	Descriptive Geometry	CM	60	_
6th	Linear Algebra	OB	90	Differential and Integral Calculus II or Fundamentals of Elementary Mathematics C
	History of Exact Sciences B	OB	45	Differential and Integral Calculus I or General Physics III
	Complex Variable	OB	60	Differential and Integral Calculus III
7th	Structure and Function of Elementary and High School	CM	60	_
	Educational Psychology / Development and Learning	CM	90	_
	Didactics	CM	60	_
	Study of Brazilian Problems A	LE	15	_
8th	Introduction to Education	CM	45	_
	Mathematics Teaching Practice	CM	120	Didactics
	Study of Brazilian Problems B	LE	15	_

Source: Documents made available by the Council of Didactic Coordination of the Mathematics Undergraduate Course

The objective of the course with this 1980 curricular reform was to train teachers for High School education, with the graduate also being able to work in higher education. The minimum expected duration for completion was estimated at 3.5 years, and the maximum was at 8 years. The total course load to be taken was 2,295 hours. Compared to the 1975 Curriculum, we see an increase of 45 hours.

The course for the supervised curricular internship, the Mathematics Teaching Practice, has been kept with the same nomenclature and 120 hours of course load. In addition, it remained in the 8th term, the last semester of the course, and had as a prerequisite the course Didactics. However, when compared to the total course load, the Mathematics Teaching Practice comprises approximately 5.22%, satisfying the compulsory supervised practice indicated again in the CFE 4.873/75 Opinion.

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The elective courses could be chosen freely by the student, being all the courses offered by UFMG whose content does not coincide, in whole or in part, with the Minimum Curriculum courses, Compulsory or Optional. It is noteworthy that there was a list with a grouping of courses per term, which was only meant to guide the student since enrollment should be done per course. However, it was necessary to follow the established prerequisites. This indication only included courses offered by the ICEx, especially those from the Bachelor of Mathematics and Physics.

According to Zaidan (1993), the undergraduate course faced problems such as the high failure rate in some courses and the low rates of graduating students. The number of students who were interested in the Bachelor's Degree decreased and the criticism that the course was too theoretical remained on the part of future teachers.

On May 17, 1983, the Council of the Mathematics Course answered a questionnaire constructed by the Undergraduate Council in one of its meetings. One of the questions concerned the curriculum in effect in 1980 and issues, solutions, and directions the Council was taking. In response, they admitted that the 1975 curricula did not meet the training needs of the high school math teacher.[5] and the mathematician. Thus, two committees of professors from the Department of Mathematics were formed to reformulate the Bachelor of Mathematics for Teaching and Bachelor of Mathematics curricula.[6]. Conversely, the 1980 curriculum was under evaluation. In the next section, we will present discussions concerning the 1987 curriculum reform.

The 1987 Curricular Reform

The 1987 Curriculum started to be discussed in 1983, with the formation of the Council Commission for Curriculum Reform. In 1983 the Commission conducted a study to evaluate students' performance and detect flaws in the 1980 curriculum. One analyzed the students who had entered the course in 1980 or 1981 and were possibly graduating.

In the document, the professors stressed their awareness that the problems of the course were not restricted to the curriculum itself, but they chose to focus only on that one. The other problems are not mentioned, nor are other discussions about them. They also pointed out the need for an analysis of the real objectives of the modalities of the mathematics undergraduate course and the courses that comprised it. After identifying the problems related to the curriculum, a proposal was formulated, then presented to the department and the students of the undergraduate course, open to suggestions. We emphasize that these concerns were not only present in the Mathematics course at UFMG. According to

[5] The High School mentioned refers to the old "Ginásios" (currently, from 6th to 9th grade) and the "Colegial" (currently, High School).

[6] In the Council of the Mathematics Course meeting minutes of May 17, 1983, all the Department of Mathematics professors' names, delegated to reformulate the Bachelor of Mathematics for Teaching, and Bachelor of Mathematics curricula, are not mentioned. However, Professor Luís Flávio de Castilho's participation, who was the coordinator of the Council, is highlighted.

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Pimenta (1995), the 1980s were marked by educators' dissatisfaction with teacher training, who requested a review so that courses could articulate theory and practice.

One of the suggestions made by the members of the Center for Mathematics Studies (CEM), formed by the students, was the common curriculum for the Bachelor of Mathematics and the Bachelor of Mathematics for Teaching in the first three terms, differentiating from the 4th or 5th term on. The Commission's report indicated the need to connect the Bachelor of Mathematics for Teaching to the reality of Elementary and High School teaching in Belo Horizonte. For this, three courses were proposed that would be taught by one professor from the Mathematics Department and another from FaE. The courses were conceived as a space for teachers and students to deepen their understanding of the professional routine accompanied by reflection and criticism, enabling its problematization and comprehension through practical and theoretical tools.

The discussions raised by the Council Committee for the curriculum reform continued throughout the following years. On June 25, 1985, in one of the meetings of the Council of the Mathematics Course, a document referring to the reform was presented. One of the proposals was the untying of the Bachelor of Mathematics for Teaching and Bachelor of Mathematics, which should not occur in the 1st term, but only in the 3rd, 4th or 5th term, and this separation should be specific to classes and courses.

On October 22, 1985, at another meeting of the Council, the members were informed about the elaboration of the New Mathematics Curriculum Project. It was also informed that one of the professors on the Commission, Professor Dan Avritzer, was attending meetings at FaE to discuss the unit's responsibility courses. In the meeting minutes of the Council, dated June 17, 1986, there is the presentation of the Proposal of the New Mathematics Curriculum, elaborated by the Commission appointed by the Council. The New Curriculum was unanimously approved and forwarded to the higher instances.

In the Proposal for the New Mathematics Curriculum, Commission's history is presented, informing that the discussions, meetings, and analyses had started in the second half of 1983 and extended until June 1986. In this proposal, a common core of Bachelor of Mathematics for Teaching and Bachelor of Mathematics courses was created, as well as new courses, to solve the difficulties that had been pointed out. Remarkably, the new curriculum was adapted to reality, seeking to train a better professional. In addition, factors external to the University that influenced and would continue to influence the course are addressed, such as a modest perspective of remuneration, problems in the labor market, and pressure on professors to subject themselves to a mercantilist teaching mentality.

Regarding the professional to be trained, one emphasizes that the Mathematics graduate would work as an Elementary and High School Mathematics teacher. Moreover, a teaching graduate profile was traced for the first time (Zaidan, 1993). The profile description points out the need for undergraduates to have a space in their training to reflect on the ways and methods of teaching the Elementary and High School curriculum-specific contents, the need for adequacy, existing textbooks, etc.

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The Proposal was divided into the Common Core, the Bachelor of Mathematics for Teaching Specific Curriculum, and the Bachelor of Mathematics Specific Curriculum. The Common Core included the courses common to the Bachelor of Mathematics and Bachelor of Mathematics for Teaching Degrees, taught in the first three terms. For this course, the objective was for the student to learn what mathematics is as a science, acquiring elements to choose between the options: Bachelor of Mathematics or Bachelor of Mathematics for Teaching. For the Mathematics Specific Curriculum, new courses have been proposed, aiming at a greater mastery by the students of Elementary and High School content.

The new curriculum was approved by the Graduate Council on December 15, 1986, and went into effect at the beginning of 1987. Table 5 shows the courses that comprised the Common Core, with their respective codes, type, theoretical, practical, and total course load, and prerequisites.

Table 5 - Undergraduate Curriculum in Mathematics - Common Core: Bachelor of Mathematics and Bachelor of Mathematics for Teaching (1987)

SE-MES-TER	COURSES	TYPE		C. H. T	C. H. P	C. H. TOTAL	PREREQUISITES
		B	L				
1st	Differential and Integral Calculus I	OB	CM	120	_	120	_
	Analytic Geometry and Linear Algebra	OB	CM	90	_	90	_
	Algebraic Problem Solving	OB	CM	60	_	60	_
	Mathematical Initiation	OB	OB	30	_	30	_
	Physical Education A	LE	LE	_	30	30	_
2nd	Differential and Integral Calculus II	OB	CM	90	_	90	Differential and Integral Calculus I and Analytic Geometry and Linear Algebra
	Linear Algebra I	OB	CM	90	_	90	Mathematical Initiation
	Geometric Problem Solving	OB	OB	60	_	60	_
	Computer Programming	OB	OB	45	30	75	_
	Physical Education B	LE	LE	_	30	30	_
3rd	Differential and Integral Calculus III	OB	CM	90	_	90	Differential and Integral Calculus II
	Numerical Calculus	OB	CM	45	30	75	Computer Programming and Differential and Integral Calculus I
	Statistics and Probability	OB	OB	45	30	75	Differential and Integral

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						Calculus I
	General Physics I	OB	CM	60	45	105	Differential and Integral Calculus I or Analytic Geometry and Linear Algebra

Source: Documents made available by the Council of Didactic Coordination of the Mathematics Undergraduate Course

According to Zaidan (1993), this curriculum demonstrated the search for a new systematization of the course, breaking with the 3 + 1 model that prevailed in previous years. The author points out that, within this new curricular structure, a core of courses was created that aimed to link mathematical and pedagogical contents. Table 6 shows the courses that make up the 1987 curricular grid for the Bachelor of Mathematics for Teaching.

Table 6 - Undergraduate Curriculum in Mathematics - Bachelor of Mathematics for Teaching

SEMESTER	COURSES	TYPE	C. H. T	C. H. P	C. H. TOTAL	PREREQUISITES
4th	Fundamentals of Elementary Algebra	CM	60	_	60	Differential and Integral Calculus II and Algebraic Problem Solving
	Mathematics and School I	OB	30	30	60	53 credits taken
	Introduction to Education	OB	45	_	45	53 credits taken
	Structure and Functioning of Elementary and High School.	CM	60	_	60	53 credits taken
	General Physics II	CM	60	45	105	General Physics I
5th	Complex Variable	OB	60	_	60	Differential and Integral Calculus III
	Descriptive Geometry	CM	30	30	60	_
	General Physics III	CM	60	45	105	General Physics II
	History of Exact Sciences A	OB	45	_	34	Differential and Integral Calculus III and General Physics III
	1st Optional	_	_	_	_	_
6th	Fundamentals Of Mathematical Analysis	OB	90	_	90	Differential and Integral Calculus III
	Mathematics and School II	OB	30	30	60	Introduction to Education and Structure and Functioning of Elementary and High

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						School and Mathematics and School I
	Psychology Of Education / Development and Learning	CM	90	–	90	Mathematics and School I
	Didactics	CM	60	–	60	Mathematics and School I
	History of Exact Sciences B	OB	45	–	45	Differential and Integral Calculus III and General Physics III
7th	Fundamentals of Geometry Plane and Descriptive Geometry	CM	75	30	105	Geometric Problem Solving
	Mathematics and School III	OB	30	30	60	Psychology of Edu. / Dev. and Learn. and Didactics and Mathematics and School II
	Study of Probability Brazilians A	LE	15	–	15	–
	Mathematics Teaching Practice I	CM	30	30	60	Didactics
	2nd Optional	–	–	–	–	–
8th	Spatial Geometry	OB	60	–	60	Fundamentals of Geometry Plane and Descriptive Geometry
	Mathematics Teaching Practice II	CM	30	30	60	Mathematics Teaching Practice I
	Study of Probability Brazilians B	LE	15	–	15	–
	3rd Optional	–	–	–	–	–

Source: Documents made available by the Council of Didactic Coordination of the Mathematics Undergraduate Course

In it, we note the presence of Mathematics and School I in the 4th semester, with 60 hours and a prerequisite of 53 credits taken. The Mathematics and School II course, proposed in the 6th semester, also maintained the course load of 60 hours but had the following courses as prerequisites: Introduction to Education; Structure and Functioning of Elementary and Secondary Education; and Mathematics and School I. The course Mathematics and School III, also with 60 hours, had as prerequisites the following ones: Psychology of Education/Development and Learning; Didactics; and Mathematics and School II, being taken in the 7th term, together with Practice I.

According to Gomes (1997), the implementation of Mathematics and School courses I, II, and III contemplated both theoretical knowledge in Mathematics Education, as well as the concern with the training of the teacher-researcher, who would be able to incorporate in his profession the methods of teaching and research. Although these courses took students to

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classrooms and promoted reflection, the author emphasizes that they were different from Mathematics Teaching Practice I and II because, besides being offered since the 4th term, they intended to be a factor of integration.

When analyzing the course descriptions of Mathematics and School I, II, and III and Teaching Practice of Mathematics I and II, we noticed aspects in common, such as the presence of undergraduates in classrooms of Elementary and High schools; the reflection on the teaching practice; and the elaboration of new teaching proposals. However, the objectives were different: while Mathematics and School I, II, and III were focused on the integration of mathematical and pedagogical content, the courses of Mathematics Teaching Practice I and II were more focused on teaching methodologies.

The total course load to be taken was 2,520 hours. Compared to the 1980 curriculum, we see an increase of 225 hours. In 1980, the Mathematics Teaching Practice course, destined for the supervised curricular internship, was offered only in the last semester, with a total course load of 120 hours. In the 1987 curriculum, this course was divided into two, called Mathematics Teaching Practice I and Mathematics Teaching Practice II, and was offered in the last two terms of the course. Both courses had a load of 60 hours, 30 hours of which were for theory and 30 hours for practice, totaling 120 hours, as proposed in the 1980 curriculum.

The prerequisite for Mathematics Teaching Practice I was Didactics, and the prerequisite for Mathematics Teaching Practice II was Mathematics Teaching Practice I. When compared to the total course load, we notice that a load of Teaching Practice courses comprises approximately 4.76%, that is, there has been a reduction concerning the 1980 curriculum. We found that the 60 hours of practical work corresponded to only 2.38% of the total course load.

As for the optional courses that the future teachers could choose, these were exclusively offered by ICEx, being those that make up the curriculum of the Bachelor of Mathematics modality.

Next, we bring some considerations, by way of conclusion, as proposed by Valente, Bertini, and Morais (2018), observing the professional knowledge of teaching in the curricular reforms presented.

Notes on the Curricular Reforms and the Professional Knowledge of Teaching - As a Conclusion

Understanding historically the Curricular Reforms of the Bachelor of Mathematics for Teaching at UFMG, in the 1970s and 1980s, allowed us to observe the construction movement of professional knowledge for teaching. In the 1970s, based on the 1971 and 1975 Curricula, in the discussions, the proposed courses, the course loads, and their provisions, it is possible to notice an overvaluation of the mathematics content courses, connected to the *knowledge to be taught*. Despite attempts to disrupt, the 3 + 1 model was still present.

In the elaboration of the 1971 Curriculum, this argument was justified by the fact that

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the pedagogical courses, responsible for the *knowledge for teaching Mathematics*, should be taken more at the end of the course because they demand a certain maturity from the students, which was not attainable in the basic cycle. The 1975 Curriculum points out that the claims by part of the students, related to the absence of courses related to the *knowledge for teaching*, started to be put into practice with the insertion of the courses Fundamentals of Elementary Mathematics A and B.

In the 1980s, the Reforms of 1980 and 1987 bring elements that show a period marked by educators' dissatisfaction with teacher education, especially for the lack of articulation between theory and practice. In 1980, the programs of Fundamentals of Elementary Mathematics A, B, and C were redesigned aiming at being more adequate for the Bachelor of Mathematics for Teaching, that is, although they were related to the *knowledge to be taught*, they were also connected to the *knowledge for teaching mathematics*. Moreover, they were proposed in the first three terms. However, there were still indications that the Bachelor of Mathematics for Teaching was an annex to the Bachelor of Mathematics, with the courses focused on *knowledge for teaching* left until the end.

In 1987, the formation of the Collegiate Commission for Curriculum Reform is considered a milestone, as it emphasizes the need to relate the course to the reality of teaching, rethinking its structure and purpose. The creation of Mathematics and School I, II, and III courses, which were simultaneously taught by a professor from ICEx and one from FaE, indicates an attempt at integration and, also, at relating, in the words of Valente, Bertini, and Morais (2018), *knowledge to be taught* with the *knowledge for teaching*.

As for the courses responsible for the internship, we noticed that these were always left until the end. Even though they were institutionalized, according to the discussions presented, they were not considered as a responsibility of ICEx, but rather left to FaE, that is, considered by the Institute as pedagogical courses. It is worth remembering that Valente, Bertini, and Morais (2018) mention that these courses have received inexpressive epistemological prominence in Bachelor of Mathematics for Teaching curricula.

However, we noticed that mathematical courses were predominant in all the curricula of the analyzed period. The pedagogical courses, which focused on *knowledge for teaching*, were left to FaE and the last terms. Nevertheless, the 1987 Curriculum was marked by the integration of both professional knowledges of teaching.

Finally, we hope that this work contributes to studies interested in understanding, in a certain historical period, the construction of professional knowledge in mathematics teaching. In addition, we consider it relevant that future mathematics teachers are prepared with mathematical content and that, consequently, the courses related to the *knowledge for teaching* occupy a greater load in the curricular grid. However, we believe that it is also necessary to value the curricula and the formative process of the courses responsible for the *knowledge for teaching mathematics* and that, throughout the undergraduate course, attempts are made to integrate this knowledge.

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