Changes in Mathematics Teacher Training in Colombia

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Abstract **– An analysis of the evolution of mathematics teacher training plans in Colombia is presented, taking the University of Tolima as a case study. The purpose is to analyse and describe the curricular changes in undergraduate mathematics teacher training at the University of Tolima. It is a descriptive, qualitative, ex-post-facto case study, based on the content analysis of curricular changes. Seven curricula approved between 1970 and 2020 were analysed. Interdisciplinary training experiences significant variations in the free choice of subjects and research topics across different study plans. There is evidence that the number of mathematics subjects has gradually decreased and in their place didactics and pedagogical practices have increased. The study contributes to a deeper understanding of the evolution and current state of the mathematics teacher education program at the University of Tolima, offering valuable insights for future curriculum development and educational policy-making.**

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1. Introduction

In Colombia, the academic title of graduate is awarded to teachers when they complete their higher education studies by a university with a department of education. The study programmes leading to the degree of graduate are called bachelor's degree, which may modify according to the institution, but generally include a solid training in the area of social sciences and humanities, which prepares the student for research, teaching, and critical analysis.

Colombian legislation through Law 115 [1], and in Article 112, refers to the institutions that train educators: "it appertains to universities and other institutions of higher education that have a department of education or other academic unit dedicated to education, professional training, postgraduate training, and updating of educators". These include bachelor's degree programmes in: mathematics, natural sciences, philosophy, social sciences, literature, English, and modern languages, physical education, recreation and sports, among others. Once the bachelor's degree is obtained, the graduate can perform in the field of teaching, research, cultural management, among others, as a head teacher.

The University of Tolima (UT) is a public university, which has promoted the training of mathematics teachers since the 1970s. Over the last 50 years, the curricula plans have been modified, adapting teacher training to the development of culture, science, technology and especially to the country's new legislative regulations. The need for professional training for the practice of teaching is ratified by Law 30 [2] and Law 115 of 1994 [1].

The first, in Article 25, establishes the degree of graduate for graduates of professional careers in education, thus giving relevance to this higher education training; and the second, in Article 112, upholds the responsibility for initial teacher training at the higher education level, i.e. through degree programmes, hence the importance of studying: In what aspects has mathematics teacher training changed at the University of Tolima, what is the purpose of the study plan in mathematics teacher training at the University of Tolima, and what curricular changes are evident in mathematics teacher training at the University of Tolima?

2. Methodology

The research presented is a case study [3], of a descriptive, qualitative ex post facto nature, supported by content analysis carried out on curricular changes in mathematics teacher training plans at the University of Tolima in the period 1970-2020.

Historical curricular modifications in mathematics teacher training and the purposes of the last seven study plans, including an initial mathematics and study plan, which was developed over 30 years, are studied. In particular, reference is made to initial training at undergraduate level carried out within the framework of professional training programmes leading specifically to a degree.

The type of research is documentary with content analysis in the sense that documents were identified and studied that provide information on the structure of the educational project of the undergraduate programme in mathematics and physics and the bachelor's degree in mathematics; and information was extracted from their content focusing on looking for patterns or themes in the content of the documents analysed both quantitatively and qualitatively.

a) Sources of information

The seven curricular plans for teacher training in mathematics and mathematics and physics over the last 50 years have been located and analysed. A search was carried out of the regulations guiding teacher training in Colombia and the curricular plans for the mathematics and physics degree, locating three study plans, identified as the study plan of 1970, study plan of 1979 and study plan of 1999. Moreover, four mathematics degree plans, identified as plan one, plan two, plan three, and plan four have been coded as follows:

MF1970: 1970 mathematics and physics bachelor's degree.

MF1979: study plan for the bachelor's degree in mathematics and physics in the year 1979.

MF1999: study plan for the bachelor's degree in mathematics and physics in the year 1999.

M2003: first study plan of the bachelor's degree in mathematics in 2003.

M2006: second study plan for the bachelor's degree in mathematics in 2006.

M2011: third study plan for the bachelor's degree in mathematics in 2011.

M2020: fourth study plan for the bachelor's degree in mathematics 2020.

The analysis focused on qualitative and quantitative variables: year of the study plan, duration of studies, indicated methodologies, type of subject knowledge, nature of the subject, number of hours or credits, type of evaluation, indicated references.

As already mentioned, there are different regulations over time both at state and university level, a classification was determined that allows the different subjects to be assigned to some component independently of the period or the regulation. These components are [4]:

- Disciplinary training
- Professional training
- Interdisciplinary training
- Humanistic training

b) Treatment of information

All the information obtained was tabulated and dumped into an ad hoc database and then analysed in two different but complementary ways. On the one hand, it was analysed using the software ATLAS. Ti version 23.0.8.0 [5] software, which is useful for descriptive and written documentary studies. Moreover, the participating researchers and authors of the study carried out an initial manual analysis. In view of the fact that there are different regulations over time both at the state level and at the level of the university itself, a classification was determined that allows the different subjects to be assigned to some knowledge independently of the period or the regulation. This led to some labels and categories that were put down by experts in mathematics education from the universities of Salamanca, Cordoba and Pontificia of Salamanca.

3. Theoretical Framework

Knowledge of mathematics teacher education plans is crucial for several reasons that have a direct impact on the quality of teaching and, therefore, on the education of students [6]. These plans have an impact on the improvement of mathematics teaching because they define what competencies and knowledge teachers are expected to acquire during their training [7]. Knowing these plans allows one to assess whether educators are receiving adequate preparation to teach mathematics effectively.

It also provides insight into how the plans incorporate curricular changes generated by legislative, pedagogical, and technological advances. Teacher curricula must evolve to adapt to changes in school curricula [8]. Knowing these curricula allows knowing how educators are being prepared to face the new approaches or standards in mathematics education.

Teaching mathematics requires specific pedagogical skills. By learning about training schemes, is possible to assess if educators are receiving training in effective teaching methods, problem-solving strategies, and the use of educational technology [9]. As Loewenberg et al. [10] point out, the notion of pedagogical content knowledge has pervaded studies of teaching and teacher training, but has done in an inequal manner across the different fields. Educators must be prepared to work with a variety of students, including those with different learning styles and special educational needs. Training curricula need to address how teachers can adapt their teaching in order to deal with the diversity in the classroom. Knowledge of mathematics teacher education plans is essential for educational research. It allows the assessment of effectiveness of different training approaches and identify areas for improvement. The quality of mathematics education is directly related to the preparation and skills of teachers [11]. Training curricula provide valuable information about how educators are being prepared, which affects the quality of mathematics education in the long term.

Knowledge of mathematics teacher education curricula is essential for educational research. It allows the evaluation of the effectiveness of different training approaches and to identify areas for improvement [12]. Some researchers point out that one of the critical points in initial teacher education is the lack of professional standards that establish the skills, abilities, knowledge, and values that should be taught and therefore acquired during the training period [13].

Recent research has already been addressing this issue, for example, Milian and Valdivia [4] analyzed curricular strategies in the pedagogical training of graduates in Mathematics-Physics Education in Cuba. Likewise, Muñiz-Rodríguez et al. [13] studied mathematics teacher training in Spain. Arredondo and Juárez [14] analyzed mathematics teacher education plans according to certain indicators in Mexico.

3.1. Training Teachers in Colombia

For many years, Colombia has been trying to offer equal, free, inclusive, and quality education in accordance with different political and social guidelines; moreover, since the middle of the 20th century, the Colombian educative system has had a similar process of transformation to that experienced in other Latin American countries, which led to several modifications in its structure and made possible its expansion at different levels and population groups [15].

Some curricular research has found that teacher training and attempts to professionalize teachers are related to political and educational projects, in each of the educational reforms, with the aim of promoting teacher training, the improvement of the quality of education, the transformation of education in order to adapt to the new demands of the production process and the technological revolution, and implementing educational policies that revalue the work of teachers and develop an Institutional Educational Project. This task has been the responsibility of teacher training institutions such as teacher training colleges and universities that have faculties of education and offer academic degree programmes accredited by the Ministry of Education [16].

According to the Political Constitution of Colombia [17], education is a right of each person and a public service that has a social function. With her, it searches the access to knowledge, science, technology and other cultural goods and values.

Law 115 [1] was also published, which establishes mathematics as one of the nine compulsory and fundamental areas for basic and secondary education. This law dedicates a specific title to educators, stating, among other provisions, that the training of educators will have four general aims:

- To train an educator of the highest scientific and ethical quality.
- To develop pedagogical theory and practice as a fundamental part of the educator's knowledge.
- To strengthen research in the pedagogical field and in specific knowledge.
- To prepare educators at undergraduate and postgraduate level for the different levels and forms of educational service provision.

The academic and professional training of educators is the responsibility of the higher teacher training colleges to provide initial teacher training and service at the pre-school level and in the primary basic education cycle, and of the universities to provide service in basic and secondary education.

In Colombia, teacher training was regulated by Law 115 of 1994, Law 30 of 1992 and Decree 709 of 1996, with the aim of improving the quality of teacher training at all levels. Subsequently, basic standards of competences in mathematics [18] were published, in which it is stated that these "…has been constitute in a guide for: [...] the formulation of programmes and projects, both for initial teacher training and for the qualification of practicing teachers" (p. 11), in the definition of what should be a reference for the study of curricular aspects from the perspective of Mathematics Education. Guacaneme *et al*. [19] carry out a detailed analysis of the regulatory changes and some of the background, structure, development and limitations of initial and continuing teacher training in mathematics in Colombia.

3.2. Training Teachers in the University of Tolima

The University of Tolima (UT) was created in the year 1955 and in the 1960s, the first expansion of the higher education system in Colombia took place, authorizing universities to create faculties of education, and to train educators by awarding bachelor's degrees. In this way, in the UT were created intermediate courses such as: agricultural technical baccalaureate, agricultural machinery technical baccalaureate, topographer baccalaureate, the school of clinical laboratory assistants, and courses for education graduates.

The UT governing board confides to the Institute of Basic Sciences and Arts (ICAB) the task of creating a series of resources to begin training graduates in different specialties in order to contribute to the development of regional education. The following year, structured courses were started, all with a major and a minor area. Also, a career director was appointed and the education programmes became independent from the Institute of Basic Arts and Sciences (ICAB). Also, an experimental scheme called the extramural plan began to operate. This plan consisted of organizing educational programmes in different municipalities where the UT initially had no offices. In this way, the teacher training programmes were taken to the municipalities of the department of Tolima, such as: Líbano, Honda, Chaparral, Espinal, Guamo, and Flandes.

The courses were aimed at teacher training and were the basis for the creation of the School of Education Sciences, which began to operate in July 1969. Technical programs in education with emphasis on mathematics, biology, history and Spanish were introduced in 1970; another program aimed at training experts in education was offered under the name of the Plan Extramuros in 1972. The bachelor's degree programs were approved by the Ministry of National Education in 1974 and in 1978 the curricula were modified.

Years later, the faculty offered new programmes, specializations such as: Teaching of Social Sciences and Teaching of Mathematics in 1994. The bachelor's degree in physical education, sport and recreation in 1994; in 1994 specializations were offered in: social development and community participation, education with an emphasis on teaching English (1995), and sex education (1996). Later, in 2008, the specialization in pedagogy was offered and in 2006, the master's degree in education [20].

3.3. The Bachelor´s Degree in Maths and physics in the UT

The UT's bachelor's degree in mathematics and Physics was a degree programme that began in 1974 and offered training in the field of mathematics as a major area and training in the area of physics as a minor area, as well as a pedagogical component. The bachelor's degree in mathematics and physics had 4 years of duration, spread over 8 semesters. It aimed at training teachers with broad knowledge and skills to develop innovative solutions in the field of mathematics and physics education. The programme consisted of a combination of subjects in mathematics, physics, statistics, logic, sociology, psychology, and educational aids, micro-teaching in mathematics and physics and a semester of pedagogical practice in a formal secondary school. Students were expected to develop skills in order to formulate and implement mathematical and physical solutions to complex problems. This bachelor's degree ended in 2000 and gave emergence to the bachelor of mathematics.

3.4. The Bachelor´s Degree in Maths in the UT

In 1999 the study plan for the bachelor's degree in mathematics was approved at the University of Tolima under the daytime modality for duration of 10 academic semesters. The bachelor's degree in mathematics at the University of Tolima is an academic programme that aims to prepare students to teach mathematics at the basic, intermediate, and advanced levels.

The programme is designed to develop students' skills through a variety of educational experiences, including theoretical classes, laboratories, seminars, workshops, and pedagogical practices.

The bachelor of mathematics programme also offers the opportunity to develop research skills and obtain practical experience in the field of mathematics education, presenting a variety of opportunities in order to carry out research projects and work with teachers in areas of their interest, through the research workshops.

The graduate in mathematics from the Faculty of Education Sciences at the University of Tolima is a professional with knowledge of the field of education in general and mathematics education in particular, with interpretative, argumentative, proactive, critical and reflective skills; permanent curriculum builder based on pedagogy, pedagogical praxis, didactics of mathematics, curriculum and assessment in mathematics, school management and educational research, also respectful of difference, in search of consensus and healthy coexistence through dialogue, in accordance with the ethical, aesthetic, and democratic principles of the citizen, promoter of a culture for peace from Mathematics Education [20].

According to the curriculum, graduates of the Bachelor's degree in Mathematics from the Universidad of Tolima will serve in roles such as: mathematics teachers in primary and secondary educational institutions, including higher normal schools with specializations in mathematics and mathematical teaching methods. They will also participate as members of research groups in education and mathematics, and as designers of curricula and educational programs focused on teaching, learning, and competency-based assessment.

In this research an analysis of the curricular changes in mathematics teacher training is carried out specifically at the University of Tolima. The teacher training in mathematics through the different curricula that have been implemented over the last 50 years is analyzed. We have made a comparison between the training received by mathematics and physics graduates and that received by mathematics-only graduates in the latest curricula. The objective is to characterize the curricular changes in the training of mathematics teachers in the bachelor's programme.

4. Analysis and Results

The 1979 training plan was the one that was in force the longest, 20 years, and the 2006 plan was 14 years. In contrast, the 1999 and 2003 plans were the shortest, lasting only 3 and 4 years respectively.

Table 1 shows the distribution of subjects for the mathematics teacher training programme at the University of Tolima.

The first column indicates the type of component in relation to the type of knowledge that the trainee teachers were expected to acquire. Then the different subjects and the number of these subjects is indicated according to each training plan.

It can be observing how the number of subjects for known has changed in the seven study plans. In disciplinary training, there is a progressive decrease of 30.4% of subjects with respect to the 1970 study plan.

Nonetheless, considering that the dual degree program was discontinued between 2000 and 2003, with education focusing solely on mathematics, there was an increase in these subjects. Only in the most recent curriculum was there a decline compared to the initial one in 1970.

As for the subjects related to vocational training, these have increased in all the plans, with an increase of 90.9% in comparison to the first plan (MF1970).

Professional training includes disciplines such as general didactic and the discipline disciplinary pedagogy and educational sciences, including pedagogical practice, show an increase of 52% from 1999 to 2006. An increase of 70% is observed in the subject pedagogical practice from 2003 to 2020 representing 33.33% of the subject's pedagogy and educational sciences. While didactics decreased by 70%.

Table 1. Distribution of subjects by component and study plan

Component	Subject	MF 1970	MF 1979	MF 1999	M 2003	M 2006	M 2011	M 2020	Total
Discipline training	Maths	16	19	14	23	18	18	15	148
	Physics	7	8	7	2	0	0	1	
	Total	23	27	21	25	18	18	16	
Profesional training	Teaching approach of discipline	4	3	4	10	13	5	3	120
	Pedagogy and sciences of eduaction	7	12	8	12	10	11	18	
	Total	11	15	12	22	23	16	21	
Interdisciplinar training	Elective	0	0	0	1	0	2	2	30
	Free choice	4	1	0	1	5	2	2	
	Investigation	1	1	1	0	0	4	3	
	Total	5	2	1	2	5	8	7	
Humanistic training	Social Sciences	8	3	1	11	8	8	7	91
	Humanities	2	2	4	7	6	5	6	
	Technologies of Information and communication (TIC)	0	0	0	3	1	0	2	
	Physical education	0	0	0	3	1	2	1	
	Total	10	5	5	24	16	15	16	
Total		49	49	39	73	62	57	60	389

Interdisciplinary training: This component consists of, electives and research subjects. The electives and free choice subjects had changes, most noticeably in 2003 and 2020. Research reappears between the 2011 and 2020 plans, showing the importance of training teachers as research teachers.

Humanistic training: Includes subjects in social sciences, humanities, information and communication technologies (ICT), and physical education. Social sciences have an upward trend. Information and communication technologies (ICT) show an increase from 1999 onwards. Physical education also shows an increase, especially after 2003.

If we focus the attention at the percentage that each component has represented in the entire training plan (Table 2), it can be observed that disciplinary training had its greatest percentage presence in the 1979 training plan (MF1979). In that plan, together with the 1999 plan, this component accounted for more than 50% of all subjects, showing the importance given to specific knowledge of the discipline of the double degree (mathematics and physics). On the contrary, in the current plan is when disciplinary training reaches its lowest representation in the curricular plan of mathematics teacher training in the UT. The highest proportion is observed in 1979, with 55.10%.

The general trend is downward, indicating a reduction in disciplinary training in the curriculum.

Professional training: Starts in 1970 with 22.45% and shows fluctuations over the years. It peaks in 2006 at 37.10% and shows a significant increase in 2011. Vocational training represents a substantial part of the training plan, and the general trend is upwards.

Interdisciplinary training, starts in 1970 with 10.20%, decreases to 2.56% in 1999, and experiences an Increase in subsequent years. Although there are fluctuations, interdisciplinary training represents a percentage of 11.67%, the lowest in the study plan. Whereas humanistic training: has a significant variability over the years; it starts with 20.41% in 1970, decreases in 1979 by 10%, and shows increases between the 1999 to 2003 plan by 20% and finally reaches in the 2020 plan a 26.67% of the study plan, being equal to that of the disciplinary training. Although it has undergone changes, humanistic training remains a substantial part of the training plan.

Table 2. Percentage of each type of component in relation to the whole training plan

Componente	**MF 1970**	**MF 1979**	**MF 1999**	**M 2003**	**M 2006**	**M 2011**	**M 2020**
Disciplinar training	46.94	55.10	53.85	34.25	29.03	31.58	26.67
Profesional training	22.45	30.61	30.77	30.14	37.10	27.07	35.00
Interdisciplinar training	10.20	4.10	2.56	2.74	8.06	14.03	11.67
Humanistic training	20.41	10.20	12.82	32. 88	25.81	26.32	26.67

Table 3 shows the distribution of presential hours per year according to academic credits, component, and study plan over different years.

Analysing the annual hourly intensity of the subjects in each component, in the 1970 plan, in the disciplinary component, 11776 out of 23296 classroom hours were developed during the school year, which represents 50.55% of the classroom hours in the 1970 plan; while in the 2020 plan, 7680 out of 28160 hours were developed, which represents 27.27%. In the vocational training component, in the 1970 plan, 4096 out of 23296 were developed, which represents 17.58% of the classroom hours, and in the 2020 plan, 11360 out of 28160 are developed, which represents 40.34% of the annual hours; observing a decrease in the number of annual classroom hours in disciplinary training and an increase in professional training.

Table 4 shows a detailed vision of the distribution of presential hours per year, expressed as percentages, according to academic credits, component, and study plan over different years.

Between 1970 and 2003, the study plan was offered in the double modality of mathematics and physics, and we can observe that the average number of mathematics subjects in this period was 16.3, while when physics was put aside, the average number of mathematics subjects increased to an average of 18.5 per year.

Table 3. Distribution of classroom hours per year, according to academic credits, component and plan of study

Component	Subject	MF 1970	MF 1979	MF 1999	M 2003	M 2006	M 2011	M 2020	Total
Discipline training	Maths	8192	9728	7168	16640	10560	10080	7360	82080
	Physics	3584	4096	3072	1280	0	0	320	
	Total	11776	13824	10240	17920	10560	10080	7680	
Profesional training	Teaching approach of discipline	1792	1536	1536	3840	1920	960	1760	58336
	Pedagogy and sciences of eduaction	4096	5632	3584	8320	4960	4960	11360	
	Total	0	0	0	320	0	1120	640	
Interdisciplinar training	Elective	5888	7168	5120	12480	6880	7040	13760	
	Free choice	1536	512	0	320	1600	1280	640	10304
	Investigation	512	512	512	0	0	1920	960	
	Total	2048	1024	512	320	1600	3200	1600	
Humanistic training	Social Sciences	2816	1024	256	4800	3040	2720	2240	37568
	Humanities	768	768	1536	4480	2880	2240	1920	
	Technologies of Information and communication (TIC)	0	0	0	1920	480	0	640	
	Physical education	0	0	0	1920	160	640	320	
	Total	3584	1792	1792	13120	6560	5600	5120	
TOTAL		23296	23808	17664	43840	25600	25920	28160	188288

Disciplinary training shows that the presential hours for Mathematics have been consistently high across the study plans. The M2011 plan has the lowest percentage of hours of disciplinary training (30.89%), while the M2020 plan has the lowest percentage (27.28%). MF1970 has the highest percentage (50.54%), followed by MF1979 (58.06%).

The MF1999 plan has the highest percentage of interdisciplinary training (28.99%), while the M2003 plan has a value of 0.73%. The M2003 plan has the highest percentage of humanistic training (29.93%), while the M2020 plan has the lowest percentage (18.18%). The MF1970, MF1979 and M2020 plans have fairly close values in this component.

Interdisciplinary training experiences notable variations in the free-choice and research subjects throughout the different study plans. The free-choice subject reaches its peak in 2006, while research has a significant increase in the study plan 2011 and 2020.

Humanistic training whose purpose is orient teachers to think and to transpose what they think in oral and written form, as well as to acquire the necessary habits for good health and to recognise the context in which they find themselves. Social sciences and humanities show a variable distribution, over the course of the study plan, while information and communication technologies (ICT) and physical education appear in the 2003 plan.

Table 4. Distribution of classroom hours per year, in percentage, according to academic credits, component and study plan

Component	Subjects	MF 1970	MF 1979	MF 1999	M 2003	M 2006	M 2011	M 2020
Discipline training	Maths	35.16	40.86	40.58	37.96	41.25	30.89	26.14
	Physics	15.38	17.20	17.39	2.92	0	0	1.14
	Total	50.54	58.06	57.97	40.88	41.25	30.89	27.28
Profesional training	Teaching approach of discipline	7.69	6.45	8.70	8.76	7.5	3.70	6.25
	Pedagogy and sciences of eduaction	17.58	23.66	20.29	18.98	19.38	19.14	40.34
	Total	0	0	0	0.73	0	4.32	2.27
Interdisciplinar training	Elective	25.27	30.11	28.99	28.47	26.88	27.16	48.86
	Free choice	6.59	2.15	0	0.73	6.25	4.94	2.27
	Investigation	2.2	2.15	28.99	0	0	7.40	3.41
	Total	8.79	4.30	28.99	0.73	6.25	12.34	5.68
Humanistic training	Social Sciences	12.1	4.30	14.49	10.95	11.88	10.49	7.95
	Humanities	3.3	3.23	8.7	10.22	11.25	8.64	6.82
	Technologies of Information and communication (TIC)	0	0	0	4.38	1.88	0	2.27
	Physical education	0	0	0	4.38	0.63	2.47	1.14
	Total	15.38	7.53	10.15	29.93	25.63	21.60	18.18

5. Conclusion

The study performed has recovered information about the distribution of both subjects and domains and the time devoted to each in the mathematics teacher education programme at the University of Tolima over a period of 50 years. It also provides a more complete vision of how the distribution of components has evolved during the different training plans. The study plan for the formation of mathematics teacher education has experienced changes over the years, with fluctuations in the number of subjects in each component. It is important to consider these changes when analysing the evolution of the study plan and its adaptation to educational and professional needs.

The more recent plans (M2011 and M2020) tend to assign less time to disciplinary training and more to vocational training in comparison to the older plans. Disciplinary training tends to decrease in percentage terms in the newer plans (Table 2), while the number of disciplinary training subjects (Table 1) varies but tends to be lower in the M2011 and M2020 plans. This could suggest a change in the emphasis from more general to more specialised training.

Professional training saw growth in both absolute terms (number of courses) and relative terms (proportion of educational components) in the latest curricula, particularly notable in M2020.

This could indicate an increased focus on work-specific preparation and practical skills and the multidisciplinary approach in response to labour market demands.

Humanistic training shows a more equal distribution in relation to the number of hours and the different components of formation. It is evident that there are notable variations in the electives and research subjects across the different study plans. Free-choice subjects reached its peak in 2006, while research has a significant increase in the 2011 and 2020 study plans.

It can observe a general trend towards higher diversification of training in the most recent study plan, with an increase in professional and interdisciplinary training. Disciplinary training seems to decrease in the most recent study plan, possibly reflecting a trend towards a more holistic and multidisciplinary approach to education. This suggests recognition of the importance of integrating knowledge from different disciplines.

It was found that there are significant differences in the distribution of hours between the different plans, especially in the disciplinary and interdisciplinary training components. Also, some plans assign time for professional training, while others do not. A general increase in the total number of subjects is observed in the most recent plans (M2011 and M2020), with a peak in M2020. Generally, the trends point towards a more diversified and adaptable education in mathematics teacher education at the University of Tolima, with a greater focus on professional preparation and interdisciplinary skills. These trends may reflect changes in labour market demands and in perceptions about the nature of higher education. It is important to highlight that these interpretations are general and can be influenced by factors specific to the educational and social context.

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