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Initial literacy and early mathematical knowledge. Confluence of practices in early Childhood Education

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Abstract

In this work, the activity patterns around which the classes are organised are analysed and the tasks that configure the actions of the classroom on the initial literacy and mathematical knowledge are recognised and evaluated in order to explain the role those different curricular elements play in them and interpret the task of curricular reconstruction that teachers undertake. To this end, data was obtained from video recordings of 27 class sessions by 5 teachers of Early Childhood Education. The results corroborate previous studies on teachers' actions that follow a school culture linked to the stage. It has also been noted that the nature of the content in Early Childhood Education also plays a key role in the creation of work proposals for practice.

Keywords: Educational practices; literacy education; mathematics education; Early Childhood Education.

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Alfabetización inicial y conocimiento matemático. Confluencia de prácticas en Educación Infantil

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Resumen

Analizando los patrones de actividad en torno a los cuales se organizan las clases y las tareas que configuran las acciones del aula sobre la alfabetización inicial y el conocimiento matemático, se pretende explicar el papel que contenidos y actividades juegan en las prácticas de aula e interpretar la reelaboración curricular que los profesores llevan a cabo. Para ello, se obtuvieron datos a partir de grabaciones en vídeo sobre el desarrollo de 27 sesiones de clases de 5 profesores de Educación Infantil. Los resultados corroboran estudios anteriores sobre actuaciones de los profesores que obedecen a una cultura escolar vinculada a la etapa. Asimismo, se constata que la naturaleza de los contenidos también en Infantil ejerce un peso considerable en la formulación de propuestas de trabajo para la práctica.

Palabras clave: Prácticas de enseñanza; alfabetización inicial; educación en matemáticas; Educación Infantil.

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INTRODUCTION

The main purpose of the work is to analyse the classroom practices implemented by a group of teachers in Early Childhood Education (ages 3-6). Our aim is to explain the role activities and content play in them and interpret the task of curricular reappraisal the teachers undertake. We seek to explore, the patterns of activity around which the recorded classes are organised and the tasks that give shape to these classroom actions involving two aspects of the early childhood curriculum: the initial teaching of literacy and mathematical knowledge. Previous papers (Ramírez et al., 2017 and Rodríguez et al., 2018) have enabled us to reach conclusions around types of activities with fairly common features for the different teachers. Some activities have a more organisational component (task planning organisation), others are more routine in nature (roll call, date and weather), others are more academic (correcting work in class, performing tasks by learning centre …) and other are more ludic (free play).

Our intention here is advancing our understanding of the nature of the practices involved in the initial teaching of literacy and mathematical knowledge, for understanding how these two curricular subjects are taught. This will provide a more in-depth understanding of teaching processes, with their ensuing applications in teacher training, teachers' self-assessment of their practices, or the design of materials.

The work conducted in classrooms between teachers and pupils is the mainstay of education. The bulk of this work is the outcome of the way teachers transform knowledge in general into classroom content through techniques, intuition, experiences, materials…because a teacher's profession involves the curricular building of classroom practices that engage pupils in their learning process. There is nothing new about the research into how these practices are built up and where they originate. Indeed, there is a certain tradition that has highlighted how some features of content have a direct impact on curricular activity. Stodolsky and Grossman (1995), Vollmer (2021) pin this connection on characteristics such as the degree of sequencing or of definition that the different contents encompass. So, too, in a study by Hennessy et al. (2005), a link is made between the common teaching practices involving ICTs and the didactic of the different disciplines. Nevertheless, these studies focus on secondary schooling, where content has a rich epistemological content, which is somewhat different to what happens in Early Childhood Education. In the case of teachers in elementary education, the degree of specialisation in the subjects involves what the teachers need to have or use to teach each specific level of the school curriculum. It would not therefore involve the specialised knowledge of the subject that a mathematician might have in the case of this subject (Gericke et al., 2018).

Despite the less specialised nature of the knowledge at this level, the kind of classroom activities involved are expected to be different because of the difference in turn in the nature of the content taught.

A classic example in this case involves the traditional arguments over overall and synthetic methods in the teaching of reading. Today, there are now also different partial approaches based on specific theories, such as the use of:

- psycholinguistics (Castles & Nation, 2023; Ehri, 2020);
- socio-culture (Smagorinsky et al., 2020; Jones and Christensen, 2023; Rand and Morrow, 2021) and
- neuropsychology (Dehaene, 2018).

Many experts in this field (Morrow et al., 2019; Cecil et al., 2020) acknowledge that teaching to read and write involves addressing different aspects: knowing why it is so important to learn to read and write and what for, which requires considering the functions of the written language, proposing attractive readings tasks (reading stories, the narration of written stories, etc.).

Within mathematical knowledge, three subdomains are identified (Alsina & Delgado, 2021):

- intuitive and informal mathematical knowledge, coming from the non-formal experience that pupils accumulate;

- the knowledge of mathematical contents that they obtain directly from their teachers and

- the knowledge of mathematical processes or skills to use the previous contents in a resolving way.

López-Dalmau and Alsina (2015) also single out another example related to mathematical knowledge in this stage, when they identify four ways of teaching mathematics that respond to four approaches with significant consequences for the classroom practices: Focus on skills, Conceptual focus, Focus on problem solving, and Investigative focus. The choice of one or other approach entails practical situations and differentiated resources, such as workbooks, handling and experimentation, and learning centres that to different degrees favour the pupils' acquisition of mathematical knowledge.

The study by Wood et al. (1990) highlights how a teacher taking part in an experience designed to prompt changes in her teaching strategies in mathematics, with real-time guidance and over a prolonged period, did not carry these strategies over to the teaching of reading. These examples highlight how teachers in elementary levels, too, may vary their way of teaching according to the content: in mathematics use tends to be made of explanations given to the whole of the class, followed by individual desk work, while working in small groups tends to appear more often in subjects in the social sciences (Adler and Sfard, 2017).

What factors can help to explain the particularities in the ways of teaching diverse content? It should be noted that the content's very nature is a key factor that informs different ways of teaching, although in the case of Early Childhood Education we should refer to other factors also featured prominently in the literature (Bergqvist and Bergqvist, 2017; Wood and Hedges, 2016): the curricular framework in which teaching processes are located, the educational culture at this stage, and the professional traditions of teachers at each level.

As for the curricular framework of Early Childhood Education (ages 3-6, 2nd cycle "Educación Infantil" in Spain, which is the period analysed herein), it is characterised by particularly unique features that can be attributed not only to the age of the pupils, but also, to the fact that schooling is not compulsory at this age, at least according to the way it is regulated in Spain. This may explain that curricular documents are designed more as guidelines than as rules, with the syllabus being built up around general curricular subjects that map out major areas of development for pupils, rather than well-defined bodies of knowledge.

In the case of Early Childhood Education, the most common tradition is the main role played by Developmental Psychology as the focus when addressing the curriculum (Wood & Hedges, 2016). From this approach, the traditional forms of knowledge (subjects) carry very little weight in the drafting of curricula because the emphasis is on learning through discovery, exploration and play (Bingham & Whitebread, 2018). These learning processes prevail over curricular content or goals because the development of the processes themselves makes them the actual learning goals at this stage.

Nevertheless, within the framework of contemporary political structures (OECD, European Commission…), the documents on the curriculum in Early Childhood Education are increasingly seen as a way of bringing this pre-school stage in line with policy on compulsory education in order to ensure the attainment of long-term socio-political and economic ends. In part, these new currents seek to justify the financial investment made in the stage by proving its effectiveness for later stages and likewise increasing the controls on the processes of assessment, training and qualification of teachers, the investments made and quality criteria. Along these lines, a contribution is made by the findings of research that singles out the long-term influence that both the initial teaching of literacy and the work on mathematical knowledge have in the acquisition of these contents in subsequent stages (Petersen et al., 2018; Piasta et al., 2021; Vanluydt et al., 2021; Watts et al., 2014).

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In the case of the curriculum for the Infant School, the contents for this stage in the official document in Spain, in the legislative framework in force during the recording of the data, were divided into three areas: Self-knowledge and personal autonomy, Knowledge of the world around, and Languages, communication and representation. If we analyze these areas we find mathematical contents of the notion of quantity and measurement, as well as the relationship between elements (order, seriation, classification, etc.) or spatial and temporal orientation, but always from an experiential and globalizing point of view. Regarding initial literacy, it is important to teach the functionality of this communication system, to initiate the differentiation between forms of writing and other forms of graphic expression, in the identification of meaningful and usual written words and phrases, and in the initiation of the written code.

Regarding the educational culture, it seems clear that teachers in Early Childhood Education manage certain teaching conditions characterised by the following: because of their developmental stage, the pupils' physical and verbal skills are less honed, and they are less capable of working on their own (Ramírez et al., 2017). The working environment provides fewer formal learning situations, shorter activities, greater task diversification, more manual activities, less desk work, and more supervision. Nevertheless, it is important to stress that each teacher stays with the same group of pupils from the time they start Early Childhood Education through to the end of this three-year stage, when they enter Primary Education. It is common in this stage to encounter organisational-didactic models such as the assembly, working in learning centres, organising space according to functional areas, longer breaks, the value of play as a strategy for accessing knowledge, and a plethora of manual and creative activities. The teachers in this stage form a nucleus around which they meet and make decisions and the involvement of the family is greater than at other stages (Bejarano-Pérez, 2010; Bingham and Whitebread, 2018).

Finally, it should be noted that the official curricular guidelines for Early Childhood Education recommend a holistic approach that allows addressing knowledge through significant action-based learning situations designed to help children discover and act out the different contexts that make up the childhood world, as well as steadily facilitate their inclusion and involvement in them. Differentiating by fields of knowledge is therefore far from common practice in early childhood classrooms.

All the above provides a panorama that despite being based on an assumed differentiation in the teaching attributable to the different nature of the contents, may be qualified by the consideration of a non-compulsory and guideline curriculum structured around broad and all-enveloping curricular ambits, with classroom practices designed to provide pupils with action-based situations, and furthermore with generalist teaching staff that are not specialised by subject areas and generally stay with the same groups of pupils over the three school years.

Based on this theoretical framework we will be seeking to answer some of the research questions we ask below. These questions are informed by the general question of how these teachers address the teaching of reading and mathematical knowledge:

- What do teachers teach when they address the process of literacy and mathematics?

- What patterns of activity are organised in the classrooms when addressing each one of these subjects?

METHODOLOGY

Participants and collection systems

The research we are presenting here has adopted a case-study model involving real practices, as we have been able to observe the classes taught by five teachers at different schools. The aim was to delve into the complexity of the processes undertaken within real classroom contexts, not to generalise (as this is not an experimental or quasi-experimental study) (Flick, 2018; Marshall et al., 2022). Over the three years, classroom sessions were recorded in periods of around 60 minutes randomly chosen and distributed over three occasions. The data were collected by video-recording the sessions with a digital

camera. In addition, the teachers wore a digital recorder with a microphone. No members of the research team were present in the classroom during the recording of the session. This therefore meant a total of 27 sessions, corresponding to 27 hours of recording. The authors have obtained the informed consent of those participating in the study. The consent document guaranteed that the recordings would be used solely for research purposes.

The teachers were selected because they were taking part in a formative process of self-reflection about their own practices, and they were especially interested in improving their teaching performance. All the teachers in the study took part on a voluntary basis, they were part of an ICT innovation project.

Table 1

Participants

Teacher	Years of teaching experience	Years of teaching experience in the current school	Number of pupils in the classroom	School	Number of recordedsessions	Sex
Teacher 1	25	18	26	B	4	F
Teacher 2	30	16	18	A	7	F
Teacher 3	20	4	20	A	6	F
Teacher 4	23	9	16	C	7	M
Teacher 5	12	1	18	A	3	F

Data analysis: System of categories

Three procedures have been used for the data analysis; a system for analysing the classroom practices that allows itemising everything that goes on in each class (Ramírez et al. 2019), a system of categories that permits analysing the tasks for teaching initial literacy and a system of categories that allows analysing the tasks for teaching mathematics.

The system for analysing classroom practices provides study categories describing the typical classroom activities (TCAs). The types of activity refer to sets of actions that allow managing the learning environment in the classroom, creating general patterns for the pupil's interaction with the teacher and among themselves. These patterns or types of activity are defined in table 2.

Table 2

Typical classroom activities featured in the study

Typical classroom activities	Activity description
Taking attendance/Roll call	Use of different methods to check the pupils' attendance
Task planning organisation	Organise and explain the work in the session or in part of the session
Task explanation	Explain the procedure for performing the learning tasks
Watching a movie with an ICT resource	View an audiovisual document screened through a technological resource
Performing a task with an ICT (Class work)	Perform different teaching-learning tasks using a technological resource
Performing tasks with and without related ICTs (Individual work)	Perform different tasks based on the same teaching content (lesson topic), combining technological and non-technological resources
Performing tasks with and without independent ICTs (Individual work)	Perform different tasks on a variety of teaching content (different lesson topics), combining technological and non-technological resources
Performing tasks by learning centre	Perform different teaching-learning tasks in a variety of work areas.

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Typical classroom activities	Activity description
Organising break time	Plan and structure the actions leading up to break time
Performing tasks without an ICT resource (Individual work)	Perform different teaching tasks using a non-technological resource
Date and weather	Identify the day of the week, month of the year, and weather for the current school day
Poetry recital	Repeat a poem, learn it by heart, and recite it out aloud, either individually or in a group
Organising return from break time	Plan and structure the actions that follow break time
Correcting work in class	Revise and assess the tasks performed in class by each pupil individually
Free play	Class time set aside for playing freely in the classroom
Snack time	Period of time set aside for eating the sandwich pupils bring from home
Choosing readings for home	Time set aside for choosing the readers to take home, usually for the weekend
Studying pictures	Interpreting the meaning of the pictures the teacher shows the whole class

The basic building block in the system for analysing initial literacy is the activity itself, defined as a specific action that is meaningful in itself. The system of categories encapsulates the approach to an integrating teaching of initial literacy that combines aspects from diverse theoretical trends (Rodríguez et al. 2018). Five dimensions are used to cover all the practices that may take place during the lengthy process of teaching initial literacy:

1) Functional aspects.

2) Language as a system of representation.

3) Teaching the code.

4) Writing and

5) Text comprehension.

These dimensions are in turn subdivided into a detailed series of categories and subcategories.

Again, the basic building block in the system for analysing mathematical knowledge is the task. With regard to mathematical knowledge, the categories of the system are structured on the basis of previous reviews validated by experts (Alsina, 2021; Engel et al., 2016; Chan et al., 2018; Muñoz-Catalán and Carrillo-Yáñez, 2018), in addition to the basic curriculum for the stage and the contrast with the inductive process of analysis of the records of practices. These categories are:

1) Logical reasoning.

2) Geometry.

3) Numbers and

4) Measures.

These dimensions are in turn subdivided into a detailed set of categories and subcategories.

RESULTS

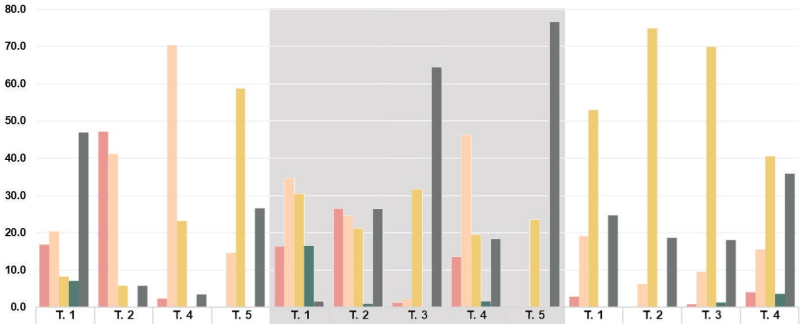
Firstly, an analysis is provided to answer the first research question, namely, what do teachers teach when they address the process of literacy and mathematics?

As regards the teaching of literacy, although there are significant differences across teachers, we may nonetheless single out certain similarities. Figure 1 shows how the existence of the dimension

teaching the code increases significantly in all the teachers through to the third year. This trend is especially apparent in Teachers 1, 2 and 4. For example, Teacher 2 goes from assigning 5.9% of her practices in the first year to 74.9% in the third year. It can also be seen for all the teachers in the third year how the two dimensions featuring the most in their practices are reading and writing, which redound to the two most "observable" aspects of literacy. Concerning writing, note should be taken of the important role that all the teachers give to this dimension, although its presence does not reflect as clear a pattern as the one for its development over the three years. On the other hand, and as a common denominator, note should be taken of the absence of text comprehension tasks (which in these years logically mean the spoken language).

Figure 1

Distribution of percentages of "Initial literacy teaching tasks" across "Years" and "Teachers".



	First year (3 years old) (%)				Second Year (4 years old) (%)					Third year (5 years old) (%)			
	T. 1	T. 2	T. 4	T. 5	T. 1	T. 2	T. 3	T. 4	T. 5	T. 1	T. 2	T. 3	T. 4
Functions of the written language	16.9	47.1	2.5	0	16.5	26.5	1.5	13.7	0	3	0	1	4,2
Language:system of representation	20,5	41,2	70,4	14.7	34.7	24.6	2.3	46.4	0	19.3	6.4	9.6	15.7
Teaching the code	8.4	5.9	23.2	58.7	30.6	21.3	31.8	19.6	23.5	53	74.9	69.9	40.6
Text Comprehension	7.2	0	0.3	0	16.5	1.1	0	1.8	0	0	0	1.4	3.7
Writing	47	5.9	3.6	26.7	1.7	26.5	64.4	18.5	76.5	24.8	18.7	18.2	35.9

As for the functions of written language, the teachers, with the exception of teacher 5, deal with it through reading and telling stories, such as stories, poems, rhymes, etc. This dimension is included in 3-4 years, with remarkable differences between teachers, with percentages of less than 5% in the third year in all cases. Similarly, at 3 years, all teachers carry out tasks to show that writing is a representational system like other more primary systems.

An analysis of each teacher's peculiarities reveals that Teacher 1 works on all the dimensions in the first and second years, whereas in the third year teaching the code and writing account for 77.8% of her practices; Teacher 2 focuses her work in the first year on the functions of the written language and other representation systems, while in the second she introduces a much greater variation in practices with similar percentages in all the dimensions except text comprehension, which is almost non-existent, and again in the third year her practices focus above all on the code and writing (93.6%); the tasks Teacher 4 undertakes during the first year focus largely on working on more primary representation systems, with readings and building sentences with pictograms, reading pictures, etc. Her practices in the second year are much more spread out, while again in the third year her practices focus mainly on the code and writing (76.5%). Both Teachers 5 and 3 focus their efforts in both years on working on the code and on writing with percentages of more than 85% in both cases and in both years.

A comparison of all the teachers (figure 2), reveals that it is in the final year when they undertake the highest number of tasks for teaching the code. The work on writing also follows a clear development from year 1 to year 3, being very incipient in the first and reaching a higher level in the third.

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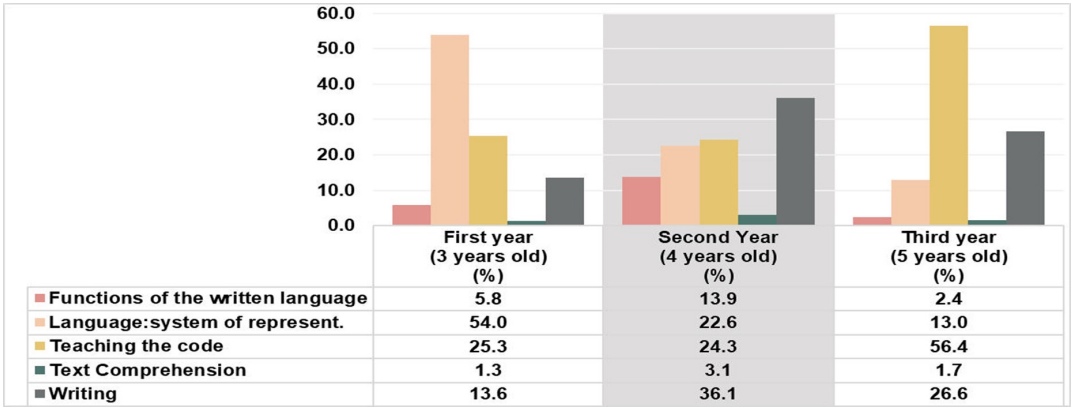
Figure 2

Distribution of percentages of "Initial Literacy Teaching Tasks" across the "Years".

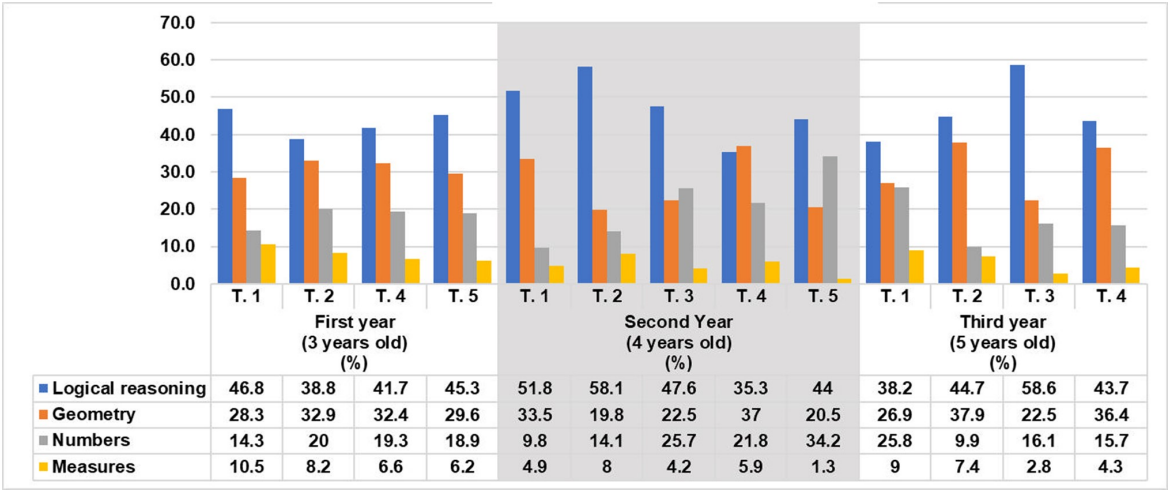


	First year (3 years old) (%)	Second Year (4 years old) (%)	Third year (5 years old) (%)
Functions of the written language	5.8	13.9	2.4
Language:system of represent.	54.0	22.6	13.0
Teaching the code	25.3	24.3	56.4
Text Comprehension	1.3	3.1	1.7
Writing	13.6	36.1	26.6

Regarding the teaching of mathematics (figure 3 and 4), there is a much closer pattern of work not only among all the teachers but also across the three years, albeit with clear differences between them. Firstly, all the teachers devote most of their efforts to developing logical reasoning over the three years, followed by working on geometry and numbers, with the teaching of units of measurement being the dimension that least appears in the practices over the three years. Secondly, there are certain peculiarities among the teachers. For example, it is interesting to note how in the second year Teacher 4 distributes her practices much more than all her colleagues. This shows that the teacher gives more or less the same importance to logical reasoning (35.3%), geometry (37.0%) and numbers (21.8%), relegating the work on units of measurement (5.9%). Meanwhile, teacher 5 shows a slight increase in his practices with numbers from 3 years to 4 years, but a decrease in 5 years, even lower than in 3 years. With respect to teachers 3 and 5, with data from only two years, they follow the pattern of teacher 5, working more on number-related content in 4 years.

Figure 3

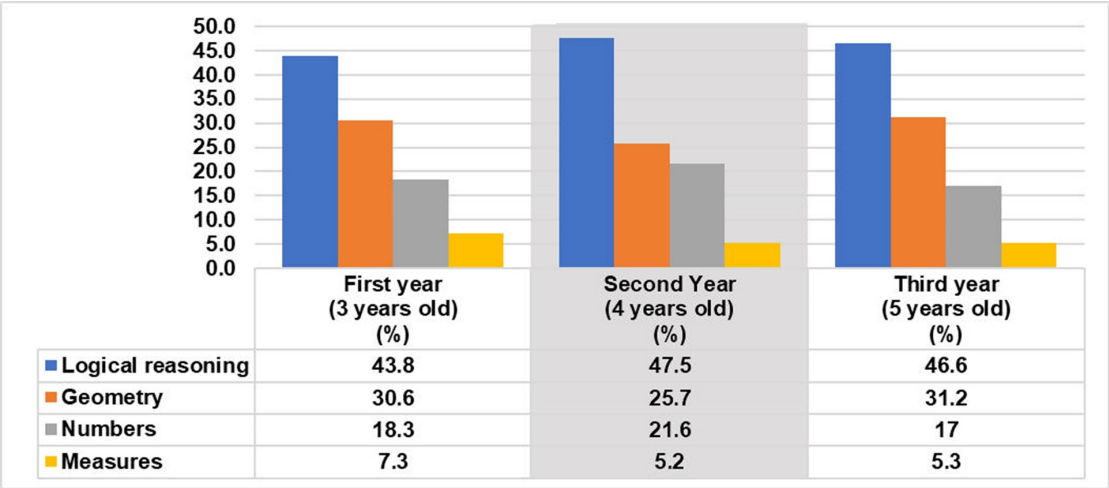
Distribution of percentages of "Tasks of teaching mathematical knowledge" in relation to "Teachers" and "Years".



	First year (3 years old) (%)				Second Year (4 years old) (%)					Third year (5 years old) (%)			
	T. 1	T. 2	T. 4	T. 5	T. 1	T. 2	T. 3	T. 4	T. 5	T. 1	T. 2	T. 3	T. 4
Logical reasoning	46.8	38.8	41.7	45.3	51.8	58.1	47.6	35.3	44	38.2	44.7	58.6	43.7
Geometry	28.3	32.9	32.4	29.6	33.5	19.8	22.5	37	20.5	26.9	37.9	22.5	36.4
Numbers	14.3	20	19.3	18.9	9.8	14.1	25.7	21.8	34.2	25.8	9.9	16.1	15.7
Measures	10.5	8.2	6.6	6.2	4.9	8	4.2	5.9	1.3	9	7.4	2.8	4.3

Figure 4

Distribution of percentages of "Tasks of teaching mathematical knowledge" across the "Years".



	First year (3 years old) (%)	Second Year (4 years old) (%)	Third year (5 years old) (%)
Logical reasoning	43.8	47.5	46.6
Geometry	30.6	25.7	31.2
Numbers	18.3	21.6	17
Measures	7.3	5.2	5.3

Secondly, in order to answer the question "What are the patterns of activity around which lessons are organised when these contents are taught", the data in figure 5 have been processed. Before starting, it is important to clarify that there are a number of tasks that have been categorised simultaneously as tasks for teaching written language and mathematical knowledge, because the two contents converge in them. For example, if the task is to follow a line of dots with a pencil to represent letters, you are 'learning to write', but you are also following trajectories, which is 'geometry'. There are also tasks that do not involve either of the two. Of the total number of typical classroom activities shown in table 2 above, those with a percentage of tasks that teach literacy and/or numeracy of more than 2% are analysed. Therefore, the patterns of activity in this work in relation to both types of content are as follows:

- Corner work.
- Performance of activities (All).
- Planning and organisation of activities.
- Correction of class work.
- Organisation of the outing to the playground.

Figure 5 shows a distribution that remains constant over the three years, with a drop in the second year in the pattern of Performing tasks by learning centres-TCA3 for the specific reason that the teachers who usually resort to this type of activity did not do so in the sessions recorded. Nonetheless, the teaching of these two contents involves patterns of an academic nature, albeit with differentiated organisational nuances. In reference to mathematical knowledge, the Typical Classroom Activities shown in figure 5 as a whole consistently and evenly accommodate the tasks detected, with all values ranging between 43.3% and 65.4%. On the other hand, in the case of reading, there is not such a constant pattern and large differences appear between the activity patterns in the same year with variations of more than 20% (e.g. Organising break time and Performing tasks (All)), but also variations of more than 20% in the same pattern (e.g. Correcting work in class in years 3, 4 and 5).

In the patterns of Performing tasks (All), Performing tasks by learning centres and Task planning organisation, the presence of literacy teaching and mathematical knowledge is always above 15%. In the case of Correcting work in class and Organising break time, there is an appreciable difference between

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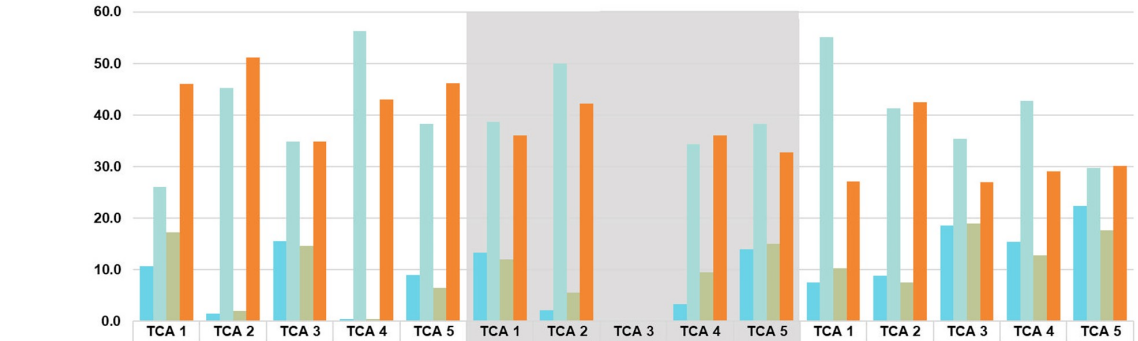
the two contents in the number of tasks across the grades, since mathematical knowledge has a higher presence than reading.

Figure 5

Percentage distribution of "Reading and writing teaching tasks", "Mathematical knowledge" and "Other tasks", across the "Years" and "Typical Classroom Activities".



	First year (3 years old) (%)					Second Year (4 years old) (%)					Third year (5 years old) (%)				
	TCA 1	TCA 2	TCA 3	TCA 4	TCA 5	TCA 1	TCA 2	TCA 3	TCA 4	TCA 5	TCA 1	TCA 2	TCA 3	TCA 4	TCA 5
Literacy	10.7	1.5	15.6	0.4	9.0	13.3	2.2	0.0	3.3	14.0	7.5	8.8	18.6	15.4	22.4
Mathematics	26.0	45.3	34.9	56.3	38.3	38.7	50.0	0.0	34.4	38.3	55.1	41.3	35.4	42.7	29.8
Literacy & Math.	17.3	2.0	14.6	0.4	6.5	12.0	5.6	0.0	9.5	15.0	10.3	7.5	19.0	12.8	17.6
Others	46.0	51.2	34.9	43.0	46.2	36.0	42.2	0.0	36.0	32.7	27.1	42.5	27.0	29.1	30.1

TCA 1: TASK PLANNING ORGANISATION
TCA 2: ORGANISING BREAK TIME
TCA 3: PERFORMING TASKS BY LEARNING CENTRES
TCA 4: CORRECTING WORK IN CLASS
TCA 5: PERFORMING TASKS (EVERYONE OF THEM)

Finally, if we analyse figure 5 thoroughly in terms of the evolution by year, we find that, in relation to the teaching of literacy in the Typical Classroom Activities Correcting work in class, Organising break time and Performing tasks (All), the tasks increase, so that their percentage is much higher in 5 years. In contrast, the tasks in Task planning organisation are almost halved in the third year (from 28% in 3 years to 16.3% in 5 years). This same analysis in the teaching of mathematical knowledge shows stable patterns, with a slight evolution in 5 years, where there is a greater presence of tasks in Task planning organisation (from 43.4% in 3 years to 65.4% in 5 years). The rest of the Typical Classroom Activities in which mathematical knowledge is worked on remains relatively stable throughout the 3, 4 and 5 years.

DISCUSSION AND CONCLUSION

As we have seen, the teachers here teach these contents within a curricular framework that seems to carry a different weight in each case. On the one hand, the data indicate that the official curriculum, coincides fairly closely with what the teachers teach in mathematics. The data have revealed a uniform treatment of the major blocks of mathematical knowledge, with the few variations being explained by the fact they involve different teachers in levels or years that are also different. These major blocks of content appear in similar proportions in the official curriculum (Bergqvist and Bergqvist, 2017): greater importance is given to logical reasoning and geometry compared to numbers and measurement. By contrast, the fit between the guidelines provided by the official curriculum and the data gathered on the teaching of literacy is much less close, not only regarding the blocks of content that are steadily addressed, but instead in the way each teacher teaches in class. These teachers, therefore, have a greater ability to reinterpret their teaching duties when addressing literacy content as opposed to content involving mathematical knowledge.

As we have discussed within the theoretical framework, a pertinent reason may be linked to the different nature of the two contents that entail specific teaching approaches (Crisan, 2017; Wood et al., 1990): In general, mathematical knowledge responds to a logical sequence that fairly often specifies the best way to teach it, showing how to organise and proceed accordingly in the work on the topic's

core content (Crisan, 2017). The case of the literacy process involves other aspects because it is an instrumental technology: mastering the language required to acquire all the other knowledge at school, including mathematics. The question of how this literacy process should be undertaken is addressed through different approaches, with some focusing more on learning the code, while others adopt a more functional view, to recap on what has already been indicated. Therefore, the issue of what needs to be worked on is not so clearly defined as in the case of mathematics, although this obviously does not mean the aim of mastering the written language is not clear.

It is important in the teaching of literacy how our teachers emphasise work on primary representational systems in first grade, such as drawing or oral language (Jones and Christensen, 2023; Rand and Morrow, 2021), increasing the tasks dedicated to the teaching of code in 5 years. This reveals a progressive sequence in literacy that moves from a gradual approach to written texts to the systematic teaching of the instrument of reading and writing by the age of 5. Bearing in mind that all the teachers work in schools where Primary Education is taught, a compulsory stage, where there is a regulated requirement in the official curriculum for pupils to master the basics of the written code in the first year, it is possible to explain by this circumstance the prominence that the teaching of the code acquires in 5 years of age.

If one accepts the above idea about the importance that these teachers, in year 5, give to the knowledge that facilitates the transition to primary school, this aspect will add to others that the data have shown to be part of the teaching culture of the Early Childhood Education teachers taking part in this study. We are referring to the grouping of the classroom work on these two subjects into major types of classroom activities designed for the performance of academic tasks. As noted in the results section, our teachers base most of their work on teaching mathematical knowledge and literacy according to activity patterns where the aim is to undertake tasks with a more formal and academic curricular purpose, although they can be managed with sundry organisational models.

The list of all the TCAs recorded that we provide in table 2 reveals patterns of a more organisational nature, others linked to routines, other more academic ones designed for a more formal development of the curriculum, and others of a more ludic nature…Yet it is precisely the more academic ones that these teachers prefer for teaching the written language and mathematical knowledge: whether they are patterns in which they plan the tasks to be undertaken, or they are patterns in which these tasks are indeed undertaken, or whether they are patterns in which they subsequently supervise the work on the tasks. In this sense, there do not appear to be any major differences in terms of the type of content, by year or by teacher. The status of mathematical knowledge and literacy for the teachers in our study is therefore on a par in the sense that they all address them in patterns of activity designed to achieve curricular goals in which the responsibility of teachers and pupils alike is clearly focused on the performance of small individual or group tasks with a clearly defined content, sharply defined resources, and an arranged teaching model.

Other types of activity that appear in table 2 that are more closely linked to the teaching of the written language, such as “Poetry recital”, “Studying pictures” and “Choosing readings for home”, have an anecdotic nature; similar to what happens with those that could be especially related to mathematical knowledge, such as “Date and weather” and “Roll call”.

In short, the study reveals clearly differentiated classroom practices among our teachers in both types of content, with teaching processes by years and teachers that are much more diverse for literacy than for mathematical knowledge. Nevertheless, both contents are largely located in the same patterns of activity. In turn, the official curriculum appears to have a greater influence on these teachers when they teach mathematical knowledge than when they address literacy.

Our findings corroborate the conclusions reached in previous studies regarding teachers’ practices that respond to a school culture linked to this cycle of education, which explains the location of the teaching tasks of the two contents in similar patterns of activity. In short, the nature of the content at this stage carries considerable weight in the formulation of classroom practices (Gericke, 2018). Also, official

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documents seem to exert more influence on teachers when they teach mathematical knowledge than when they deal with literacy.

In addition, the study has detected the wide range of activity types used in the classroom, describing the nature of the same (Ramírez et al. 2017). These types of activity largely suggest an emphasis on the learning process through discovery, exploration and play (Wood and Hedges, 2016), although they fairly accurately outline the importance that content related to teaching mathematical knowledge and literacy have at this stage. This means these contents cater for differentiated tasks according to their nature as clearly different spheres of curricular knowledge, which in turn explains the teachers' diverse approaches to their work.

This study is conditioned by two factors that restrict its possibilities for generalisation and delimit its scope. On the one hand, the complexity of teaching situations in Early Childhood Education that complicates the recording of data because of the methodological difficulty in finding accurate indicators of the performance of both teachers and pupils in the multidimensional context of the practices, and on the other, the ethnographic nature of the study conducted. These peculiarities are limitations of the study, but do not invalidate the value of this type of work on practice as underlined by several of the references included in this paper. With these aspects in mind, we plan to advance the study of the topic by including new cases that enrich the body of data.

In spite of these limitations, the work's findings might help to inform certain content in the training of teachers in Early Childhood Education. On the one hand, the aim would be to provide teachers with planning and management models for classroom tasks that are centred around activities as a curricular aspect used to design and develop the practice. On the other hand, as regards the training of teachers for this stage, the tasks generally detected in this study would provide guidelines for giving curricular meaning to the teaching of these two types of content in the classroom.

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AUTHOR´S CONTRIBUTIONS

Elena Ramírez-Orellana: Project administration; Formal Analysis; Conceptualization; Writing – original draft; Writing – review & editing; Research; Methodology; Resources; Supervision; Validation; Visualization.

Inés Rodríguez-Martín: Formal Analysis; Conceptualization; Writing – original draft; Writing – review & editing; Research; Methodology; Resources; Validation; Visualization.

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Inmaculada Martín Sánchez: Formal Analysis; Conceptualization; Data curation; Writing – review & editing; Research; Methodology; Resources; Visualization.

REFERENCES

Adler, J., & Sfard, A. (Eds.) (2017). *Research for educational change: Transforming researchers' insights into improvement in mathematics teaching and learning*. Routledge.

Alsina, Á. (2021). Revisando la educación matemática infantil: una contribución al Libro Blanco de las Matemáticas. *Edma 0-6: Educación Matemática en la Infancia, 9*(2), 1-20. https://doi.org/10.24197/edmain.2.2020.1-20

Alsina, Á., & Delgado, R. (2021). Identificando los conocimientos para enseñar matemáticas en educación infantil: un primer paso para el desarrollo profesional. *Revista Sergipana de Matemática e Educação Matemática, 6*(2), 1-23. https://doi.org/10.34179/revisem.v6i2.16003

Bejarano-Pérez, J. (2010). El currículum de la Educación Infantil. In J. Gimeno-Sacristán (Ed.), *Saberes e incertidumbres sobre el currículum* (pp. 399-420). Morata.

Bergqvist, E., & Bergqvist, T. (2017). The role of the formal written curriculum in standards-based reform. *Journal of Curriculum Studies, 49*(2), 149-168. https://doi.org/10.1080/00220272.2016.1202323

Bingham, S., & Whitebread, D. (2018). School readiness in Europe: Issues and evidence. In M. Fleer & B. Van Oers (Eds.), International handbook of early childhood education (pp. 363-391). Springer. https://doi.org/10.1007/978-94-024-0927-7_15

Castles, A., & Nation, K. (2023). Learning to read words. In M. J. Snowling, C. Hulme, & K. Nation. *The science of reading. A handbook*. Second Edition (pp. 148-164). Wiley. https://doi.org/10.1002/9781119705116.ch7

Chan, M. C. E., Clarke, D. J., Clarke, D. M., Roche, A., Cao, Y., & Peter-Koop, A. (2018). Learning from lessons: Studying the structure and construction of mathematics teacher knowledge in Australia, China and Germany. *Mathematics Education Research Journal, 30*(1), 89-102. https://doi.org/10.1007/s13394-017-0214-6

Cecil, N.L., Lozano, A.S., & Chaplin, M. (2020). *Striking a Balance: a comprehensive approach to early literacy*. Routledge. https://doi.org/10.4324/9780429442841

Crisan, C. (2017). Mathematics. In A. Sehgal Cuthbert & A. Standish (Eds.), *What should schools teach? Disciplines, subjects and the pursuit of truth* (pp. 20-37). UCL Institute of Education Press.

Dehaene, S. (2018). *El cerebro lector*. Siglo XXI Editores.

Engel, M., Claessens, A., Watts, T., & Farkas, G. (2016). Mathematics content coverage and student learning in Kindergarten. *Educational Research, 45*(5), 293-300. https://doi.org/10.3102/0013189X16656841

Ehri, L.C. (2020). The science of learning to read words: A case for systematic phonics instruction. *Reading Research Quarterly, 55*, S45-S60. https://doi.org/10.1002/rrq.334

Flick, U. (2018). *Introducción a la investigación cualitativa*. Morata.

Gericke, N., Hudson, B., Olin-Scheller, C., & Stolare, M. (2018). Powerful knowledge, transformations and the need for empirical studies across school subjects. *London Review of Education, 16*(3), 428-44. https://doi.org/10.18546/LRE.16.3.06

Hennessy, S., Ruthven, K., & Brindley, S. (2005). Teacher perspectives on integrating ICT into subject teaching: commitment, constraints, caution, and change. *Journal of Curriculum Studies, 37*(2), 155-192. https://doi.org/10.1080/0022027032000276961

Jones, M.E., & Christensen, A.E. (2023). *Constructing strong foundations of early literacy*. Routledge. https://doi.org/10.4324/9780429284021

López-Dalmau, M., & Alsina, Á. (2015). La influencia del método de enseñanza en la adquisición de conocimientos matemáticos en Educación Infantil. *Edma 0-6: Educación Matemática en la Infancia, 4*(1), 1-10. https://doi.org/10.24197/edmain.1.2015.1-10

Marshall, C., Rossman, G.B., & Blanco, G.L. (2022). *Designing Qualitative Research*. SAGE.

Morrow, L. M., Dougherty, S. M., & Tracey, D. H. (2019). Best practices in early literacy: Preschool, Kindergarten, and First Grade. In L. M. Morrow, & L. B. Gambrell (Eds.), *Best Practices in Literacy Instruction* (pp. 75-103). The Gildford Press.

Muñoz-Catalán, M. C., & Carrillo-Yáñez, J. (Eds.) (2018). *Didáctica de las matemáticas para maestros de Educación Infantil*. Paraninfo.

Petersen, D. B., Gragg, S. L., & Spencer, T. D. (2018). Predicting reading problems 6 years into the future: Dynamic assessment reduces bias and increases classification accuracy. *Language, Speech, and Hearing Services in Schools, 49*(4), 875-888. https://doi.org/10.1044/2018_LSHSS-DYSLC-18-0021

Piasta, S. B., Logan, J. A., Farley, K. S., Strang, T. M., & Justice, L. M. (2021). Profiles and predictors of children's growth in alphabet knowledge. *Journal of Education for Students Placed at Risk (JESPAR), 27*(1), 1-26. https://doi.org/10.1080/10824669.2021.1871617

Ramírez, E., Clemente, M., Recamán, A., Martín-Domínguez, J., & Rodríguez, I. (2017). Planning and doing in professional teaching practice. A study with early childhood education teachers working with ICT (3–6 years). *Early Childhood Education Journal*, 45, 713-725. https://doi.org/10.1007/s10643-016-0806-x

Ramírez, E., Rodríguez-Martín, I, Martín-Domínguez, J., Clemente, M., & Martín-Sánchez, I. (2019). Building upon research experience: More than a decade investigating teaching Practices. En B. Vogler (ed.). *Teaching practices: Implementation, challenges and outcomes* (pp. 1-43). Nova Science Publishers.

Rand, M. K., & Morrow, L. M. (2021). The contribution of play experiences in early literacy: Expanding the science of reading. *Reading Research Quarterly*, 56, S239-S248. https://doi.org/10.1002/rrq.383

Rodríguez, I., Clemente, M., Ramírez, E., & Martín-Domínguez, J. (2018). How and for how long is literacy taught in Early Childhood Education? A multiple-case study of the classroom practices of seven teachers. *European Early Childhood Education Research Journal, 26*(5), 738-759, https://doi.org/10.1080/1350293X.2018.1522759

Smagorinsky, P., Guay, M., Ellison, T. L., & Willis, A. I. (2020). A sociocultural perspective on readers, reading, reading instruction and assessment, reading policy and reading research. In E. B. Moje, P. P. Afflerbach, P. Enciso & N. K. Lesaux (Eds.), *Handbook of reading research* (Vol. 5, pp. 57-75). Routledge. https://doi.org/10.4324/9781315676302

Stodolsky, S.S., & Grossman, P. L. (1995). The impact of subject matter on curricular activity: An analysis of five academic subjects. *American Educational Research Journal, 32*(2), 227-249. https://doi.org/10.3102/00028312032002227

Vanluydt, E., Supply, A. S., Verschaffel, L., & Van-Dooren, W. (2021). The importance of specific mathematical language for early proportional reasoning. *Early Childhood Research Quarterly*, 55, 193-200. https://doi.org/10.1016/j.ecresq.2020.12.003

Vollmer, H. J. (2021). Powerful educational knowledge through subject didactics and general subject didactics. Recent developments in German-speaking countries, *Journal of Curriculum Studies, 53*(2), 229-246. https://doi.org/10.1080/00220272.2021.1887363

Watts, T. W., Duncan, G. J., Siegler, R. S., & Davis-Kean, P. E. (2014). What's past is prologue: Relations between early mathematics knowledge and high school achievement. *Educational Researcher, 43*(7), 352-360. https://doi.org/10.3102/0013189X14553660

Wood, E., & Hedges, H. (2016). Curriculum in early childhood education: critical questions about content, coherence, and control. *The Curriculum Journal, 27*(3), 387-405. https://doi.org/10.1080/09585176.2015.1129981

Wood, T., Cobb, P., & Yackel, E. (1990). The contextual nature of teaching: Mathematics and reading instruction in one second-grade classroom. *Elementary School Journal, 90*(5), 497-513. http://www.jstor.org/stable/1001799