



EARLY Survey
Descriptive Analysis for Portugal.
November 2022

Introduction and Background

The remote emergency teaching context has reinforced the need to mobilise the use of digital resources in the pre-school education context, not only in communication processes and planning activities with and for children, but also in the active use of digital technologies. Different challenges were posed to directors and staff in ECE, parents/carers, professionals in education, future education professionals and children (Timmons et al., 2021). These challenges divided the attention of society, which at an early stage focused mainly on ensuring safety and maintaining hygiene care that minimised the risk of contagion. Over time, education professionals and families realised that they also needed to ensure the development of children's skills and learning. This situation highlighted the difficulties of some families and carers in supporting the children, and there was a need for close liaison between professionals and families/carers to assist in the process of carrying out the proposed activities (synchronous or asynchronous) in the family context, with particular attention to the younger children.

The need for investment in ECEC, despite having been previously recognised by several international entities (e.g., OECD, UNESCO), becomes more relevant in order to minimise the impact of lockdown on children's health, well-being and cognitive and educational development. Especially with younger children there is a greater dependence on the availability, motivations and skills of parents/carers and the use of technologies in an effective way.

However, during the period of confinement recommendations were made for working at a distance from home and it was recommended to some educators to make suggestions for platforms to be used, the type of work that could be done and the frequency of contact with the children. There were different situations in the practices of the professionals, but with an effort to maintain a contact with the children and also for the families to respond to the requests of the educational professionals (Mesquita et al., 2020).

Some studies, point out that kindergarten teachers themselves who had to find solutions, but the lack/insufficiency of a national strategy or guidance meant that many children were left out because of

their age or because of their families' socio-economic circumstances (e.g., lack of digital equipment) (Bers, et al, 2022). The ECEC sector has been insufficiently supported and included in COVID-19 policy responses and measures, especially compared to other education sectors (European Commission, 2021,a).

Information about lockdown in Portugal

Like many other countries, Portugal has been subject to several general containments and health sieges in specific regions (e.g., Melgaço; Ovar) due to the spread of the COVID-19 pandemic virus. Between March and May 2020, a large part of the Portuguese population was confined (except for emergency or essential services). During this period, the ECE institutions were closed, and emergency distance learning was activated, which sought to overcome the limitations and constraints to the educational process and the development of distance learning using technologies and articulation between education professionals and parents (OECD, 2021; UNICEF, 2020). Several national and international studies have observed negative impacts on the development of students' skills (e.g., school, social, emotional) (Zaccoletti, et al., 2020). However, the Portuguese government has developed resources to support educational professionals and families (e.g., the platform "Estudo em casa"). Also, it sought to make technological resources available to families. As mentioned by Alves, Figueiredo and Matos (2022), communication between families and educational teams was appreciated for the reflection of sustained practices, even if mediated by technologies. It presented recommendations for the reintegration of children into preschool after confinement(s), and specific initiatives for early childhood care have been reduced. The technologies have become an active and necessary part of children's and adults' lives to enable them to interact, learn and work. Although international recommendations for quality practices had already been recommending contact with technologies from an early age, the experience of distance learning has accelerated the process of using these resources. Families, education professionals, future educators, and children, even those who were not previously prepared for these experiences, have been forced almost immediately to interact with these resources and to think of pedagogical and didactic ways of integrating technologies in a way that is appropriate to the characteristics and needs of the contexts, children and those involved in the process of promoting the integral development of the child (European Commission, 2021b). In this sense, communication and sharing of good practices have been recognised as appropriate strategies to promote quality in early childhood education after the pandemic (Van Laere et al., 2021).

Information about computational thinking and robotics in ECE in your country

According to several authors, computational thinking can be defined in different ways, for example, allowing for adjustments, refining experiences with new possibilities (Resnick & Rosenbaum, 2013) or thinking about thinking (Papert, 1985).

Since the 2015/2016 school year, the interest in integrating programming into Portuguese formal education has intensified, especially in the 1st cycle of basic education, with the implementation of the "Programa de Iniciação à Robótica." developed by the Direção Geral de Educação. This programme aimed to interconnect scientific and practical knowledge, pose challenges and problems that stimulate creativity and logical reasoning, promote the use of multiple applications and languages (e.g., visual language) and develop values, attitudes and resilience strategies, based on project methodology and problem solving and the use of active learning methodologies.

Although there are references in Portugal for the use of programming, since 1997, as the use of a symbolic language for other areas, such as arts or writing (Figueredo et al., 2021), the number of investigations involving young children with programming, robotics or computational thinking in Portugal remains small. Even though Papert (1995) has defended that "(...) the child, even at pre-school age, is in control - the child programs the computer. And by teaching the computer to 'think', the child embarks on an exploration into the way it thinks itself." (p.35). Also, other authors advocate the importance of exploring computational thinking and robotics in order to stimulate in children the ability to know themselves and the relationship between body movement in space or even the skills and actions needed for movements in space - other children, objects (Miranda-Pinto, 2016; Resnick, 2017).

In Portugal, two projects were carried out within the scope of computational thinking, programming and robotics, which included their exploration in kindergarten (e. g., <https://www.kidsmedialab.pt/equipa/> and <https://www.nonio.uminho.pt/kml2>). Over six years, different ways of using robots (e.g., SuperDoc Robot, Klbo), programming (e.g., Scratch Junior) and computational thinking activities related to everyday actions (e.g., brushing teeth, picking up an object, etc.) were explored with children and educators. It was possible to carry out these activities with young children and with the help of the educational professionals, who explored different resources and activities that aimed to develop learning (e.g., spatial orientation games, story building, science investigations, exploring geometric figures and/or the association between vocabulary). An atmosphere of sharing and mutual help between the various professionals involved was evident. The children showed interest in exploring the activities, and in some cases, they asked their parents to buy a robot for their personal use (Miranda-Pinto et al., 2022).

In parallel, Portuguese primary educators and teachers needed to receive training in the use of programming and robotics in these contexts was recognised. Thus, under the KML II Project - Laboratory of programming and robotics technologies and learning for preschool and primary education, some education professionals had access (year 2018) to 50h of training actions, 25 of which were face-to-face and predominantly asynchronous on computational thinking, programming and robotics (Amante et al., 2019).

Also, the ALGO-LITTLE project (Algorithmic Thinking Skills through Play-Based Learning for Future's Code Literates) has developed ways to integrate Algorithmic Thinking skills into pre-school education to prepare future code literates from an early age (Figueiredo et al, 2021).

Thus, over the last few years there has been a growing increase in initiatives addressing programming, robotics and computational thinking in Portugal, but also at OECD level (Bers, et al, 2022). The same authors recommend the need to increase the training of ECEC professionals in this area and to provide time and resources for children to be producers of content (Bers, et al, 2022). Internationally studies revealed that kindergarten teachers felt they needed training, resources and technical support, curriculum adjustments and parental support to use educational robotics appropriately (Uğur-Erdoğmuş, 2021).

Information about the survey

In this working paper, we present the descriptive analysis of the survey sent out by email from members of the Portuguese project team to potential participants. It was an on-line survey designed by the EARLY team and translated into Portuguese language (Portuguese questionnaire link: <https://forms.gle/FrqEP56AoyJSFgFi9>).

This survey aims to receive feedback from schools, teachers, and families on strategies and challenges to support the development of an online education methodology for children aged 3 to 7 years old based on their experiences during the periods of confinement that occurred in Portugal, on account of the SARS-COV-19 pandemic period. The survey comprises three sections and will take approximately 15 minutes to complete.

The addressees of this questionnaire were family members or carer of a child or children 0-7 years old (e.g., father, mother, aunt, grandfather, etc.), teaching staff, support staff, board or Initial teacher education student.

The 57 answers were collected between 6th May and 5th November 2022 through an online questionnaire survey distributed by email to potential participants (e.g., participants in previous projects in the field of education, partner entities in internships, higher education students, and educational professionals form communities of practice - e.g., Kids Media Lab 2) The majority of participants are parent / family member / carer of a child or children 0-7 years old and the female gender. The participants were all Portuguese. (Table 1)

Table 1.
Participants Profile

	Variable	ni	fi(%)
Role	Parent / family member / carer of a child or children 0-7 years old	24	42,1%
	Teaching staff of children 0-7 years old	22	38,6%
	Support staff of children 0-7 years old	2	3,5%
	Board or administration of centers for children 0-7 years old	3	5,3%
	Initial teacher education student	6	10,5%
Country	Portugal	57	100%
Gender	Male	53	93%
	Female	4	7%

As shown in table 1, there was greater participation of parent / family member / carer of a child or children than of teaching staff, which contradicts the tendency of greater involvement of teaching staff to participate in this type of study (e.g., Kit@ projet, Kids Media Lab 2).

A possible more frequent articulation and understanding of the roles attributed to each of these elements in the educational community is one of the factors that may have led to these results, resulting from the need for articulation and mutual support during the period of remote emergency teaching experienced during the periods of confinement between 2020 and 2022.

However, the results follow the international entities' guidelines (e.g., OECD, UN, UNICEF) about the importance of more significant and more active involvement and participation of parents in the activities developed in the ECE context. Thus, it seeks to promote the development of well-being, learning, and the improvement of the quality of education, which values the interactions and relationships established by the educational community.

Table 2.

Parents/families/carer Profile

Variable		ni	fi (%)
Number of children	1	19	79,20%
	2	5	20,80%
Year/s of birth of children	2013	0	0%
	2014	4	13,80%
	2015	8	27,60%
	2016	2	6,90%
	2017	6	20,70%
	2018	5	17,24%
	2019	2	6,90%
	2020	2	6,90%
	2021	0	0%

As shown in table 2, most participating parents/families/carers have one or two children under their care (with a lower frequency of affirmative answers). This year/s of birth were children(s) born between 2014 and 2020, with 2015 and 2017 having the highest absolute frequency.

Table 3.

Staff and Board Profile

Variable		ni	fi (%)
age group	0-3	3	11,11%
	3-6	21	77,78%
	both	3	11,11%

As shown in table 3, most of the staff and board work with 3 - 6 years old age groups of children. As expected, all participants with a Board or administration of centers for children profile indicated working with both age groups (0-6 years old).

Table 4.
Initial Teacher Education Students Profile

Variable		ni	fi (%)
practicum experience	none	0	0%
	0-3 yo children	0	0%
	3-6 yo children	2	33,33%
	0-6 yo children	3	50%
	other ages	1	16,67%

As shown in table 4, the age range with which the Initial Teacher Education students participating in this study (n=6) worked most were, respectively, and in descending order, from 0 to 6 years old and from 3 to 6 years old. In the nursery context, children's age is where the Initial Teacher Education students have the least experience.

1. Remote learning during COVID-19 pandemic

According to table 5, Portuguese participants generally experienced at least one lockdown experience, which took place between march and may 2020. One of the participants reported not having had this experience, which presupposes that he has been assuming the minimum emergency services (e.g., area of health, maintenance of operations for workers at the service of combating the pandemic). There is also a percentage of participants who have experienced at least two lockdowns, possibly due to contracting the virus themselves or close contacts, regional sieges, prohibitions on leaving residential areas in festive seasons, and/or accounting for the extended school vacation period between january and february 2021.

Table 5.
Lockdown experiences in the country in 2020-21

	ni	fi (%)
There was no general lock-down	1	1,75%
There was one general lock-down	31	56,14%
There were two or more different periods of general lock-down	24	42,11%
There were only regional lock-downs	0	0%

More details on the duration of longest stay at home for the children in 2020-21 are shown in table 6.

Table 6*Duration of longest stay at home for the children in 2020-21*

	ni	fi (%)
There wasn't any long stay at home	1	1,75%
Around two weeks	1	1,75%
Around one month	5	8,77%
Around one to two months	18	31,60%
More than two months	32	56,13%

As shown in Table 7, the National Strategy for Distance Learning in Early Childhood Education in 2020-21, according to the perspectives of most parents/ carers, is that there was general guidance for distance learning in ECE. However, many parents/ carers perceived that we had distance learning, but no national strategy for ECE, or they did not know (n=14, respectively). These data reveal a lack of an accurate unanimous perception of the national strategy adopted at the time.

Table 7*National strategy for remote learning in Early Childhood Education in 2020-21*

	ni	fi (%)
There was no need for remote learning	1	1,75%
We had remote learning but no national strategy for ECE	14	24,56%
There was general guidance for remote learning in ECE	17	29,82%
There was a national strategy with specific orientations for remote learning in ECE	11	19,31%
I don't know	14	24,56%

From the participants' perspectives in this study, as shown in table 8, contact between teachers and children during lockdowns generally occurred most often directly with the children, but mostly in groups. However, the responses were diverse, suggesting different options for the Early Childhood Education teachers in their interaction with the children. These results may be due to different individual profiles and skills of teachers and children (e.g., technological knowledge, perceptions on how to support parents/ carers to help implement strategies, available resources, and availability of families/ carers, among others).

Table 8*Contact between teachers and children during lockdowns*

	ni	fi (%)
Early Childhood Education teachers kept in communication with families/carers but not with the children directly	12	21,4%
Early Childhood Education teachers had contact with the children directly but mostly in group	22	39,3%
Early Childhood Education teachers had contact with the children directly both in group and more individually	16	28,6%
I don't have the information to answer this question	1	1,806%
Other answers	5	8,77%

As shown in table 9, the platforms most reported for supporting communication between ECE and families/caregivers was WhatsApp and e-mail. The less frequent platforms used were classroom screen, ClassDojo, and Messenger.

Table 9

Platforms reported for supporting communication between ECE and families/carers

	ni	fi (%)
Classroomscreen	1	0,7%
Facebook	11	7,9%
Whatsapp	22	15,8%
E-mail	22	15,8%
Google Classrom	16	11,5%
Google Meet	6	4,3%
Zoom	21	15,1%
Youtube	2	1,4%
Padlet	3	2,2%
Kahoot!	2	1,4%
ClassDojo	1	0,7%
Moodle	3	2,2%
Messenger	1	0,7%
Microsoft TEAMS	19	13,7%
I have no information to answer this question	5	3,6%
No application	2	1,4%
Skype	2	1,4%

As shown in table 10, most participants identified the frequency of ECE teachers' suggestions for activities to develop at home as more than once a week there were suggestions (n=24) or once a week there were suggestions (n=21). However, the results presented indicate different perceptions of the strategies adopted by ECE teachers.

Table 10

Frequency of suggestions by ECE teachers of activities to be developed at home

	ni	fi (%)
Once per month there were suggestions	5	8,8%
Once per week there were suggestions	21	36,8%
More than once per week there were suggestions	24	42,1%
There were daily suggestions	0	0%
I don't know	3	5,3%
Other - please specify	4	7%

As shown in table 11, the families/carers' lack of time due to remote work, the lack of resources available at home to develop the activities and the fact that families/carers have no experience in using digital educational platforms were identified as relevant difficulties in the implementation of activities by families/carers.

Table 11

Difficulties that impacted the experience for children regarding activities sent by teachers to be developed by families/carers

	was not relevant / didn't have an impact		was somewhat relevant / had some impact		was relevant / had an impact		was very relevant / had a great impact		I don't have information to answer this question	
	ni	fi%	ni	fi%	ni	fi%	ni	fi%	ni	fi%
Lack of time from families/carers due to remote work	3	5,3	11	19,3	25	43,9	16	28,1	2	3,5
Lack of resources available at home for developing the activities	10	17,9	16	28,6	22	39,3	6	10,7	2	3,6
Activities that were suggested were too structured or too formal for young children	23	41,1	17	30,4	8	14,3	8	14,3	6	10,7
Families/carers were insecure about knowledge about the topics of the activities	18	32,1	13	23,2	16	28,6	3	5,4	6	10,7
Families/carers were insecure about how to engage children in activities	18	32,1	13	23,2	14	25	5	8,9	6	10,7
Families/carers had no experience in using digital educational platforms	14	25	14	25	15	26,8	7	12,5	6	10,7
There were too many suggestions being presented to families/carers	24	42,9	17	30,4	6	10,7	1	1,8	8	14,3
The activities were not aligned with children's interests	26	46,4	10	17,9	8	14,3	2	3,6	10	17,9
The learning to be developed with the activities was not evident	18	32,1	16	28,6	9	16,1	3	5,4	10	17,9
The activities were not challenging for the children	20	35,7	15	26,8	7	12,5	5	8,9	9	16,1

As shown in table 12, the frequency of synchronous times with children involving shared activities is higher than once a week (32%) or once a week (20%). However, a significant proportion of the participants needed to be aware of whether synchronous times with these characteristics occurred (18%) or stated that there were no synchronous times during the lockdown.

Table 12

Frequency of synchronous times with children that involved shared activities

	ni	fi (%)
Once per month there were synchronous moments	5	9
Once per week there were synchronous moments	11	20
More than once per week there were synchronous moments	18	32
There were daily synchronous moments	6	11
I don't know	10	18
There were no synchronic moments.	6	11

As shown in table 13, during synchronous moments and activity sharing, the families' difficulties in having time were considered very relevant, as well as the lack of experience in using digital platforms and the fact that synchronous interaction did not focus on one-to-one interaction. Given the above, the data suggest that these moments of synchronous interaction should be developed in groups, possibly to stimulate communication and interaction with children. These data follow the line of international

recommendations that highlighted the importance of maintaining children with their peers to combat social isolation and stimulate the development of social, emotional, cognitive and learning skills.

Table 13

Difficulties that impacted the experience for children regarding synchronous times that involved shared activities

	was not relevant / didn't have an impact		was somewhat relevant / had some impact		was relevant / had an impact		was very relevant / had a great impact		I don't have information to answer this question	
	ni	fi%	ni	fi%	ni	fi%	ni	fi%	ni	fi%
Lack of time from families/carers due to remote work to be present during the synchronous moments	5	9	9	16	16	29	17	30	9	16
Families/carers lacked the technology to participate in synchronous moments	17	30	12	21	13	23	4	7	10	18
Families/carers had no experience in using digital educational platforms	14	25	14	25	15	27	5	9	8	14
Children were not used to interacting through technology (e.g., videoconferencing)	13	23	17	30	12	21	8	14	6	11
The synchronous moments were too long	17	30	16	29	9	16	5	9	9	16
The synchronous moments were not focused on interacting with children one-on-one	15	27	10	18	17	30	6	11	8	14
The activities during the synchronous moments were not engaging for the children	15	27	22	39	1	9	2	4	12	21
Children were shy during the interactions	13	23	16	29	14	25	4	7	9	16

2. Learning from the remote experience

Looking ahead, the results that follow can provide good insights into future initiatives.

As shown in table 14, most participants say they did not report on resources for ECE created during the closure (n=23). But some participants identified the creation of interactive websites for storytelling (n=12), websites with interactive games (n=10), or websites or ebooks with suggested activities for families/carers to do at home with children (n=10), with only a part of the resources identified as Ebooks on COVID-19 and related topics (n=2).

Table 14

Resources for ECE created during the lockdown

	ni	fi (%)
Websites with interactive games	10	17,5
Ebooks about COVID-19 and related topics	2	3,5
Websites or ebooks with activities suggested for families/carers to do at home with children	10	17,5
Creation of interactive websites for storytelling	12	21,1
I have no information to answer this question.	23	40,4

As Table 15 shows, a higher frequency of answers indicates that participants are unaware of possible arrangements for isolated children (n=10) or claim not to have the information to answer this question (n=14). The most current provision for children in isolation identified by participants are synchronised moments are arranged between the teacher and the stay at home child/ren (n=11) or synchronised moments are arranged between the group of children, with the teacher, and the stay at home child/ren (n=8), when measures participants perceptions applied to these situations.

Table 15
Current provision for children in isolation

	ni	fi (%)
There is no provision	10	18
Teacher stay in contact with families/carers	7	12
Teacher send activities to be developed at home	4	7
Synchronous moments are arranged between the teacher and the stay at home child/ren	11	19
Synchronous moments are arranged between the group of children, with the teacher, and the stay at home child/ren	8	14
There are national resources (websites, ebooks, etc) for families to explore with children during isolation	3	5
I don't have the information to answer this question.	14	25

The content analysis of the question: *What do you think was learned from the experience about children and their learning?* allowed us to identify and describe the main learning experiences perceived and recognized by the participants regarding the experience about children and their learning.

It was possible to perform a content analysis to 94.7% of the responses obtained. This analysis observed a distribution of the participants' answers by three categories: Appreciation, Constraints and Future Recommendations, as shown in Table 16. The appreciation category refers to the aspects learned that were considered relevant by the participants during remote learning. Constraints refers to aspects learned regarding the barriers observed. Future recommendation refers to general indications about important aspects to be considered for the future.

An Appreciation category is divided into seven sub-categories: Social interaction; Potential of the use of technology; Family-school relationship; Children's adaptive skills; Contact with new methods; View of the school's work and Family-child relationship. A Constraints category is divided into Limitations of distance education; Lack of contacts of education professionals; Pedagogical knowledge of families; Technological resources of families; Technological knowledge and Type of technology resources used. Future recommendations is divided into four categories: Contact with alternative methods; Increased digital readiness; Increased presence and children's needs and interests.

Table 16

Brief summary of the content analysis - What do you think was learned from the experience about children and their learning?

Category	Sub-category	Example	Frequency
Appreciation	Social interaction	We value the importance of social interaction (P14) (...) That children would like to interact with their peers, even at a distance (...) (P30)	17 references
Appreciation	Potential of the use of technology	I learned a lot, especially in the field of technologies and online motivation with the children. (P50) That the children were not used to it, but quickly adapted and interacted, through the virtual (P57)	7 references
Appreciation	Family-school relationship	On the other hand, I can also state that it has strengthened the family-school relationship, which once again demonstrated that this relationship is crucial and that the activities and the educational practice should always be concerned with the well-being of the child, as well as its characteristics and potentialities (P7)	6 references
Appreciation	Children's adaptive skills	Their [children's] capacity for persistence (P1) (...) children easily adapt to change (P26).	3 references
Appreciation	Contact with new methods	The children became aware of other working methods, as well as other ways of interaction. (P12)	2 references
Appreciation	View of the school's work	That the work being done in schools is very, very important (P16)	1 reference
Appreciation	Family-child relationship	This experience allowed the carers to focus on their children and be more present during the activities, allowing them to participate as well. (P22)	1 reference
Constraints	Limitations of distance education	Children learn in interaction; their involvement decreases in synchronous sessions because they cannot intervene when they want to (P42)	4 references
Constraints	Lack of contacts of education professionals	That parents are the greatest educators in disaster situations, when they can be with their children because in my specific case, there was no contact with the school in any way (P23)	3 references
Constraints	Pedagogical knowledge of	(...) their [family] tools/knowledge are not pedagogical, so when	2 references

Category	Sub-category	Example	Frequency
	families	carrying out the activities the caregivers were limited to just helping to perform the task (P22)	
Constraints	Technological resources of families	That technologies are very insufficient and not everyone has the same conditions and means (P34)	2 references
Constraints	Technological knowledge	That they need more experience in digital to feel confident (P44)	1 reference
Constraints	Type of technology resources used	The use of videoconferencing is unnecessary for pre-school children. It doesn't work (...) (P47)	1 reference
Future recommendations	Contact with alternative methods	That it is necessary to find alternatives to teaching methods that respond to situations of isolation such as Covid. (P18) (...)	1 reference
Future recommendations	Increased digital readiness	That they need more experience in digital to feel confident (P44)	1 reference
Future recommendations	Increased presence	That we need to be more present in the growth of children (P54)	1 reference
Future recommendations	Children's needs and interests	Children's interests and needs should be considered throughout the teaching and learning process (P4)	1 reference

Thus, the descriptive results are briefly presented below:

The participants highlighted positive attitudes with this experience (e.g., adaptability and persistence, particularly of the children). There were also indications, in general, of a greater mutual appreciation of the various elements of the educational community. Concerning the teaching modality for children in this age group, face-to-face teaching, as preferential, was mentioned compared to distance learning, with valued face-to-face interaction and physical contact roles. However, they highlighted as positive the support that adults tried to provide in remote teaching and the knowledge of new methods and forms of interaction.

The participants highlighted the relational aspects between educational professionals, families, and children. They reported, in general, a greater closeness (with a strengthening of the relationships) and a common interest in the child's well-being and the promotion of its development. Some participants reported having experienced distancing from the educators during this period.

Families try to respond to the needs and requests of educational professionals, even if they have only sometimes been able to implement them in the ways expected by the professionals, but given the lack of pedagogical and didactic knowledge. However, professionals generally recognized the effort made by families to help educators and children. There is a general idea of reinforcement of a greater closeness of the family to the educational context during the COVID period.

In pedagogical terms, they consider the diversity of learning experiences with children in this age group as favourable and demanding. In some cases, they assume that remote distance teaching was a conditioner of adequate learning development (less significant or motivating).

In future terms, they referred to the importance of the interventions between members of the educational community, especially in the learning relationship between children and the relationship between education professionals and families. They drew more knowledge of pedagogical modalities, tools, and methodologies. Also recognized a greater appreciation of educators' role and developed activities in this context by the families. Finally, participants realized the need for more excellent knowledge and alternative children teaching methods for future isolation situations (e.g., a new wave of COVID, permanence in hospital, etc.).

As shown in table 17, most participants recognise that remote learning experiences can be useful in the specific situations presented, such as health-related problems (e.g. long stay in a hospital or the presence of chronic diseases), geographical accessibility issues (e.g. living in remote areas) or ensuring equal opportunities (e.g. supporting children with special needs).

Table 17

Situations for which the experience gained with remote teaching in Early Childhood Education could be useful

	was relevant / not didn't have an impact		was somewhat relevant / had some impact		was relevant / had an impact		was very relevant / had a great impact		I don't have information to answer this question	
	ni	fi%	ni	fi%	ni	fi%	ni	fi%	ni	fi%
Children who have a long stay in a hospital	3	5	6	11	13	23	30	53	5	9
Children who live in remote areas	4	7	9	16	16	28	25	44	3	5
Children whose families/carers travel frequently	5	9	9	16	17	30	20	35	6	11
Children with chronic health problems	3	5	5	9	16	28	27	47	6	11
Children with special needs	9	16	7	12	19	33	19	33	3	5

3. Views on distance learning for professional/personal development

As shown in table 18, most of the participants indicated having distance learning experiences, with almost half having had between two and five experiences in this context.

Table 18

Experience with distance learning in the past 3 years

	ni	fi%
I haven't had the experience.	8	14
Just once	4	7
Two to five times	28	49
More than five	17	30

As shown in table 19, there is a perspective of high relevance about distance learning, both in terms of improvement of professional skills and in terms of benefit for learning. Participants had positive feelings about distance learning (e.g., comfort or enthusiasm).

Table 19
Perspectives about distance learning

	was relevant / not didn't have an impact		was somewhat relevant / had some impact		was relevant / had an impact		was very relevant / had a great impact		I don't have information to answer this question	
	ni	fi%	ni	fi%	ni	fi%	ni	fi%	ni	fi%
I feel comfortable participating in distance training.	3	5	7	12	15	26	32	58	0	0
I believe I can learn through distance education.	2	4	9	16	17	30	29	49	1	2
I am enthusiastic about participating in distance education as part of my professional development.	4	7	7	12	20	35	24	42	2	4
I think that it is helpful to have professional development as distance education.	2	4	9	16	18	32	27	47	1	2

Requirements for a positive distance learning experience

The content analysis of the question: What do you think it would take to make distance education for your own learning a positive experience?, allowed to identify and describe the participants' perceptions of requirements for a positive distance learning experience.

It was possible to perform a 96.5% content analysis and five categories were found: Contents, Action/Training, Valorization, Anticipation and Conditionalities. Contents refers to aspects related to what should be addressed/considered during distance learning. refers to aspects to be considered during training moments; Valorization includes aspects considered relevant by the participants; Anticipation refers to what should be considered and thought about before distance learning; and conditionalities refers to aspects that may influence the development of distance learning activities.

A Content category comprises four subcategories: Interesting and attractive; Different and innovative challenges; Practical examples and Adjusted to curriculum guidelines. An Action/Training category comprises three subcategories: Content - applications/platforms for working with children; Diversified audience and Mixed format. A Valuing category includes Interaction between participants; Commitment of community members; Accessibility anywhere; Close contact between families and schools; Visual contact and Experience of distance learning. An Anticipation category encompasses five sub-categories: Contact time in distance learning; Contingency planning; Adaptability of interactions according to contexts; Individualisation and Sharing experiences from different contexts. A Conditionalities category included three sub-categories: Technological resources: Schools; Technological resources: Trainees' predisposition, as visible in Table 20.

Table 20

Brief summary of the content analysis - What do you think it would take to make distance education for your own learning a positive experience?

Category	Sub-category	Example	Frequency
Contents	Interesting and attractive	Invest in good content (P50)	5 references
Contents	Different and innovative challenges	Challenge me to situations different from those we live in a school context (P2)	4 references
Contents	Practical examples	More case studies and activities on the theme to be developed (P56)	1 reference
Contents	Adjusted to the Curricular Guidelines	More age-appropriate programmes encompassing the areas of the curriculum guidelines (P26)	1 reference
Action/Training	Contents - Applications/platforms for working with children	An advanced training considering different applications to work with children, besides the known ones (P9)	3 references
Action/Training	Diversified audience	(...) to provide caregivers with the minimum knowledge (through short courses provided by Early Childhood professionals) to accompany their child (P22) more training on the subject (P38)	3 references
Action/Training	Mixed format	I believe in the mixed system in teacher training: Learning distance + presential (P50)	2 references
Valorisation	Interaction between participants	Choose to interact more, i.e. get participants to interact with each other more. Create an environment for collective discussion (P7).	5 references
Valorisation	Community members commitment	Educating parents and guardians to value the commitment and effort of teachers (P5)	3 references
Valorisation	Accessibility anywhere	I think distance learning is useful because anyone can learn, whether they are in Portugal or in another country. (P11)	3 references
Valorisation	Close contact between families and schools	(...) keeping (the Early Childhood professionals) a close contact, not being exacerbated, to support the learners (P22).	2 references

Category	Sub-category	Example	Frequency
Valorisation	Visual contact	(...) cameras always stay on (P7)	1 reference
Valorisation	Experimentation of Distance learning	To be implemented and used [distance learning] (P35)	1 reference
Anticipation	Contact time in distance learning	Adjusted schedules, without too much time in front of the screen (P 29)	5 references
Anticipation	Contingency planning	To always have contingency plans that can be used in situations like the ones you have gone through (P23)	1 reference
Anticipation	Adaptability of interactions according to contexts	In pre-school education the number of synchronous interactions should be at the discretion of the educator and the families (P36)	1 reference
Anticipation	Individualization	To have a greater number of individualised teaching moments (P37)	1 reference
Anticipation	Sharing experience from different contexts	Contact with experiences from other parts of the world (P12)	1 reference
Conditionalities	Technology resources: Schools	More technology/media in schools (P44)	5 references
Conditionalities	Technology resources: Home	to equip all homes with tools, such as computers and others to be able to develop with quality and in a way (P42)	2 references
Conditionalities	Trainees' predisposition	I think that change should not be so much focused on training but rather on the predisposition of the trainee (P4)	1 reference

Participants mentioned, in general, interesting, and valuable (e.g., interaction with people and realities from another country) distance learning. However, they considered this modality to be challenging (difficulty in maintaining focus) and requiring external incentives for its use, time for the development of activities in this modality, and personal availability/predisposition for this learning modality. Also, the place where distance learning happens could be relevant, as well as the available resources.

Some of the aspects recommended by the participants to promote positive experiences of distance learning are: promoting activities that encourage positive and more frequent discussion interactions between participants; ensuring the participation of all participants; valuing the diversification of methodology; stimulating visual interaction at a distance (e.g., connected cameras); exploring resources less known by education professionals (e.g., applications) can use that with children.

Some participants recognize a more significant effort to maintain attention in the distance learning modality, and a loss of interest regarding the contents addressed compared to face-to-face teaching. The participants also consider that children should have equal access to digital resources that allow

them to enjoy distance learning. Participants suggested short training courses (preferably face-to-face) on how to develop distance learning in the future. Specialized teams should deliver these actions where there is good communication and interaction, sharing experiences and resources for the practical application of distance learning with children in ECE and their families.

4. Views on CT and educational robotics in ECE

This part will consider participants' views on computational thinking, as a problem-solving approach that allows us to approach a complex problem, understand what the problem is and develop possible solutions. That solution can then be presented in a way that a computer, a human, or both can understand it. It has been integrated into various educational systems around the world. Reference will also be made to the educational use of robotics and CT in this context.

Thus, as shown in table 21, participants presented a position that reinforced the relevance of the computational thinking experiences approach, considering themselves enthusiastic and stating that these activities in ECE are relevant. However, regarding feelings of comfort, it was found that the participants' perspective was more modest in promoting activities for children with these resources.

A brief comparison between the participants' perspectives on distance learning and the use of computational thinking shows more relevant perceptions and more relevance in distance learning than in computational thinking.

Table 21
Perspectives about computational thinking in Early Childhood Education

	was relevant / not relevant / didn't have an impact		was somewhat relevant / had some impact		was relevant / had an impact		was very relevant / had a great impact		I don't have information to answer this question	
	ni	fi%	ni	fi%	ni	fi%	ni	fi%	ni	fi%
I believe children in ECE should have experiences with computational thinking.	4	7	10	18	22	39	20	35	1	2
I am enthusiastic about computational thinking in ECE.	4	7	13	23	19	33	19	33	2	4
I think that it is helpful to have activities connected to computational thinking in ECE.	3	5	11	19	23	40	18	32	2	4
I feel comfortable promoting activities for children with computational thinking in ECE.	13	23	18	32	12	21	7	12	7	12

In turn, in this context we see educational robotics as a way to enhance children's learning through robot-related activities, technologies and artefacts. These activities may involve the use of a physical robot, usually purpose-designed for children, a modular system such as LEGO Mindstorms, or other electronic components.

As shown in table 22, in general, there is a very relevant perspective on conducting educational experiences using robotics. As for the enthusiasm and perceptions of helpfulness to have connected computational thinking and robotics in ECE, the perspective was also predominantly relevant. In turn, regarding the feeling of comfort in promoting these activities, and with more discrepant results, a reduction in the participants' perspectives was generally observed.

Table 22
Perspectives about educational robotics in Early Childhood Education

	was relevant / not relevant / didn't have an impact		was somewhat relevant / had some impact		was relevant / had an impact		was relevant / very relevant / had a great impact		I don't have information to answer this question	
	ni	fi%	ni	fi%	ni	fi%	ni	fi%	ni	fi%
I believe children in ECE should have experiences with educational robotics.	2	4	13	23	19	33	20	35	3	5
I am enthusiastic about educational robotics in ECE.	2	4	11	19	21	37	19	33	4	7
I think that it is helpful to have activities connected to computational thinking and robotics in ECE.	1	2	12	21	22	39	19	33	3	5
I feel comfortable promoting activities for children with educational robotics in ECE.	11	19	14	25	14	24	8	14	10	18

As shown in Table 23, participants had different perspectives on what they would like to learn more about. According to the frequency of higher answers in each item, learning more about computational thinking had the highest relevance in the ECEC context, followed by learning more about Educational Robotics and, finally, learning more about distance.

Table 23
Perspectives regarding aspects participants would like to learn more about.

	was relevant / not relevant / didn't have an impact		was somewhat relevant / had some impact		was relevant / had an impact		was relevant / very relevant / had a great impact		I don't have information to answer this question	
	ni	fi%	ni	fi%	ni	fi%	ni	fi%	ni	fi%
Learning more about Computational Thinking in ECE.	4	7	11	19	17	30	22	39	3	5
Learning more about Educational Robotics in ECE.	4	7	12	21	18	32	20	35	3	5
Learn more about Distance Learning in ECE.	8	11	15	26	19	33	15	26	2	4

As shown in table 24, the participants presented very different answers, however, the themes with the highest frequency of response were Methods and strategies for the development of CT, Educational robotics: benefits for children and learning and Computational and algorithmic thinking: benefits for children and learning.

Table 24*Topics signalled for further learning*

	ni	fi%
Computational and algorithmic thinking: features and types	9	4,4
Computational and algorithmic thinking: benefits for children and learning	24	11,7
Educational robotics: benefits for children and learning	28	13,5
Methods and strategies for developing CT	31	15,0
Coding tools that can be used to develop CT in ECE	17	8,3
Physical programming and CT with robotics in ECE	15	7,3
Plugged and unplugged activities about CT and curricular areas for ECE	23	11,1
Education for young children in emergency situations	19	9,2
Distance education for ECE	17	8,3
Educational robotics for inclusion	23	11,1

Experiences with CT and/or Ed. Robotics

The answers to the question: Is there any experience or issue regarding computational thinking, educational robotics or distance education in Early Childhood Education that you would like to share? allowed us to identify that most participants did not present experiences using computational thinking, educational robotics, or distance education in Early Childhood Education, except for two participants who indicated having already developed activities in classroom contexts using the DOC robot - Clementoni's robot (2 references).

5. Conclusions and implications for EARLY

Distinct participant experiences were noted during lockdown in Portugal in 2020-2021 and distance learning during the pandemic of COVID-19. The frequency and timing of lockdown were distinct. However, it was found that most participants were a general lockdown and staying at home for more than two months. Ambivalence was also highlighted in the responses regarding the presentation of national strategy for distance learning in ECE. It was found that most Early Childhood Education teachers had direct contact with children, but mostly in groups. In turn, in the contacts established with families/carers WhatsApp, Email, Zoom and Microsoft TEAMS were the most used.

In these contacts, a frequency of suggestions from the ECE teachers about activities to develop at home occurred, in general, more than once a week there were suggestions. The difficulties that affected the children's experience of activities sent by teachers to be developed by families/carers were lack of time, lack of resources and families/carers had no experience in using digital educational

platforms. However, for the most part they reported having more than once a week, there were synchronised moments with children involving shared activities. Families'/carers' lack of time due to remote work to be present during synchronous moments was considered with a difficulty that affected children's experience of synchronous times involving shared activities.

As far as learning from the remote experience is concerned, the identification and use of different resources for ECE, such as the creation of interactive websites for storytelling, the consultation of websites with interactive games or resources (e.g., ebooks) for families/carers to explore at home with their children. Participants in general indicated very different views regarding current provision for children in isolation: from lack of information to answer the question, lack of provision to synchronic moments arranged between the teacher or the group of children and the stay at home child/ren.

The lived experience highlighted in the participants the idea that the children presented positive attitudes towards the lived experience (e.g., adaptability, and persistence). They highlighted as positive aspects of the remote teaching the exploration of new knowledge and methods, as well as a greater proximity and cooperation between education professionals and parents. Less positive aspects were the ability to maintain the motivation and significant involvement of children during remote learning. Also highlighted was the relevance of the experience for applicability to other similar situations in the future (e.g., stay in hospital due to isolation), especially with children with chronic health problems or children with special needs.

Regard to the views on distance learning for professional/personal development, most participants had experiences with distance learning in the past 3 years, presenting positive feelings (e.g., comfort and enthusiasm) and views regarding the relevance of this modality for teaching and professional development. In this modality, some challenges were identified (e.g., keeping the focus of attention or need for direct adult support in exploring with young children), as well as some positives aspects (e.g., exploration of other resources).

Participants mentioned they considered relevant to develop experiences with computational thinking in ECE, believing them to be helpful and showing enthusiasm. However, they only considering as somewhat relevant the fact that they felt comfortable promoting this type of activities with young children.

Most participants considered the importance of children have educational robotics experiences very relevant in ECE, while most participants only recognised some impact from feeling comfortable to promoting activities for children with educational robotics in ECE. However, few of the participants had any previous experience of contact with Computational Thinking and/or educational robotics.

Concluded as main ideas were that participants had experience with emergency remote teaching (ERT) during lockdowns. They highlighted lack of time, resources, experiences, and knowledge as limitations. As the activities and interactions that were experienced were evaluated positively, being welcoming proposals for parents to develop at home and linked to technology. Social interaction and children's interests were seen as important, and the value of the experience gained with ERT in Early

Childhood Education was recognised for various situations. In general, very positive expectations towards distance learning and very positive expectations towards computational thinking and distance learning (not entirely comfortable) were observed.

Limitations

The participants in this questionnaire were volunteers who volunteered to fill it out, which does not allow generalisations of the information obtained to other contexts.

Implications

The results obtained help to understand the experiences and the positive or less positive aspects associated with the specific experiences of distance learning. The data collected allowed us to better understand the type of relationships and resources that were used during distance learning. Likewise, it was possible to identify a set of situations in which distance learning and previous experiences may be conducive. Participants, also, identify suggestions that can help the EARLY project team to design action proposals that respond to real needs and suggestions presented by the participants. For example, participants suggested holding short face-to-face courses with experts to explore how to develop online learning with young children.

The results also made it possible to gather relevant data on the subjects about which the participants would most like to learn. Thus, participants considered very relevant to learn more about Computational Thinking and Educational Robotics in ECE, as well as relevant to learn more about Distance Learning in ECE. On the other hand, the most referred topics were: Computational and algorithmic thinking: benefits for children and learning; Educational robotics: benefits for children and learning and Methods and strategies for developing Computational Thinking, which are presented as relevant suggestions in the context of action planning in the scope of the EARLY project.

References

- Alves, M., Figueiredo, M. P., & Matos, I. A. (2022). Perspetivas sobre literatura para a infância na educação pré-escolar à distância. Sentidos – Congresso Internacional sobre Educação: Literacias, Inclusão e Tecnologias, Viseu.
- Amante, L., Souza, E., Quintas - Mendes, A., Monteiro A. F, Pinto, M., Osório, A. J. & Araújo, C. L. (2019). *Computational thinking, programming and robotics in basic education: evaluation of an in-service teacher's training b-learning experience*. ICERI2019 Proceedings. DOI: 10.21125/iceri.2019.2626.
- Bers, M. U, Strawhacker, A. & Sullivan, A (13 July, 2022). *The state of the field of computational thinking in early childhood education*. OECD Education Working Papers No. 274. <https://doi.org/10.1787/3354387a-en->.

- European Commission (2021a). *Early childhood education and care and the COVID-19 crisis. Understanding and managing the impact of the crisis on the sector*. Publications Office of the European Union. <https://data.europa.eu/doi/10.2766/60724>.
- European Commission (2021b). *Directorate-General for Education, Youth, Sport and Culture, Toolkit for inclusive early childhood education and care: providing high quality education and care to all young children*, Publications Office, <https://data.europa.eu/doi/10.2766/399018>.
- European Commission, Directorate-General for Education, Youth, Sport and Culture, Van Laere, K., Sharmahd, N., Lazzari, A., et al. (2021). *Governing quality early childhood education and care in a global crisis: first lessons learned from the COVID-19 pandemic: analytical report*, Publications Office, <https://data.europa.eu/doi/10.2766/642131>.
- Figueiredo, M., Amante, S., Gomes, H., Gomes, C. A., Rego B., Alves, V., & Duarte R. P. (2021). Algorithmic Thinking in Early Childhood Education: Opportunities and Supports in the Portuguese Context. In Chova, Lopez & Torres (Eds.) *Proceedings of EDULEARN21 Conference* (pp. 9339 - 9348). IATED. ISBN: 978-84-09-31267-2.
- Mesquita, C., Lopes, R. P., Loureiro, A. C., & Ribeiro, C. (2020). Pedagogical challenges in times of SARS-COV-2 in Early Childhood Education. Em L. Gómez Chova, D. López Martínez, & I. Candel Torres (Eds.), *ICERI 2020: 13th International Conference of Education, Research and Innovation. Conference proceedings* (pp. 7358–7368). International Association of Technology Education and Development.
- Miranda-Pinto, M. (2016). Desafíos de programación y robótica en Educación Preescolar: proyecto Kids Media Lab. *Tecnología, Innovación e Investigación En Los Procesos de Enseñanza-Aprendizaje*, 1848-1855.
- Miranda-Pinto, M., Araújo L. C., Osório A.J. & Monteiro A.F. (2022). Desenvolvimento Positivo pela Tecnologia (PTD) checklist de envolvimento: crianças/criança e ambientes/facilitadores. *RE@D - Revista de Educação a Distância e Elearning*, 5 (1), 1-20.
- Timmons, K., Cooper, A., Bozek, E. et al. (2021). The Impacts of COVID-19 on Early Childhood Education: Capturing the Unique Challenges Associated with Remote Teaching and Learning in K-2. *Early Childhood Educ J* 49 (pp. 887–901). <https://doi.org/10.1007/s10643-021-01207-z>
- OECD (2021). *Using Digital Technologies for Early Education during COVID-19: OECD Report for the G20 2020 Education Working Group*, OECD Publishing, Paris, <https://doi.org/10.1787/fe8d68ad-en>.
- Papert, S. (1985). *Logo: Computadores e Educação*. Editora Brasiliense. Retrieved from <https://www.estantevirtual.com.br/sebosaojose/seymour-papert-logo-computadores-e-educacao-1714393381>.
- Resnick, M. (2017). *Lifelong kindergarten: cultivating creativity through projects, passion, peers, and play*. Cambridge, MA: The MIT Press.
- Resnick, M., & Rosenbaum, E. (2013). Designing for tinkability. In M. Honey & D. E. Kanter (Eds.), *Design, Make, Play: Growing the Next Generation of STEM Innovators* (pp. 163–181). Routledge. <https://doi.org/10.4324/9780203108352>.
- Uğur-Erdoğan, F. (2021). How Do Elementary Childhood Education Teachers Perceive Robotic Education in Kindergarten? A Qualitative Study. *Participatory Educational Research*, 8 (2), pp. 421-434. <http://dx.doi.org/10.17275/per.21.47.8.2>.

- UNICEF (2020). *Covid-19: Are children able to continue learning during school closures? A global analysis of the potential reach of remote learning policies using data from 100 countries*. UNICEF.
- Van Laere, K., Sharmahd, N., Lazzari, A., Serapioni, M., Brajčović, S., Engdahl, I., Heimgaertner, H., Lambert, L., Hulpia, H. (2021). 'Governing quality Early Childhood Education and Care in a global crisis: first lessons learned from the COVID-19 pandemic', *NESET report*, Luxembourg: Publications Office of the European Union. doi: 10.2766/642131.
- Zaccoletti S, Camacho A, Correia N, Aguiar C, Mason L, Alves R. A. & Daniel J. R. (2020). Parents' Perceptions of Student Academic Motivation During the COVID-19 Lockdown: A Cross-Country Comparison. *Front. Psychol.* 11:592670. doi: 10.3389/fpsyg.2020.592670.