

Article

Educational Robotics to Address Behavioral Problems in Early Childhood

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Abstract: After detecting behavioral problems in an early childhood education classroom and verifying the importance of intervening at early ages, we propose the design of an intervention plan through an educational proposition to modify the problematic behaviors. This proposition is focused on developing standards of conduct through computational thinking using robotics. Firstly, needs were identified; then, an educational proposition was implemented; and, lastly, the results were evaluated. For this study, a mixed methodology (quantitative and qualitative) was used. The instruments selected were observation scale, interview and teacher's diary. The results show a clear improvement of disruptive behaviors. The technology used contributed to the collaborative resolution of the problem, allowing the students to lead such resolution by stimulating their participation and creativity. Thus, it can be asserted that the development of computational thinking through educational robotics is effective for the improvement of social skills at early ages.

Keywords: disruptive behaviors; computational thinking; educational robotics; early childhood education



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1. Introduction

Child disruptive behaviors are frequent, and they lead to the deterioration of the classroom and social environment [1,2]. Regarding this issue, educational robotics have great pedagogical potential, with increasing use in schools for the development of cognitive skills and abilities in the scope of education [3–7].

To address the increase in disruptive behaviors in early childhood education classrooms and the lack of interventions, after decades of research in the use of technologies at early ages, we proposed a study to determine how the technologies that help to develop computational thinking (specifically, robotics) could significantly improve the disruptive behaviors detected.

Unfortunately, if they are not treated early, child disruptive behaviors are very likely to become chronic disorders in adolescence, and it is difficult to correct them [8,9]; therefore, early intervention from early childhood [10–12] is essential for the adequate development of the person. In some cases, early disruptive behaviors coexist with other neurodevelopmental disorders that can often be a risk factor of a chronic mental disorder [13–16]. However, due to the difficulties in differentiating disruptive behaviors from other conditions, they are neither identified nor treated appropriately [17].

The theoretical perspectives agree that disruptive behaviors are shown during the first years of schooling, when children start developing social skills and self-regulation [11,18–20]. However, there is lower consensus on the stage at which the disruptive behaviors of preschool children represent concerning problems, since the mere presence of behaviors related to aggression, defiance and negative emotions do not pose a problem unless they are persistent. Disruptive behavior reflects a pattern of irritability and disregard for social rules [21]. The authors of [22] state that this type of behavior takes place due to the lack of knowledge about rules or authority, exhibiting attitudes of whim or egocentricity.

Disruptive behavior can refer to the actions of children who easily get distracted and lose attention, those who often leave their chair, and those who are defiant [20]. When

maintained over time and at an exaggerated frequency, these conducts become a problem, as they have a negative impact on the life of the individual, affecting her/his personal, social, academic and/or family development. These are behaviors that defy the norms of coexistence, negatively affecting the order and climate of the classroom; thus, it is fundamental to detect and address them [23].

Focusing on those behaviors that are manifested in the school environment, [24] classified disruptive behaviors into three types: noisy, motor and verbal. In this line, ref. [25] concluded that disruptive behaviors can be grouped into the following: (1) motor (doing different activities instead of the ones they are asked to do, leaving their chair, etc.), (2) verbal (raising their voice, using inappropriate language, insulting, etc.), and (3) aggressive, both physical (hitting, damaging own and others' objects, pushing, etc.) and verbal (blackmailing, insulting, scoffing, etc.).

To work on these behaviors and redirect them, it is necessary to know which factors influence their manifestation. The literature shows that research in this topic has evolved from studies that emphasized the role of socio-environmental factors in child disruptive behavior [26] to an approach based on pathophysiological foundations [27] and, finally, the focus on the origins of the development of antisocial behavior and the need to predict this behavior.

Decades of epidemiological, clinical, developmental and basic studies have shown that the environment exerts a strong impact on physical, cognitive, social and emotional development, as well as on mental health throughout human life.

Therefore, the family environment and its great impact on the development of children is a reference, since parents are the most long-lasting influence in the lives of children, and parenting methods can significantly affect the degree and rate of the child's externalization (e.g., hyperactivity, rule-breaking conducts and/or aggression) and internalization (e.g., anxiety, abstinence and/or depression) [28]. The ways in which parents interact with their children are strongly influenced by stressors, as well as by the experiences provided by other family members, friends, teachers, members of the community and social institutions [29].

In addition, exceptional situations, such as that caused by the COVID-19 pandemic, have induced a variety of stressors that have affected children and their families. These stressors include the collective trauma derived from generalized disease and deaths, the fear of a novel and dangerous pathogen, social isolation and the interruption of family routines and economy [30–32]. This situation was prone to generating disruptive conducts in the classroom. The study of Prime et al. [33] showed a conceptual framework of family risk and resilience during the COVID-19 pandemic, highlighting that a wide range of stressors induced by this pandemic (e.g., job loss, social isolation) influenced the psychological distress of parents, which, in turn, affected the adjustment of their children through the parent–child interactions. In other studies, parents have stated that their stress had increased due to the pandemic [34,35].

In the classroom and in the student–teacher relations, this situation is also associated with academic and behavioral performance. Negative experiences with peers (e.g., rejection, negligence and lack of friends during the first years of schooling) have been associated with higher levels of loneliness, negative self-esteem, depression, anxiety, school avoidance and antisocial behaviors [36], causing some type of disruptive behavior.

In view of this situation, and from the educational context, it is important to design effective interventions for the treatment of disruptive behaviors in young children involving the families [12,37,38], since, in the experiences carried out to date, few families have participated in these programs [12]. Studies on interventions aimed at working on parenting skills have reported significant reductions in early childhood behavioral problems and better parent–child relationships in young children [39]. It is also necessary to work from within the classroom with didactic strategies that redirect children's behaviors. Early treatment allows intervening and influencing the course of the problems of disruptive behavior. Intervention at pre-school age can be advantageous, since behavior control appears during this developmental stage, and allows modifying the regulatory skills [9,40]. Early detection and intervention of early childhood behavioral problems play an important

role in successful academic adaptation, whereas the lack of intervention can have prejudicial results regarding the social, emotional and behavioral functioning of the child (e.g., deficient relationships with siblings and peers, attention problems and low academic performance).

Considering that we live in a technological society that permeates many of the spaces (home and leisure) in which young children spend most of their time, and the impact of this technological society on their lives [41], we believe that technology can be an ally to redirect these undesired disruptive behaviors. The benefits of its use will help to attain the development of different meta-cognitive and social skills, favoring cooperative learning [42].

Working in early childhood classrooms on computational thinking through robotics is a didactic strategy that will foster and facilitate the development of social, emotional and communicative skills in young children, helping to improve social coexistence [43]. The authors of [44] define CT as a problem-solving process which includes the following characteristics: (1) formulate problems in a way that allows us to use a computer or the like to help solve them; (2) organize and logically analyze data; (3) represent the data through abstractions such as models and simulations; (4) automate solutions through thinking algorithmic; (5) identify, analyze and implement possible more efficient and effective solutions; and (6) generalize and transfer this process to a wide variety of problems.

Authors such as [45,46] point out the importance of working on these skills and concepts in the stage of early childhood. They also state that this must be implemented from an adequate approach, ensuring that the children themselves create their own learning. The authors of [47] highlights the idea that educational robotics uses a constructivist and active methodology, which potentiates the interest of the children by proposing more inclusive teaching methods and contexts. The authors of [48], for the use of robotics, propose a pedagogical framework based on both constructionism and social constructivism. To this end, it may be useful to employ four types of activities: (1) unplugged, (2) playing, (3) doing and (4) mixed.

All of the above mentioned constitute the foundation for the realization of this study, in which technology was the resource selected to modify the disruptive behaviors detected in the students of an early childhood education classroom of 3-year-old children, for which a didactic sequence was designed through an intervention plan based on robotics-supported computational thinking.

2. Materials and Methods

2.1. Context and Study Sample

This study was jointly conducted by the University of Seville, the Mornese Foundation and an Early Childhood and Primary Education School during the academic year 2022/2023. The Mornese Foundation is a nonprofit organization that intervenes in vulnerable groups at risk of exclusion. This organization has different intervention areas with different projects. The present study was carried out in the socio-educational area, since the educational center attends to a large number of low-income families at risk of exclusion.

The abovementioned foundation is ascribed to a collaboration agreement with certain educational centers of the region, which have families at risk of exclusion. The request to the Foundation emerged from the center itself, which demanded human resources. The members of the Mornese Foundation searched for the profile that best fitted the detected need. Such need was specified in a 1st-year early childhood education classroom (3 years of age), where children showed multiple behavioral problems, which deteriorated the classroom environment and hindered the learning process. The group was constituted by 25 students aged 3–4 years, with 13 boys and 12 girls. It is important to take into account the inherent diversity of every human being, which must be effectively attended to.

2.2. Study Objectives

The main objective of the study was to determine whether working on computational thinking in an early childhood education classroom of 3-year-old children, and implement-

ing activities using robotics, can improve the disruptive behavioral problems detected. To this end, the following specific objectives were proposed:

- O1. Identify the disruptive behaviors of the early childhood education classroom.
- O2. Design an intervention plan through a didactic sequence to improve the disruptive behaviors detected, including robotics as a tool for conduct modification.
- O3. Evaluate the extent to which the intervention proposition improves the initial disruptive behaviors.

2.3. Study Phases

Based on the objectives proposed, the study was divided into three phases. Table 1 presents each study phase, the instruments used and the type of analysis performed.

Table 1. Study phases.

Phase	Instruments	Analysis
PHASE 1. Diagnosis of needs	Conduct scale (Pre-test)	Quantitative
	Interview (classroom teacher and support teacher) Classroom teacher's diary	Qualitative Qualitative
PHASE 2. Design and implementation of Intervention sessions	Classroom teacher's diary	Qualitative
PHASE 3. Final evaluation	Conduct scale (Post-test)	Quantitative
	Classroom teacher's diary	Qualitative

A mixed methodology (quantitative and qualitative) was used for this study, with a quasi-experimental design without a control group. In the first phase, the initial conduct scale (pre-test) and the interviews to both the classroom and support teachers were carried out, with the aim of identifying and defining those initial disruptive behaviors that would be the starting point for the design of the intervention plan. In the second phase, 6 sessions were designed to be carried out in the early childhood education classroom of 3-year-old children for 2 weeks. Once the sessions were developed, in the third phase, the conduct scale was applied again to obtain the post-test measures (final evaluation). Throughout all three phases, the classroom teacher wrote in her diary about the behavioral evidence observed before, during and after the intervention.

2.3.1. PHASE 1. Diagnosis of Needs

In this phase (O1), as was previously commented, and due to the characteristics of the students, the data-gathering technique selected was observation (conduct scale), interview and the teacher's diary.

The conduct scale used, which was adapted from [49], guarantees the reliability and validity of the instrument. It consists of 3 dimensions and 18 items, which are measured in a 4-option scale: never, almost never, often and very often. This instrument was used to record the observations before the intervention and after the intervention, which allowed determining whether the needs detected were satisfied.

The data were collected by two observers, who were trained in the application of the system described above. Both observers evaluated the group at the same time, although independently; then, a concordance analysis of both observations was performed, calculating Cohen's index, which allowed knowing the concordance level beyond chance. The obtained results (0.91) showed very good agreement between the observers. Subsequently, a single coding was established, providing the final data for the analysis and interpretation of the next study phases.

The interviews that were carried out with the classroom and support teachers were essential, since these professionals are considered to be key informants due to the fact that they are the two people who spent most time in the classroom; thus, they had greater knowledge about the children and their characteristics, needs and families. These interviews were performed individually and separately in order to avoid response contamination.

The classroom teacher’s diary was used to gather evidence of the behaviors observed throughout the entire process, with examples of situations and specific expressions that were considered significant.

2.3.2. PHASE 2. Design and Implementation of the Intervention Plan

The design of the intervention plan (O2) was based on the needs related to the disruptive behaviors detected in Phase 1. The intervention consists of a collaborative learning methodology linked to the constructivist and constructionist approach, founded on the premise “learn by doing” since the learners play a leading role, taking into account their interests at all times and favoring handling and experimentation. The intervention program falls into the area of self-knowledge and personal autonomy, which includes the recognition of rules. The intervention plan has a common thread based on a tale, through which 6 sessions are carried out, with 2 activities per session. The activities were designed for 3-year-old students, attending to their psychoeducational and group characteristics at all times. The sequencing is progressive—that is, with increasing difficulty—which allows adapting to the individual evolution of each student.

These activities focused attention on developing good habits and standards of conduct, for which robotics is the vehicle used to respond to the needs detected. Specifically, we worked with robotics adapted to the age of the participants. Educational robotics facilitates integral development, which is essential in this stage, increasing the interest for the content and attaining a more inclusive context [50]. We started with unplugged playful activities and continued with activities using the *Mouse Activity* floor robot. Figure 1 shows the sequence of sessions that make up the educational proposition.

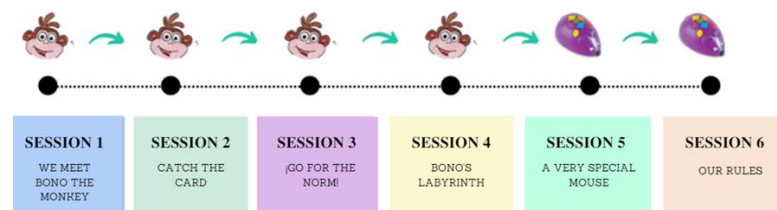


Figure 1. Sequence of sessions.

Each of the six sessions consist of two activities, which are described in Figure 2, showing pictures of their implementation.

SESSION 1	<p>Activity 1 Differentiation of behaviors through a story</p>		<p>Activity 2 Unplugged robotics (directionality with the own body)</p>	
SESSION 2	<p>Activity 1 Unplugged robotics following the instructions with the own body. Achievement of standards.</p>		<p>Activity 2 Assessment of the previous activity. Classification of behaviors according to their nature.</p>	
SESSION 3	<p>Activity 1 Differentiation of behaviors and group reflection about them.</p>		<p>Activity 2 Unplugged robotics. Follow the directions through an object, on the mouse pad. Use of pictograms of behaviors.</p>	
SESSION 4	<p>Activity 1 Unplugged robotics. Establish the path to reach a behavior (spatial notions).</p>		<p>Activity 2 Remember the nature of behaviors. Point the way forward by arrows, reaching a behavior.</p>	
SESSION 5	<p>Activity 1 Incorporation of the Mouse Activity. Schedule to get to the norm or behavior.</p>		<p>Activity 2 Incorporation of the Mouse Activity. Schedule to get to the norm or behavior through obstacles. Greater complexity.</p>	
SESSION 6	<p>Activity 1 Program the Mouse Activity to reach the desired behaviors, selected by the students themselves.</p>		<p>Activity 2 We remember the behaviors in a group and create our poster of norms.</p>	

Figure 2. Sessions, activities and example of their implementation.

2.3.3. PHASE 3. Evaluation of the Effectiveness of the Proposed Intervention

Phase 3 corresponds to the evaluation of the effectiveness of the proposition (O3). In this phase, the post-test evaluation was carried out, using the same attitude scale as the one employed in Phase 1. As in the previous phases, the teacher's diary was used, in which the classroom teacher recorded examples of conducts before, during and after the intervention.

2.4. Data Analysis

Descriptive and central tendency analyses were performed. A content analysis was also conducted to explore the needs and to illustrate the quantitative data with evidence. Moreover, contrast analyses were applied to analyze the differences between the pre-test and post-test results.

3. Results

3.1. Diagnosis of the Initial Situation. Student Behavioral Problems

To approach the first objective of the study (i.e., to identify the specific problems in terms of disruptive conducts (O1)), we analyzed the data obtained from the two observers in the three dimensions of the conduct scale: Dimension 1 "care for materials and furniture" (Table 2), Dimension 2 "classroom environment" (Table 3) and Dimension 3 "bad conducts" (Table 4).

Table 2. Descriptive analysis of Dimension 1 (scale: 1 = never, 2 = almost never, 3 = often and 4 = very often).

Variables	Score
Care for materials and furniture	2.80
They break classroom materials	3.00
They paint on the tables, walls, etc.	3.00
They take toys or materials home	2.00
They do not respect the private property of the materials of each child	3.00
They throw garbage on the floor in the classroom, schoolyard and other spaces	3.00

Table 3. Descriptive analysis of Dimension 2 (scale: 1 = never, 2 = almost never, 3 = often and 4 = very often).

Variables	Score
Classroom environment	3.00
They disobey and disrespect the teacher	3.00
They refuse to comply with the rules of behavior	4.00
They interrupt and bother the teacher during class	4.00
They refuse to do their homework	2.00
They enter and leave the classroom without permission	2.00

Table 4. Descriptive analysis of Dimension 3 (scale: 1 = never, 2 = almost never, 3 = often and 4 = very often).

Variables	Score
Bad conducts	2.11
Physical aggression	3.00
Threatening or insulting	1.00
Forcing others to do things they do not want to do	1.00
Stealing material	3.00
Calling their peers names or making fun of them	1.00
Disregarding a peer or excluding him/her from the group	1.00

As can be observed in Table 2, most of the students did not respect the materials or the furniture. They frequently threw garbage on the floor or broke materials without respecting

their ownership. Regarding the act of taking materials home, although it occurred in some cases, this was not a generalized behavior in the group.

Regarding Dimension 2 “classroom environment”, as can be observed in Table 3, the students, in general, did not comply with the rules of behavior, interrupted the teacher during class, and disobeyed her very often. Less frequently, they refused to do their homework and entered and left the classroom without permission.

Lastly, Table 4 presents Dimension 3 “bad conducts”, which shows that physical aggression and stealing materials occurs often, whereas no behaviors were observed in terms of threatening or insulting, forcing others to do things they do not want to do or disregarding a peer or excluding him/her from the group.

To complete this information, Figure 3 shows a conceptual representation of the results of the content analysis of the interviews conducted with the two key informants (classroom teacher and support teacher).

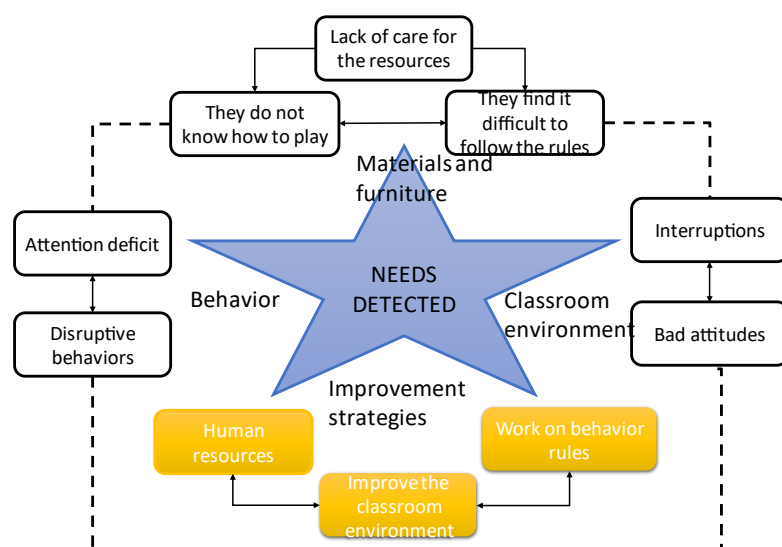


Figure 3. Conceptual representation of the results of the interviews.

As can be observed in Figure 3, the needs detected in the interviews show three clear dimensions that were influenced by the identified behaviors: (1) classroom environment, which was negatively affected by the constant interruptions; (2) the lack of care for the resources, as the children were not interested in learning how to use them and they found it difficult to follow the rules; and (3) disruptive behaviors, such as hitting or insulting, which also involved attention deficit. To sum up, the interviews revealed needs that were always linked to bad conducts and the establishment of rules, which caused interruptions, attention deficit and a lack of skills in group play. In both cases, the interviewees agreed that, in order to address these needs, greater support is necessary, as well as working specifically on the knowledge of behaviors and improving the classroom environment.

3.2. Evaluation of the Effectiveness of the Proposition

Regarding the objective of determining the extent to which the intervention proposition was successful with respect to the detected need (O3), a comparative analysis of each study variable was performed (Figures 4–6).

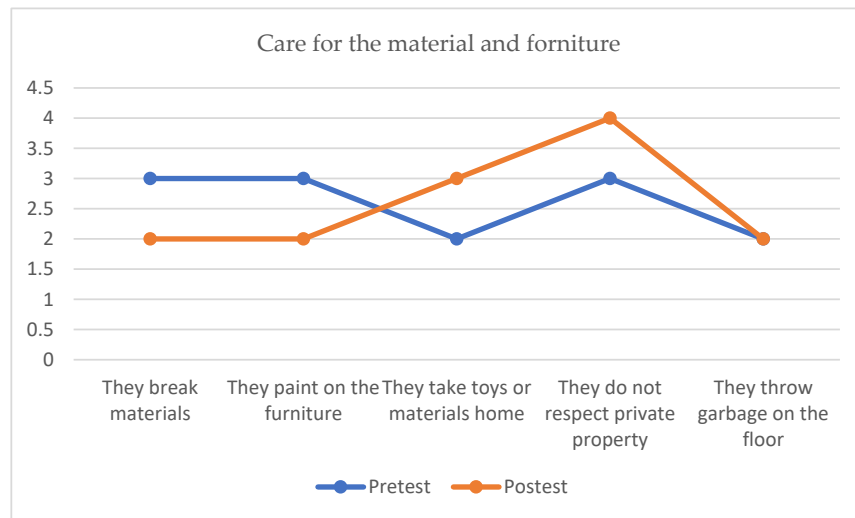


Figure 4. Pre-test and post-test results of the dimension “care for the materials” (scale: 1 = never, 2 = almost never, 3 = often and 4 = very often).

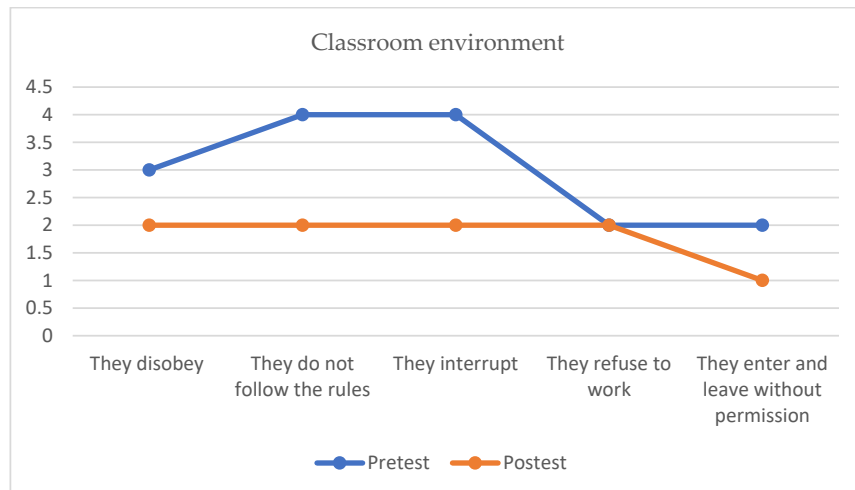


Figure 5. Pre-test and post-test results of the dimension “classroom environment” (scale: 1 = never, 2 = almost never, 3 = often and 4 = very often).



Figure 6. Pre-test and post-test results of the dimension “bad conducts” (scale: 1 = never, 2 = almost never, 3 = often and 4 = very often).

As is shown in Figure 4, almost all the variables of this dimension show a significant improvement. Only the variable “they take toys and materials home” does not improve, but this is not a very frequent behavior.

Figure 5 presents the results of the dimension “classroom environment”. As can be observed, improvements were obtained in all variables. This is the dimension that showed the best results with respect to the data obtained in the pre-test. It is worth highlighting that, after the intervention, the children almost never interrupted the teacher or refused to follow the rules, and they never entered or left the classroom without permission.

Figure 6 gathers the pre-test and post-test of the dimension “bad conducts”, where “physical aggression” and “stealing materials” were frequent. The greatest improvements were achieved in these two variables.

Complementarily, the teacher’s diary, which recorded the target behaviors, was analyzed. A sequenced observation was performed before, during and after the intervention process. The obtained results were synthesized for each of the dimensions (Tables 5–7).

Table 5. Teacher’s diary analysis. Care for the materials and furniture.

Variables	Evolution		
	Before	During	After
Care for the Materials and Furniture			
They break classroom materials	We found broken books, didactic sheets, IDB and toys.	The damage done to IDB and toys decreased, but not that done to books and sheets.	We used MOUSE (Robot) without damage, and the damage done to the materials was mostly related to less deliberate actions.
They paint on the tables, walls, etc.	The posters of the ITUs, panel, radiators, walls, etc., were painted.	They stopped painting on the walls and radiators, but they keep painting on some of the furniture and others’ materials.	The drawings on the furniture were the result of a tantrum. Painting on others’ materials were done by fewer students.
They take toys and materials home	They put different toys in their backpacks, as well as rubbers and crayons.	These attitudes were observed in fewer students.	Only one student took a toy home.
They do not respect the private property of others	They took money from the drawer of the teacher and check inside the teacher’s purse.	There was some prowling in the area, but no elements were extracted.	The prowling continued in some students, although less frequently.
They throw garbage on the floor in the classroom, schoolyard and other spaces	They threw banana peel on the floor, as well as biscuit wrap and milkshake cartons.	The amount of garbage thrown on the floor of the classroom decreased, but not in the schoolyard.	They corrected these attitudes among them.

Table 6. Teacher’s diary analysis. Classroom environment.

Variables	Evolution		
	Before	During	After
Classroom Environment			
Disobeying and disrespecting the teacher	The students drank water without permission and did not follow the indications of going back to their seats. They painted on the board during another activity, and they took materials from the teacher’s table and played with them.	The students show interest in the development of the class, with more obedience and respect. However, they still left their seats to drink water without permission.	It was hard for them to ask for permission to drink water, but their respect increased.

Table 6. *Cont.*

Variables	Evolution		
	Before	During	After
Classroom Environment			
They do not follow the behavior rules	They jumped on the classroom furniture, such as tables, and even hid under them.	They no longer hid under the tables.	They jumped on the furniture less frequently, although they still jumped on tables and chairs sometimes. They continued to restrain themselves from hiding under the tables.
Interrupting and bothering the teacher during class	During class, they shouted at the teacher, spoke out loud with peers, took classroom materials and interrupted the teacher.	They no longer took classroom materials, and they reduced the number and magnitude of interruptions.	The interruptions were the usual of their age.
Refusing to do their homework	They crossed their arms and refused to do the activity.	We only observed refusal when they “missed a family member”.	Refusals decreased significantly.
Entering and leaving without permission	Sometimes, they went to the toilet or walked around the facilities without permission.	They only left without permission to go to the toilet.	They asked for permission before leaving.

Table 7. Teacher’s diary analysis. Bad conducts.

Variables	Evolution		
	Before	During	After
Bad Conducts			
Physical aggression	They hit their peers’ heads, pull their hair and push them.	They corrected these aggressive attitudes.	The aggressive behaviors decreased.
Threatening and insulting		This was not observed	
Making others do things they do not want to do		This was not observed	
Stealing materials	They took the sheet or the pencil of a peer, mocking him/her.	This attitude decreased significantly.	This attitude disappeared, especially the mocking.
Calling others names or making fun of them		This was not observed	
Disregarding a peer and excluding him/her from a group		This was not observed	

As can be observed in Table 5, the intervention proposition based on computational thinking allowed for a clear improvement and correction of the behaviors that are presented as needs, which implies great progress, since the class develops more easily; moreover, the situation allows using materials that enhance the motivation of the students, such as floor robots.

As is shown in Table 6, the classroom environment also presented a significant improvement, although the students were still very dynamic; moreover, respect prevailed, refusal almost disappeared and they knew and accepted the behavior rules. This indicates that a larger number of activities and games can be carried out, thereby increasing the interest of the students.

Lastly, Table 7 gathers the progress regarding the bad conducts observed. As is shown, the aggressive behaviors are infrequent and the mocking disappeared, which facilitates teamwork.

4. Discussion

As was pointed out in the introduction, disruptive behaviors are a concerning issue for teaching professionals, especially for teachers in the first educational stages, where such behaviors begin to appear and on which we can intervene with strategies and techniques to modify them. The recent events caused by the pandemic may have caused imbalances related to adaptations to the rules in children aged under 5 years, as they were locked in their homes without interacting with people other than their closest relatives for a long period of time, and those behaviors are now manifesting in the classrooms.

Effective interventions in the treatment of young children with disruptive behaviors usually involve the participation of their parents [37,38], hence the need for collaborative family-school work. The efficacy of the programs carried out in a wide range of contexts and children/family populations [10,51–53] have been characterized by the poor participation of the family, which has contributed to the fact that the expected results have not been obtained. However, the programs that have been conducted online have significantly improved the different conditions of family and mental health [54].

From the educational centers, it is fundamental to understand and define the behaviors, as well as to know the methodological strategies that help to correct them in a relaxed and friendly environment. It is important to support the teachers in order to ensure that they can detect and respond to the disruptive behaviors of young children. It would be convenient to provide training and mechanisms to counteract these negative relations between teachers and students that are generated in the classroom in the presence of children who show disruptive behaviors [55–57]. Those young children who draw attention, interfere, bother, interrupt and prevent the teacher from carrying out his/her educational work are the ones who create a bad environment in the classroom [58].

This is why it would be interesting to understand how teachers perceive these behaviors and determine which factors influence their perceptions [59,60].

It was observed that the factors that intervene in the manifestation of these conducts are varied and usually unrelated to the educational context, although they are rarely caused by a single factor. Therefore, this is an issue that must be addressed considering its complexity and based on the understanding of how classroom coexistence develops; moreover, it is important to delve into the factors related and unrelated to the educational center in which such behaviors are taking place.

Many didactic aspects can be modified by the teacher, such as classroom organization (solid and inflexible groups), the methodology used (teacher-centered classes) and the lack of student–teacher interaction. No style is better than the other, although some styles adapt better to a certain group than to other groups [58].

5. Conclusions

In this study, we carried out a didactic intervention using robotics to promote prosocial behavior. As is shown by the results, and with the triangulation of the different instruments used, all the disruptive behaviors detected at the beginning of this experience improved considerably; moreover, some of these conducts disappear, such as interrupting, bothering and preventing the teacher from teaching the class, as well as leaving without asking for permission. We believe that working for the development of computational thinking generates in the students a system of mental organization and guideline management that leads to the readjustment of those aspects that hinder the normal flow of the classroom. Involvement in the tasks and the detection of elements that disrupt the adequate realization of activities encourages them to accept that it is necessary to establish rules, order, sequences, etc., influencing progressive change in their conducts, and even removing some of these behaviors.

In the same line, [61] carried out a study in two classrooms of three-year-old children, where they worked on the knowledge of the AB pattern through robotics in one classroom, whereas in the other classroom they used other activities. These authors observed that the use of robotics helped the students not only to obtain better results at the cognitive level, but also to be more motivated and show more interest in learning difficult abstract

concepts. Thus, the use of robotics favors the development of computational thinking, since the students solve problems in a specific manner, facilitating the knowledge, adaptation and acquisition of a different type of language, i.e., computational language. This technology promotes social relations, helping the users to know themselves and improve their confidence and motivation. The students were the leaders of their learning, as they used a technological tool to overcome a challenge, thereby fostering their creativity by responding to the problems that were presented to them (p. 64).

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Due to confidentiality and privacy agreements, it is not possible to make these data publicly available.

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