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SOCIAL STORY INTERVENTION TO ENCOURAGE THE PARTICIPATION OF A CHILD WITH AUTISM IN OUT OF SCHOOL ROBOTIC ACTIVITY

Evaggelia Tsiomi, Med in Special Education, Team Science Member, Include, Thessaloniki, Greece, evangeliatsiomi@gmail.com

Anastasia Paschalidou, Student in Educational and Social Policy, Social Volunteer of Include, Thessaloniki, Greece, anastapascha10@gmail.com

Andromachi Nanou, Ph.D in Special Education, Team Science Leader of Include, Thessaloniki, Greece, antananou@gmail.com

In this research, an educational intervention was carried out to investigate the effectiveness of social story intervention to a 12 year old boy diagnosed at 2nd level of ASD in order to participate with his classmates in out of school educational robotic activity. The activity lasted 4 hours and took place in the inclusive robotic lab of " Tokei Maru:School for all". Interviews, researcher's diary and descriptive evaluation of the child's social adjustment were used for data collection. According to the findings the child reacted positively and participated in robotic activities although it was not expected by his mainstream and the support teacher. The educational intervention carried out in the context of ELiSe Erasmus+

Key words: ASD, autism, social story, educational robotics,out of school activity

INTRODUCTION

In recent years, robotics have been gaining ground in the education sector. The revolution in the field of robotics in education has been achieved in the last decade with robotics escaping from the laboratory environment and entering the reality of the school (Chambers & Carbonaro, 2003). Students could also join educational robotic activities out of school in the context of a school trip. According to Nugent and colleagues these aut of school activities are more interesting than inside the school (Nugent et. al., 2016).

Children with Autism Spectrum Disorders (ASD) face difficulties participating in activities that are out of their daily programme even if they are across home, school, or community contexts. One of their main difficulties concerns their participation in out of school trips (Simpson et al., 2018). Due to childrens' with ASD preference in consistency and sameness, students with ASD sometimes struggle when their daily schedules are disorganized by a school trip. Some students run away, tantrum, or display other difficult behaviors when they are under stress, which can make the trip significantly challenging and complicated. Repetitive and restricted behaviors, social anxiety, less effortful control, poor social skills, and dislike of school appear to be risk factors for poor transfer to schools. The need for on-going and individualized school based interventions is fundamental (Marsh, Spagnol, Grove, & Eapen, 2017). In order for school trips

to be beneficial for all children, transition and preparation strategies for children with ASD have to be developed (Hume, 2008).

Social stories have been introduced as an educational tool that supports children with ASD in their transitions (Briody & McGarry, 2005). Social Stories are short stories for children with autism in order to understand social situations, provide support in new and sometimes confusing social experiences (Gray, 1995). Feinberg (2002) argued that social stories increased four social skills: greeting behaviors, participation in the game, asking another child what he or she wants to play, and the choice of one child to play with. Most authors (Nichols et al., 2005, Reynhout & Carter, 2006) agree that although Social Stories are a promising intervention, given the research to date, it is premature to conclude that are a strategy based on evidence (Wright, B., Teige, C., Watson, J. *et al.* 2020).

As educational robotics are being integrated in school curriculum and previous studies have indicated that there is high interest in improving the relationship between robots and children with ASD (Arshad, et al., 2020) specific strategies to engage children with autism to participate in robotic activities have to be developed in inclusive settings (Tsiomi & Nanou, 2020, Nanou, et al., 2019).

RESEARCH PART

Purpose

The main purpose of the study is to investigate the effectiveness of a social story intervention addressed to a child with autism with specific difficulties in dealing with transitions to participate in out of school robotic activity with classmates.

Research methodology

The research methodology followed the procedure of an educational intervention. An educational intervention is a qualitative study that involves the design, implementation and evaluation of a proposal or curriculum in a particular subject and may relate to either the content or the teaching process. It requires measurements before and after the intervention. By comparing the results of the measurements before and after the educational intervention, researchers test the success or not of the educational intervention (Damaskinidis & Christodoulou, 2019).

Participants

The educational intervention was applied to a twelve year old boy Fanis with an ASD diagnosis who was attending a 5th grade class with a capacity of 18 students. Fanis, according to the Educational and Counseling Support Center was diagnosed with ASD-2nd level "Requiring substantial support (notable difficulties in socialization and flexibility)". He faces difficulties in maintenance

and understanding of social relationships, in dealing with change and transitions. Fanis participated in the social story intervention with the consensus of his mother. His teachers have been informed about the social story intervention after they conduct the "school for all" in order to participate in robotic activities.

Place and time

The educational intervention carried out at " Tokei Maru:School for all" Include. Include develops universal design of learning methods to include children with disabilities in different activities. The place is highly equipped and offered by the Stavros Niarchos Foundation. There was a 500 meter distance between the Fani's and Tokei Maru:School for all and the transition was held on foot.

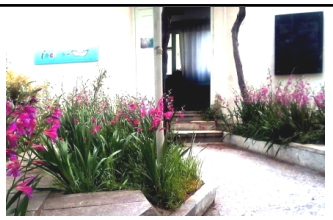
DIDACTIC METHODOLOGY

School for all Tokei Maru lab uses LEGO constructive play and educational robots such as NXT or EV3 Lego Mindstorms or We do in inclusive robotic activities. Lego Mindstorms has been used in several research interventions for children with autism as it fulfills goals such as social interaction between children with or without disabilities, since they do not require verbal communication and fosters, under specific rules, teamwork (Tsiomi & Nanou, 2020). In addition, LEGO constructive play promotes imagination, creativity and collaboration among expatriate peers and has therefore been used to develop or improve social skills in students with autism (Pang, 2010).

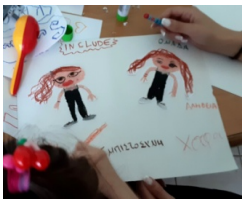
In order for Fanis to be included in the out of his school robotic activity specific adaptations were prepared with the collaboration between the school family and Takei Maru experts. More specifically the program was structured in 6 steps (fig.1). These steps were explicitly taught through digital social story powerpoint point presentation to the child with ASD by his school support teacher. In the Social story construction photos from previous educational robotic programs in Tokei matu were used. More specifically the social story presented the following information: a) photos of the entrance, b) the 6 steps of the activity including the problem that has to be solved and how the child with autism has to behave, c) the duration of the activities d) the emotions. Social story was sent via ppt to the support teacher 1 week before the robotic activity in order to teach it to Fanis. The structure of the social story and the description of the 6 steps are being presented in fig.1.

Data collection tools Initial and final evaluation: *Mainstream and Support Teacher's Interview*: The interview was structured including questions about the specific difficulties and interests of the child in order the social story to be adapted to his needs.

Entrance
I see a garden when I enter the "Tokei Maru: School for all". I am happy to be there

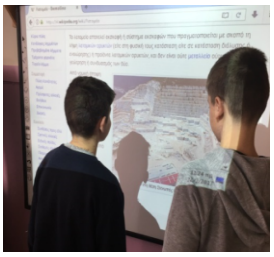


1. Explore the place. I am free to go and see all the places (5 min)	2. Children will be splitted into four teams. I stay with my team (15 min)	3. I prepare a poster with my team (15 min)



4. I hear the problem that my team has to solve. "The Problem: At the quarry of your area there is the need for automation. How would you help this process with your robot? Think of possible solutions and define different roles, developers, builders, architects, researchers" (15 min)

5. I help my team to solve the problem. I do what my team needs. Each team cooperates to solve the problem: look for information on the interactive board, construct the piece with their own material and their own robot by consulting the manual outlining the steps of the EV3 designing process using the appropriate bricks of kit (40 min).



6. Finally, each team presents its work . I stay with my team and help with the presentation (10 minutes).I am happy that I present my work with my team!

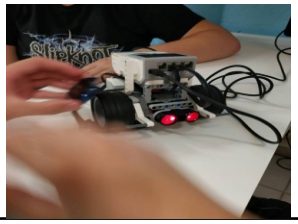


Figure 1. The entrance and the 6-step structure of the robotic activity in the Tokei Maru School for All

Data collecting during intervention: During the intervention were used the following tools : a) *Researcher's diaries*: in the diaries the observations of the child behaviors during activities was recorded by an external observer, a special educator with expertise in robotics. The special educator was observing a child's explicit behavior, his willingness to engage verbally or non-verbally, his eye contact times, his activation, his willingness to complete the activity and his anxiety signs. *b) P-Rubric of descriptive evaluation of child's participation at all stages of the activity.* The P-Rubric was designed for the needs of the intervention (Stevens, & Levi, 2005). The rate of the P-Rubric was 1-3. 1: not participating, 2: participating with teacher support, and 3: participating autonomously.

RESULTS

Initial evaluation

From initial assessment through interviews it was found that the child, although he could communicate verbally, experienced difficulties in adapting to disruptions of his daily scheduled activities and transitions. It was difficult for him to obey new rules and guidelines. He has never participated before in out of school activities because of increased anxiety. The support teacher and the teacher of the class felt that the child would not be able to respond to the visit. They had never used social stories before.

Intervention

According to the researcher's observations, the child entered the place with his support teacher. He seemed calm and began to move in space following the first step. His intention was to get in touch and get to know the objects. He started to be nervous when his peers got into the School for all and he started to bite his hands. Then the support teacher showed him his place to sit, as it was presented in the 6 step figure he was taught. The child saw the place and moved on "he felt comfortable" as the researcher commented. As the action started in all the stages mentioned above, it went smoothly. He was actively involved in the design of his team's poster with encouragement from the special educator. During the problem while assembling the Lego it was decided unanimously by the team to take on the role of finder, helping to find the necessary bricks. He was engaged with the support of his teacher and managed to be helpful to his team. During the presentation of the team at the end of the activity he expressed stress by biting his nails nervously while the others presented their work. He felt an active member of the team and participated in the presentation when the children started to sing while they presented the poster. Children gave him a musical instrument. "He was probably shy, feeling awkward because the educators, the researchers and his classmates were looking at him and his team," he researcher

noted. According to the descriptive engagement assessment, as shown in the table below, there was active child participation either autonomously or with support in most parts of action. There was tension during the division of the activities where the kid stood up from his seat and started to revolve nervously at the place. He also tried to throw Lego bricks at his peers. The support teacher tried to calm him by showing him the 6 steps of the activity and by reminding him which step he had to follow. He went back to his team and he continued to work on the activity. In the following diagram the participation of the child in every step is presented

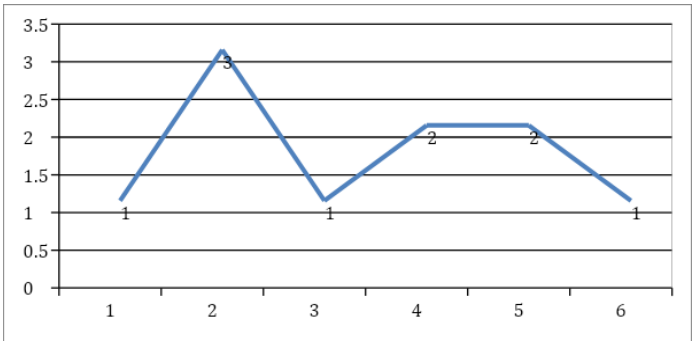


Figure 2. Descriptive assessment of the child's participation during the 6 steps of the robotic activity according to the rating by the special educator using the P_ Rubric

Final evaluation

According to the teacher's final interview the behavior adjustment of the child with autism was impressive. The teacher expressed his satisfaction and he said that it was the first time that a child with autism stood close to the team and cooperated in an out of the school activity. The teacher underlined the benefits of the usage of the social story that due to her opinion made the difference on child behavioral adjustment. The support teacher of the autism child during the final interview highlighted the unexpected difference in the child's behavioral adjustment and the involvement in the out of school activity. His opinion was that "the story manage to create a context of safeness for the child"

CONCLUSIONS

The research question was whether education through a social story could facilitate the participation and social adjustment of a child with autism spectrum at a school visit and participate in robotic activity. The effects of the social story intervention are encouraging as the child managed to stay calm and felt secure out of school. Although his teachers were negative about his participation and felt that he would not be able to respond to the program, the child with autism actively participated in most of the phases. As the two teachers, the mainstream and the support, claimed after the intervention program, social stories could help the child to be prepared before out of school activities. We conclude, based on

the literature (Gray,1995), that social history has a positive effect in supporting the child's participation. Robotic out of school activity became accessible for the child with ASD

RESEARCH LIMITATIONS

The experimental study with one subject is a qualitative study and its data cannot be generalized. In addition, observation and interview tools include by definition some degree of subjectivity that may relate to interpretations of the observations and sayings of the individual involved.

ACKNOWLEDGMENTS

The results of this social story investigation have been used as evidence based quid lines in the context of EliSe Eliminating Social Exclusion Erasmus+ It creates a descriptive model of transferring, traveling and participating in leisure time activities for families with children with Autism Spectrum Disorders.

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