



Institute for Autistic and Psychotic Children (EIPA),
Luxembourg

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Case Study

Institute's Profile:

Institute's name: institute pour les enfant autiste et psychotique Luxembourg (Institute for Autistic and Psychotic Children - EIPA) and Centre de compétences pour enfants et jeunes présentant un trouble du spectre de l'autisme (CTSA)

Institute's type: Public, under the authority of the Ministry of National Education, Childhood and Youth.

Institute's activities: Specialized school providing the education, teaching and rehabilitation for children and adolescents with an autism spectrum disorder subject to compulsory education.

Case study duration: January 2018 to June 2018

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Integration of QTrobot in the institute:

The institute received a QTrobot in January 2018. LuxAI, the vendor of QTrobot, presented a 2-hours workshop to therapists and educators of the institute on how to program and control the QTrobot using its graphical user interface.

LuxAI did not provide any pre-developed educational curriculum to the institute. Instead, it encouraged the therapists and educators to develop their own programs for the robot, and integrate the robot in their existing activities as they see fit. The therapists and educators learnt how to program and control the QTrobot following the workshop and were able to program the robot and integrate it in their activities without further support of LuxAI.

The QTrobot was used by a speech therapist for a duration of 6 months with 14 children during individual sessions and with 7 children in a group setting. The children were between 4 and 12 years old and all are on the autism spectrum.



Impact of QTrobot on children in individual therapy sessions:

- ❖ **Spontaneous initiation of children:** Some children take the initiative from the first meeting to address QTrobot. This is even observed in children who tend to flee the exchanges with the educator during first interactions. Children initiated the interaction with QTrobot as following:
 - **Looking at the robot:** All the children looked at the robot with interest and analyzed the screen representing the face. This happened with all the children, even those who tend to avoid eye contact, have furtive and fleeting eye contact, and those who tend to look out of the corner of their eyes.
 - **Touching the robot:** Most children tried to touch the robot. They often tried to touch the hands and arms of the robot to prompt the body movements. They also touched the face of the robot while it showed facial expressions (the question that arises here is whether they do so to give commands to the robot to show more facial expressions.)
 - **Verbal interaction:** Some children said hello to the robot as soon as they see it. Some took the initiative to speak to the robot and made a request or comment. For example, when reading a book, children designated an image and commented on it by addressing the robot. When the robot shows an expression in combination with an exclamation and a word, children tend to verbally imitate the robot.

- ❖ **Effect on children's collaboration and motivation to participate in the session:** Working with the robot improves children's motivation and collaboration during the sessions. We observed a better collaboration during the speech therapy sessions, when children are informed at the beginning of the session, that they will work with the robot at the end of the session. They tend to remain seated and have a better performance in the proposed exercises and given instructions. In this case, the robot acts as a reinforcer for children. In the case of one child, at the beginning of the year, sometimes he refused to leave his class to attend the speech therapy session and it was challenging for the therapist to convince the child to participate in the session. Since the robot has been introduced, he spontaneously gets out of the class and participates in the sessions, smiling and showing a collaborative mood. He also regularly asks to work with the robot.

- ❖ **Effect on attention, engagement and concentration:** Most of the children had higher attention and concentration while working with QTrobot. Children participate in the proposed activities for a longer time while working with the robot comparing to the times that they work with the therapist alone. The combination of gestures, facial expressions and speech shown by the robot have the highest effect on attracting children's attention.

- ❖ **Effect on disruptive and stereotypical behaviors:** During the activities with QTrobot, we observed reduction in number and duration of stereotypical behaviors in children. These behaviors happened less often and they lasted shorter comparing to the time that robot is not used. Also, the behaviors



had less intensity (if the child moved the arms and the whole body during the session without the robot, while working with QTrobot, the movements are limited to shaking the hand).

- ❖ **Effect on children's mood and attitude:** Most children had better mood during the interaction with QTrobot comparing to the time they work with the therapist alone. They expressed their happiness by smiling and laughing while working with the robot.

- ❖ **Effect on Imitation:** Most children imitate various expressions and behaviors of the robot directly. The same children did not imitate the same expressions when they were presented by the therapist or with some cards showing the same expressions. Exclamations associated with emotions are spontaneously repeated by some children after doing the same activity three or four times with the help of the robot.
Some children imitated the robot's speech and behaviors when they were prompted. Some children did not imitate the robot directly. They just listened to the robot and they repeated the pronounced words just when they were asked "What did you hear?".

- ❖ **Effect on quality of verbal language:** Some children used more verbal language and words when they were informed that afterwards they will work with the robot. During articulation exercises children put more effort, when they were working with the robot. Also, they were more tolerant to be corrected and they repeated the words more. When we do the same exercise without the robot, some children begin to whine or turn their head and avoid the articulatory effort.

Impact of QTrobot on children in group activities:

During the introduction session of QTrobot to a class group, we observe a variety of reactions to QTrobot:

- One child had a great interest in the robot and took initiative and immediately said hello to the robot.
 - One child was interested but kept some distance from the robot.
 - Two had fluctuation in their interest and diverted their attention toward the robot in an inconsistent manner. One of them was also diverting attention often to the robot's tablet.
 - Three children didn't show a high interest in QTrobot and diverted their attention toward other activities.
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- ❖ **Music activity:** During a music activity in the classroom, we observed that children are quieter, more focused and show some respect towards the robot. They watched the robot's activities closely.



The presentation of the different steps of the activity must be carried out by the classroom teacher. She explains the tasks to be executed and encourages the children to imitate the robot (together or in turn)

- ❖ **Reading a book:** We also used QTrobot during an activity consisting in reading books to the children. During this activity, we witnessed that:
- Children directed their attention highly to the robot and the book, while they often get distracted if the same activity is done without the robot.
 - When the robot was holding a book, children didn't try to turn the pages. When the activity was done without the robot, they tended to insist on turning the pages and they wanted to pass from each page quickly.
 - They reacted more to the exaggerated vocal expressions of the robot and its intonations.
 - Some children commented more on the images of the book when the activity was done by the robot.
 - Children tend to repeat the words more, when the robot is reading the stories to them.

Lesson learnt and best practices

- ❖ **Using QTrobot on the ground vs using QTrobot on a table:** The robot is more effective when placed on the table. When the robot is on the table, children are more comfortable to interact. Also, children don't try much to touch the robot. However, it is better to put the robot on a shorter table or to give the child a taller chair, so that the eyes of the robot and the child are at the same level, otherwise the child tends to stand up frequently, to see the face of the robot better.
- ❖ **Effect of the tablet controlling QTrobot on children:** Several children get distracted by the tablet and tried to take it to play with it. Some wanted to control the robot by using the tablet. Also, in a session with the assistance of a trainee controlling the robot using a tablet, one child diverted more attention to the trainee. However, when instead of a tablet, a smart phone was used to control the robot, children didn't get distracted.

Regarding the manipulation of the tablet by the therapist, the device is not very responsive. Thus, when the orders are slow to be activated, the child gets impatient and tries to manipulate the robot himself.

- ❖ **Fear:** During the first sessions, some children get scared when the robot moved the arms. If we introduce step by step "faces" then "sound" then "gesture", it's better. Moreover, children lose the



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fear of the gesture when they see that the robot is controlled by the tablet and they have the opportunity to try it themselves.

- ❖ **Interactions:** Most children seek contact with the robot. They approach it, try to touch it and smile. Some children are indifferent or even cautious about the robot and the caregiver remains the person to whom the children address primarily. Some children have special expectations from the robot and lose interest when the robot does not do what they expect or does something that does not interest them. Two or three children went to the adult to give a specific order to the robot.

- ❖ **Other notes:** Some of the observed effects, such as seeking contact, improved attention and collaboration, are also achieved with other reinforcers and other media such as puppets. The observations concern particular areas and we observed an effect on training situations. The generalization of acquired knowledge must subsequently be carried out in a real situation and without the presence of the robot.

Disclaimer by LuxAI:

The content of this report is produced and its publication was authorized by the authors, who are independent of LuxAI. The translations from the original language to English and formatting was made by LuxAI, which was reviewed and confirmed by the authors. The report presents various cases of using QTrobot in activities with children with autism and the observations are made by the therapists. These activities are developed by the therapists without the LuxAI's help. The proposed way of using QTrobot by LuxAI is to place the QTrobot on a stable table out of the reach of the children and not to allow any physical interaction between the children and the QTrobot.