

# Helping Educators Monitor Autistic Children’s Progress Across Sessions: A Needfinding Study

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## ABSTRACT

Social robots may be beneficial to educators working with autistic children in helping to monitor the children’s progress. To identify needs for measuring and tracking progress of autistic children, we conducted interviews with nine experienced educators in Serbia and the Netherlands who work with autistic children. Responses revealed educators’ needs to identify antecedents of notable child behaviour, to have standardised measures of social skills, and to understand child behaviour across settings. We present initial design concepts how social robots could be utilised to meet these needs.

## CCS CONCEPTS

• **Human-centered computing** → *User centered design*; • **Social and professional topics** → *People with disabilities*.

## KEYWORDS

User needs; Autism Spectrum Condition; Automatic reporting

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## 1 INTRODUCTION

Autism Spectrum Condition is a neurodevelopmental condition characterised by difficulties with social interaction and communication and the presence of restricted, repetitive patterns of behaviour [1]. Social robots are used increasingly to enhance interventions for autistic children [3, 9]. As a secondary purpose, these socially intelligent systems provide unique opportunities to gather and

present information on the child’s progression that is important for understanding whether an intervention is working but can be difficult for the educator to assess as the changes can be minor and are easily missed [6]. Current methods for monitoring autistic children’s behaviour predominantly rely on embedded cameras [e.g. 4, 5] or wearables which record movement patterns [e.g. 7]. However, the children may not be aware that their behaviour is being monitored, as they do not directly engage with these systems, nor are these systems transparent to the children, which raises concerns on whether the children would assent to the monitoring of their behaviour [10]. Social robots could alleviate this concern, as they already observe and analyse the child’s behaviour to facilitate a degree of autonomy in their interaction with the child. Moreover, social robots can be made to be highly transparent about their analysis of the child’s behaviour by communicating this explicitly to the child.

We aim to utilise the potential of social robots to provide information on an autistic child’s progression, but we do not yet know well enough what information is actually useful to educators. Therefore, we conducted interviews to assess the needs of educators for monitoring and reporting the progression of autistic children.

## 2 METHOD

### 2.1 Participants

Nine educators (female:  $n = 8$ ) participated in semi-structured needfinding interviews. Two were from the Netherlands (NL), and seven from Serbia (SRB). Participants were recruited from a local search of autism-related institutes (NL) and from a network of autism educators (SRB). Their titles are art therapist ( $n = 1$ , NL), head psychologist ( $n = 1$ , NL), special educator ( $n = 6$ , SRB) and psychomotor educator ( $n = 1$ , SRB). The educators had between 5- and 29-years’ of experience ( $M = 17$ ,  $SD = 9$ ) working with autistic children. All participants were actively employed as educators working with autistic children or adolescents at the time of the interviews.

### 2.2 Procedure

The interviews were conducted over the phone (NL) or in person (SRB) and lasted approximately 30 to 45 minutes. They were structured as follows. Firstly, the interviewer introduced herself

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and obtained consent to record audio. The participant was then asked demographic and professional questions (e.g., type of children they work with, types of therapies they use). Next, the interviewer would ask the participant to describe actual positive and negative events that occurred in a session with an autistic child, how they recognised and dealt with the event. This was followed by the interviewer asking the participant to describe their current practices with measuring and reporting on the progression of an autistic child. Afterwards, participants were asked several questions regarding how they would like to measure and report on the child's progression if it were up to them.

### 2.3 Thematic analysis

The audio-recordings were transcribed verbatim and analysed using thematic analysis [2]. We used the thematic analysis as a realist method, meaning we report on the experiences, meaning, and reality of participants. The themes were identified using a bottom-up (data-driven) approach. Three researchers familiarised themselves with the transcripts, reviewed the identified themes, and concluded on the final definitions of themes, which we report in this paper.

## 3 RESULTS

### 3.1 Theme 1: need for moment-by-moment monitoring

Participants mentioned a need to identify reasons for a child's behaviour that had considerable impact on the session. Behaviours such as when a child gets upset or leaves. Participants mentioned that this could be because of something that happened during the session. However, the cause of such child behaviour could also be related to something that happened outside the session – “the context is important” [NL1]. Similarly, identifying positive behaviours, such as what may be particularly motivating to the child, may be useful for the educator (and other people) to know:

“What did the teacher apply and what methods in work are adequate for this pupil, because I think it is very valuable for all other colleagues to know how to approach a pupil.” [SRB6].

The majority of the participants mentioned that detailed, moment-by-moment monitoring is currently challenging. Some participants work with multiple autistic children at the same time, which makes it impossible to always notice antecedent behaviours that lead up to the positive or negative events. In one-on-one sessions it may also not be possible to pay close attention to the child at every moment. Participants mentioned the high workload during a session in which they need to keep track of various things; this can prevent them from paying close attention to the child at times. Furthermore, some participants mentioned that they sometimes have difficulty looking objectively at their own role in the child's behaviour.

### 3.2 Theme 2: need for standardised measures of social skills

Six participants in Serbia mentioned a need for standardised, validated measures of child progress in social skills learning. The dependency on a certain language seems to be a key barrier for the adoption of current standardised tests. A Serbian educator said:

“What we follow is based on spoken language tests; battery of tests created for typically developing population of children. ... because everything we have and use is validated on some foreign test that are unstandardised and I am not sure that these are adequate materials” [SRB1].

Other Serbian educators mentioned that they report on the child's progression in social skills purely based on their observations, as they do not have access to any standardised tests.

### 3.3 Theme 3: need to understand child behaviour across settings

Most participants mentioned that they would like a better understanding of children's progress outside of their sessions to assess whether progression within sessions also generalises to other settings. One participant said:

“Professionals do not see all aspects of the child's life: at school, at home, or at sports. The context can determine a lot. The child could perform well at school, but abreact at home or vice versa. A professional cannot grasp the whole picture.” [NL1].

NL1 further suggests an alternate method involving parents for understanding the child's progress across setting: “Optimal would be the collaboration of a professional and parents”. That is, a key challenge is to be able to also look at the child's progress in settings where the educators are not present.

## 4 DISCUSSION AND CONCLUSION

The aim of our study was to assess the needs of educators working with autistic children in monitoring and reporting the children's progression. Educators in the Netherlands and Serbia mentioned identifying antecedents of noteworthy child behaviour, having standardised measures for progression, and identifying progression across settings as needs. Further research is required to verify whether these needs are more widely shared between educators working with autistic children in the Netherlands, Serbia, as well as other countries.

Social robots can be utilised to try and meet these needs. The robot's behavioural analysis could be used to mark salient moments in a recording of the interaction. This could help educators to quickly review the interaction. Furthermore, because robots can create standardised situations and provide stimuli that are always the same [8], the robot's analysis of the child's affective and behavioural response to these stimuli could be further developed to provide standardised measures that are not language-dependent. The need to assess progression across settings may be more difficult to meet. Possibly, social robots that serve as a companion to an autistic child could be utilised to this purpose, as they may observe behaviour in the different settings of daily life.

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