Developing a robot that will help blind children chat with sighted friends

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Children with mixed visual impairment having a group conversation moderated by the robot Dash. Credit: Interactive Technologies Institute

A new accessibility-focused robot under development will allow children of mixed visual abilities to have a balanced conversation where everyone

participates equally.

Researchers at the Interactive Technologies Institute have recently released a study on using a robot to mediate group discussions between children with mixed-visual abilities.

The team presented the study during the ACM/IEEE conference this March in Stockholm, and it's now published as part of the *Proceedings of the 2023 ACM/IEEE International Conference on Human-Robot Interaction*.

The research team identified the problem of children with disabilities participating less in group discussions due to the lack of accessible technologies that fit the needs of children with and without visual impairment.

"Most accessible technologies are developed to be used only by children with disabilities, which excludes them from many classroom activities. Additionally, children with visual impairment have more challenges perceiving conversation and related non-verbal cues," explains Isabel Neto, the leading researcher and Ph.D. candidate at Instituto Superior Técnico.

To solve this issue, the researchers adapted a commercially-available robotic toy—Dash—that mediates group discussions between mixed-visual abilities children. The robot moves between the children and stays in front of the currently speaking child as a listening buddy while using microphones to understand how much each child has talked. The robot changes its position and goes to the child that spoke less in the group to encourage her to intervene.

Dash uses bright, colorful LEDs and verbal utterances to communicate conversation engagement or encourage participation. "The robot's

behaviors were created through software development, specifically designed to be used by mixed-abilities children. Its behaviors are perceived by any child, regardless of their visual acuity," clarifies the researcher.

The study performed with groups of children aimed to test if the robot intervention would promote equal participation of children with and without visual impairment in group conversations. "We were interested in assessing how balanced the group participation would be. We considered a group balanced whenever children spoke fairly for the same amount of time. On the other hand, we considered unbalanced the groups in which at least one child spoke significantly more or less than the others," clarifies Isabel Neto.

The study showed that the robot reduced the discrepancy between how much children with and without visual impairments participated. The team reached these results by using what they called a directive strategy. In this case, the robot moves near the least participating child, encouraging them to talk. "Although it did not fully eliminate discrepancies, the robot did reduce this unevenness. For this reason, this is a small yet promising step towards fairer participation of all children in classroom activities," concludes the researcher.

This research highlights the benefits of creating inclusive technologies that anyone can use, promoting fair and equitable experiences. In the future, the Interactive Technologies Institute research team will perfect the directive strategy to make it feel more organic and natural. "We also want to expand our audiences and explore how we could use a robot on other mixed-ability groups, such as children in the autism spectrum," she reveals. The researchers hope their findings will positively influence group dynamics in classrooms, workplaces, and homes.

More information: Isabel Neto et al, The Robot Made Us Hear Each

Other, *Proceedings of the 2023 ACM/IEEE International Conference on Human-Robot Interaction* (2023). DOI: 10.1145/3568162.3576997