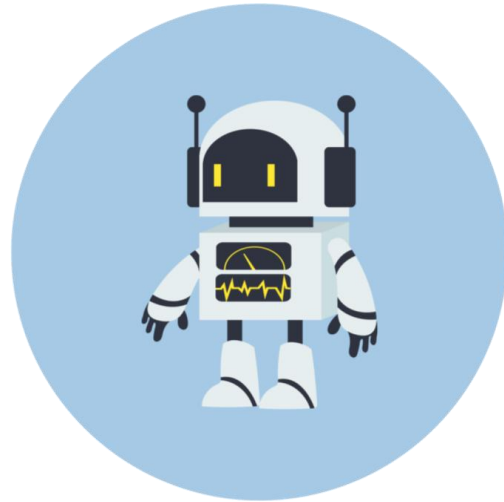


Examining Teachers' Opinions on the Potential for Using Social Robots in Philadelphia Public Schools



Allison Langer, Peter Marshall

The Department of Psychology & Neuroscience



Background: Social Robots

What are social robots?

- Robots designed to interact and communicate with people ¹

What are the advantages of social robots?

- Can act on their physical environment
- Allow naturalistic interactions²

Where are they used?

- Healthcare, therapy, **education**



Social Robots in Education



A



B



C

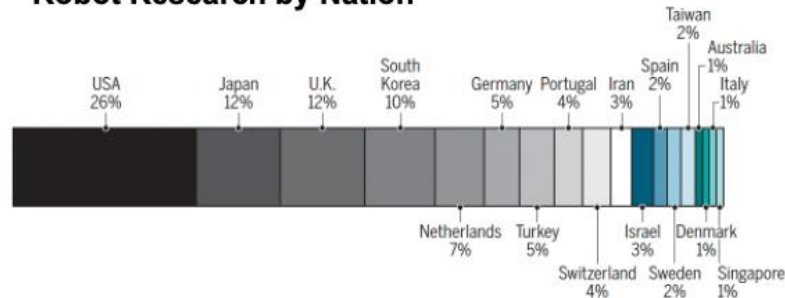


D

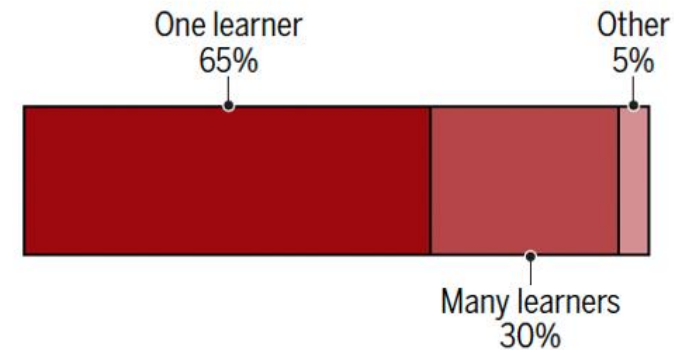
Belpaeme, et al. (2018)

Research on Social Robots in Education

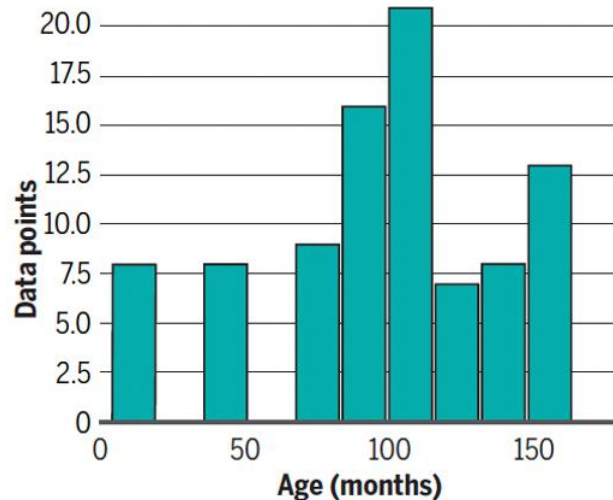
Robot Research by Nation



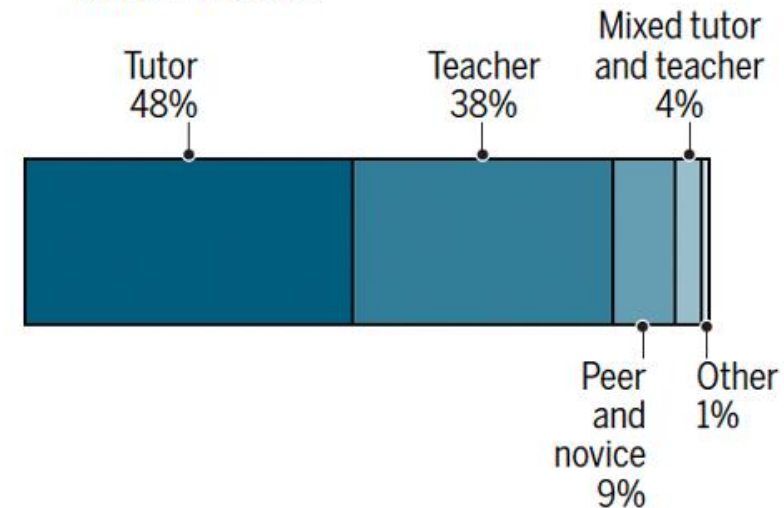
Number of learners per robot



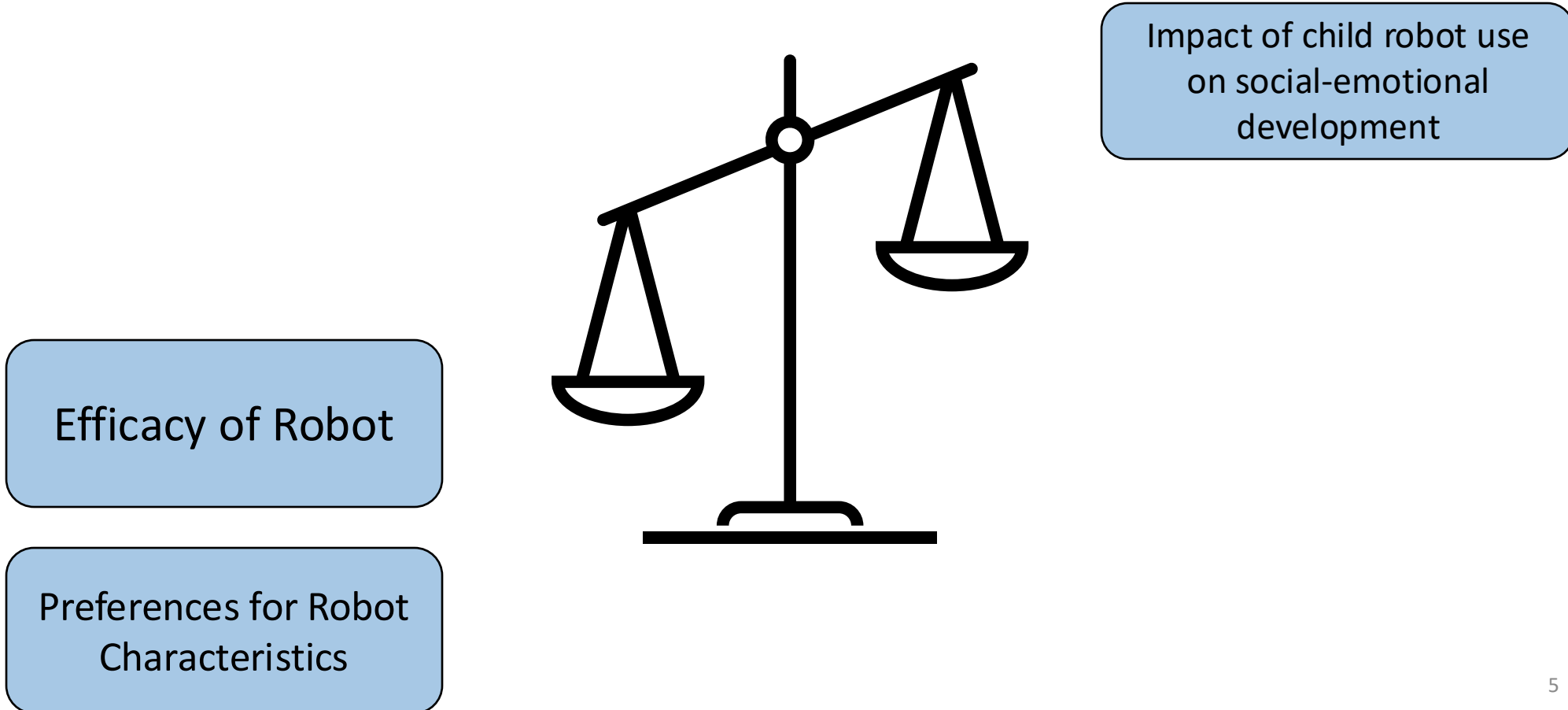
Children's ages



Role of robot



Research on Social Robots in Education



Social & Emotional Development

Why would robots have an effect?

- Predictions from other fields
 - Relations between “screen time” and poor performance on measures of social-personal developmental milestones⁵
 - Long-term influence of Alexa on children’s ability and desire to have face-to-face interactions⁶
- Children anthropomorphize robots⁷





Social Robots & Socio-emotional Impact

Stakeholder Research

Examining Teachers' Opinions
on the Potential for Using Social Robots
in Philadelphia Public Schools





Study Participation – Eligibility & Consent

AAA

+

-

Eligibility Screening Questionnaire

Thank you for your interest in participating in our study! To determine if you are eligible for the study, please complete the following questions:

Are you at least 18 years old?
* must provide value

Yes ▾

Are you currently a K-12 teacher?
* must provide value

Yes ▾

You are eligible to participate in the survey!
Please provide your school-associated email address to be redirected to the survey:
* must provide value

Submit

Save & Return Later

AAA

+

-

Consent Form

Please read through the consent form for this research study. If you have any questions, please reach out to allison.langer@temple.edu.

Thank you!

RESEARCH SUBJECT CONSENT FORM

Title: Examining Teachers' Opinions on Child-Robot Interactions in Schools
Protocol No.: 29349
Investigator: Peter J. Marshall, Ph.D. & Allison Langer
Daytime Phone Number: (443) 574-4136
Email: Allison.Langer@temple.edu

RESEARCH CONSENT
You are being asked for your consent to take part in a research study. This consent document describes the key information that we believe most people need to decide whether to take part in this research.

Why am I being invited to participate in this research?
Social robots can interact and communicate with humans, and are currently being developed for use in primary and secondary education. We are asking you to take part in this research because we are interested to hear your thoughts and opinions on the use of social robots in schools.

How long will I be in this research?
We expect that your taking part in this research will last 15-20 minutes.

What happens to me if I agree to take part in this research?
If you decide to take part in this research study, you will be asked to complete a survey that will take between 15 and 20 minutes to complete.

What are the risks of this study?
There are no physical risks, but you might experience momentary discomfort. You might be asked to answer questions that make you too uncomfortable. There is also a mild risk of breach of confidentiality. Your participation in this research will be held strictly confidential, however, confidential

Who can answer my questions about this research?
If you have questions, concerns, or complaints, or think this research has hurt you or made you sick, talk to the research team at the phone number or email listed above on the first page.
This research is being overseen by an Institutional Review Board ("IRB"). An IRB is a group of people who perform independent review of research studies. You may talk to them at (215) 707-3390 or irb@temple.edu if:
*You have questions, concerns, or complaints that are not being answered by the research team.
*You have questions about your rights as a research subject.

Will I be paid for taking part in this research?
For taking part in this research, you may be paid up to a total of \$5 in the form of an Amazon Gift Card. Federal tax law requires you to report this payment as income to the Internal Revenue Service. You may be asked to tell us your social security number, full name, address, or other identifying information in order to compensate you for your participation. We may request this because we are required to report cumulative payments more than \$599.00, to the Internal Revenue.

I consent to take part in this research study.
* must provide value

☐ Yes
☐ No

reset

Submit



Methods

- Participants:
 - Teachers (n=69) in the School District of Philadelphia
- Measures:
 - Negative Attitudes Towards Robots (Nomura, 2006)
 - Social Robot Survey (adapted from Kennedy et al., 2016)
 - Robot's role in the classroom
 - Acceptability
 - Socio-emotional impact

Social robots, such as the one pictured below, can interact and communicate with humans. Such robots are being explored for use in primary and secondary education, given the increasing need for technology to support the efforts of educators in providing individualized, adaptive learning environments for children. Social robots can act autonomously to speak, move, use body language, and understand speech commands from humans.

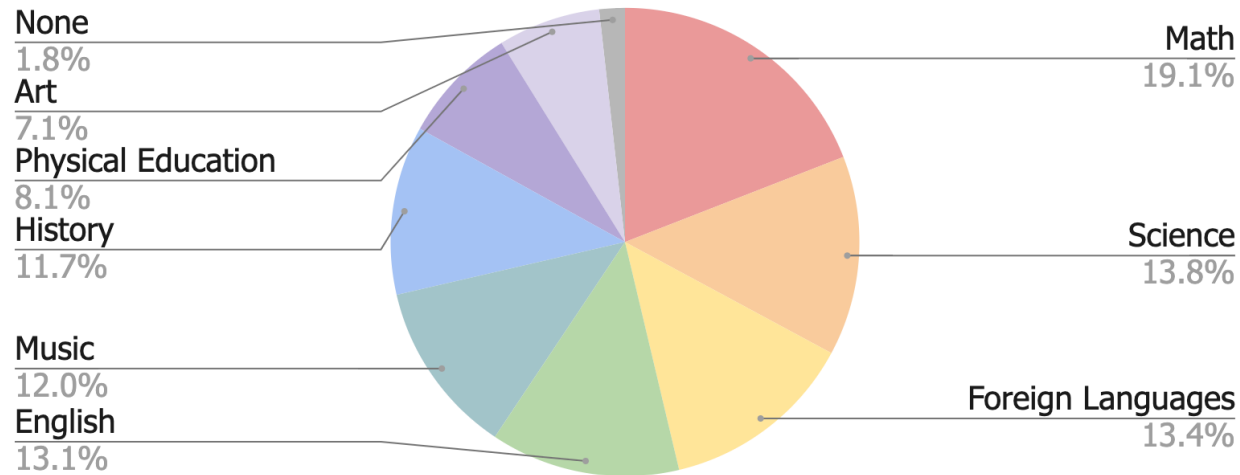


In classroom settings, social robots can use their capabilities to help children learn new words, complete math or reading tasks, and play interactive games involving imitation. Social robots are designed to interact with students on a frequent basis and could be implemented in the classroom for the entirety of the school year.

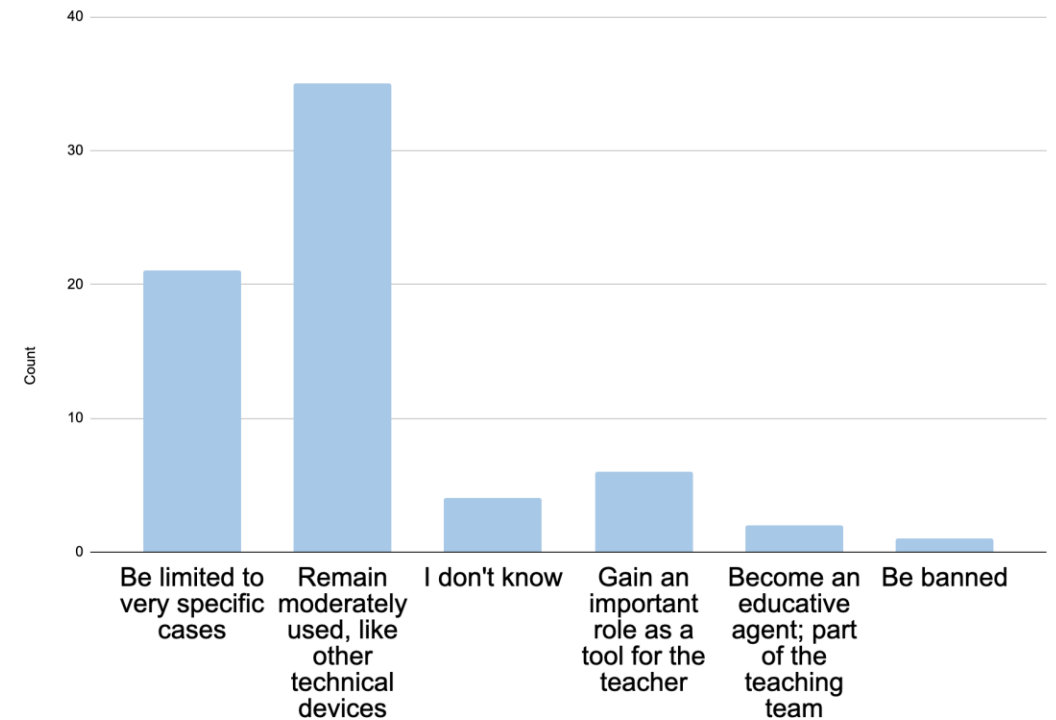


Results: A Robot's Role

Which subjects do you think robots may aid in teaching?



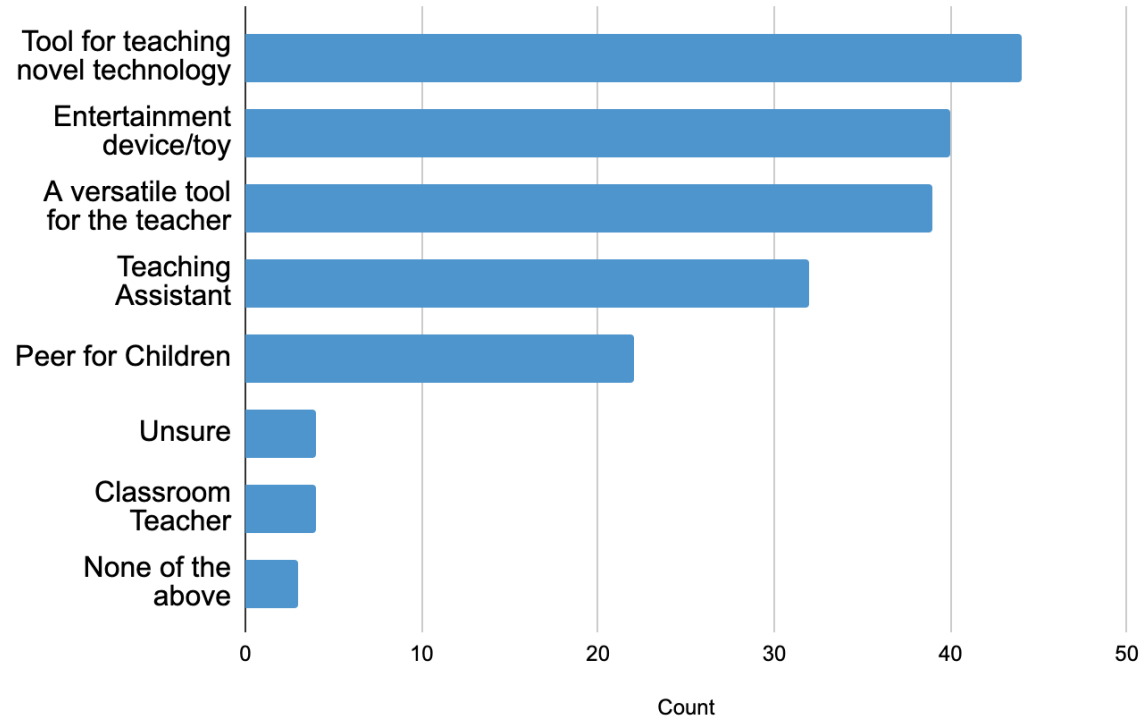
In child education, social robots should ideally...



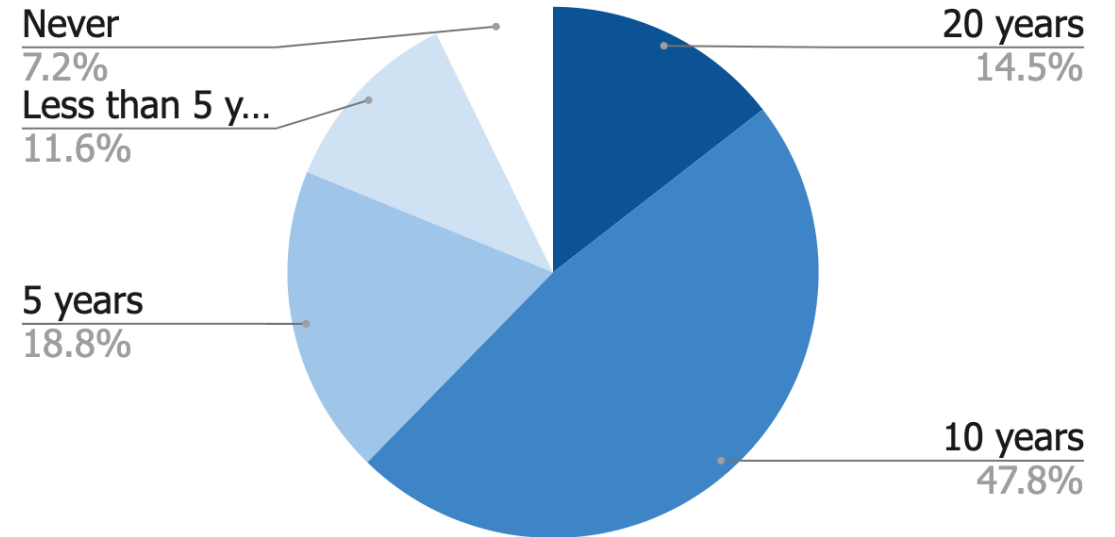


Results: A Robot's Role, Continued

I would see a social robot as a: [select all that apply]

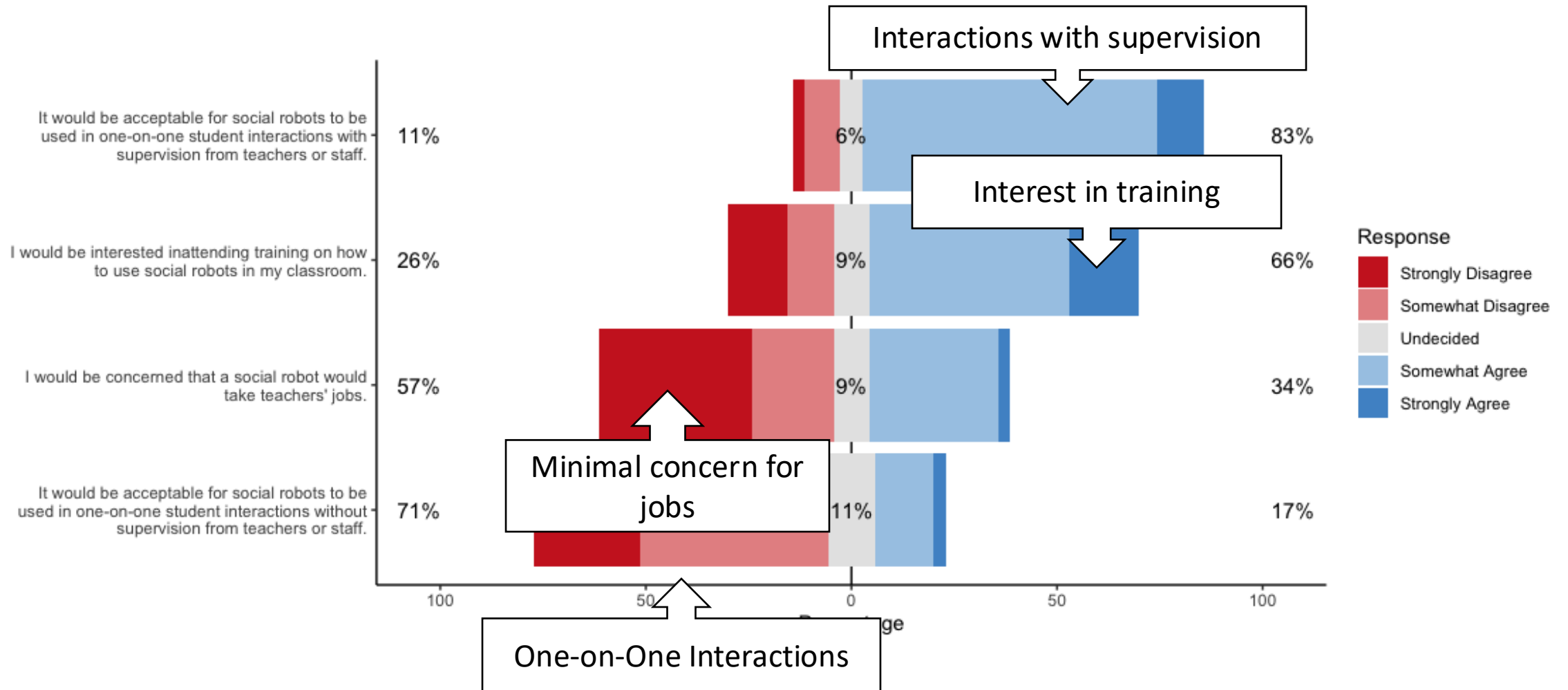


When do you think it will become commonplace for social robots to be in schools in the U.S.?





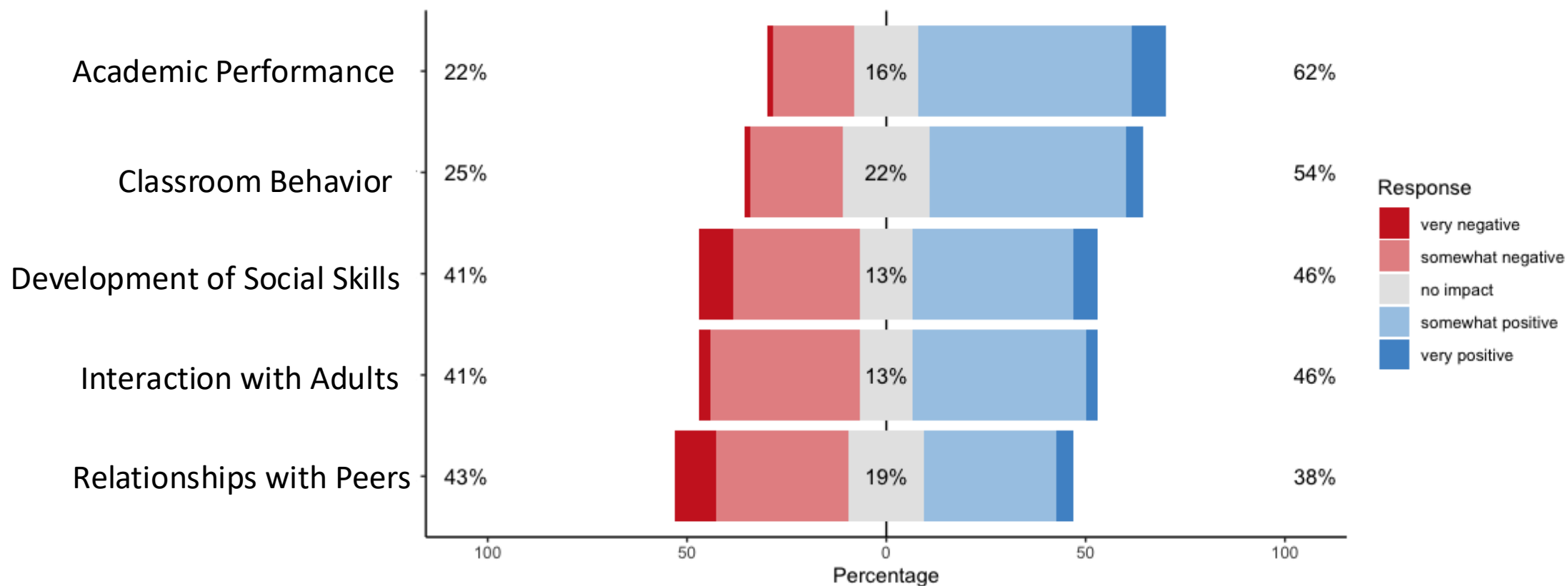
Results: Acceptability





Results: Socio-emotional Impact

In the long term, the use of social robots in schools would have the following impact on children's...





Results: Negative Attitudes Towards Robots

Table 2. Correlations of Survey Items and NARS Scores

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. It would be acceptable for social robots to be used in one-on-one student interactions with supervision from teachers or staff.	3.81	0.91									
2. It would be acceptable for social robots to be used in one-on-one student interactions without supervision from teachers or staff.	2.20	1.11	.40**								
3. In the long run, the use of social robots in schools would have the following impact on children's academic performance	3.48	0.96	.56**	.31*							
4. In the long run, the use of social robots in school would have the following impact on children's classroom behavior	3.32	0.93	.56**	.28*	.68**						
5. In the long run, the use of social robots in school would have the following impact on children's interactions with adults	3.06	1.03	.62**	.39**	.68**	.64**					
6. In the long run, the use of social robots in school would have the following impact on children's social relationships with peers	2.88	1.12	.57**	.26*	.60**	.60**	.71**				
7. In the long run, the use of social robots in class would have the following impact on children's development of social skills	3.03	1.15	.57**	.38**	.66**	.66**	.84**	.77**			
8. I would be interested in attending training on how to use social robots in my classroom.	3.41	1.38	.46**	.15	.39**	.29*	.40**	.49**	.45**		
9. I would be concerned that a social robot would take teachers' jobs.	2.43	1.39	-.13	-.02	-.29*	-.12	-.22	-.27*	-.23	-.12	
10. .NARS Score	42.71	9.29	-.34**	-.24*	-.32**	-.35**	-.32**	-.44**	-.46**	-.42**	.36**

Note. *M* and *SD* are used to represent mean and standard deviation, respectively. * indicates $p < .05$. ** indicates $p < .01$.

Results – Open Ended

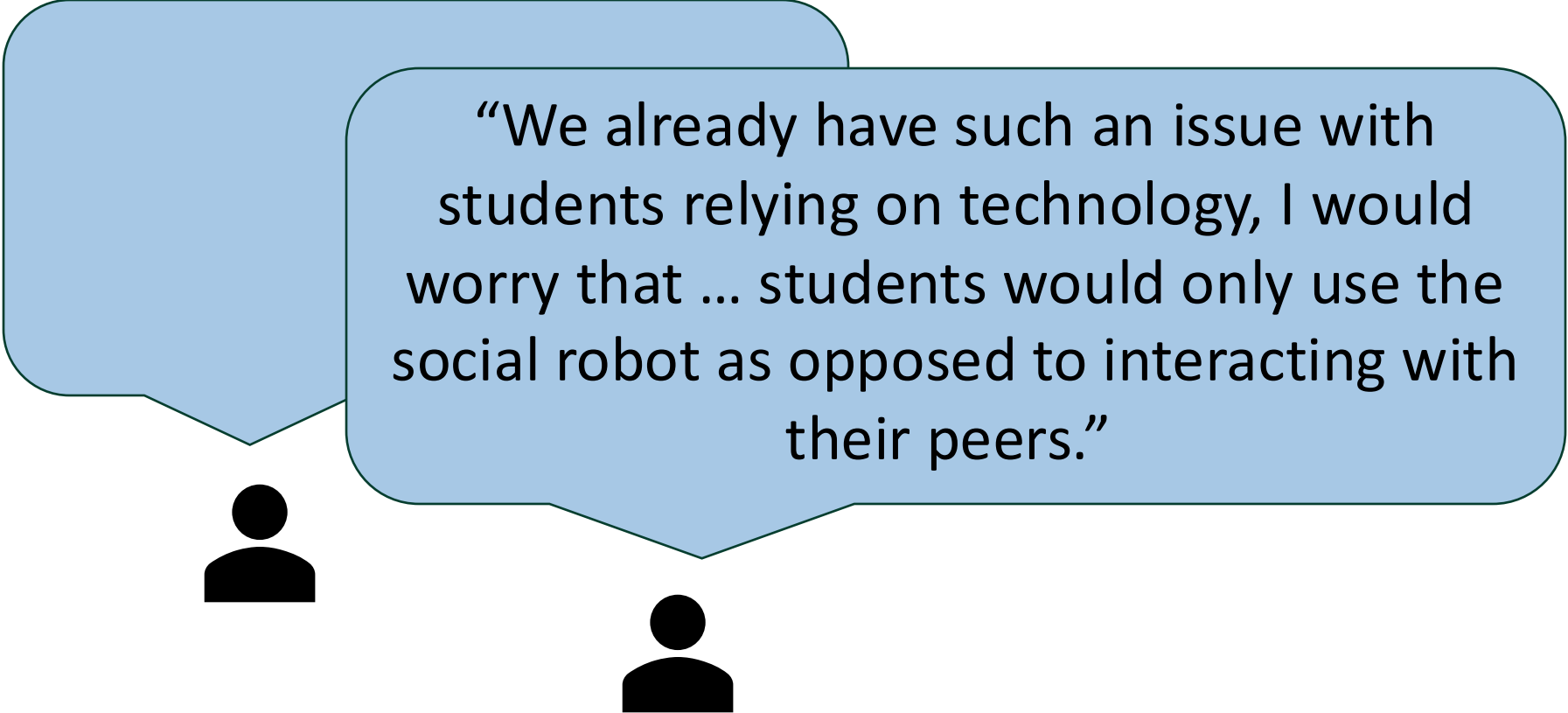
“Please give your opinion on the possible advantages or disadvantages of having social robots in your classroom.”

Theme I: Individualized & Adaptive Learning

“It may be an advantage to be able to give students more individualized attention, where applicable.”

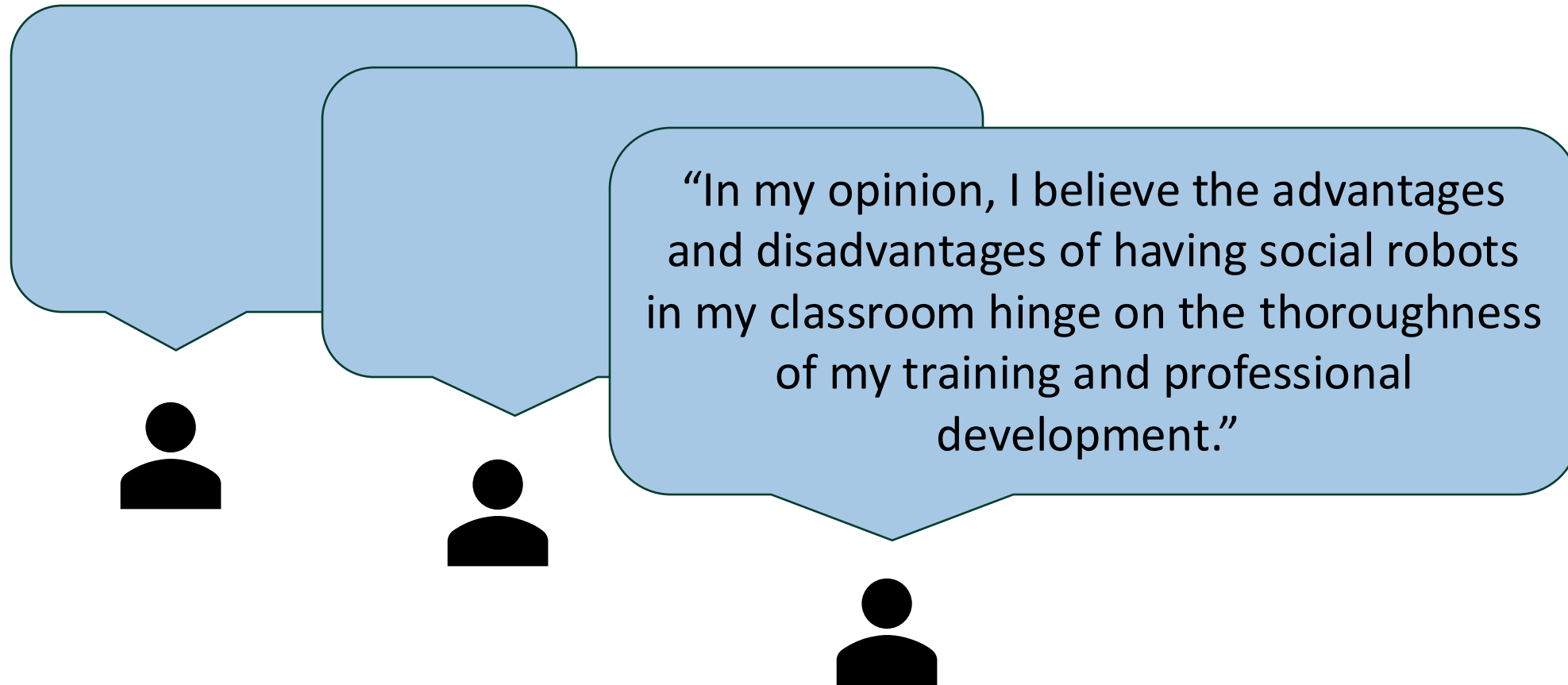


Theme II: Socio-Emotional Development

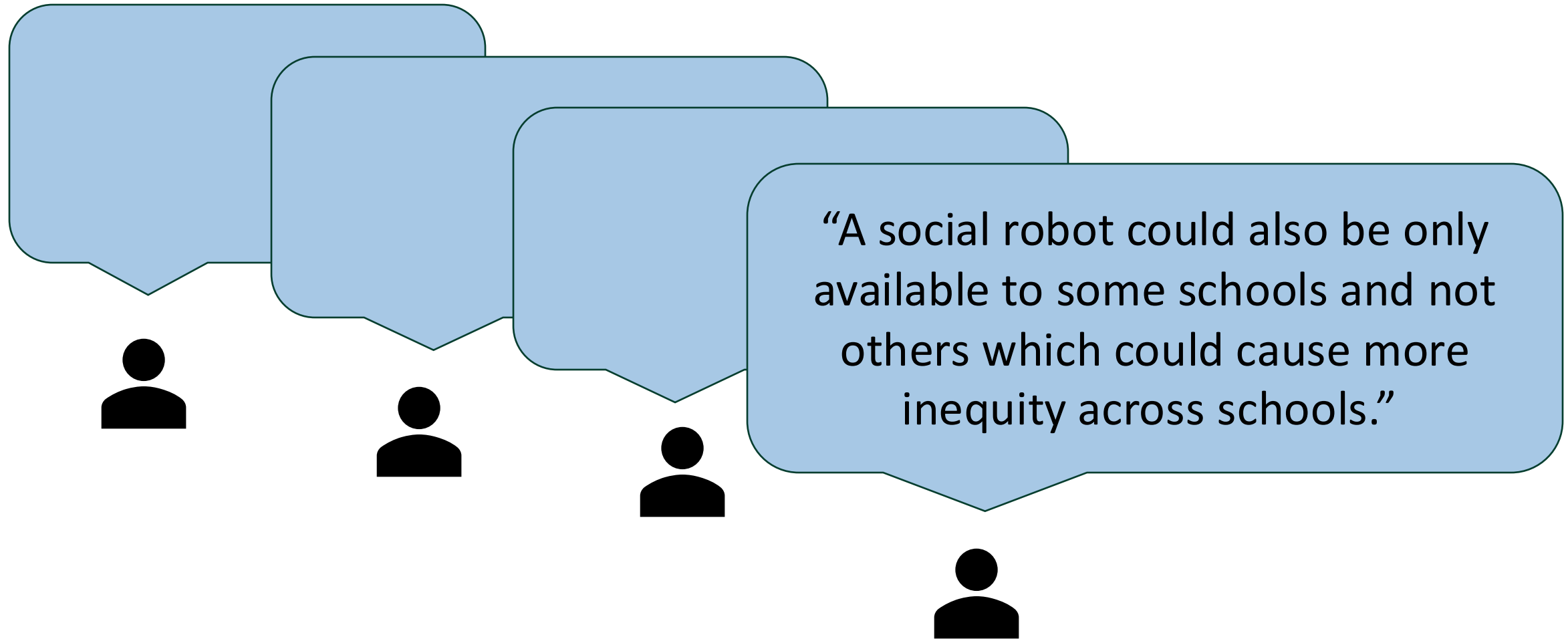


“We already have such an issue with students relying on technology, I would worry that ... students would only use the social robot as opposed to interacting with their peers.”

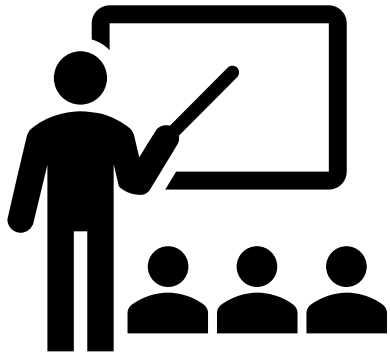
Theme III: Teacher's Role & Training



Theme IV: Equity & Accessibility



Discussion



Teachers saw robots as...

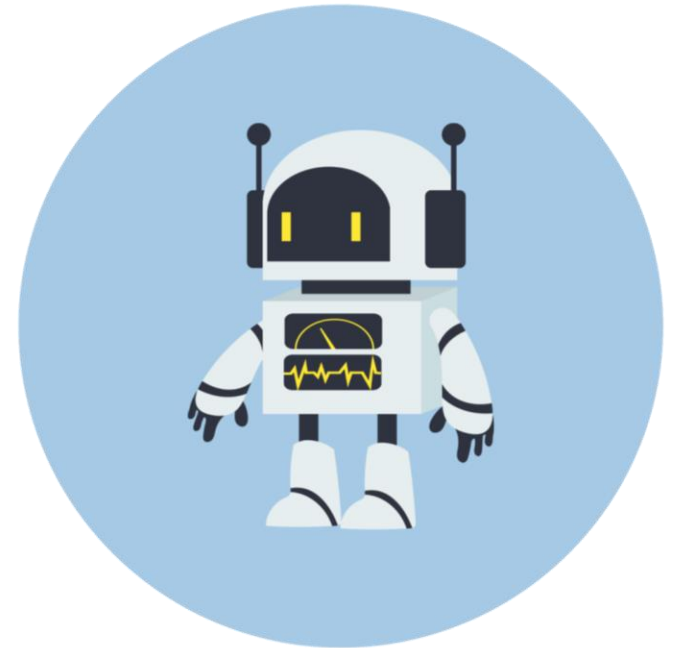
- an individualized educational use to supplement teacher instruction

Teachers acknowledged potential...

- inequitable distribution of the technology
- privacy risks
- **harmful effects on students' social development**

Implications & Future Directions

- Long-term studies of robots in classrooms with participatory design
 - Focus on socio-emotional *and* learning outcomes
- Research that focuses on user's individual differences
- Understand how robots compare to other forms of technology (screens, voice assistants, etc.)



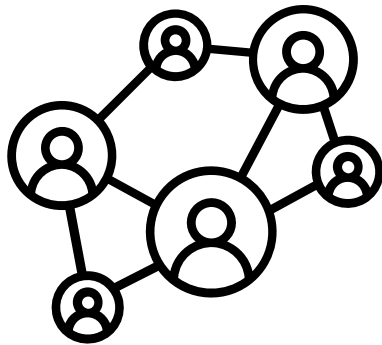
Thank you

- School District of Philadelphia
- Advisor: Peter Marshall, PhD
- Funding agencies
- You all!

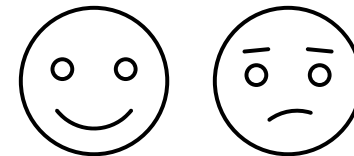


What is “socio-emotional development”?

Social development refers to a child’s ability to **create** and **sustain** meaningful relationships with adults and other children.



Emotional development is a child’s ability to **express**, **recognize**, and **manage** his or her emotions, as well as **respond** appropriately to others’ emotions.



Appendix – Sample Descriptives

<i>Continuous Variable</i>	<i>n</i>	<i>M</i>	<i>SD</i>
<i>Years of Teaching Experience</i>	69	14.65	10.29
Categorical	<i>n</i>	<i>%</i>	
<i>Age Range</i>			
18-24	2	2.9%	
25-34	17	24.6%	
35-44	27	39.1%	
45-54	16	23.2%	
55-64	7	10.1%	
<i>Gender</i>			
Female	46	68.7%	
Male	21	31.%	
Missing data	2	2.9%	
All other gender categories	0		
<i>Education Level</i>			
Some college (two years or fewer)	1	1.4%	
Associate degree	1	1.4%	
Bachelor's Degree	4	5.8%	
Master's degree	62	89.9%	
Master's degree & JD	1	1.4%	
<i>Type of School</i>			
Magnet School	14	20.3%	
Public School	54	76.8%	
CTE High School	1		

NARS (Nomura, 2006)

Item No.	Questionnaire Item	Sub-Scale
1	I would feel uneasy if robots really had emotions.	S2
2	Something bad might happen if robots developed into living beings.	S2
3	I would feel relaxed talking with robots*	S3
4	I would feel uneasy if I was given a job where I had to use robots.	S1
5	If robots had emotions I would be able to make friends with them.*	S3
6	I feel comforted being with robots that have emotions.*	S3
7	The word “robot” means nothing to me.	S1
8	I would feel nervous operating a robot in front of other people.	S1
9	I would hate the idea that robots or artificial intelligences were making judgements about things.	S1
10	I would feel very nervous just standing in front of a robot.	S1
11	I feel that if I depend on robots too much, something bad might happen.	S2
12	I would feel paranoid talking with a robot.	S1
13	I am concerned that robots would be a bad influence on children.	S2
14	I feel that int the future society will be dominated by robots.	S2

(*inverse item)