ROBOTS @ SCHOOL°

A study by **Latitude°** in collaboration with **LEGO® Learning Institute** & **Project Synthesis**

ROBOTS @ SCHOOL is one installment of Latitude 42s, an ongoing series of innovation studies which Latitude, an international research consultancy, publishes in the spirit of knowledge-sharing and opportunity discovery for both established companies and emerging entrepreneurs.
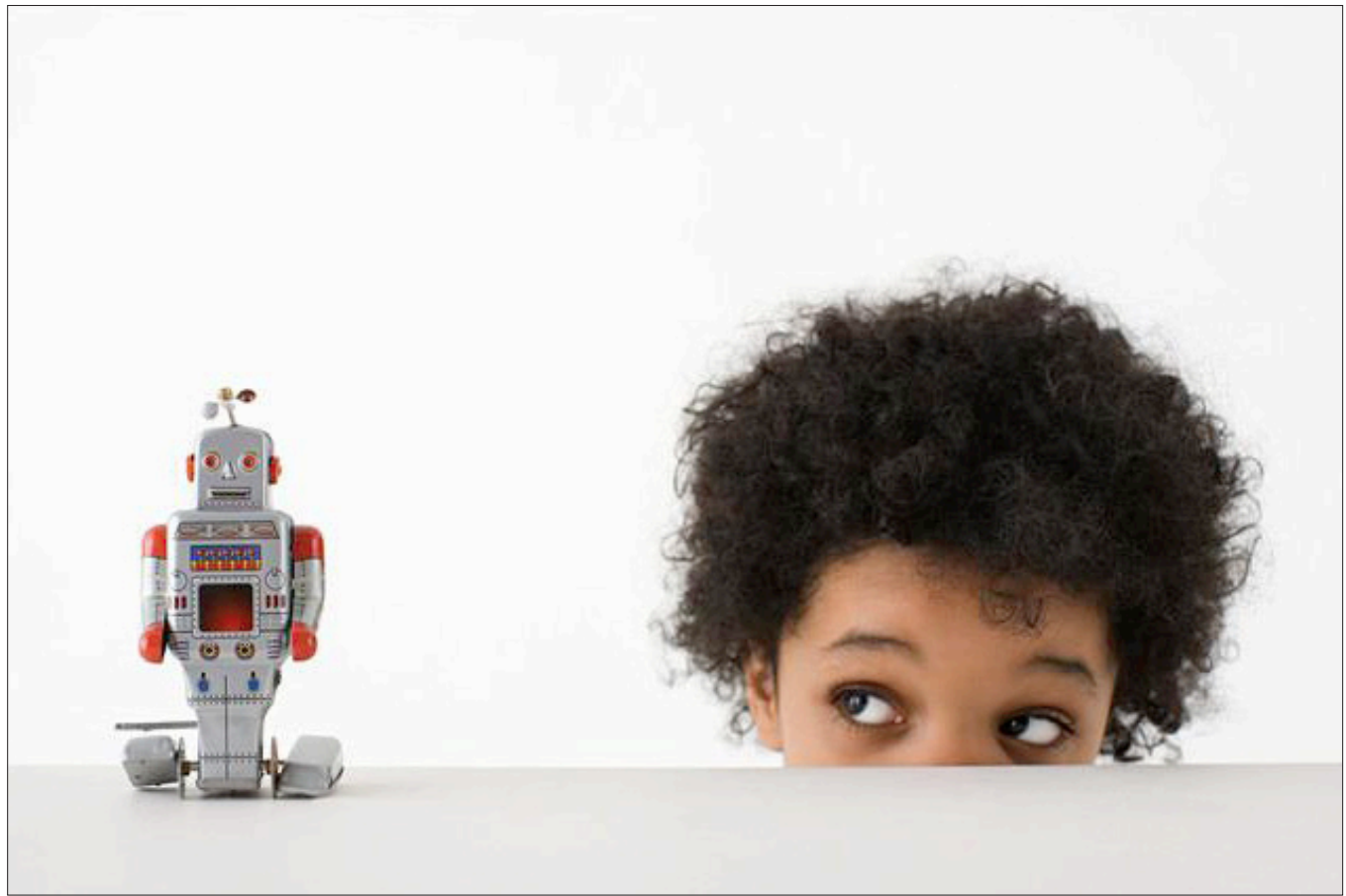
Latitude°

42°   KIDS & LEARNING

INTRODUCTION°
WHY ROBOTS?

From our recent work with children, we know that young people instinctively expect technology to respond to them in very human-like ways—to motivate and empower them, often serving as a sort of companion, rather than merely a tool for solving specific problems. While many adults think about technology as separate from humanness, kids tend to think of it as *fundamentally* human. It comforts us; it keeps us company; it helps us learn and grow; and, in some cases, it can fulfill certain emotional needs more reliably than other people.

In this way, our study isn't about robots, per se; it's about something much bigger. Robots are a useful proxy for understanding kids' social, creative and learning aspirations in ways that might be more illuminating than if we engaged them directly on such issues. Robots allow kids to project their weaknesses, strengths and ambitions. Of course, they're also the embodiment of AI, helping us understand generally how we might want to interact with a whole new breed of machine intelligence in the future.

WHAT WOULD HAPPEN IF ROBOTS WERE A PART OF YOUR EVERYDAY LIFE?
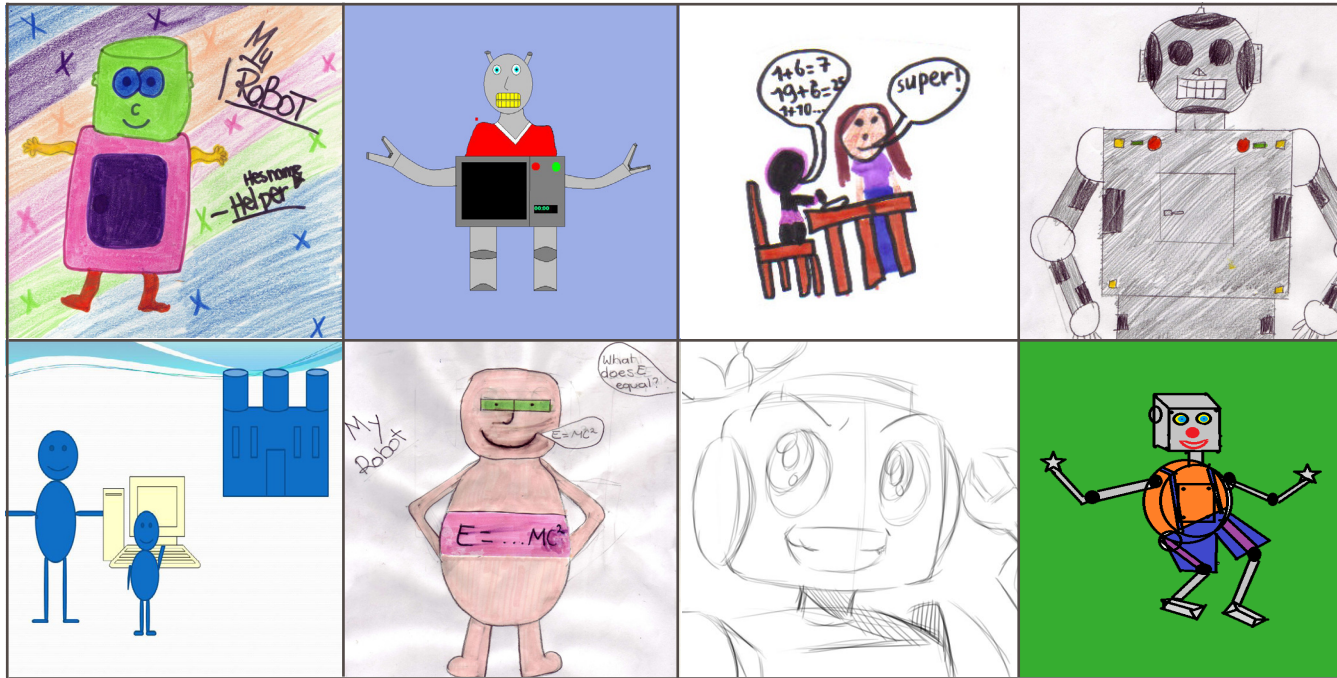
PRIMARY PLACES OF STUDY:

35° / 15' : AUSTRALIA
48° / 51' : FRANCE
52° / 31' : GERMANY
33° / 55' : SOUTH AFRICA
51° / 30' : UNITED KINGDOM
38° / 89' : UNITED STATES

In late 2011, Latitude asked 348 children, ages 8-12, from around the world to imagine their lives as if robots were a fixture in their learning environments—at school and beyond. After answering a series of basic demographic and technology usage questions, children were asked to select and write a story around one of three narrative prompts rooted in specific life settings: in the classroom; at school, but outside of class; and at home after school.

Latitude developed a coding scheme to quantify the presence of certain themes among the collected stories and images. Specifically, we coded around a few areas, including the nature of human-robot relationships and the dimensions of human-robot activities (e.g., play, learning, creation, and exploration). Reported frequencies represent the number of stories out of the total 348-story submission pool containing the reported code.

TYPE OF STUDY:

GENERATIVE

METHODOLOGY:

NARRATIVA™ (NARRATIVE ANALYSIS)

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KEY STUDY QUESTIONS

1. What intersections exist between learning, play and creativity, and how might technology facilitate all three fluidly?

2. What kind of relationships do children hope to develop with and through robots?

3. What are the specific opportunities for robots and other technologies to ignite and encourage children's learning and creativity?

INSIGHT°
SMART = SOCIAL, MACHINES TELL US

My Robot is My Role Model

Although some kids cast their robots in a superhuman or sci-fi mold, many created humanoid peers they could identify with and aspire to be like. Generally, the imagined robots could speak and communicate with ease, came "pre-loaded" with smarts and useful knowledge, and were social naturals. Nearly 2/3 of kids took for granted that robots could make excellent human friends in spite of their *machine* intelligence—blurring the line between technology and humanness (see infographic on page 8).

Smarts are the Key to Social Success

Robots' "machine magnetism" and general likeability doesn't stem from their novelty. (In fact, kids tell us robots are a lot like us.) It stems from their intelligence; being a nerd is a net positive, not a social stigma, in kids' story worlds. This is, no doubt, also true in the real world (sans robots) for today's digital natives—robots simply helped to illuminate what kids value in social scenarios. Robots possess an enviable ability to fit in with others and to navigate their peer environments precisely *because* they're smart. In other words, social aspirations and learning aspirations are closely linked—being perceived as intelligent creates social opportunities, giving children a solid motivation to learn.
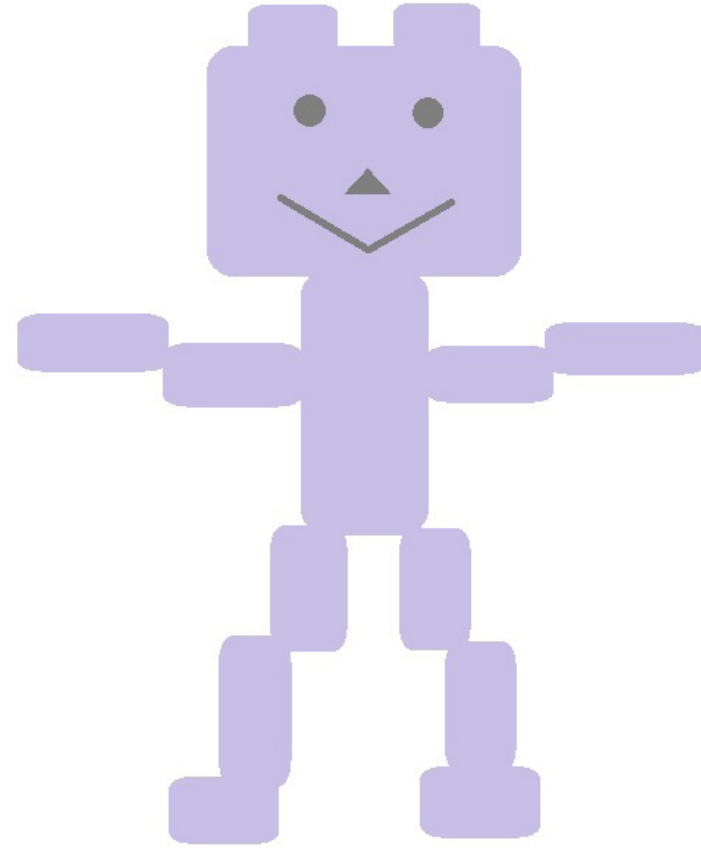

"My teacher treated my robot just like she was a real human student. My friends treated my robot like a human, too. She is friendly and funny and she fits in with all of us. No one would ever know that she is a robot except that she is made of metal and does not have skin. **She is really smart and everyone likes to talk to her. She has a funny voice, but we do not tease her**."

—Girl, 8, United States

INSIGHT°
ROBOTS FREE US TO LEARN & CREATE IN NEW WAYS
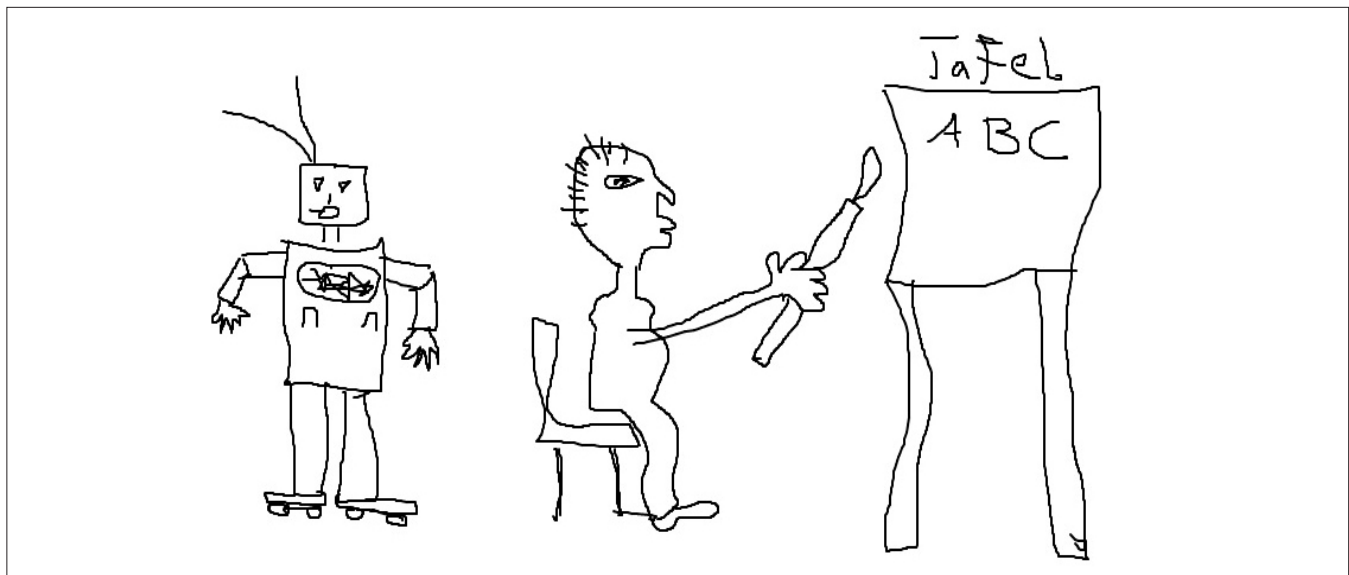
"When I get home, my robot helps me with my homework. My mother and father [came in and said] no video games now, homework first, but when they saw that I was already finished and had done everything correctly, they were glad that I had made friends with the robot. It could do everything—play soccer, build Legos, read, do math, write, and all the movements a person can make. Since my parents really are always at work a lot, they can't always help me or play with me or cook something. Now the robot helps them with that." —Boy, 9, Germany

Putting the Fun Back into the Fundamentals
Most of kids' robots (75%*) acted patient and supportive in educational contexts. Since robots fulfill a range of emotional needs, they render learning more fun and make kids eager to tackle even boring material. Robots are better versions of our teachers and parents, offering limitless time and patience, encouraging confidence and self-direction, and allowing us to make mistakes sans self-consciousness.

Empowering Me to Pursue Higher-Level Learning & Creativity
Robots' supportiveness lessens kids' fear of failure and of being perceived as a social outlier, empowering them to take more creative risks. On a practical level, 25% of kids imagined robots that could help with chores or other "low level" responsibilities, freeing them up to pursue higher-order learning and creative activities—two processes (creating and learning) which were strongly linked in kids' minds.

je m'appelle romx7

"When I got to school this morning, my teacher surprised me by giving me a robot to help me with my schoolwork. **We played football at recess with my friends. In class, he wrote for me and helped me to think.** Leaving school he carried my bag and transformed into a bike. When we got home he prepared my snack and helped me do my homework. He created books for me to read, and we played with toy cars. He keeps my secrets. **I can tell him anything, and he gives me advice.**"

—Boy, 10, France

LET'S CLOSE THE DIVIDE BETWEEN LEARNING & PLAY
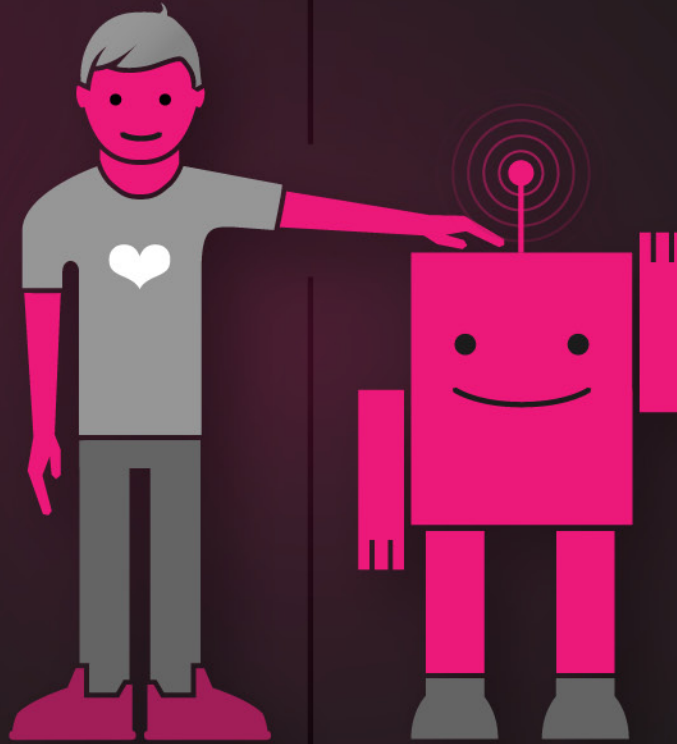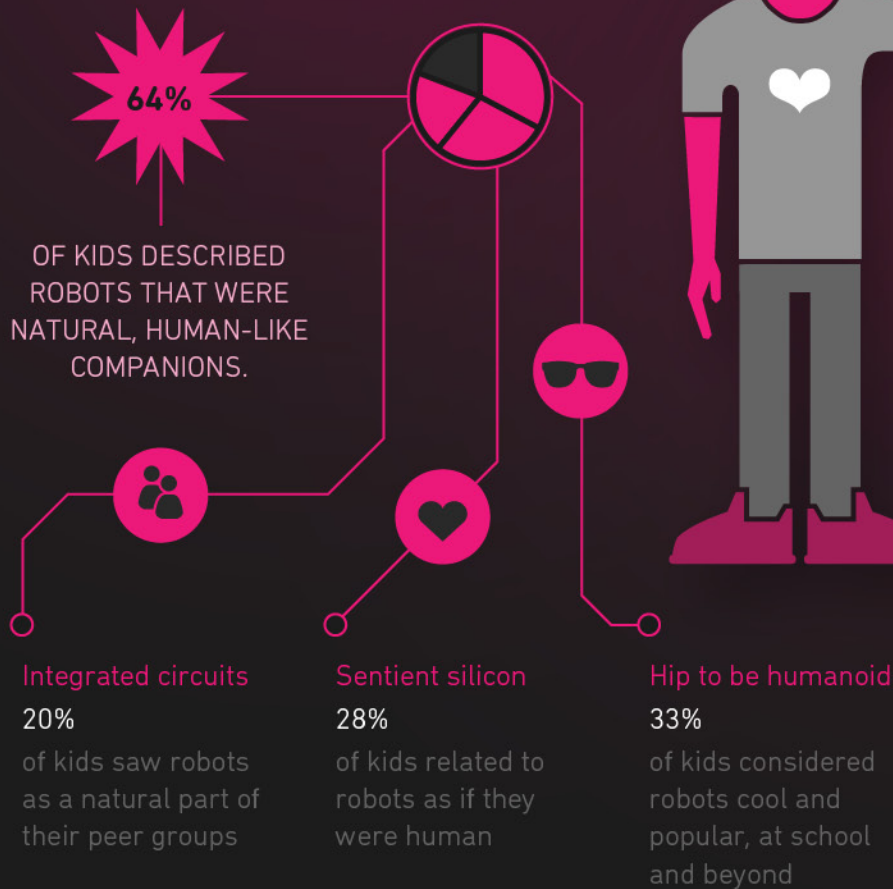
One and the Same: Playmate and Study Buddy

While one might expect kids to create more stories about play than learning, an equal number (38%) focused on each of these themes. Kids are as motivated to learn as they are to have fun, and they tend to view learning and play as allied—often overlapping—pursuits even if, in practice, their lives usually appear much more compartmentalized.

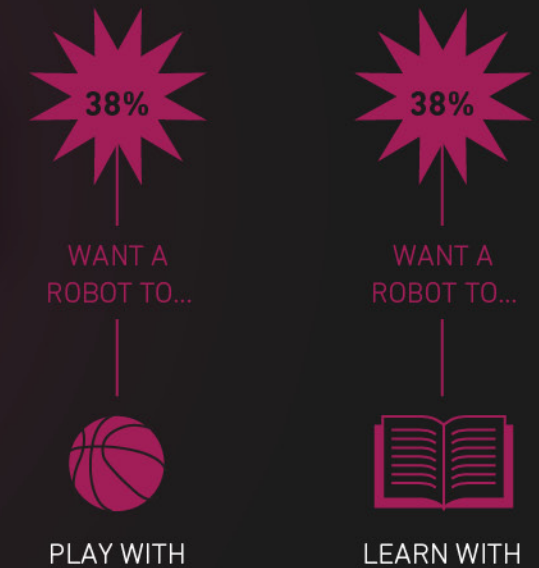### Learning Becomes Fun, Play Becomes Knowledge

In the stories we collected, kids tended not to make hard choices between learning and play; instead, they (with their robots) moved fluidly between the two, and oftentimes participated in activities at the intersection of both. On one end of the spectrum, a robot might help a child make a game out of his or her math homework; on the other end, the act of building a fort can become an educational process. In the middle, kids seek to learn either physical or academic skills because doing so is enjoyable in itself.

WITH ROBOTS AS FRIENDS, LEARNING IS PLAY (AND PLAY IS LEARNING)

HUMANIZING MACHINE INTELLIGENCE...

...TO INSPIRE & EMPOWER

64%

OF KIDS DESCRIBED ROBOTS THAT WERE NATURAL, HUMAN-LIKE COMPANIONS.

38%

WANT A ROBOT TO...

PLAY WITH

38%

WANT A ROBOT TO...

LEARN WITH

Integrated circuits
20%
of kids saw robots as a natural part of their peer groups

Sentient silicon
28%
of kids related to robots as if they were human

Hip to be humanoid
33%
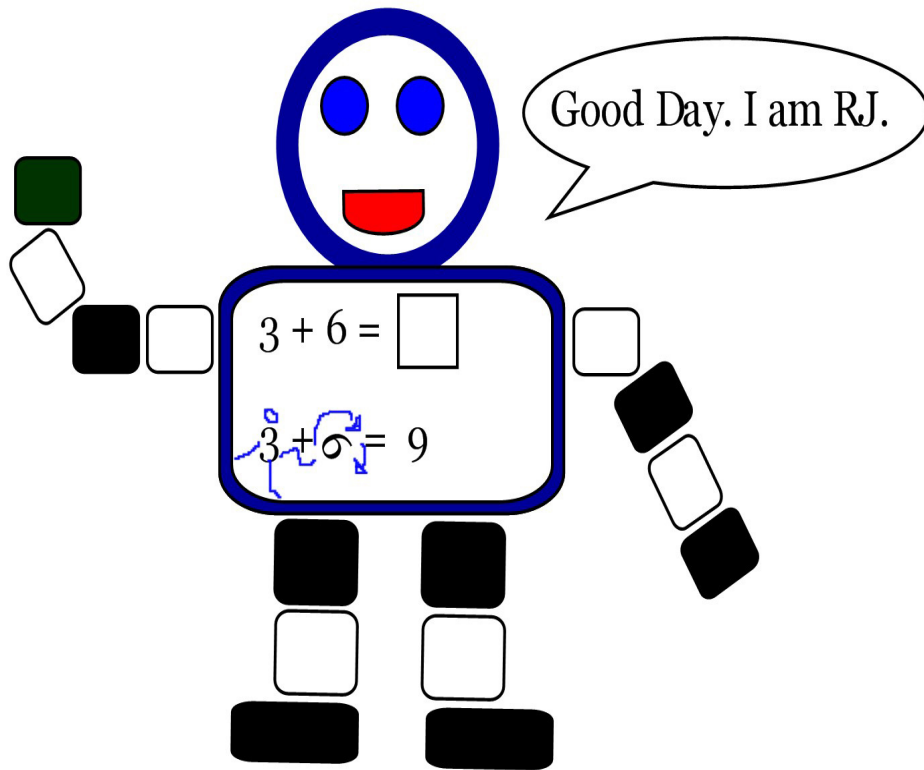of kids considered robots cool and popular, at school and beyond

Kids commonly blurred the boundaries between learning and play, thinking of them as mutually reinforcing.

They expect technologies to change state with them — to teach and be taught; to support and motivate; and to be true companions and collaborators.

*This summary is based on findings from Latitude's "Robots @ School" study. To learn more about the methodology and how kids, ages 8-12, think about technology's role in supporting learning, play and creativity, download the full report at http://bit.ly/robotstudy

"RJ is a cool dude robot. He looks like a transformer robot, and with a click of a button he shows me his screen. It then looks like a laptop. I may type my work into the laptop, instead of writing. Then RJ fixes my spelling, and tells me when my sentence is wrong. **That way the teacher does not see all the mistakes, but can see how good my idea is**."

—Boy, 12, South Africa

OPPORTUNITIES°
ADDRESS COMMON LEARNING NEEDS

In their narratives, kids revealed three familiar frustrations where robots (and other tech solutions) could be applied to help them overcome specific educational hurdles:

Academic Pacing Could Be More Personalized

In most classrooms, academic pace is poorly matched to any individual child. Kids are eager to learn and willing to put in the work required to understand a concept, but it's discouraging when they feel like they're off pace with their classmates—whether ahead or behind. Interactive software for devices from traditional desktops to iPads to robots continues to provide more customized experiences for children at disparate learning levels.

Kids Have a Relevance Filter—Leverage It

Even early in their formal educations, kids recognize different levels of value attached to their schoolwork. Work doesn't always have to be fun or creative to have value (e.g., multiplication tables), but kids are quick to identify—and eager to offload—work that doesn't help their thinking progress to higher levels. Teachers should emphasize the value of the work by demonstrating a variety of ways the resulting knowledge can be used later, and should consider the need for different levels of engagement (some of which may be tech-driven or game-based) across topics.

Parents and Teachers are Only Human, After All

Kids understand that even the most well-intentioned parents and teachers have limited time, patience, and ability to help them, and sometimes forgo seeking help because they don't want to be perceived as a bother. By encouraging kids to be more self-directed (with the help of tech resources, collaborative assignments, and so on) teachers can manage their time and be more present when students really do need to work with them.

OPPORTUNITIES°

"This study clearly emphasizes, that if you ask children about their relationship to robots, it will not only provide a glimpse into the future of technology but, more importantly, the children will describe to us how we should imagine our future relationship to each other."

— Bo Stjerne Thomsen, Senior Research Manager at LEGO® Learning Institute

FOR TECHNOLOGISTS: BUILD TRULY "HUMAN" RELATIONSHIPS

Once reliant on mouse and keyboard, our tech interactions are now based on gesture, voice, and touch, encouraging a greater sense of intimacy and personalization with our devices. Kids take the same jump much further, imagining technologies that aren't treated as possessions or tools but as active collaborators, teachers, and friends. They are far more interested in what they can do *with* technology than in what technology can do *for* them. Projects like MIT's Autom, a humanoid health coach, are creating new motivational frameworks by fundamentally redefining our relationship with technology—both physically and emotionally.

## FOR DEVELOPERS & CONTENT PRODUCERS: ENABLE LEARNING VIA MAKING

Older generations of learning software employed games and interactivity as merely a different means of teaching a specific skill set. From this study, we see that technology should help kids learn in self-directed, open-ended, and exploratory ways. Projects for proactive learning, like MIT's Scratch, a programming language and online, collaborative community for kids, as well as LEGO® Mindstorms®, are great examples of how we don't have to make trade-offs between designing for play, learning, or creativity; children certainly don't think of these as discrete aims. Develop platforms that allow kids to learn more actively through hands-on creation and real-world problem-solving.

## FOR EDUCATORS: EMBRACE CREATIVE COLLABORATION & SYNTHESIS

Many teachers remain wary about the use of Web technologies in class, due to concerns about privacy, plagiarism, and other risks. However, they chance overlooking a larger benefit: a great deal of educationally valuable online activity is about creative repurposing, building on others' efforts, and sharing output—competencies which will only become more important as the Web matures. When possible, open a classroom to online tools (e.g., wikis, social networks, games, storytelling tools, etc.) that require kids to find relevance in and draw conclusions from the Web's seemingly limitless mass of valuable, collective intelligence.

ROBOTS @ SCHOOL°
SELECT SUBMISSIONS
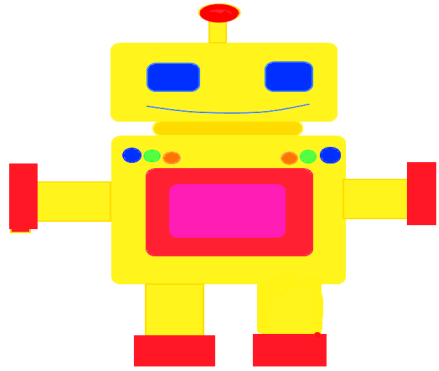
"Larry [the robot] said to me, 'Look, maths is an important part of your life and you will be using it a lot in the future. If you don't do maths now with me, I won't be a close friend.' I said, 'Ok I will do it,' so we raced each other with multiplication and he won but I got a better score than I got at school. Every time we did it I got better and started to kind of like maths. When we finished, I said to Larry, 'Thanks for caring about me.'" —Girl, 11, Australia
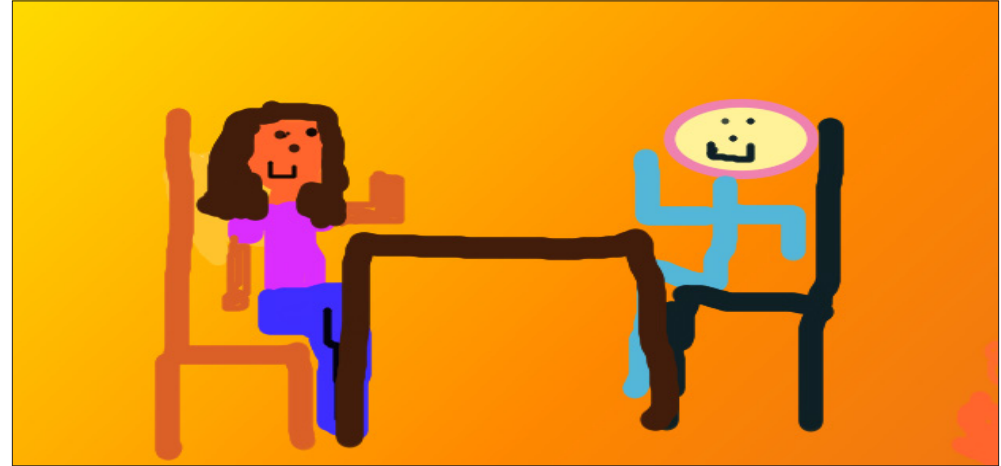
"I have a few problems in spelling. The robot shall support me and improve me until I am at the same level as my classmates. The teacher tells the robot where my problems are. The robot is looking for one of his many stored programs and dictates to me. I write what he says and correct it. He can also wrinkle his forehead when something is not right. He continually encourages me even when I have not done so well." —Girl, 10, Germany

"My group finished its work before class ended, so my teacher let us leave early with the robot. I am overcome with joy and I play with him. But my friends are jealous so I lend them him (but not always). We are happy that he is with us and we have a good time. He helps us with building problems, like building models. Or scientific and al-chemical problems. He can fly, drive, run and walk, of course."—Boy, 11, France
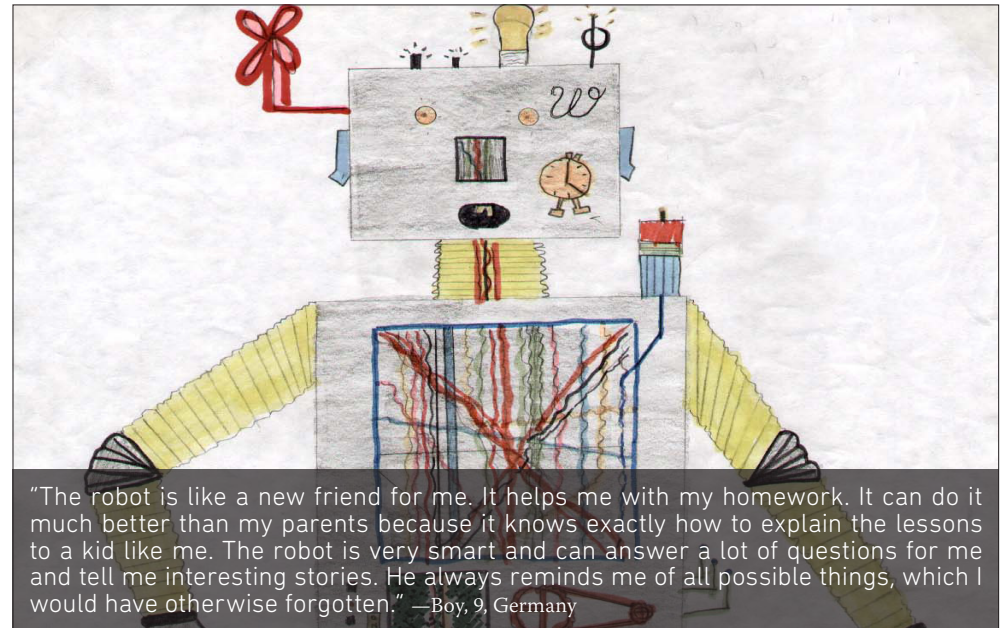
"The robot is like a new friend for me. It helps me with my homework. It can do it much better than my parents because it knows exactly how to explain the lessons to a kid like me. The robot is very smart and can answer a lot of questions for me and tell me interesting stories. He always reminds me of all possible things, which I would have otherwise forgotten." —Boy, 9, Germany

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This study was prepared by:

Latitude°

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Published in Collaboration with

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