How Robots Are Having an Impact on Learners with ASD

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PATINS Tech Expo
4/4/19

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President

Heather Koren
Director of Assistive Technologies

Ted Klopp
Director of Sales & Business Development

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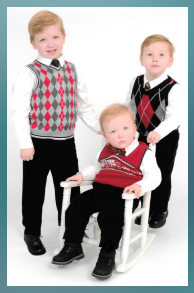
  Director of Big Projects
- Gus Klopp, 6 years old
  Director of Medium-Sized Projects
- Hans Klopp, 5 years old
  Director of Little Projects



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What is Autism?

Autism spectrum disorder (ASD) is a developmental disability that can cause significant social, communication and behavioral challenges.

(CDC)

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Prevalence

- About 1 percent of the world population has autism spectrum disorder. (CDC)
- About 1 in 59 children has been identified with autism spectrum disorder. (CDC)
- More than 3.5 million Americans live with an autism spectrum disorder. (Buescher et al., 2014)

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Prevalence

- ASD occurs in all racial, ethnic, and socioeconomic groups. (CDC)
- ASD is about 4 times more common among boys than girls. (CDC)
- ASD has increased by 6-15 percent each year from 2002 to 2010. (CDC)
- Autism is the fastest-growing developmental disability. (CDC)

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Financial Impact

- Autism services cost U.S. citizens $236-$262 billion annually. (Buescher et al., 2014)
- The U.S. cost of Autism over a person's lifespan is about $2.4 million for a person with an intellectual disability, or $1.4 million for a person without. (Autism Speaks)
- Cost of lifelong care can be reduced by 2/3 with early diagnosis and intervention. (Centre for the Economics of Mental Health, UK)

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Therapies

- Occupational Therapy
- Speech Therapy
- ABA Therapy

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Why is Robot Therapy Effective?

- A robot will hold an ASD students attention longer than a human.
- A robot is non-judgmental.
- A robot repeats an activity the same way every time.

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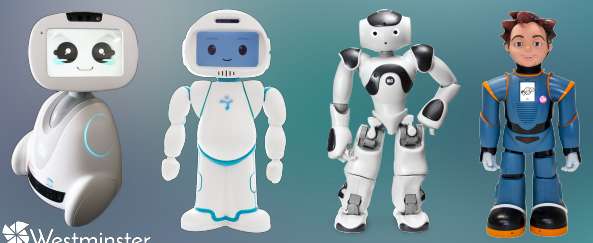
Autism Robot Therapy Options



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BUDDY

- Face is a screen
- Helps with security, smart home, social interaction, personal assistant, multimedia, edutainment, elder care and more
- Expected to launch in 4th quarter of 2016
- Website states: "The adoptbuddy store is currently closed. If you want to update your personal information related to your pre-order."

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QTrobot

- Curriculum guide includes about 80 sessions
- Robot has 50 applications for education and autism therapy
- Data collection in development
- Based in Luxembourg
- Two year warranty – expected life span of bot is three years

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LuxAI

QTrobot Research Study

- 15 students over two hours in August 2018 at University of Luxembourg
- Found no statistical difference between student interaction with QTrobot vs. a person
- Findings differ from other studies that show students with ASD will imitate a robot more than a person – students imitated the person more
- Student with ASD didn't have as many repetitive behaviors when interacting with QTrobot

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QTrobot Case Study

- 14 students over six moths in 2018 at Institute for Autistic and Psychotic Children in Luxembourg
- Generally used as a reward when a student with ASD would interact with a therapist, rather than having QTrobot deliver therapy
- Fewer repetitive behaviors working with QTrobot and imitated expressions directed by the robot
- Students showed increased positive moods with higher and longer attention rates when working with QTrobot

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NAO Robot

- Was initially conceived as a STEM Robot and still is used in STEM
- askNAO (Autism Solution for Kids) Solution is relaunched in new appcalled askNAO Tablet - offers several different activities
- Tracks progress by session
- Large range of movement
- Completely programmable

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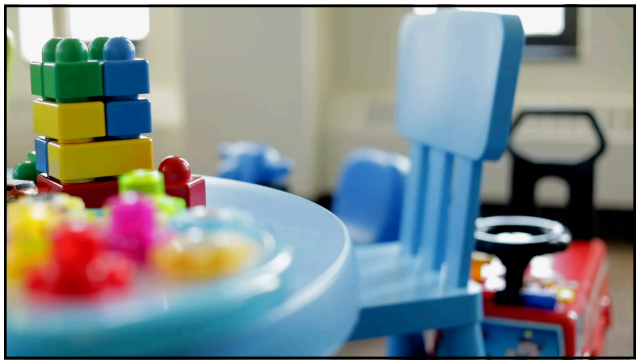

Milo & Robots4Autism

- Robots4Autism Program is designed specifically for ASD students
- Separate program with Milo specifically for STEM
- Speech is 20% slower than human
- Developmental Behavioral Approach
- Evidence Based Practices

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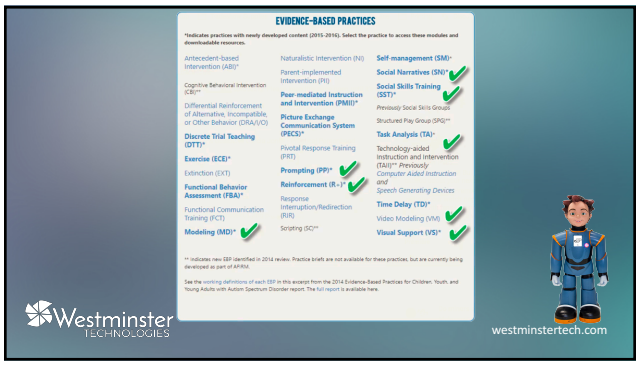
EVIDENCE-BASED PRACTICES
*Indicates practices with newly developed content (2015-2016). Select the practice to access these modules and downloadable resources.
Antecedent-based Intervention (ABI)*
Cognitive Behavioral Intervention (CBI)**
Differential Reinforcement of Alternative, Incompatible, or Other Behavior (DRA/I/O)
Discrete Trial Teaching (DTT)*
Exercise (ECE)*
Extinction (EXT)
Functional Behavior Assessment (FBA)*
Functional Communication Training (FCT)
Modeling (MD)*
Naturalistic Intervention (NI)
Parent-implemented Intervention (PII)
Peer-mediated Instruction and Intervention (PMII)*
Picture Exchange Communication System (PECS)*
Pivotal Response Training (PRT)
Prompting (PP)*
Reinforcement (R+)*
Response Interruption/Redirection (RIR)
Scripting (SC)**
Self-management (SM)*
Social Narratives (SN)*
Social Skills Training (SST)*
Previously Social Skills Groups
Structured Play Group (SPG)**
Task Analysis (TA)*
Technology-aided Instruction and Intervention (TAII)** Previously Computer Aided Instruction and Speech Generating Devices
Time Delay (TD)*
Video Modeling (VM)
Visual Support (VS)*
** Indicates new EBP identified in 2014 review. Practice briefs are not available for these practices, but are currently being developed as part of AFIRM.
See the working definitions of each EBP in this excerpt from the 2014 Evidence-Based Practices for Children, Youth, and Young Adults with Autism Spectrum Disorder report. The full report is available here.
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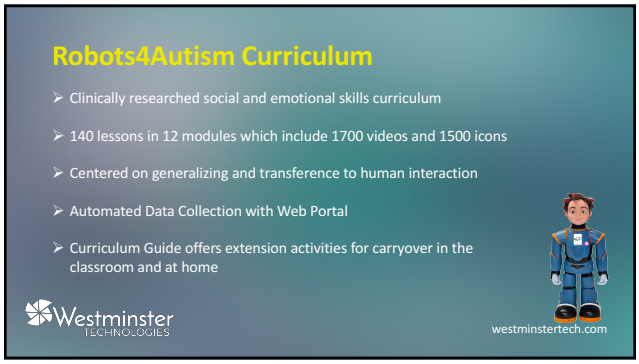
Robots4Autism Curriculum
Clinically researched social and emotional skills curriculum
140 lessons in 12 modules which include 1700 videos and 1500 icons
Centered on generalizing and transference to human interaction
Automated Data Collection with Web Portal
Curriculum Guide offers extension activities for carryover in the classroom and at home
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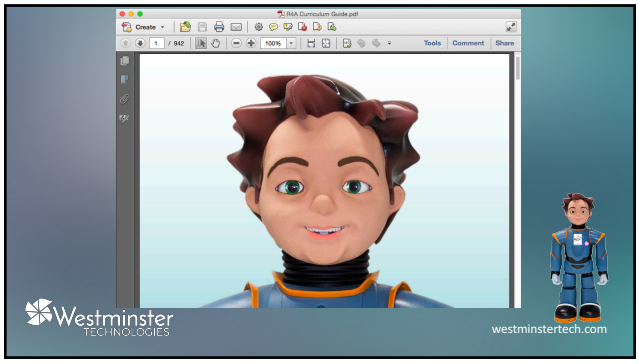
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Robots4Autism Curriculum Modules

- Calm Down Techniques
- Greetings
- Leave-Taking
- Conversation Dynamics
- Facial Expressions/Emotions
- Playdates
- Parties

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Robots4Autism Web Portal

Student Lesson Details: Student 1 Demo

Module Name	Lesson Name	Start Time	Elapsed Lesson Time	Correct	Max Correct	Score	Avg Resp Time	Student	Facilitator	Robot
Calm Down Module - calm Down	Calm Down Tool 3 - Calm Down Tool: Take a Break	08/09/16 04:12 PM	00:00:52	0	0	N/A	00:00:18	Student 1 Demo Soup Class	leng Soupka RoboKind Soup Class	RKR25 10000137
Calm Down Module - calm Down	Calm Down: Break - Calm Down Tool: Take a Break	08/09/16 11:10 AM	00:01:27	0	0	N/A	00:00:48	Student 1 Demo Soup Class	leng Soupka RoboKind Soup Class	RKR25 10000137
Conversation Module 1 - Greetings	Greetings Lesson 5 - When to greet - Dos and don'ts for starting a conversation	08/05/16 04:13 PM	00:03:50	0	3	0	N/A	Student 1 Demo Soup Class	leng Soupka RoboKind Soup Class	RKR25 10000137
Conversational Module 2 - Leave-taking	Leave-taking Lesson 1 - Introduction to leave-taking	08/05/16 09:56 AM	00:16:38	3	6	50	00:02:35	Student 1 Demo Soup Class	leng Soupka RoboKind Soup Class	RKR25 10000137
Conversational Module 2 - Leave-taking	Leave-taking Lesson 1 - Introduction to leave-taking - Teach	08/05/16 10:50 AM	00:10:55	0	0	N/A	N/A	Student 1 Demo Soup Class	leng Soupka RoboKind Soup Class	RKR25 10000137

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Sample IEP Goals

Social Emotional IEP Goals & Robots4Autism Curriculum

SAMPLE ANNUAL SEL GOALS	INTRO & GAMES	CALM DOWN	CONVERSATIONAL MODULE			EMOTIONAL MODULE			SITUATIONAL MODULE					GROUP ACTIVITIES		
* SOURCE: National Association of Special Education Teachers	--	--	1	2	3	1	2	3	1	2	3	4	5	SMART BOARD	VIRTUAL WORLDS	ROBOTS
___ will engage in appropriate cooperative social play interactions initiated by others 4/5 opportunities to do so.	•				•				•	•	•	•	•	•	•	•
___ will engage in appropriate turn-taking skills by attending to another's turn and waiting for own turn 4/5 opportunities to do so.	•				•				•	•	•	•	•	•	•	•
___ will appropriately acknowledge an interaction initiated by others by giving an appropriate response, either verbal or non-verbal -	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
___ will initiate an interaction with others by gaining attention by stating what is taking place in environment or exhibiting actions of others 4/5 opportunities to do so -	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
___ will identify various emotional states in others 4/5 opportunities to do so -						•	•	•		•						
___ will identify various emotional states in self 4/5 opportunities to do so -		•				•	•	•		•						

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Life Changing Benefits

Behavior
- Decreases in disruptions and meltdowns
- Increases in ability to concentrate

Emotions
- Increased understanding of emotions and their meanings
- Willingness to look at a humans face
- Creates confidence and willingness to engage in social situations

Vocabulary
- Increases in verbalization
- Increases in attempts to use language and expand vocabulary

Home & School
- Changes in behavior at home
- Ability to function at school translates to rapid academic progress

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Pilot Study

South Carolina
October 2017 – June 2018
15 Districts, 305 Students, 47 Staff Members

- Various sizes, demographics and locations
- SPED Teachers, Paraprofessionals & Specialists all facilitated Milo-led instruction and curriculum

Key Results

- 90% of students achieved mastery, resulting and observable generalizing, transference to human to human interaction
- 70% of the 90% achieved that level by repeating a lesson plan multiple times

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Side-by-Side Comparison

BUDDY

- No info specific to Autism therapy is available

Cost:

N/A

QTrobot

- Face is a screen
- Limited Autism curriculum
- Limited studies

Cost:

Robot & Curriculum - $7,650
Premium Support - $560

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Side-by-Side Comparison

NAO Robot

- No facial expressions
- More moving parts
- Programmable
- Several activities
- No studies

Cost:

Robot - $9,000
askNAO - $1,500

Robots4Autism

- Several facial expressions
- Fewer moving parts
- Not programmable through Robots4Autism
- Extensive curriculum
- Several studies

Cost (Sale - 5/31/19):

Robot - $3,250
Curriculum - $3,750/year
Set up - $750
Virtual Training - $1,000

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Cost Breakdown

Robot	$3,250
Curriculum	$3,750
Set up	$ 750
Virtual Training	$1,000
TOTAL	$8,750

Cost per student = $583.33

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Questions

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