

# Robotics Activity Attitudes Scale

The Robotics Activity Attitudes Scale was created by the CREATE Lab Arts & Bots Team at Carnegie Mellon University for use with students age 11 – 14 participating in in-school robotics projects.

This version and information for interpretation was originally presented in:

**Title:** "Development of an assessment for measuring middle school student attitudes towards robotics activities"

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**Online:** <https://doi.org/10.1109/FIE.2016.7757677>

**Recommended Citation:** J. Cross, E. Hamner, L. Zito, I. Nourbakhsh and D. Bernstein, "Development of an assessment for measuring middle school student attitudes towards robotics activities," 2016 IEEE Frontiers in Education Conference (FIE), Erie, PA, 2016.

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# Robotics Activity Attitudes Scale

This survey is part of the Arts & Bots research study. The purpose of this research is to improve student experiences in science, technology, math, and engineering education. The survey is expected to take less than 20 minutes.

This is not a test. Your answers will not be graded.  
But it is important to answer the questions yourself, without asking anyone else for help.

*Please answer each question carefully and to the best of your ability. Your answers will help us to improve education for future students.*

1. Please select the answer that shows how you feel right now about the statement. There are no right or wrong answers, just be honest.

	NO!	no	Neither yes or no	yes	YES!
I feel good when I learn about technology.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am not good at making robots.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It's important to me to know more about technology than most people.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I could learn to build a robot.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel uncomfortable when someone talks to me about technology.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Whenever I use something that is computerized, I am afraid I will break it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like designing new things.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I look for as much information as I can about robots.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I started a robotics project, I think I could do a really good job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can write a computer program.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like to learn more about robotics.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can communicate my ideas to my team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am a technical type person.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It makes me nervous to even think about using computers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am good at thinking logically.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I get excited about discussing technology.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2. Please select the answer that shows how you feel right now about the statement. There are no right or wrong answers, just be honest.

		NO!	no	Neither yes or no	yes	YES!
I like to learn new facts about robots.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am a good team member.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am the kind of person who works well with technology.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I ask a lot of questions about robots if I don't understand them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I come up with solutions that other people don't think of.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Robots are boring to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can program a robot.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel confident about my ability to make robots.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have a good feeling about computers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other people think of me as a technical type person.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like solving complex problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technology is interesting to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Learning about robots is important to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like to watch TV shows and/or read about robots.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am good at making robots.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Everywhere I go, I am out looking for new things about robots.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am the type of person who could become a roboticist.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. Please select the answer that shows how you feel right now about the statement. There are no right or wrong answers, just be honest.

	NO!	no	Neither yes or no	yes	YES!
I like to do robotics activities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am interested in discovering things about robots.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like working on teams.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like to prove that I know more about technology than my friends.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I don't know something about computers, I try and find an answer.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I could learn to write a computer program.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I want to learn everything about technology, even if it's complicated.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is cool to learn new things about robots.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am often trying to find out more about computers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can make a robot.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I know I can learn a lot about robots.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoy exploring new ideas about robotics.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am good at designing things.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I try to do activities related to technology.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Robotics is interesting to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I solve problems logically.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am curious about how robots work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Interpretation Guidance:

### Following text and table is an excerpt from:

J. Cross, E. Hamner, L. Zito, I. Nourbakhsh and D. Bernstein, "Development of an assessment for measuring middle school student attitudes towards robotics activities," *2016 IEEE Frontiers in Education Conference (FIE)*, Erie, PA, 2016.

[The scale was constructed as] Likert-like scale items where students stated their agreement with various statements on scale consisting of "NO!", "no", "neither yes or no", "yes", and "YES!" [12] which are scored with a 1 to 5 scoring where 1 was "NO!" and 5 was "YES!". [...]

We performed an exploratory factor analysis on the RAAS 2015. [...] We extracted 5 factors following the guidelines of using an eigenvalue threshold of 1 and evaluating the Scree plot, which accounted for 66.2% of scale variance. The 5 factors were: Confidence, Learning Potential, Personal Robotics Identity, Personal Technology Identity, and Curiosity.

Two of the factors that we extracted matched dimensions that we had constructed. The Confidence factor included items encompassing confidence related to skills involving robots, computers, and problem solving (see Table VI). The Curiosity factor included items that measured a student's affect towards discovering, exploring, and learning about new robotics and technology concepts.

Two other factors were related to the student's personal identity. The Personal Robotics Identity factor included interest, identity, expectancy value, and strongly worded curiosity items that reflected the broader importance of robotics to everyday life. Similarly, the Personal Technology Identity factor included interest, identity, curiosity, and expectancy value items that measured the broader importance of technology and computers to everyday life.

The final factor was very interesting in that it included interest, confidence, curiosity, and expectancy value items that measured a student's confidence in their ability to and positive feelings towards developing skills and gaining knowledge with respect to robotics and technology. This factor is unique from the dimensions that we originally developed for RAAS 2010, but also very interesting. Other education research has demonstrated that the belief that intelligence is malleable, sometime referred to as having a Growth Mindset, has positive implications for student motivation and resilience [18] [19]. [...]

Table VI: RAAS 2015 Factors

Factor	Item
Confidence	1. I am good at making robots.
	2. I can program a robot.
	3. I can write a computer program.
	4. I can make a robot.
	5. I am good at thinking logically.
	6. I feel confident about my ability to make robots.
	7. I like solving complex problems.
	8. I am good at designing things.
	9. I solve problems logically.
	10. I could learn to write a computer program.
Learning Potential	1. If I started a robotics project, I think I could do a really good job.
	2. I could learn to build a robot.
	3. I like designing new things.
	4. I would like to learn more about robotics.
	5. I feel good when I learn about technology.
	6. I like to learn new facts about robots.
	7. I get excited about discussing technology.
	8. I like to do robotics activities.
	9. I know I can learn a lot about robots.
	10. I ask a lot of questions about robots if I don't understand them.
Personal Robotics Identity	1. Other people think of me as a technical type person.
	2. I try to do activities related to technology.
	3. I am a technical type person.
	4. When I don't know something about computers, I try and find an answer.
	5. I am often trying to find out more about computers.
	6. I am the kind of person who works well with technology.
	7. I like to think that I know more about technology than my friends.
	8. Technology is interesting to me.
	9. I have a good feeling about computers.
	10. I come up with solutions that other people don't think of.
Personal Technology Identity	1. Everywhere I go, I am out looking for new things about robots.
	2. I like to watch TV shows and/or read about robots.
	3. I am the type of person who could become a roboticist.
	4. I look for as much information as I can about robots.
	5. Learning about robots is important to me.
	6. It's important to me to know more about technology than most people.
Curiosity	1. It is cool to learn new things about robots.
	2. I am curious about how robots work.
	3. I enjoy exploring new ideas about robotics.
	4. Robotics is interesting to me.
	5. I am interested in discovering things about robots.
	6. I want to learn everything about technology, even if it's complicated.

[12] S. J. Gibbons, et al. "Middle school students' attitudes to and knowledge about engineering," International Conference on Engineering Education, Gainesville, Florida, 2004.

[18] L. S. Blackwell, K. H. Trzesniewski, and C. S. Dweck, "Implicit theories of intelligence predict achievement across an adolescent transition: a longitudinal study and an intervention," *Child development*, vol. 78, no. 1, pp. 246-263, 2007.

[19] C. S. Dweck, "Even geniuses work hard," *Educational Leadership*, vol. 68, no. 1, pp. 16-20, 2010