Nine ways engineers help their children learn about engineering

In one study, over 80 engineers were interviewed or surveyed about what they do to help their children learn about engineering. Below are 9 of their most common responses.

1. **Play hands-on with everyday items**
   While playing with everyday items, encourage your children to imagine new uses for them.

2. **Encourage them to ask questions**
   Foster your children’s natural curiosity by encouraging them to ask you questions and helping them figure out how and where to find the answers.

3. **Let them take things apart**
   Provide your children with the tools to take things apart and put them together again (as long as there are no choking, electric, or other hazards!).

4. **Play with puzzles**
   Challenge your children to find several ways to solve puzzles and to explain the different processes they used.

5. **Visit science centers or children’s museums**
   They will allow your children to explore STEM concepts at their own pace, often through hands-on experiences that are enhanced through signs that provide more explanation of the concepts.

6. **Read books**
   Read fiction and non-fiction STEM books with your children.

7. **Build with blocks**
   Ask your children questions about what they are building: What are you building? Who is it for? How will they use it? Why did you…?

8. **Develop mathematics and science skills**
   Visit your local library or store to find software, videos, books and kits that allow your children to practice mathematics and science skills in a fun and engaging way.

9. **Attend summer camps and special activities**
   Build interest in STEM by taking advantage of camps, programs and special activities hosted in your community.
You asked. We answered!

My daughter and son love to build and create things with their building toys. How do I help foster their engineering thinking?

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Have them solve an engineering design problem. Below we have outlined how you can help your children identify a problem and solve it.

Define the problem. Identify an engineering design problem to solve. Set criteria (desired attributes) and constraints (limits). Recognize who the client (who has asked you to find a solution) and users are (who will use the end product).

Learn about the problem. Research to see what, if any, solutions have already been created to solve the problem or one similar to it. Read different texts about the science and mathematics skills, knowledge and tools that will help them solve the problem.

Plan a solution to the problem. Have them generate many ideas before deciding which one they would like to try. Encourage them to make a design plan. They may need to go back and learn something new before they can finish their plan. That is ok!

Try the solution. Have them use their plan to create a prototype (a testable model that may be smaller or larger than the final design).

Test the solution. Help your children conduct fair tests to see if their plan is a good solution for the problem.

Decide. Use the test results to make decisions about their solution. Did the solution solve the problem and meet the constraints? Should they try other ideas they previously brainstormed or brainstorm new ideas to achieve a better solution?

Communicate/deliver. Have them make claims (use evidence to support what they believe is true) about their solution so the client knows why they should use or (use evidence to support what they believe is true) about their solution so the client knows why they should use or (use evidence to support what they believe is true) about their solution so the client knows why they should use or (use evidence to support what they believe is true) about their solution so the client knows why they should use or select it. Have them communicate their idea to the client.

Where does your family find design challenge ideas?

My daughter and I get inspiration from the community—things we see or hear about on the news.

We get ideas from books, television shows and movies.

My kids and I look around our home. We find ways to make life easier for us or our pets.

How to discuss engineering with your child

Recommendation 1: Use the word “engineer” in everyday talk as repeated exposure will allow a child to use it in everyday conversations. Point out the word if you hear it in a commercial or see it in a book or on television.

Recommendation 2: If you are a STEM professional, talk about your own work. Parents are the major source of occupational knowledge. It is never too early to start talking about STEM professions; if you feel that the topic is too complex, talk about where you work, what you work on, who you work with and what kinds of things you do (e.g., work outside, use a computer, draw, talk with others, etc.).

Recommendation 3: Too often children associate engineers with train drivers/mechanics/construction laborers. Address these inconsistencies early. For example, if children read that “an engineer drives the train”, help them understand that there are other types of engineers who design things to help people, or that engineers design engines but mechanics are the people who fix cars. These beliefs are often hard to mitigate later down the line and those that are not interested in these associations may not consider engineering as an ample field of study.

Recommendation 4: Increase interactive strategies for reading: ask questions, make eye contact, allow your children to hold the book or turn the pages, etc.

Gender bias in the purchase of STEM-related toys

A recent study conducted by Jacob Inman and Dr. Monica E. Cardella on gender bias in the purchase of STEM-related toys indicates that toys that promote the development of math, science, and engineering skills are given to boys twice as frequently as they are given to girls. This idea of stereotypical “boys’ toys” may contribute to the lack of women in technical engineering fields. The study demonstrated the importance of purchasing toys linked to the development of STEM skills for all children to promote the participation of women in STEM fields.
1. **Ubongo. Ages 8+;** thamesandkosmos.com $39.95
2. Laser Pegs Tinted Race Car. Ages 5+; laserpegs.com $29.99
5. Remote-Control Machines Animals. Ages 8+; thamesandkosmos.com $49.95
6. Aircraft Engineer. Ages 3+; thamesandkosmos.com $44.95
8. Suspend Family Game. Ages 8+; melissaanddoug.com $16.99
10. Twiddler Triple Temptation. Ages 10+; hapetoys.com $32.99
11. LightUp Edison Kit. Ages 5+; lightup.io $49.99
15. Dimension. Ages 8+; thamesandkosmos.com $49.95

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3. Ozobot Bit 2.0. Ages 8+; ozobot.com $59.95
4. Thinkrolls 2. Ages 3-9; avokiddo.com $2.99
5. Tangible Play’s Osmo. Ages 6+; playosmo.com $99.99 (or $79.99 without the Numbers pack)
6. Thinkrolls. Ages 3-8; avokiddo.com $2.99
8. Move the Turtle. Ages 5-12; movetheturtle.com $3.99 (Hint: iTunes has a bundle that includes both the Robot School and Move the Turtle apps for just $3.99!)
9. BLOX 3D. Ages 4-8; appymonkeys.com $2.99
10. BLOX 3D Junior. Ages 2-5; appymonkeys.com $2.99
11. BLOX 3D World Creator. Ages 6-8; appymonkeys.com $2.99
12. Infinifactory. Ages 10+; zachtronics.com $4.99
13. TIS-100. Ages 10+; zachtronics.com $6.99

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