

## **Role Playing and the Robot Design Challenge**

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G&T students always rise to the subject of robots. It never fails to unleash creativity and intense interest. Here I present a favorite design challenge of mine, oft repeated over the years at many schools in a wide variety of grades.....including with teachers at in-service seminars. Give it a try in your gifted classroom. This challenge has appeared in a variety of my articles and books.

The gifted students who took my robot challenge have designed robots to:

- Assist handicapped individuals
- Fight fires
- Clean up hazardous wastes
- Provide security.

The creativity I have seen displayed in such exercises is nothing short of incredible.

Use this challenge to integrate the curriculum, showing gifted students how real-world design constraints come into play. This whole design challenge can be accomplished in two-hours. My preference is conducting this as a morning exercise. First, arrange the students into teams containing 5 members. Let each team pick a team name and choose a team captain. Now assign them a design challenge to invent a robot that can do a certain task. You can choose from among the ones I have mentioned above, or you can use other tasks. It is important that all teams use the same challenge, so they can learn from each other.

This design challenge also involves each member of the team assuming a role to play during the invention process:

- 1) The marketing person—whose job it is to represent the user of the robot. If the challenge is to design a robot to assist a handicapped person, then our marketing team member should act on behalf of the handicapped person, making sure their needs are being met by the invention/design.
- 2) The economist—whose job it is to be concerned with how much the robot will cost and how it can be made at a reasonable price.
- 3) The engineering person—whose job it is to look at the technical details of the robot design and the kinds of materials that can be used in its construction and production.
- 4) The activist—whose job it is to look after the legal, safety, and environmental impacts that such a design may present.
- 5) The team captain whose job it is to make sure that the team members are communicating in a give-and-take setting, and considering the different aspects of the challenge. The team captain will lead the oral presentation by the team at the end of the two-hour challenge.

At the conclusion of the challenge, each team will make an oral presentation, where they can talk about:

- \* Their robot design
- \* Why they chose to design it this way
- \* What it will cost to build and sell
- \* Its special features and benefits

The team captain will lead this oral presentation, and it is suggested that all team members have a chance to say a few things about the robot design. Each team should have 5-10 minutes for their presentation. Encourage lots of pictures and diagrams and sketches to get team points across. I have found it useful over the years to “prime the pump” for this by showing G&T students a short video dealing with robots to get them thinking along this line. Sometimes I give them something to read a day or two before the challenge that discusses robots, and the many applications in which they are being used. The challenge can also be the conclusion to several lesson plans that have discussed robots.

For older G&T students, this exercise can be expanded to include design notes kept by the team, like an inventor’s notebook, a written team report component and team interactions that span as much as a week’s time. During this expanded effort, each team member can write a section of the team report, with the team captain organizing the report and introducing it as well as writing a conclusions section.

This design challenge is a microcosm of the workplace, where team efforts are common. This is basically the new product design process in industry, with experts from around the company lending their knowledge and expertise to the effort...thus the role-playing component for the students. Something as complex as building a robot requires many different job skills and disciplines. Time should be given to discussing this, letting the students identify them.

A related aspect of this exercise is to have your students look at the history of robots, and what society thinks of them. Will they take jobs away from humans? Could they be dangerous? How do we make them safe? Many very good robot stories and movies exist. Perhaps these should be explored as well. Where else do your gifted students think robots might be used? Make lots of lists and capture those good application ideas!

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Author's Website Choices....check them out.....

<http://www.nytimes.com/2008/12/02/technology/techspecial2/02robots.html>

<http://www.newscientist.com/article/dn19364-lessons-in-robotics-change-childrens-perceptions.html>

<http://www.post-gazette.com/pg/06222/712431-298.stm>

<http://www.dailymail.co.uk/health/article-1364585/Autism-Kaspar-friendly-robot-teaches-autistic-children-enjoy-simple-hug.html>

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Harry is a retired engineer, inventor, teacher, and author. He holds 12 US Patents; and has published over 500 articles and papers, as well as 50 teacher's resource books and math games. Over 60,000 teachers nationwide read his educational articles every month. His GEP books include:

- 1) "Solar Power, Fuel Cells, Wind Power and Other Important Environmental Studies for Middle School Gifted Students and Their Teachers: A Technology, Problem-Solving and Invention Guide";
- 2) "Energizing Your Gifted Students' Creative Thinking & Imagination";
- 3) "Heroes of Giftedness: an Inspirational Guide for Gifted Students and Their Teachers" (major contributor).

His latest book, "STEM----a Powerful Approach to Real-World Problem Solving for Gifted and Talented Students in Middle and High School Grades", was released by GEP in April 2011.

### **Highlights of Articles from Gifted Education Press (Continued from the April-May 2011 *GE News-Page*) Articles by Donna Ford and Colleagues:**

"Teacher Referral as Gatekeeping: Cultural Diversity Training is One Key to Opening Gifted Education Doors" (Donna Y. Ford) (*GEPQ*, Summer 2007) – <http://bit.ly/cTvap2>.

"Continuing the Search for Equity and Excellence: An Overview of Frasier's Talent Assessment Profile (F-TAP)" (Tarek C. Grantham and Donna Y. Ford) (*GEPQ*, Spring 2007) – <http://bit.ly/h5rZXd>.

"Highlights from The Mary Frasier Teacher Scholars Program: A Dream Come True" (Donna Y. Ford and Tarek C. Grantham) (*GEPQ*, Winter 2007) – <http://bit.ly/i13gpC>.

"Promoting a Scholar Identity in African American Males: Recommendations for Gifted Education" (Gilman W. Whiting) (*GEPQ*, Summer 2006) – <http://bit.ly/gn4LeL>.

"Under-Representation of Diverse Students in Gifted Education: Recommendations for Non-Discriminatory Assessment: Part 2" (Gilman W. Whiting and Donna Y. Ford) (*GEPQ*, Summer 2006) – <http://bit.ly/gn4LeL>.

"Under-Representation of Diverse Students in Gifted Education: Recommendations for Nondiscriminatory Assessment (Part 1)" (Donna Y. Ford and Gilman W. Whiting) (*GEPQ*, Spring 2006) – <http://bit.ly/hxzEOJ>.

"Identification of Young Culturally Diverse Students for Gifted Education Programs" (Donna Y. Ford) (*GEPQ*, Winter 2006) – <http://bit.ly/dF3UWi>

"Ten Suggestions for Increasing Diversity in Gifted Education" (Donna Y. Ford) (*GEPQ*, Fall 2005) – <http://bit.ly/e07RwU>.