Make-an-Engineer Introduction to Engineering Activity (P12 Resource/Curriculum Exchange)

Dr. Morgan M. Hynes, Purdue University, West Lafayette

Dr. Morgan Hynes is an Assistant Professor in the School of Engineering Education at Purdue University and Director of the FACE Lab research group at Purdue. In his research, Hynes explores the use of engineering to integrate academic subjects in K-12 classrooms. Specific research interests include design metacognition among learners of all ages; the knowledge base for teaching K-12 STEM through engineering; the relationships among the attitudes, beliefs, motivation, cognitive skills, and engineering skills of K-16 engineering learners; and teaching engineering.

Ms. Chanel Beebe, Purdue University, West Lafayette

Chanel Beebe is an Engineering Education Researcher at Purdue University where her work focusing on broadening participation in engineering and engineering thinking. Her passion lies in empowering communities to solve their own problems using creative pedagogies and engagement strategies. Her research looks at using the engineering design process to address social issues in a way that keeps the design process in the hands of communities that face the social problems.

Miss Avneet Hira, Purdue University, West Lafayette

Avneet is a doctoral student in the School of Engineering Education at Purdue University. Her research interests include K-12 education and first year engineering in the light of the engineering design process, and inclusion of digital fabrication labs into classrooms. Her current work at the FACE lab is on the use of classroom Makerspaces for an interest-based framework of engineering design. She is also interested in cross-cultural work in engineering education to promote access and equity. She is an aerospace engineer, and is the present Vice President (Educational Content) of the Student Platform for Engineering Education Development (SPEED).

Mrs. Kayla R. Maxey, Purdue University, West Lafayette

Kayla is a doctoral student in the School of Engineering Education at Purdue University. Her research interest includes the influence of informal engineering learning experiences on diverse students' attitudes, beliefs, and perceptions of engineering, and the relationship between students' interests and the practices and cultures of engineering. Her current work at the FACE lab is on teaching strategies for K-12 STEM educators integrating engineering design and the development of engineering skills of K-12 learners.

Engineers do all sorts of amazing things to make the world a better place.

STEP 1: IDENTIFY A PROBLEM YOU WANT TO SOLVE

What problem would you like to solve for yourself and others?
Write it on the body.

Keeping my room clean!

Keeping siblings out
of your room!

Cheap and clean
energy!

Ending world hunger!

Cool and safe mode
of transportation!

STEP 2: NAME TWO OF YOUR INTERESTS

Which of your interests will help you solve the problem?
Write one on each arm.

sports

cooking/baking

photography

reading

music

computers

fashion

animals/nature

drama

building

art

gardening

STEP 3: DECIDE HOW YOU WILL THINK LIKE AN ENGINEER

How can you think like an engineer to solve the problem?
Write it on the head.

failing

iterating

collaborating

communicating

analyzing

testing

making

asking

creating

optimising

imagining

improving

STEP 4: WHO ARE YOU? Share your engineer's story!

BRAD VERSION

Materials (per paper doll):

printer, 8.5" x 11" card stock, scissors, exacto knife (optional), (2) brads, writing tool

Instructions:

1. Download the **MAKE-AN-ENGINEER - Brad Version template** and print it out on an 8.5" x 11" sheet of card stock.
2. Cut out the body, head, arms, and hair (the one that most resembles the student) pieces.
3. Use scissors or an exacto knife to cut along the slits in each piece.
4. Attach the arms to the body using the brads.
5. Slide the head and hair pieces onto the neck piece.
6. After discussing what an engineer is and the types of problems they solve, have students record the following on their engineer:
 - a. Identify a problem they want to solve and write it on the body.
 - b. Name two of their interests that will help them solve the problem. They should write one interest on each arm.
 - c. Decide how they will think like an engineer and write it on the head.

*Note: These steps and example responses students could record are on the **Student Guide**.*
7. Have each student record their engineer's story on the **What is Your Engineer's Story** paper.
8. To complete the doll so it stands, fold the rectangular tab below the feet back. Then, pull the two long tabs attached to the sides of the feet behind the body. Connect them by slipping the slits into one another.
9. Allow students to share their engineer and its story.

MAKE-AN-ENGINEER

Brad Version

FACE

lab

For All: a
Chance to
Engineer

PURDUE

ENGINEERING

ENGINEERING EDUCATION

MAKE-AN-ENGINEER

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web.ics.purdue.edu/~hynesm/Welcome

GLUE VERSION

Materials (per paper doll):

printer, 8.5" x 11" card stock, scissors, glue, writing tool

Instructions:

1. Download the **MAKE-AN-ENGINEER - Glue Version template** and print it out on an 8.5" x 11" sheet of card stock.
2. Cut out the body, head, arms, and hair (the one that most resembles the student) pieces. Don't forget to cut the slits on the long tabs attached to the feet.
4. Use glue to attach the arms, head and hair to the body piece.
6. After discussing what an engineer is and the types of problems they solve, have students record the following on their engineer:
 - a. Identify a problem they want to solve and write it on the body.
 - b. Name two of their interests that will help them solve the problem. They should write one interest on each arm.
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Glue Version

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WHAT IS YOUR ENGINEER'S STORY?

I can use my interest in _____

to solve the problem of _____

by _____