

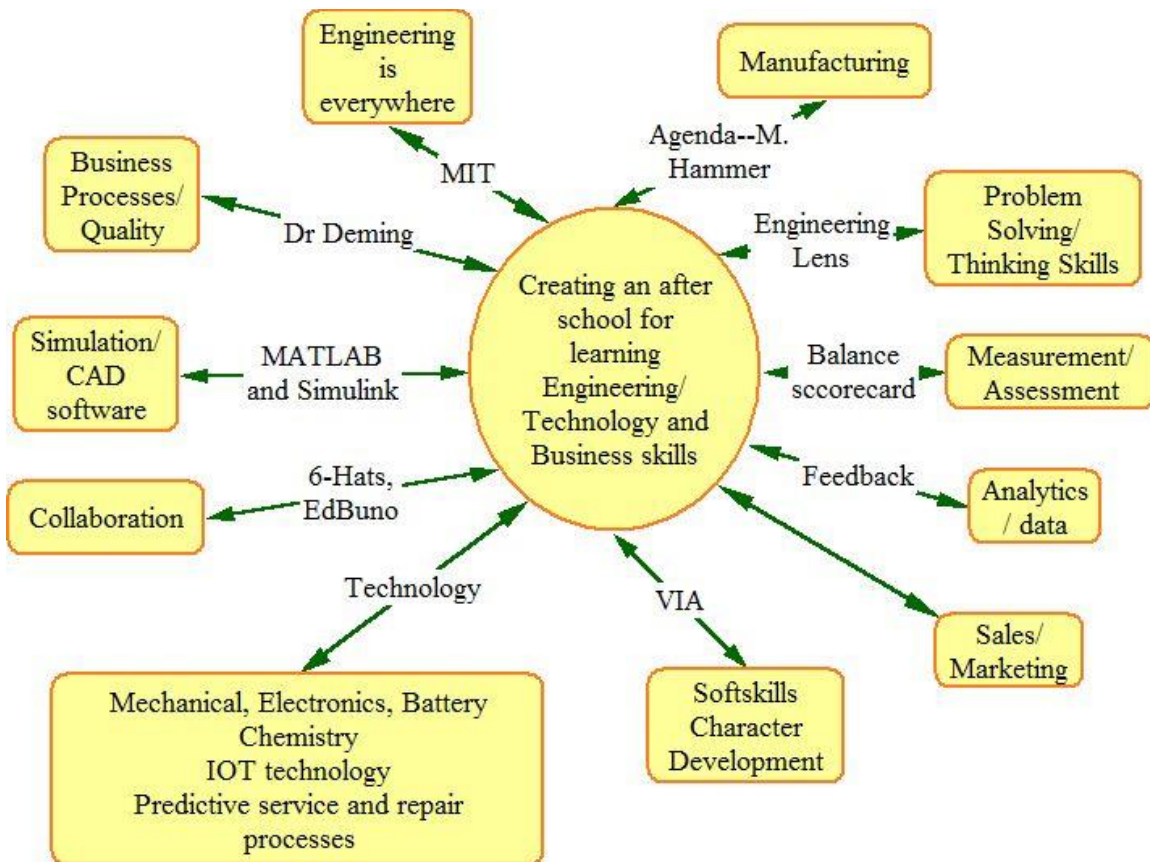
Tools

Tools

These items are to be learned and become Second-nature in how to use.

Tool	Explanation
Brain writing	Divergent thinking, new ideas
Shaping ideas	Sorting; mundane, stretch , Magical
Framing the problem	Defining
Decision making	Convergent thinking's
Requirements	
6-hats	Collaboration
Creating learning targets	Teacher set learning goals from standards
Questions for learning	
Habits of mind	Building character strength
Axonify Gamification Workbook	
https://developingchild.harvard.edu/resources/building-core-skills-youth/	
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3. **Model great research skills.** If I have done a good job with the project design, students will get the vast majority of the information they need from their own independent research. For this to work, however, I need to coach them in good research skills, and I sometimes invite the librarians in to help. This research, which often draws from internet message boards, programming language documentation, sample code, and Wikipedia, is a slightly different skillset than the research that students might do for a history research paper.
4. **Scaffold complex skills.** Tools like Makey Makey, Little Bits, Scratch, Tickle, and Tynker make it easier than ever for novice students to create authentic products that solve real problems. If you teach CompSci or electronics and you aren't familiar with any of these tools, stop reading right now and Google them. My

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personal favorite is an Arduino compatible board called the Light Blue Bean, which can be programmed from an iPad using the block-based language Tickle.

5. **Check for understanding always.** In a classroom focused on highly individualized projects, it's critical that the teacher monitor what students are struggling with. Optimal learning occurs when students struggle with a problem that they believe they can find the solution to. If they crossover into frustration and confusion, they are at risk of giving up. Teachers should keep careful track of what students know and what they need to learn in order to successfully complete their projects. Using strategies such as "fisttofive" or "thumbsup" to check the understanding of the entire group after a mini-lesson is also helpful.
6. **Favor found and recycled objects.** In [his TED talk](#), Daniel Pink talks about the connection between creativity and what is known as Functional Fixedness—or people's tendency to see only a single use for an object. Requiring students to fashion electric switches out of clothes pins, or building a robot torso out of a soda bottle, will help students to flex their creative muscles and think beyond the standard uses for everyday objects.
7. **Model mental inventory taking.** Innovation and problem solving depends on having a great understanding of what you know and what you still need to learn. Build in components of your projects that require students to list the things they understand about their project and also to articulate as specifically as possible the things they still need to understand better.
8. **Whatever you do, don't try to grade creativity and innovation.** Grades work really well when there is a correct answer you want students to work toward. If you want them to own a problem and to produce a genuinely original solution to it, you cannot motivate that with a grade. In fact, when you assign a grade to something like creativity, students will often perform for the grade and not for the best possible solution. Thus, a grade for creativity, will often become an unintended disincentive.

"Project-based learning is one of the most effective methods for instilling complex skills in students, and — since virtually no skill is as complex or as crucial as literacy — it's vital that we make

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project-based lessons available to as many classrooms as possible," said Christine Willig, president of the company's K-12 group, in a press release. "The FLEX Literacy Project Experience's reading, writing and group activities help guide a far more meaningful learning experience by fostering higher-order thinking skills that are invaluable in the classroom and beyond."