

Using Games to Promote STEM Education

Would you teach kindergarteners about atoms? What about genetic patterns of inheritance? Most people might scoff at the idea of introducing such scientific concepts at such an early age, but gamification is a growing trend in education that can effectively engage students in complex topics.

I have two young children, six and four years old, and one thing I've noticed on my parenting journey is that early and elementary educators are terrified of teaching science.

You can imagine that there might be several reasons for this. Perhaps most people don't exactly have fond memories of their high school science classes. Or maybe these teachers are under the misconception that science lessons would require materials and equipment which are too expensive for their classrooms. There may also be a pervasive thought that these topics are too complicated to introduce to young children.

Ironically, the truth is that young children are natural scientists. Their innate curiosity stimulates their brain to use the five senses to experiment with the world around them. This makes elementary school a prime team to engage students in education related to science, technology, engineering, and math (STEM).

Fortunately, early STEM education is a rapidly growing trend. After-school STEM enrichment centers are popping up all over the country. Amazon recently announced the opening of a store exclusively for STEM toys. Additionally, centers such as the Museum of Science in Boston are developing innovative K-12 curriculum such as "Engineering is Elementary."

One area ripe for development is STEM gamification. I've passionately loved board games throughout my life, so when the opportunity arose to design games for my own science classes, I leaped on it. One of my first games involved 1st-3rd graders playing a card game which pieced

together phases of the mushroom life cycle. I will never forget the thrill when the students shouted out phrases like, “Oh, mycelium belongs in that spot!” Complex biology vocabulary and concepts were sneaked into their minds, all in the name of fun and competition.

Evidence shows that general critical thinking skills can be improved by playing tabletop games. More abstract problem-solving abilities can be enhanced by playing specialized games like [Laser Maze](#) from ThinkFun or [Suspend](#) from Melissa & Doug. To take this evolution further, I am advocating the use of tabletop games to teach applied STEM concepts.

I recently joined forces with other STEM professionals and educators to form Catlilli Games (www.catlilli.com). Our classroom experiences have led us to recommend the following features for educational STEM games:

1. **Creativity.** Contrary to popular belief, the scientific method involves much creative thought. Moreover, kids respond to games that feature some imaginative element, whether it be role-playing or drawing.
2. **Layered learning.** We design games that provide a gentle introduction to high-level subjects, but we create different versions of rules (younger vs. older) which allow players to tackle as much complexity as they wish.
3. **No prior knowledge needed.** Many parents are intimidated by STEM games because they do not want to “expose” a lack of knowledge to their children. In order to ease parents’ fears, we design games in which everybody learns together. These are not trivia games; instead, they allow players to immerse themselves in a game world where learning is a byproduct of fun.

As a scientist-turned-educator, I have witnessed firsthand the power of tabletop games to excite and teach young children about STEM. I have observed preschoolers learn about atoms as the building blocks of our universe. I have enjoyed watching first graders internalize concepts of dominant vs. recessive genes. Gamification is a fun, accessible method of promoting STEM education.

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