



A common goal shared by educators and policymakers alike is to help students become empowered, lifelong learners. One effective way to achieve this is to give children opportunities to identify topics, subjects and activities that interest them, so that their natural curiosity will propel them to explore their interests in a way that is meaningful to them.

While there is a need for and value around creating structured learning experiences, we can also look for ways and moments to create space for choice and child-centered control — within both formal and informal education.

Choice and control, particularly as they relate to whether or not to participate in an activity and if the activity has options or elements that can be selected, are considered to be key aspects of most free-choice/informal learning experiences (Falk & Dierking, 2002). Having choices promotes agency, a “...feeling of control over [one’s] actions and their consequences.”<sup>1</sup>(Moore, 2016).



*While engaging in at-home learning, a young innovator customizes their very own robot.*

## Free-Choice Learning

The term “Free-Choice Learning” was coined by John Falk, founder of the Institute for Learning Innovation and Emeritus Sea Grant Professor of Free-Choice Learning at Oregon State University, and Lynn Dierking, professor at Oregon State University, in part to highlight the fact that individuals are self-motivated to learn about subjects in which they are most interested.<sup>2</sup>

Their work, paired with a robust body of other scholarly research, has created a near universal consensus among educational circles concerning the positive impact that choice has on children’s engagement in learning.

In their influential book, “Lessons Without Limit,” Falk and Dierking argue that while on its surface, the term “free-choice learning” might sound chaotic, in truth it represents the style of learning that is most natural and common.

---

**“Free-choice learning is the most common type of learning in which people engage. It is self-directed, voluntary, and guided by individual needs and interests — learning that we will engage in throughout our lives. Since it is the learning that we do when we want to, by definition it involves a strong measure of choice — choice over what, why, where, when, and how we will learn.”**

---

As Falk and Dierking explain, free-choice learning is “the learning that we do when we want to.” So in this context, a lack of engagement is no longer an impediment to student progress. In our own lives, for example, learning about topics that interest us, from making the perfect homemade pizza to learning how to code, is naturally compelling and self-sustaining.

To maintain a functioning education system at the national level, however, students need to learn subject matter that might not naturally appeal to them. Learning standards and proficiencies segmented by grade level ensure that students graduating high school possess well-rounded knowledge and abilities across a wide range of fields. With this foundational learning in place, students are positioned to choose to try their hand at entrepreneurship, developing a trade skill or specializing in a particular field at the collegiate level.

In a paper titled “The Contribution of Free-Choice Learning to Public Understanding of Science,” Falk categorizes this type of education as “formal education,” and explains that it plays an essential role in introducing us to both new areas of knowledge and skill sets.<sup>3</sup>

1. Moore, J. W. (2016). What is the sense of agency and why does it matter? *Frontiers in Psychology*, 7. <https://doi.org/10.3389/fpsyg.2016.01272>

2. Falk, J.H. & Dierking, L.D. (1998). Free-choice learning: An alternative term to informal learning? *Informal Learning Environments Research Newsletter*. May/June 1998 Washington, DC: American Educational Research Association.

3. Moore, J. W. (2016). What is the sense of agency and why does it matter? *Frontiers in Psychology*, 7. <https://doi.org/10.3389/fpsyg.2016.01272>

However, as is abundantly clear to those working in public education today, the status quo is unsustainable and due to COVID-19-related challenges, children and teachers have had to increase their tolerance for ambiguity and demonstrate their resilience like never before.

A recent report published by the Center on Reinventing Public Education summarizes what many schools across the country continue to face, including:

- The realization that many students are falling behind academically and are in need of just-in-time supports as opposed to traditional remediation techniques
- Staffing shortages, challenging student behaviors and the politicization of health, safety and education
- Concerns that schools alone will not be able to do enough to help students recover amid the challenges noted above and the pressures caused by the COVID-19 pandemic<sup>4</sup>

The researchers conclude that the problems schools are facing today are multifaceted, and the “consequences of disrupted learning during the pandemic will require ongoing work and adaptation from school districts now and into the future.”<sup>5</sup>

Many school districts could benefit from trying a new approach to learning that is both engaging to students and teachers, and flexible enough to be used in existing curricula.



A Camp Invention® participant is awed by a hands-on experiment.

## Using Invention Education to Enhance Formal Education

While free-choice learning is categorically different from formal education practices that define our national education system, increasingly, educators are beginning to implement aspects of the former into the latter.

In fact, there exist many opportunities within formal education to integrate the research-based benefits of free-choice learning techniques that teach students how to effectively learn, build confidence and become successful lifelong

learners. Particularly when it comes to teaching STEM (science, technology, engineering and mathematics) subjects, active and open-ended approaches to learning have steadily gained in popularity and scholarly recognition.<sup>6</sup> The effectiveness of this approach is grounded in the long and storied history of experiential learning, which has its beginning with the ancient Greek philosopher Aristotle, who believed that the true test of someone’s knowledge of a given topic or theory is through their ability to apply it.<sup>7</sup>

Today, prominent educators including David Kolb, founder and chairman of Experienced Based Learning Systems and emeritus professor of organizational behavior at the Weatherhead School of Management at Case Western Reserve University, argue that learning can only occur following the internalization and active expression of experience.<sup>8</sup>

Invention education, a pedagogy that leverages a child’s natural inclination to create and guides them through the act of invention to build the mindset and skills that will help them navigate complexity, builds on this long and effective tradition of experiential learning by inviting students to invent solutions to real-world problems.

One of the key benefits of this approach to learning is that it is equitable by design. In fact, everyday household objects that are readily available and might otherwise be discarded represent the perfect prototyping materials for children to use at a moment’s notice. Using a process known as upcycling, the act of recycling an item into something of greater value, students from all backgrounds have the ability to create their own invention prototypes.

### Prototyping Materials Are Everywhere

- Small or medium boxes
- Paper towel tubes
- Canisters and containers
- Cups and lids
- Bubble wrap
- Foam trays
- Rubber bands
- Miscellaneous paper (construction, magazines, newspapers, etc.)
- Balls and sporting goods
- Pulleys
- Springs
- Strainers
- Washers
- Unwanted toys (building blocks, car/train tracks, game parts, pinwheels, plastic figurines, toy vehicles, etc.)
- Unwanted DVDs, tapes and cases

4. Schwartz, H. L., & Diliberti, M. K. (2022). Flux in the educator labor market: Acute staff shortages and projected superintendent departures: Selected findings from the Fourth American School District Panel Survey. Rand Corporation. <https://doi.org/10.7249/rra956-9>

5. Ibid.,

6. Small, R., Moore, R., Alemdar, M., Skukauskaite, A., Tolbert, D. L., Tan, E., Eagle, E., Couch, S., Estrabrooks, L., Perry, A., & Nikolai, W. (2019). Researching Invention Education - A White Paper

7. University of California - UC Davis. (n.d.). Toolbox: History and Links. Experiential learning toolbox: History and links. Retrieved July 2022, from <https://experientiallearning.ucdavis.edu/tlbx-links.shtml>

8. McLeod, S. (2013, January). Kolb’s Learning Styles and Experiential Learning Cycle. Simply Psychology. Retrieved July 2022, from <https://www.simplypsychology.org/learning-kolb.html>



**“ As prototypes unfold, they allow you to work on things, they allow you to make changes — prototypes don’t often work, they break, they change, you have new ideas. You have to manipulate them a lot. Your prototype has to be flexible.”**

— National Inventors Hall of Fame® (NIHF) Inductee Steve Sasson, inventor of the digital camera

Invention education’s ability to apply free-choice learning within the context of a more formalized structure is what in part attracted Falk to partner with NIHF to investigate the long-term impacts of this type of pedagogy.

The results were substantial. Participation in just one week of invention education curricula from NIHF resulted in statistically significant short- and long-term improvements in creativity, STEM interest and problem-solving skills. For those students who participated in multiple years of invention education curricula, Falk found even stronger growth in the areas above.<sup>9</sup>



*A Camp Invention camper shows off the hydraulic arm they built.*

## Engaged Learning Everywhere

One of the central reasons why invention education is so effective is that it can be implemented and enjoyed from anywhere. Readily available materials can be transformed into invention prototypes that can motivate children to pursue their interests and passions.

This sense of empowerment, cultivated through the act of hands-on problem solving and grounded in the proven effectiveness of free-choice learning, gives children the ability to become the protagonists of their own learning and ignite their natural curiosity to explore the world around them.

9. National Inventors Hall of Fame, & Falk, J. F. (n.d.). Camp Invention 2017-2018 Evaluation Summary. Retrieved from [https://www.invent.org/sites/default/files/2021-02/ILI\\_Evaluation\\_Summary\\_Camp\\_Invention\\_May2018.pdf](https://www.invent.org/sites/default/files/2021-02/ILI_Evaluation_Summary_Camp_Invention_May2018.pdf)