



# Design Thinking Literature Review

## What is design thinking?

Design thinking is a way to address complex problems using a multi-step process. Although there are numerous variations of design thinking, they are all center on identifying and understanding the needs of the end-user and have multiple possible solutions. The participants employing design thinking gather data about the needs of the end-user through various methods, generate ideas to address these needs, and then test and revise these ideas based on user feedback (Gibson, 2016; Ruth et al, 2019; Willness & Bruni-Bossio, 2017; Noel & Liub, 2017; Davis, 1998; Carroll et al, 2010; Scheer, Noweski, & Meinel, 2012). The ultimate goal is to improve a set of circumstances for a group of people.

## How can design thinking support student learning?

In an education context, design thinking can build valuable skills and competencies in students. Design thinking provides opportunities for students to problem-solve together and facilitate collaboration (Carroll et al, 2010). Empathy is a central part of design thinking, as students need to consider perspectives of multiple stakeholders or end-users (Ruth et al, 2019; Noel & Liub, 2017; Carroll et al, 2010). Design thinking also requires students to think critically (Gibson, 2016; Carroll et al, 2010) and can contribute to creativity and innovation, as students test and retest possible solutions where there are unrestricted options for addressing problems (Gibson, 2016; Noel & Liub, 2017). This testing and re-testing of an idea can help students see the value in failure, as each iteration provides additional evidence that contributes to the development of a better solution (Ruth et al, 2019; Gibson, 2016; Noel & Liub, 2017; Carroll et al, 2010). Further, design thinking is aligned with hands-on, project-based learning (Carroll et al, 2010; Davis, 1998).

### **Related References:**

Carroll, M., Goldman, S., Britos, L., Koh, J., Royalty, A., & Hornstein, M. (2010). Destination, Imagination and the Fires Within: Design Thinking in a Middle School Classroom. *International Journal of Art & Design Education*, 29(1), 37-53. <http://www.iimagineservicedesign.com/wp-content/uploads/2015/08/Design-Thinking-Concepts-at-School-K-to-12-Article-PDF.pdf>

Davis, M. (1998). Making a Case for Design-Based Learning. *Arts Education Policy Review*, 100(2), 7- 15. [https://projects.ncsu.edu/www/ncsu/design/sod5/phd/resources/Davis\\_Making\\_a\\_Case.pdf](https://projects.ncsu.edu/www/ncsu/design/sod5/phd/resources/Davis_Making_a_Case.pdf)

Gibson, M.R. (2016). Learning to Design Backwards: Examining a means to introduce human-centered design processes to teachers and students. *Design and Technology Education: An International Journal*, 21(1), 8-20. <https://files.eric.ed.gov/fulltext/EJ1119556.pdf>

Noel, L. & Liub, T.L. (2017) Using Design Thinking to Create a New Education Paradigm for Elementary Level Children to Higher Student Engagement and Success. *Design*

*and Technology Education: An International Journal*  
<https://files.eric.ed.gov/fulltext/EJ1137735.pdf>

Ruth, A., Hackman, J., Brewis, A., Spence, T., Luchmun, R., Velez, J., & Ganesh, T.G. (2019). Engineering Projects in Community Service (EPICS) in High Schools: Subtle but Potentially Important Student Gains Detected from Human-Centered Curriculum Design. *Education Sciences*, 9(35).  
<https://files.eric.ed.gov/fulltext/EJ1211950.pdf>

Scheer, A., Noweski, C., & Meinel, C. (2012) Transforming Constructivist Learning into Action: Design Thinking in Education. *Design and Technology Education: An International Journal*, 17(3), 8-19. <https://files.eric.ed.gov/fulltext/EJ996067.pdf>

Willness, C. & Bruni-Bossio, V. (2017). The Curriculum Innovation Canvas: A Design Thinking Framework for the Engaged Educational Entrepreneur. *Journal of Higher Education Outreach and Engagement*, 21(1), 134-164.  
<https://files.eric.ed.gov/fulltext/EJ1139524.pdf>

**Associated links and resources:**

Design Thinking for Educators (IDEO) <https://designthinkingforeducators.com>

Design Thinking for Educators Toolkit (IDEO) <https://designthinkingforeducators.com/toolkit/>

The Nueva School: Design Thinking <https://www.nuevaschool.org/notably-nueva/design-thinking>



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