DESIGN THINKING >> and the << SCHOOL LIBRARY

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This past school year, I set out to develop lessons that incorporated the design thinking process into my literature exploration curriculum in the school library. Design thinking is a term that I have heard many times over the past few years in the context of education. Design thinking has been incorporated into the school environment as a way to devise more-effective professional development and class schedules, and student-centered classroom spaces. I have been involved in using the design thinking process for all of these purposes, and the more I learned about the process the more interested I became in using design thinking with my students. Could the benefits of the design thinking process be translated to the classroom environment, resulting in a deeper involvement of students in the learning process, more-engaged students, and more-effective long-term learning? I explored this process with my first-grade students.

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What Is Design Thinking?

In developing the lesson and the outcomes for this project the first step was understanding the design thinking process, its history and background, and the aspects of the process that could be adapted for younger students. As an evolution of the research and development process, design thinking has been around for decades in the design and business world. What makes design thinking a fresh idea now is the recent focus on human-centered design. Tim Brown, President and CEO of IDEO, described design thinking as:

> "a methodology that imbues the full spectrum of innovation activities with a human-centered design ethos. By this I mean that innovation is powered by a thorough understanding, through direct observation, of what people want and need in their lives and what they like or dislike about the way particular products are made, packaged, marketed, sold and supported. (Brown 2008, 86)

The design thinking process was developed and used as a way to develop better products and services that focused on the needs of the end user. Human-centered design involves observation and development of a deep understanding of how people use a product and interact with it, and the role the product plays in their lives.

Design thinking has been used not only in for-profit product development but also by non-profit groups as a way to find solutions for social issues. Design thinking has been used by organizations and groups around the world to help better understand the needs of populations in all aspects of social justice issues, from healthcare to clean water. The cornerstone of design thinking is empathy; when the designer better understands the day-to-day needs of a group of people, the design of a solution will better fit the needs of those people for whom the solution is intended.

As the principles of design thinking moved from the traditional business research and development arena to the area of social justice, the principles also began to make inroads in education. Schools started to see the benefit of using the design thinking process in the redesign of educational spaces, professional development, and curriculum to find methods of making experiences better for students and teachers. IDEO released the free downloadable *Design Thinking for Educators* toolkit and website to offer guidance on the use of the process in the education field. An example of a district that benefitted from applying design thinking was the Howard County (MD) Public School System, where the process was used to reevaluate their paper-based curriculum. The district wanted to implement student-centered curriculum delivery, as noted in the following statement.

"Tapping into teacher, parent, and student behaviors in and outside of school, the design team collected inspiration around the ways that people engage with information and interact with curricular materials. Understanding the desires of teachers, students, parents, and administrators has helped the team rethink curriculum delivery as well as develop resources to replace, augment, and enhance current curriculum documents." (IDEO n.d.)

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Elements of the Design Thinking Process

The design thinking process, no matter what the arena, requires empathy, optimism, experimentalism, and collaboration.

As design team members work on a human-centered design project, their exploration of the needs and perspectives of the end user result in their feeling empathy, allowing the designers to see the world from multiple perspectives and create a design that works best for the end user.

Optimism is the mood of the team. No challenge is too big, and a solution can always be found to create a better product, overcome a challenge, meet a need, or design a space.

Design thinkers are experimentalists, who are constantly asking questions and looking for creative solutions to problems, rethinking and reworking ideas.

Collaboration is also key to design thinking. Design thinkers working together are open to the ideas and suggestions of their team members and also seek input and information from a variety of experts, including those outside the field of study for which the team is designing.

Steps of the Design Thinking Process

The Institute of Design at Stanford University (a.k.a., the d School) lists five steps in the design thinking process.

Step one is to understand or empathize. In this step the design team focuses on observing and interviewing their subjects and learning as much as possible about their audience. The team will be looking to answer questions such as "Who is the user?" and "What matters to this person?"

Step two is to define the issue and the needs of the user. What is the audience's point of view and what are the needs of the end user?

Step three is the ideate stage. The team brainstorms as many creative solutions as possible. "Crazy ideas" are encouraged!

Step four is the prototype stage. This stage involves creating or building a rough representation of one or more ideas to show to the end user.

Step five is to test the product, sharing ideas and prototypes with end users and a larger audience to garner feedback.

The iterative process would then continue with reworking and adjusting the product as the design team receives feedback from end users. The process can take weeks, months, or even years as the design team works to create the best product or service (Hasso Plattner Institute of Design n.d.).

At my school we engaged first-graders in this design thinking process.

Design a Better House for the Three Little Pigs

Overview

The focus of the first-grade design thinking challenge was to gain a deep understanding of the elements of *The Three Little Pigs* story and to design a better house for the pigs. My goal was to have students look more deeply than usual at the characters, setting, problem, and solution in the story so that they would better understand how all of these elements interact and depend on each other to make an engaging and interesting story. I hoped that, as students looked more closely at the elements of this story while reading, they would develop an awareness that they could transfer to their own writing.

I chose *The Three Little Pigs* as the theme because most children are familiar with the story, and multiple versions of the story are available for students to read and study. This familiarity allowed students to begin with some basic understanding of the tale as they delved deeper into the story and maintained their interest as we read different versions.

Students focused on understanding the problems the three little pigs faced in the story and then found solutions for those problems. Students prototyped their ideas and then shared them with their classmates and the larger school community.

Step 1: Understand

The first stage of the design thinking process is empathizing. For the first-grade lesson I used the word "understand" during this stage, a word more easily understood by first-graders than "empathize." I discussed with the students what the process was going to be and why we were going to look closely at the

story and, through the story, try to understand the lives of the three little pigs. I framed empathy and understanding as learning what was happening in the story so we could better understand what was happening with our subjects. I read *The Three Little Pigs* by Paul Galdone (HMH Books for Young Readers 1984). Galdone's is a traditional version of the story in which the pigs build their houses out of straw, sticks, and bricks. The first two pigs are eaten after the wolf huffs and puffs and blows their houses down. The third little pig builds his house out of bricks and tricks the wolf into climbing down the chimney where the pig has waiting a pot of boiling water. The wolf is cooked and eaten for supper.

After I read this version, students identified the characters, three little pigs and a wolf; and the setting, a farming area or a small wooded area in the country. Students identified two problems: first, the wolf wanted to eat the pigs, and second, two little pigs did not build houses strong enough to keep the wolf out, resulting in their being eaten. Students identified two solutions to avoid being eaten. The first was the third little pig's choice to build his house out of bricks, and the second was to eliminate the future threat of the wolf by tricking the wolf down the chimney and into the boiling pot of water.

Step 2: Observe

The second stage of the design thinking process is the define stage in which the team members "redefine and focus insights" based on what was learned in the empathy stage (Mark Wolfe Design 2013). For this project, I redefined this stage as the observe stage. I wanted students to have another

opportunity to think about how the elements of a story intertwine with each other. At this point, students looked at the setting.

We read *The Three Little Javelinas* by Susan Lowell (Cooper Square 1992). This version of the story is set in the American Southwest desert; the three little pigs are javelinas (peccaries). After reading the story students discussed how the setting of the story changed other elements of the story. Not only are the characters different from the domestic pigs in the traditional version but also the materials used to build their houses: tumbleweeds, dried cactus ribs, and adobe bricks. The antagonist of the story is a coyote instead of a wolf.

In groups students brainstormed about how the characters, problems, and solutions might vary if the setting of the story changed again. This exercise's goal was to deepen learners' understanding about ways the setting of the story affected the other elements of the story. Each group was given a different setting: ocean, mountains, city, rainforest, and swamp. The groups brainstormed not only new characters but also new materials that could be used, types of houses that could be built, and what the ending might be based on the new setting. Ideas included a fish and a shark for characters, and sea grass and coral for the ocean setting. The city setting inspired cats and dogs as characters using newspaper, cardboard, and traditional construction materials for the houses. Students shared their ideas and their reasoning with their classmates.

Step 3: Define

During the next step, the define stage, students were asked to focus on the character traits of the pigs,

taking a deeper look at both the positive and negative traits of the pigs. During this stage, we read *The Three Ninja Pigs* by Corey Rosen Schwartz (Putnam 2012). This version focuses on the personalities of the characters more than do the versions we read previously. After reading the story, students brainstormed and shared words to describe the good qualities of each pig's personality and identified qualities of each pig that worked against them as they built their houses and tried to defeat the wolf.

Students then brainstormed ideas about the materials that the pigs used in the different stories. What were good qualities of the lighter materials and the stronger ones? What were negative aspects of building with the various materials? As they answered these questions students dug deeper into the character traits of the pigs and also developed a deeper understanding of the problems the pigs were facing. As a result, empathy for the characters increased. Students were ready to move on to the next brainstorming step and take the project to the next level of learning.

Step 4: Ideate

Students then moved into the ideate stage of the design thinking process. This is the brainstorming stage where any and all ideas are welcome, no matter how crazy, unusual, or far-fetched they may seem. The objective is to get all of the ideas out. Even the most outrageous ideas may contain a nugget of possibility that can lead to a solution (Hasso Plattner Institute of Design n.d.).

For this stage of the process, we worked as a large group. Students shared ideas, wrote them on sticky notes, and added them to the board. The ideas ranged from the simple, such as offering the wolf

something else to eat, to the more complex ideas of titanium houses with elaborate laser security systems. Students focused on the things we had learned in the "define" stage to keep them focused on the task of creating a solution for the pigs. As we went through the process, we filled the board with notes.

Next, working as a class, we grouped the ideas into categories and saw a number of larger themes emerge. The themes included: guards, traps and mazes, tricks and decoys, lasers, and security. First-graders also came up with some ideas that focused on social justice issues, including finding another food source for the wolf. They thought that if the wolf had something else to eat, he would leave the pigs alone. Another idea was friendship. If the pigs found a way to be friends with the wolf, then he wouldn't eat them because, as one of my students said, "You just don't eat your friends." The final theme was education. If the first two pigs had more education on better ways to build houses they would have had better results.

Students grouped themselves based on the solution on which they wanted to focus, such as security, friendship, or alternate food sources. The final step of the ideate stage was to sketch a design of the house each group would build. Students focused on the themes we had determined and drew pictures of their ideas. They then shared those ideas with the rest of the class. Students again broke into small groups to plan the next stage of prototyping.

Step 5: Prototype

The prototype stage is the building step of the design thinking process. During this stage, members of the team use a variety of materials to create a representation of their

design idea. The prototype stage in our project allowed the students' solution-based groups to create and build models of their houses for the three little pigs. For my students, this step focused not only on being creative with the use of materials as they built models of what they had visualized but also on improving their teamwork and collaboration skills. During this step, each group had to make a plan, decide the characteristics on which to focus while building, work together to decide who was going to build each element, and compromise and understand that this was a team challenge.

Students began with a team meeting to map out what they were going to create. The next step was the building process. Spread out in the room were a large collection of building materials, including boxes, construction paper, stuffing, fabric, pipe cleaners, glue sticks, tape, etc. Students collected materials and started building, using resources creatively as they focused on the end users, the pigs.

Students spent two classes building in the library. Each session was approximately an hour long; students were engaged and involved during the entire process. Other than a few minor disagreements that needed adult intervention, students worked within their groups to resolve conflict. Every student was able to contribute to the building process.

Step 6: Share

The final step of the design thinking process is the test stage. Traditionally, in this step, members of the design team return to the original end users they had interviewed earlier, and share the prototype and receive feedback. Then the group makes

alterations and adjustments based on user feedback. For *The Three Little Pigs* project I called the final step the "share" step. Given that our user group consisted of fictional characters, the final step was revised to involve the groups' sharing their final projects with their classmates.

Each group made a video explaining the design decisions made as its house was planned and built. The videos were shared at an all-school assembly, and the models were displayed in the school. During the sharing process students answered questions about their projects, shared thoughts about their houses, and listened to feedback about their designs. During the all-school share students extended their projects to an authentic audience, taking the assignment outside the classroom to share beyond their peer group and present to a large group of students, teachers, administrators, and staff.

AASL's Learning Standards and Design Thinking

The design thinking process meets many of AASL's *Standards for the 21st-Century Learner* (AASL 2007).

Throughout the steps students were asked to retell and remember the key points of the story as they engaged in the process (Standard 1.1.7: "Make sense of information gathered from diverse sources…").

First-graders were asked to collaborate at all stages of the process from sharing information and brainstorming ideas about the story as a class to designing and building in a small team (Standard 2.1.5: "Collaborate with others to exchange ideas, develop new understandings, make decisions, and solve problems"). Throughout the design thinking process students were asked to share their ideas and listen to others.

Our first-graders also were asked to provide feedback to classmates about their ideas and plans, and listen to and accept feedback on their own ideas (Standard 3: "Share knowledge and participate ethically and productively as members of our democratic society").

Because they were asked to delve deeper into the story, students developed a deeper understanding about how the elements of a story—including characters, setting, problem, and solutions—are connected. Students also developed empathy for characters in the story and made strong connections by focusing on the needs of others (Standard 4.1.3: "Respond to literature and creative expressions of ideas in various formats and genres"). In the process, they expressed feelings about characters and events in the story, made connections between literature and their own experiences, and identified plot, characters, times, and places in the story.

Reflection

This project took place over twelve weeks as students made their once-a-week forty-minute visits to the school library. From week to week students were ready and able to engage in the process. They recalled where we were in each stage of the project and quickly reconnected to the themes. When we used the design thinking process to dissect the elements of the story, first-grade students were able to make deeper connections to what we were reading than they did in a single story session.

This project contributed to students' deeper understanding of stories that were read in the classroom and writing projects in which they engaged through their Writer's Workshop curriculum in the classroom.

This project also introduced students to terms that they will hear and be expected to identify in literature as they advance in school. Terms included: characterization, point of view, retellings, perspective, and the connection between all the elements of the story.

Students also spent time thinking about a situation from a different perspective and gaining empathy and understanding for the three little pigs and the big bad wolf. Developing empathy is an important component in our development as members of human society; fostering empathy is an essential part of our role as educators of young children.

First-grade teacher Tisha Johnson said this about *The Three Little Pigs* project:

> Not only did the children enjoy listening to several versions of the story (they were especially drawn to the newer version on the Ninja Pigs since Ninjas are a hot topic in my classroom right now), but the project pulled them in a way that I have never seen first-graders engaged in library classes before. The children were taught and followed the design

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thinking process to create the ultimate home to save the pigs. They were truly invested in working with their peers to work through every idea that was offered in their group. During this project there was laughter, contemplation, problem solving, negotiation, testing, failing and testing again, joy, and pride.

Challenges included the limited library time scheduled for each class. Although students were engaged in the process spread out over twelve weeks, students might have felt that the whole project was more connected had they been able to work in the library more frequently. As I move forward with extended projects like this one, I hope to encourage the school administration and teachers to support the change to a fixed/flex schedule allowing for an increased connectivity within a project and between the library and the classroom.

The key to success for design thinking projects like this one is collaboration among students and among educators. The best way for deeper learning and questioning skills to be developed is through lessons school librarians coplan with classroom teachers and subject specialists. The result can be in-depth learning for all students regardless of their ages.

The Three Little Pigs project was a model for a 21st-century methodology that incorporates project-based learning and design thinking with young learners, as students were provided with a clear problem to address and the tools to solve the problem using a clear process. I look forward to using design thinking with more students and classes as we explore literature and other research topics in the school library.

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RESOURCES ABOUT DESIGN THINKING IN EDUCATION

K12 Lab Network wiki: <https://dschool.stanford.edu/groups/k12>

A wiki from d School at Stanford University about using design thinking in schools.

Design Thinking in Schools: <www.designthinkinginschools.com/about>

A collaborative website by IDEO and the K12 Lab at Stanford University where teachers from around the world can share design thinking projects they are planning and implementing at their schools.

Design Thinking for Educators Toolkit by IDEO: <www.designthinkinginschools.com/about>

The global design firm IDEO offers a free toolkit for educators to explore design thinking and provides examples on how to begin to use the process in education.

#dtk12chat: <www.dtk12chat.com>

Follow #dtk12chat on Twitter to learn more about educators using design thinking or join the weekly Wednesday night chat to talk with other design thinking educators.