



Design Pack

School

What if school engaged students in ways that were exciting, empowering and culturally relevant? What if school was just one part of a community of learning that extends far beyond the classroom walls? What if school equipped students to view the world as a single uninterrupted opportunity to learn?

From the experts in game-like learning at Quest Schools, this design pack will immerse you in 10 components of the innovative Quest model that will help you fundamentally re-imagine the experience of teaching, learning, and engaging students.



How do I use this School Design Pack?

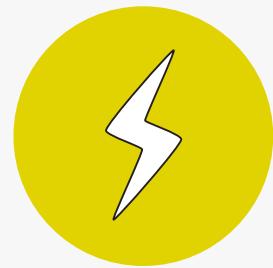
We, at Institute of Play and Quest schools, want to share what we do in our classrooms and schools with you.

Each section of this design pack focuses on one component of our school model that both engages and supports students in their learning. The section structure consists of an overview of the component, an example of the component in action, and a set of reflection questions to guide your own thinking about what is possible in your school. At the end of each section is a next step if you want to learn more about specific components.



Whether you are a teacher, school leader, or a curious individual, this design pack will give you insights about Quest schools and our approach to teaching and learning.

We did not plan for this design pack to be read only from front cover to back cover. Feel free to pick and choose which components you want to read about based on your own interests and passions.



If a component excites you, please experiment with integrating it into your school.

In developing this design pack, we want you and others to use and build on these components in your own contexts.

What is in this School Design Pack?

10 components of Quest schools make up the School Design Pack. They are categorized into three groups: **Core Frameworks**, **Key Structures**, and **Major Supports**.

Core Frameworks

To support all students in learning, three research-based core frameworks – game-like learning, systems thinking, and connected learning – guide the design of Quest schools.



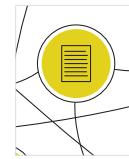
Game-like Learning

An approach to learning rooted in how games drop players into accessible, inquiry-based, feedback-rich, and complex problem spaces.



Systems Thinking

The ability to understand systems and manage complexity is integral to the development of 21st century citizens.

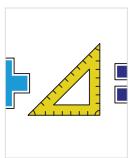


Connected Learning

Meaningful learning, which happens when young people are supported to pursue a personal interest/passion, is amplified by using today's extraordinary digital media tools.

Key Structures

Three key structures – domains, assessment, and teacher dimensions – boost effective student and teacher learning in and out of classrooms.



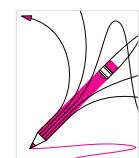
Domains

Students seek out knowledge and skills from different content areas to solve complex problems in interdisciplinary courses called domains.



Assessment

Assessment of academics and 21st century skills is embedded in student learning and is dependent on immediate and ongoing feedback about progress towards learning goals.



Teacher Dimensions

To be most effective, teachers need time and space to grow and strengthen the multiple dimensions of their work and focus on supporting all students in learning.

Major Supports

Four major supports at Quest schools – Mission Lab, Missions and Quests, Boss Level, and Technology Integration – create unique learning spaces and experiences for students and teachers.



Mission Lab

Mission Lab is an in-school design studio staffed by game designers and curriculum designers who support integration of our core frameworks into curriculum and instruction.



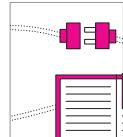
Missions and Quests

Our students are continually given Missions, complex problems that cannot be solved immediately, that are ultimately solved after completing a series of sequenced Quests.



Boss Level

Boss Level, based on the hardest level in video games, is an intensive, immersive learning experience during which students use all their skills and knowledge to solve a complex problem.



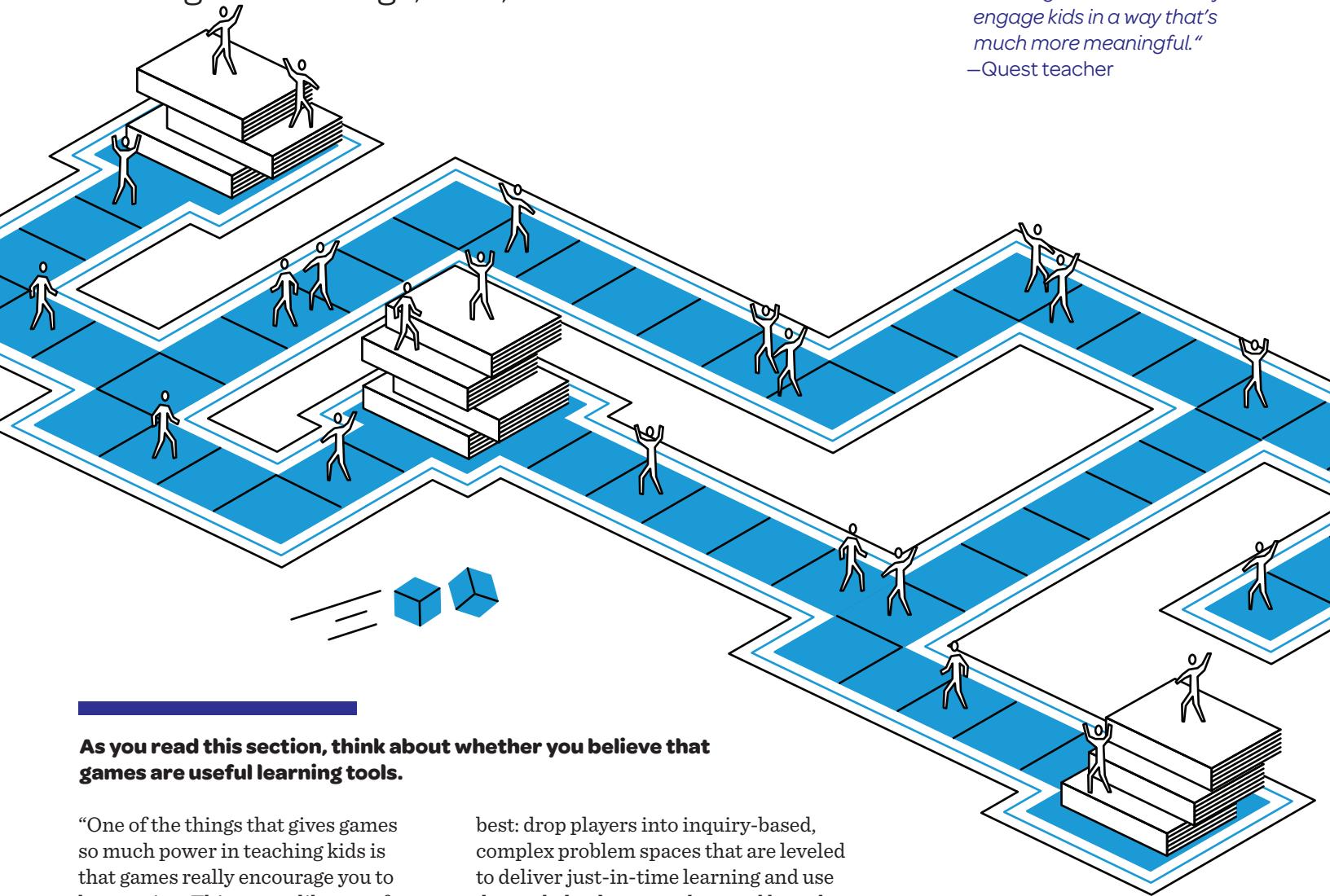
Technology Integration

Digital technologies are powerful learning tools, which we work to use and integrate purposefully and meaningfully.

Game-like Learning

Game-like learning is a research-based theory of learning that supports student engagement and learning of knowledge, skills, and habits of mind.

"Games have these really beautiful learning principles and if we are able to transfer those into classroom teaching then we can really engage kids in a way that's much more meaningful."
—Quest teacher



As you read this section, think about whether you believe that games are useful learning tools.

"One of the things that gives games so much power in teaching kids is that games really encourage you to keep trying. This seems like a perfect fit for when you are teaching kids, to teach them in a safe environment and encourage them to try without fearing failure." —Game Designer, Institute of Play

Game-like learning is a research-based theory of learning that supports student engagement. This approach to learning draws from what we know games do

best: drop players into inquiry-based, complex problem spaces that are leveled to deliver just-in-time learning and use data to help players understand how they are doing, what they need to work on, and where they need to go next. Games also provide engaging contexts for students to build content knowledge along with 21st century skills, such as communication, collaboration, creativity and innovation.

Following are the set of seven guiding design principles that have surfaced from a process of reflection on our school
Continued on next page

The Seven Principles of Game-like Learning:

Everyone is a participant

A shared culture and practice exists where everyone contributes, which may mean that different students contribute different types of expertise.

Challenge is constant

A “need to know” challenges students to solve a problem whose resources have been placed just out of reach.

Learning happens by doing

Learning is active and experiential. Students learn by proposing, testing, playing with, and validating theories about the world.

Feedback is immediate and ongoing

Students receive ongoing feedback on their progress against learning and assessment goals.

Failure is reframed as iteration

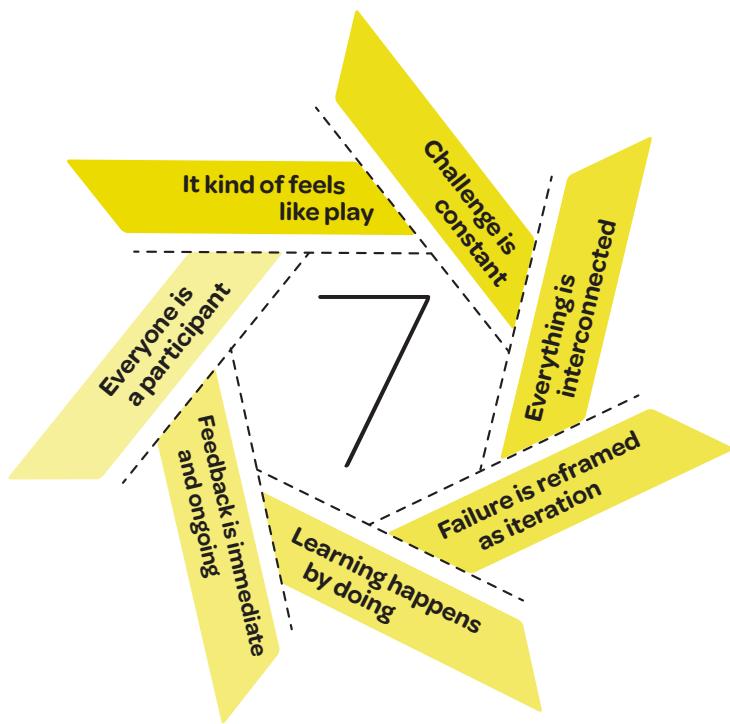
Opportunities exist for students and teachers to learn through failure. All learning experiences should embrace a process of testing and iteration.

Everything is interconnected

Students can share their work, skill, and knowledge with others across networks, groups, and communities.

It kind of feels like play

Learning experiences are engaging, learner-centered, and organized to support inquiry and creativity.



Continued from previous page

model. These seven principles inform the design of our schools’ curriculum and instruction. Please note that the principles should be understood as working together within a system—no single principle does much on its own, but together, the principles provide an effective framework for designing engaging student learning experiences. They may also be used to evaluate the design of a particular learning experience.

Game-like learning informs teaching and learning at our schools in both long-term curriculum planning and

daily lesson planning. For example, at the long-term curriculum level, student learning is organized into game-like experiences called missions. Students are given roles and must solve a series of problems to successfully complete the challenges of the mission. On the daily lesson level, students may engage in board and digital games to support their learning of specific concepts. They also have opportunities to modify and design games to show their own understanding and to help others learn relevant content and skills.

Game-like learning in action: Caterpillar!

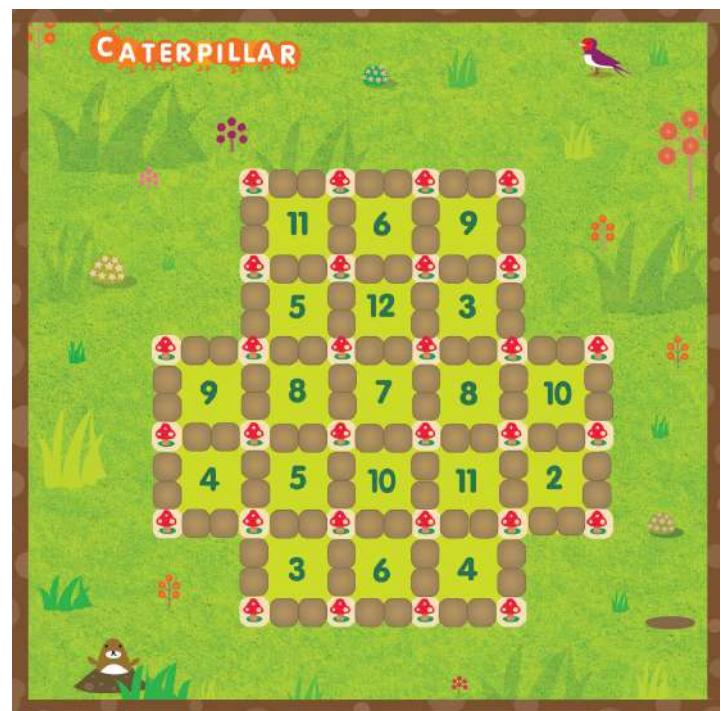
Four eleven-year-olds focus their attention on

Caterpillar's colorful game board covered with rows of blue, green, yellow, and purple blocks. One girl rolls a set of dice and adds purple blocks to the game board. The boy across from her scribbles something on a sheet of paper, grins, and then exclaims, "the frequency of seven is the highest, so far!"



Caterpillar is a board game designed to help students learn about frequency. To play the game, students roll dice and use the resulting sum to construct caterpillars (made of wooden blocks) on a numbered game board. The goal of the game is to build the longest caterpillar. Throughout the game, students also tally how many times a sum appears after each dice roll. At the end of the game, students create frequency graphs based on their dice roll results to visually identify the most frequently rolled sum. Another round of play results from the outcomes of these graphs.

During game play, the teacher circulates around the room and monitors student learning. After students finish their frequency graphs, students take on the identity of game designers to "mod" or change Caterpillar to improve the effectiveness of the game in teaching frequency. To design a more successful game, students must use their knowledge of frequency and their peers' interests, as well as their own creativity.



Based on their roll of the dice, students place their colored blocks on the brown squares or mushrooms on the game board to create their caterpillars.

Reflection Questions

Which of the game-like learning principles resonated with you? Why?

How could you integrate the game-like learning principle(s) into your school and classrooms?

After reading this section, what do you want to learn more about?

Next Steps

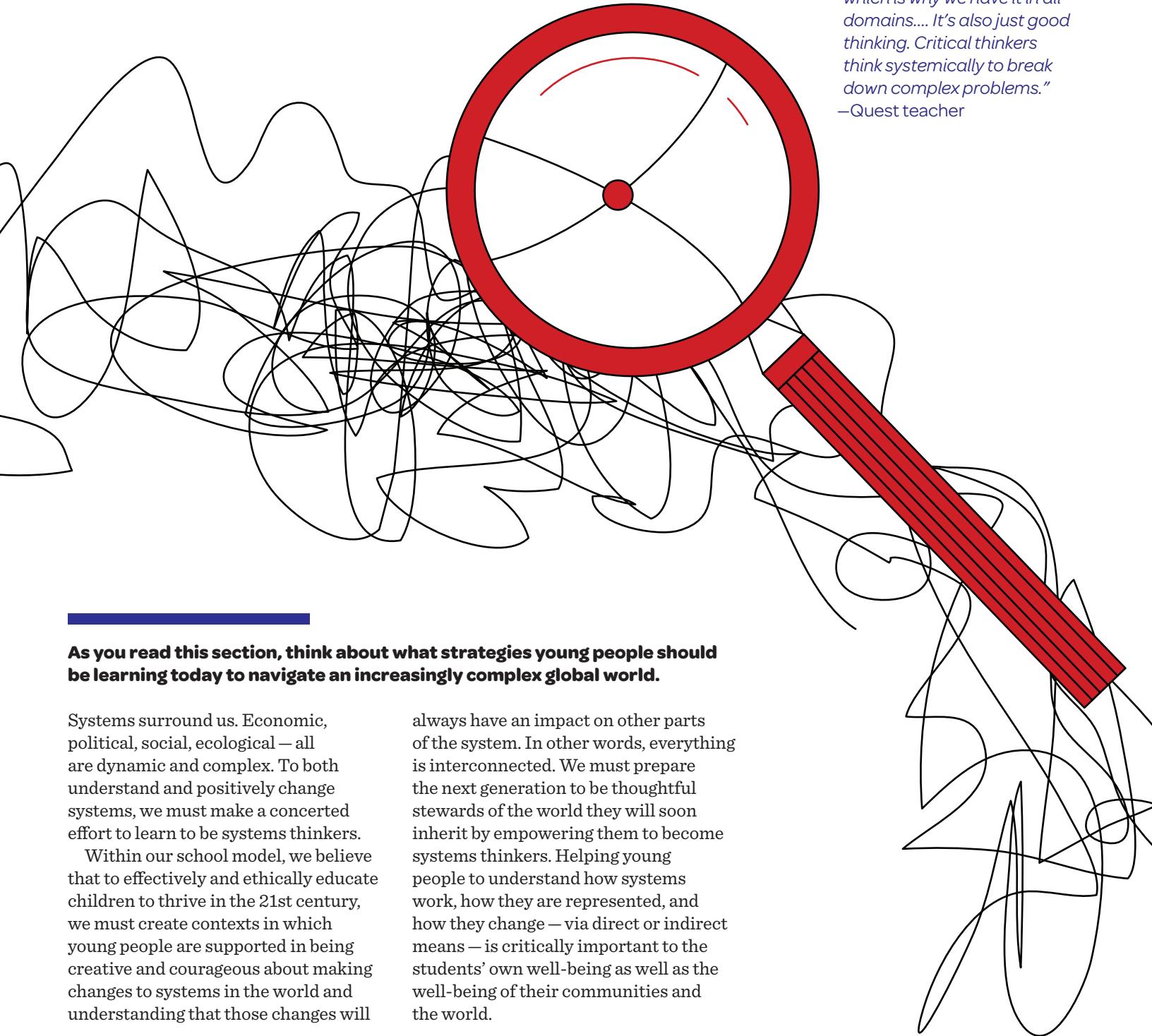
If you are interested in learning more about game-like learning in your classroom and/or school, go to the Missions and Quests section of the **School Design Pack**.

If you are interested in implementing Missions and Quests in your curriculum, go to the **Curriculum Design Pack** for more information and tools.

Systems Thinking

Understanding how systems work helps students to analyze and solve complex problems.

"The obvious thing about systems thinking is that it can be in any domain, which is why we have it in all domains.... It's also just good thinking. Critical thinkers think systemically to break down complex problems."
—Quest teacher



As you read this section, think about what strategies young people should be learning today to navigate an increasingly complex global world.

Systems surround us. Economic, political, social, ecological – all are dynamic and complex. To both understand and positively change systems, we must make a concerted effort to learn to be systems thinkers.

Within our school model, we believe that to effectively and ethically educate children to thrive in the 21st century, we must create contexts in which young people are supported in being creative and courageous about making changes to systems in the world and understanding that those changes will

always have an impact on other parts of the system. In other words, everything is interconnected. We must prepare the next generation to be thoughtful stewards of the world they will soon inherit by empowering them to become systems thinkers. Helping young people to understand how systems work, how they are represented, and how they change – via direct or indirect means – is critically important to the students' own well-being as well as the well-being of their communities and the world.

Systems Thinking Learning Trajectory and Goals

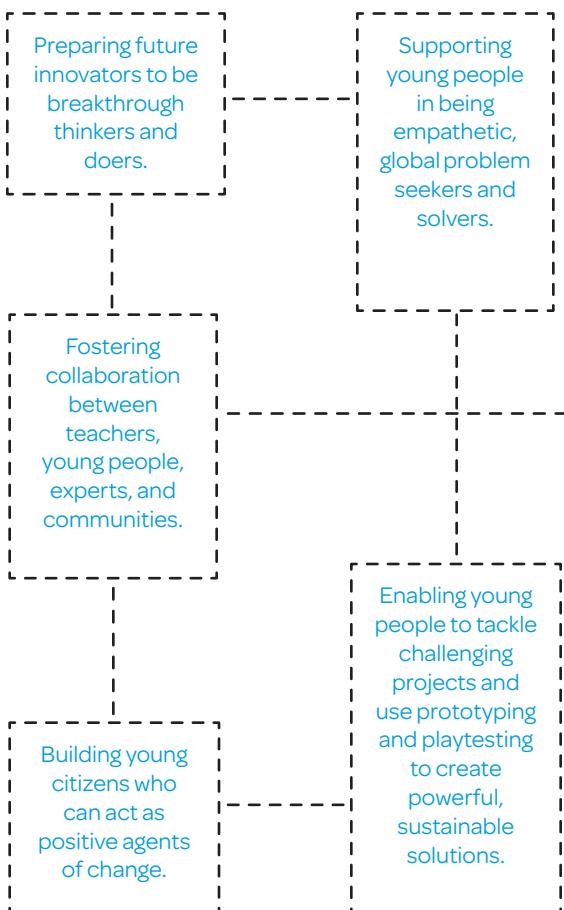
Systems thinking opens the door for students to reach several learning goals centered on key 21st century skills (see graphic). To support students' development of systems thinking, our model includes a three-year learning trajectory of sequenced systems thinking concepts and skills. Starting in 6th grade, students learn basic concepts of systems thinking, and by 8th grade, they are using a more complex set of

concepts and skills to strategize how to propagate change within systems. In Quest upper schools, we revisit all of these concepts and skills in the same scaffolded manner, but in more depth. Our work to help students learn systems thinking results in a series of positive outcomes as shown in the graphic below.

We also include supports to help teachers build content knowledge and skills about systems thinking, since it

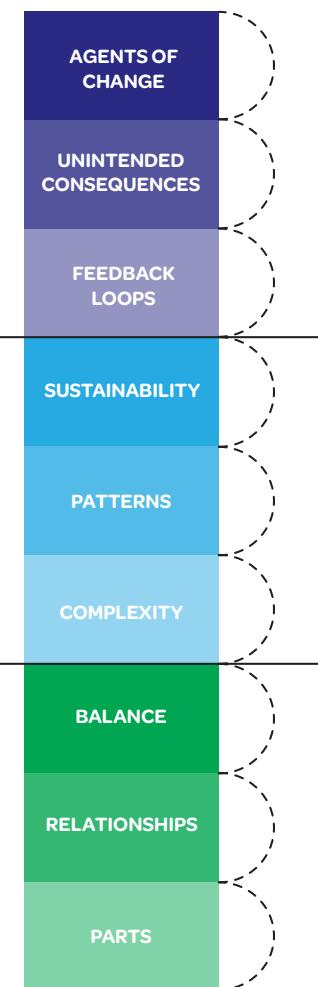
may not be a familiar area for many of our faculty. Professional development sessions include learning experiences tied to systems thinking as well as systems thinking tools for teachers to use in classrooms with their students.

By integrating systems thinking across all aspects of our schools we are:



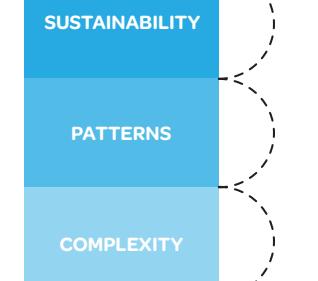
8th Grade

How can we contribute to and transform dynamic systems?



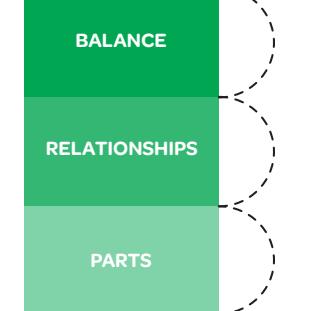
7th Grade

What makes a system dynamic?



6th Grade

What is the structure of a system?



Systems Thinking in Action: Stress Levels

"I'm the most stressed when my mom comes home from work... and sometimes when I'm late for school or during lunch," explained a student using a Behavior Over Time Graph (BOTG). He continued, "my least stressful time is hang-out time after dinner."

BOTGs are systems thinking tools that enable students to see patterns over time, start to examine why these patterns exist and identify some ways they could potentially change negative patterns. In our 8th grade Wellness class (physical education and health), teachers ask students to map different emotions over days or weeks to help students see how their emotions vary and hypothesize possible triggers for some emotions – the causes of variability. This systems thinking tool not only enables students to understand their world as a system, but also helps them to regulate their own emotions and feelings (one of the socio-emotional skills taught and assessed at our schools).



A Quest student's Behavior Over Time Graph showing the relationship between his stress levels and his daily activities during three days.

Reflection Questions

Does your school teach any systems thinking? If so, what do you teach?

Would integrating systems thinking (or more systems thinking) into your curriculum be helpful/useful for you and your school? Why?

After reading this section, what do you want to learn more about?

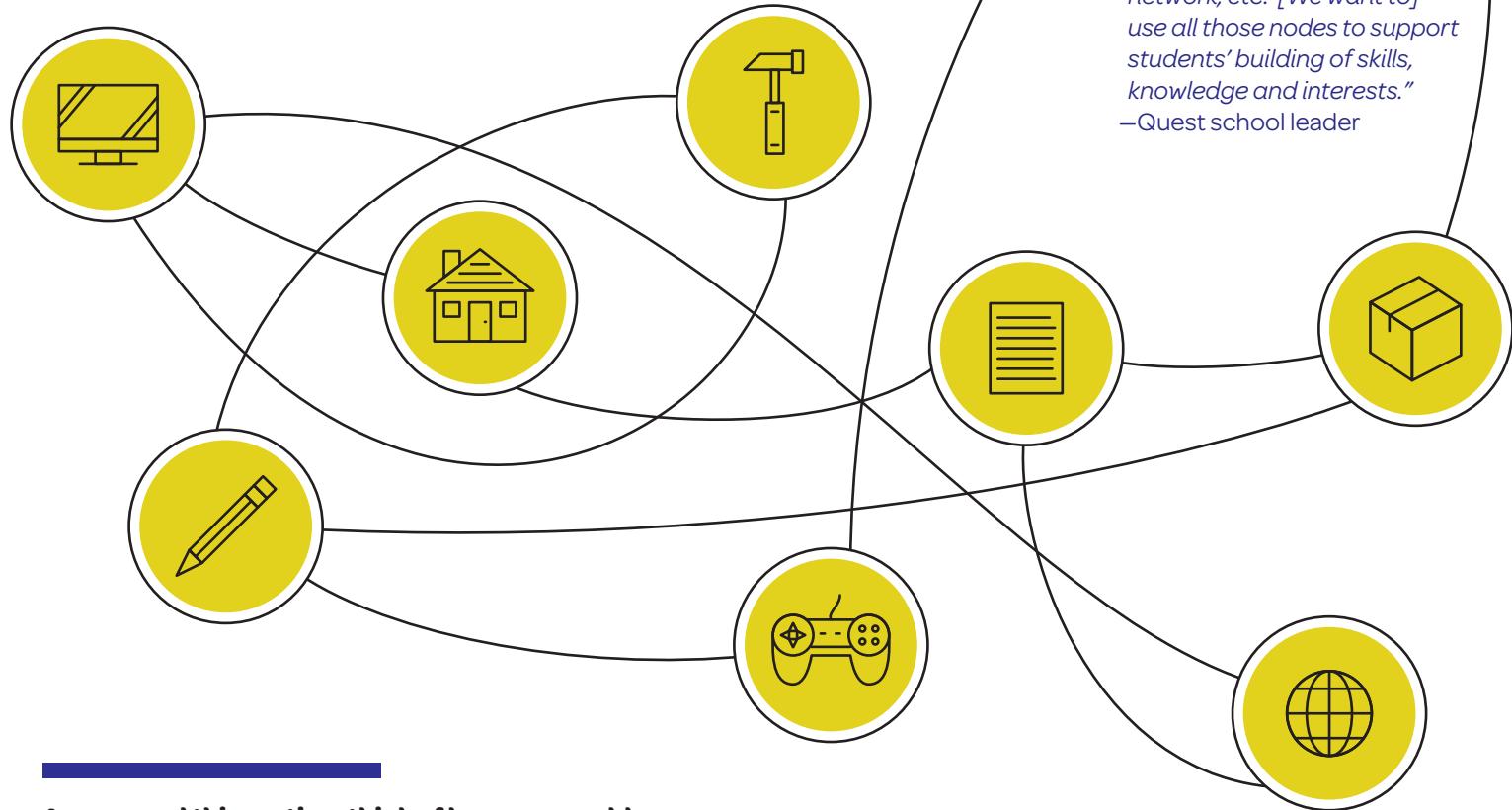
Next Steps

If you are interested in learning more and/or implementing systems thinking in your classroom and/or school, go to the **Systems Thinking Design Pack**.

If you are interested in learning more about socio-emotional skills at our schools, go to the **Competencies Design Pack** (not yet released).

Connected Learning

Connecting student interests/passions and their learning in and out of school makes for deeper learning with higher retention.



As you read this section, think of how you would know “connected learning” if you saw it in action.

How do we, as educators, create learning experiences that are more effective and engaging, better integrated into student's lives, and broadly accessible for many more kids?

Connected learning is one way to create these learning experiences. It builds on the idea of helping young people become producers of knowledge and culture rather than only consumers of knowledge. It does so in ways that connect the often-divided realms of formal and informal learning. This approach to learning also seeks to

use interest and passion as the core motivations for learning, and then share produced knowledge and culture across peer and adult communities with similar interests.

Within this framework, school is not the only place where learning is valued; rather, it is one of several linked contexts in which learning happens. If done well, such designs would provide opportunities for young people to learn and work within connected networks, rather than within isolated educational institutions, supported through

innovative uses of social media and other tools for public sharing. Ultimately, connected learning enables young people to creatively construct new learning networks as they reflect on how learning is connected to their interests, passions, and life goals.

Connected Learning in Action: Internships!

Wednesday afternoons for our 9th graders are far from typical. You may see one of our 9th graders using Adobe Illustrator to design new graphics for an Institute of Play project or another 9th grader leading explorations with elementary students in the Discovery Room of the American Museum of Natural History. Internships are just one way that we work to help students connect their learning to their own interests and passions and across different contexts outside of classrooms.

To be able to leave school for an internship, students take an internship class during 8th grade or the beginning of 9th grade. In this course, students complete an inventory of their interests to help them match their interests to particular professional paths. Students cycle through numerous internships within our schools — ranging from working with teachers to school leaders to librarians — to practice the skills and responsibilities needed to succeed in a professional environment.

Feedback from both students and internship supervisors about our internships program is positive and inspiring. Some of our students have extended their internships into summer jobs, whereas others have made networking connections with amazing and interesting adults who have similar interests to their own. This program is just one of many we continue to create to connect students' learning to their interests and expand their learning environment beyond classrooms.



During their internship at Institute of Play, Quest to Learn students work with our Creative Director to design, review and revise graphics to be hung in their school's hallways.

Reflection Questions

How do you support students in cultivating their interests and passions in school?

What did you learn about connected learning that may be useful for you and your school?

After reading this section, what do you want to learn more about?

Next Steps

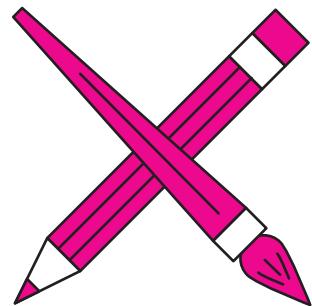
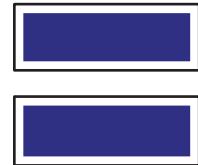
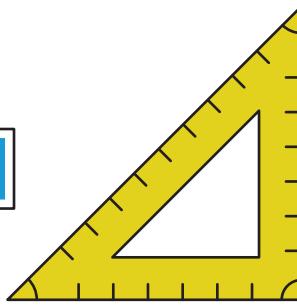
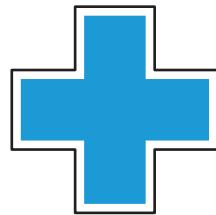
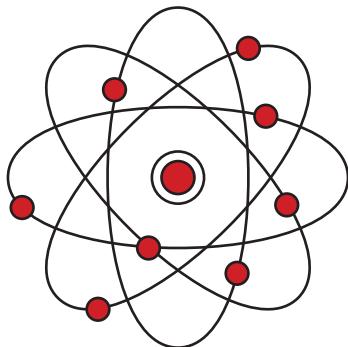
If you are interested in learning more about connected learning, go to the **Connected Learning Design Pack** (not yet released).

Domains

We take an interdisciplinary approach to learning that mirrors how knowledge and skills are integrated in real life.

"Domains are not only a really beneficial way to challenge the students by having them make connections across otherwise separate areas of study, but a strong way to incite teacher engagement and foster a newness in our teaching."

—Quest teacher



As you read this section, think about how your school helps students see and understand connections across subject areas.

"Does this angle work for our spaceship to leave the Earth's atmosphere?" asked one 8th grade student, as he and another student looked at their self-designed simulation on Algodoo, a physics simulation software program. The relatedness between math and science is clear in that 8th grader's short question.

In the world around us, information is not separated and isolated into specific content areas, such as science, math, social studies, etc. In reality, the world is dependent on content areas interacting in a multitude of ways. Our schools use this idea of relationships and interactions among subject matter to create five domain courses of integrated content areas:

- [The Way Things Work](#) (integrated science and math);
- [Being, Space, and Place](#) (integrated English/Language Arts and social studies);
- [Codeworlds](#) (integrated math and English/Language Arts);
- [Wellness](#) (integrated nutrition, physical education, health, and socio-emotional learning)
- [Sports for the Mind](#) (game design and digital/media arts).

All interdisciplinary domains support students in building multiple ways of knowing and doing when faced with complex problems that innately involve more than one content area and skill set.

In addition, students learn how to use the larger lens of systems thinking to see and examine patterns across content areas. For instance, after students learn about supply and demand in economic systems in Being, Space, and Place, they can more easily understand how supply and demand comes into play in an ecological system with populations of predators and prey.

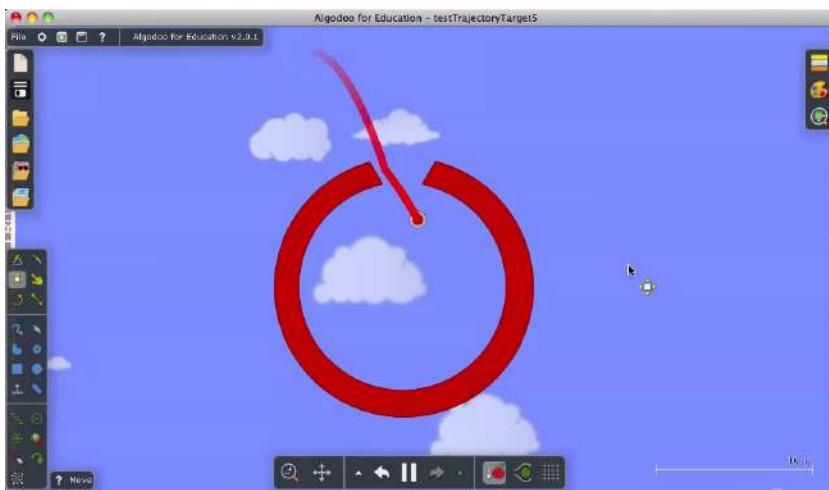
By creating interdisciplinary spaces, students will be able to more easily transfer their understanding to new contexts and situations, because they see how some content appears in more than one place. And, ultimately, we know students truly understand concepts when they are able to transfer their knowledge and understanding to apply it in a new way in a new space.



To shoot a rocket into a hoop in the sky, students must use this projectile machine.



Students must figure out the correct angle of the projectile machine to shoot the rocket into the red hoop.



If the angle is correct, the rocket soars up and into the red hoop.

Domains in Action: The Way Things Work

During a mission in The Way Things Work

(TWTW), 8th graders design a spaceship, take-off logistics and space path to the Moon for a space tourist company that wants to transport people from Earth to the Moon. To succeed in this mission, students must use their knowledge and skills in astronomy, physics, and geometry. Physics and astronomy have evident connections to math, but by bringing geometry into the project, students begin to see how math and science are deeply intertwined.

To experiment with different trajectories for their spaceships, students spend time learning about the science and math within Newton's Laws by doing a hands-on ball and ramp investigation. Then, they do an additional investigation of trajectory using Algodoo, a physics simulation software. They must figure out the trajectory to shoot a rocket from a launcher into a circular basket in the sky.

By engaging first in a hands-on investigation, students build understanding about the basics of Newton's Laws. Then, the virtual simulation allows them to experiment, as they change variables and run multiple tests easily and quickly. Finally, students move on to use the design process, math and science knowledge and skills, and Algodoo to figure out the best take-off trajectory for their spaceship to reach the moon.

Reflection Questions

Do you integrate content and skills in your school in interdisciplinary spaces? If so, how?

What may be some benefits to creating interdisciplinary spaces in your school? What may be some challenges?

After reading this section, what do you want to learn more about?

Next Steps

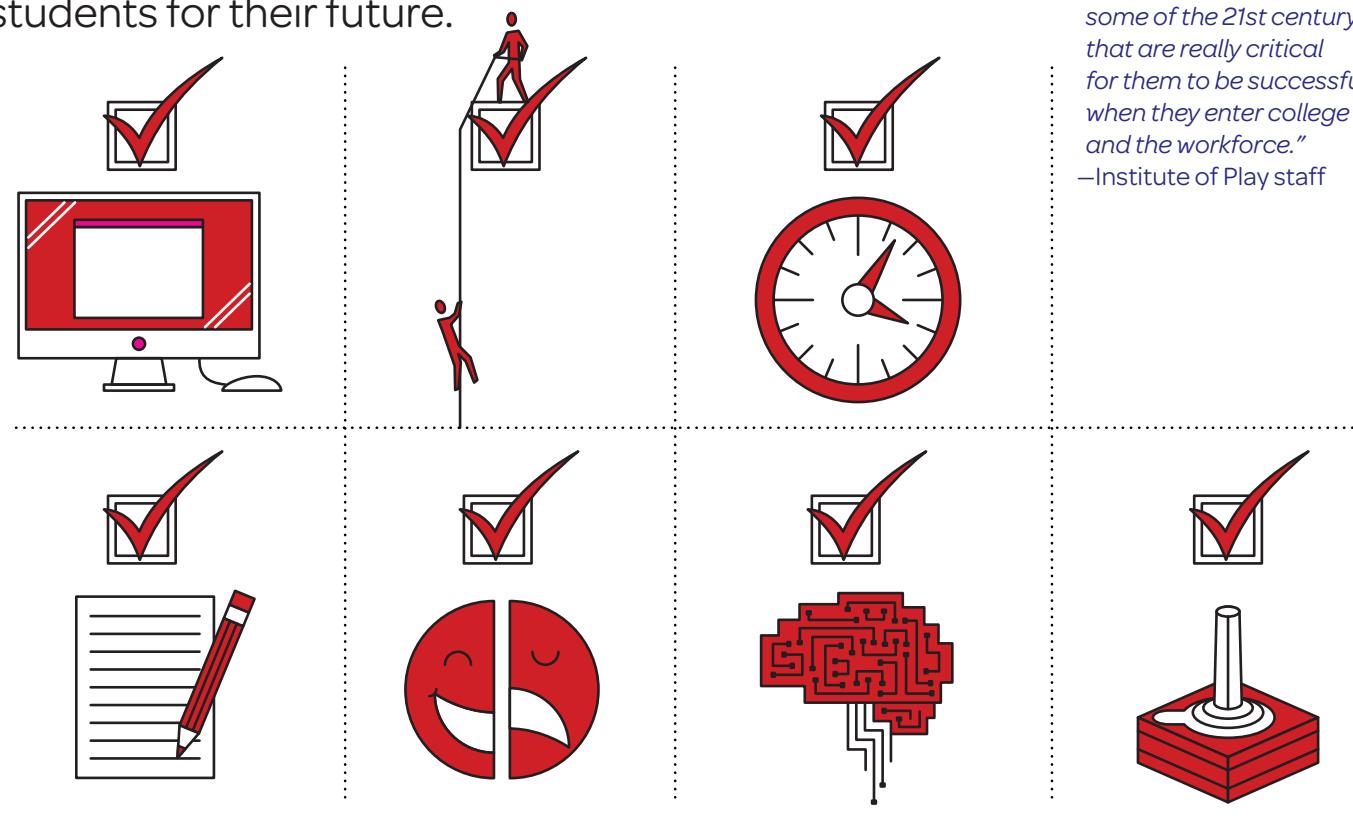
If you are interested in learning more about our unique interdisciplinary domain focused on game design and digital/media arts, go to the **Sports for the Mind Design Pack** (not yet released).

Assessment

We evaluate content knowledge and skills and 21st century skills through embedded, performance, and traditional assessments to prepare our students for their future.

"The students who come here are not only getting learning in the state standards, but they are also getting learning in empathy, collaboration, and some of the 21st century skills that are really critical for them to be successful when they enter college and the workforce."

—Institute of Play staff



As you read this section, think about how your school's assessment model aligns to what you value in student learning.

"What we assess defines what we value."

—Wiggins, 1990

If this is so, then what do we assess at our schools? Since we aim to develop students who are academically, socially, emotionally, physically, and professionally prepared for college, career, and life in the 21st century, we use a dual-purpose assessment model involving academics and competencies.

The academic facet of our model is grounded in assessments aligned with national and state standards. The rigor

of our assessments, including larger performance assessments, prepares our students to be academically successful in college and beyond, without needing to take remedial academic courses.

The second aspect of our assessment model emerges from our belief that students need both subject matter knowledge and skills and 21st century skills to help them be ready for a future we cannot even begin to imagine now. In our assessment model, we include a set of competencies encompassing

key 21st century skills—design thinking, systems thinking, and socio-emotional skills. These competencies are integrated into everyday learning and assessment within our classes.

To assess and self-assess content knowledge and competencies, our teachers and students use rubrics with a novice to master trajectory (novice, apprentice, senior, and master). This trajectory provides invaluable feedback for needed next steps around teaching and learning.

Assessment in Action: Content, Teamwork, and Time Management

Should the Persian King invade Sparta or Athens? Students huddle in groups researching and writing up their notes arguing for their side of this debate. To show their understanding of historical content knowledge, students study Sparta's and Athens's military strength, culture, and benefits for future civilizations in order to support their argument. During the first step of this project, groups of two to three students complete a debate prep assignment to help them begin to structure their debate argument. Students' debate prep assignments are assessed in the following three academic-focused areas (based on Common Core Standards in English/Language Arts for Grade 6):

Claims

Introduce three main claims for your argument.

Main Arguments

Support claims with clear reasons and relevant evidence using credible sources.

Outside Research

List and organize relevant information from multiple credible print and digital sources and quote or paraphrase others' information while avoiding plagiarism and providing basic bibliographic information for sources.



This map is one resource to help students decide whether to invade Athens or Sparta because it shows the territories of the city-states.

In addition to evaluating academic learning, students' socio-emotional skills, one of our schools' competency areas, are assessed in the debate prep assignment. For this assignment, students are evaluated on two socio-emotional skills:

Teamwork

Is respectful of other group members and their needs to participate; creates and revises clear and careful plans that take others' interests and resources into account.

Time Management

Uses time wisely and efficiently in order to meet deadlines; organizes and keeps track of information.

By providing feedback to students on both academic achievement and socio-emotional skills, our teachers help students build the essential knowledge and skills needed to succeed in middle and high school as well as in college and career.

Reflection Questions

What do you value in learning? Are you assessing what you value at your school?

How are the components of our assessment model similar or different to those at your school?

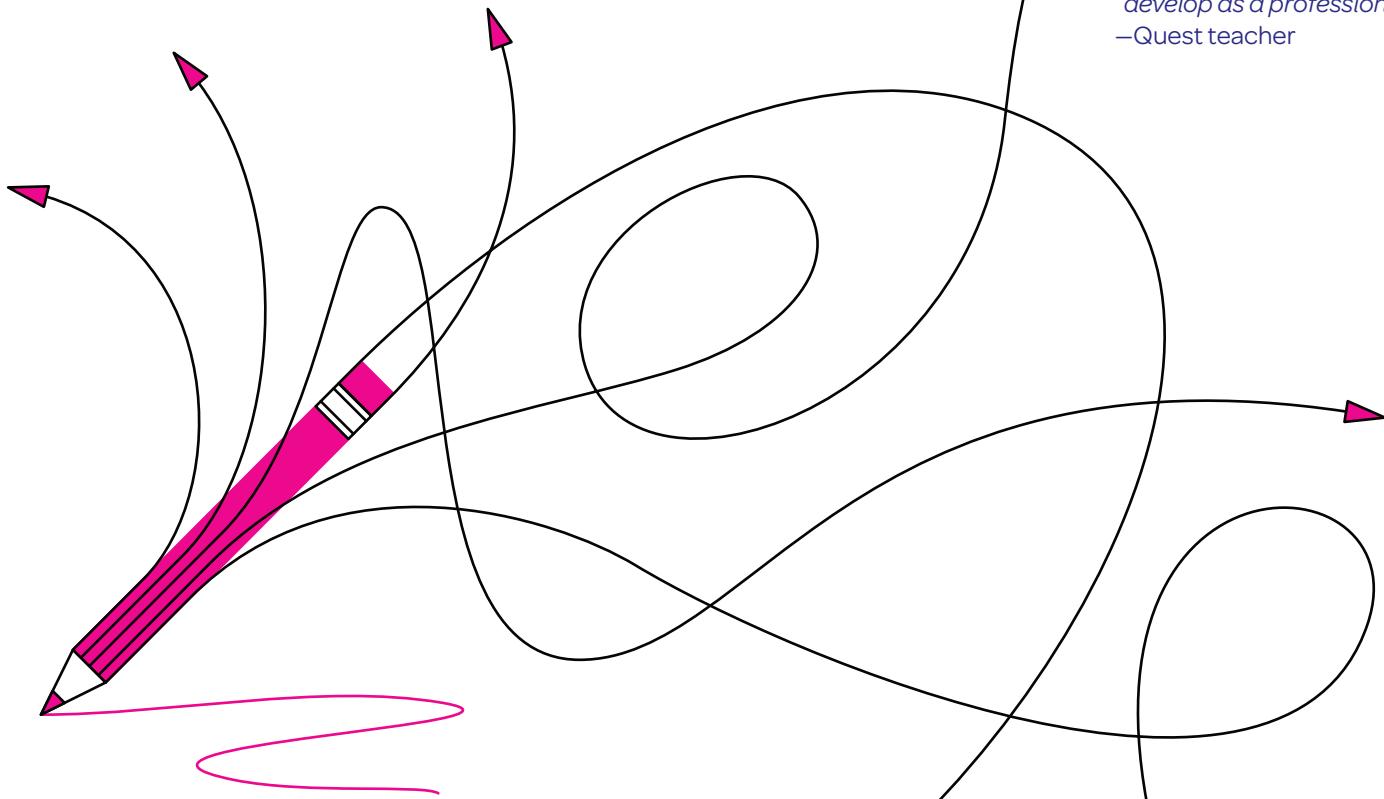
After reading this section, what do you want to learn more about?

Next Steps

If you are interested in learning more about competencies, go to the **Competencies Design Pack** (not yet released).

Teacher Dimensions

Teaching is much more than what happens in a classroom every day.



"There's a lot of room for growth here.... I think that's awesome that you're able to develop as a professional."
—Quest teacher

As you read this section, think about what makes a teacher effective in her classroom.

Designing, assessing, planning, practicing, experimenting, integrating, reflecting, leading, managing, supporting, growing: teaching is not a simple endeavor.

Effective teachers use and integrate many types of knowledge and skills on a daily basis. Teaching and its complex set of knowledge and skills are learned and honed over time. Our goal is to support teachers in becoming the best and most effective teachers possible.

To support teacher development and growth within our schools, we created a framework that includes seven key dimensions of teaching. This framework is both grounded in the literature of teacher development and effectiveness, and relevant to the needs of teachers in our unique teaching and learning model.

The Seven Dimensions of Teaching are:

Designer

Teachers co-design, implement, and revise game-like curricula with game designers and curriculum developers. Teachers are able to focus on both student engagement and learning which, when combined, lead to increased student learning.

Assessor

Teachers design and implement embedded assessments, use data from assessments to evaluate student learning, make adjustments to curriculum based on assessments, and help students set learning goals. Teachers are able to use tools and data to make decisions about how to best support all students in reaching learning goals based on student strengths and areas of need.

Systems-thinker

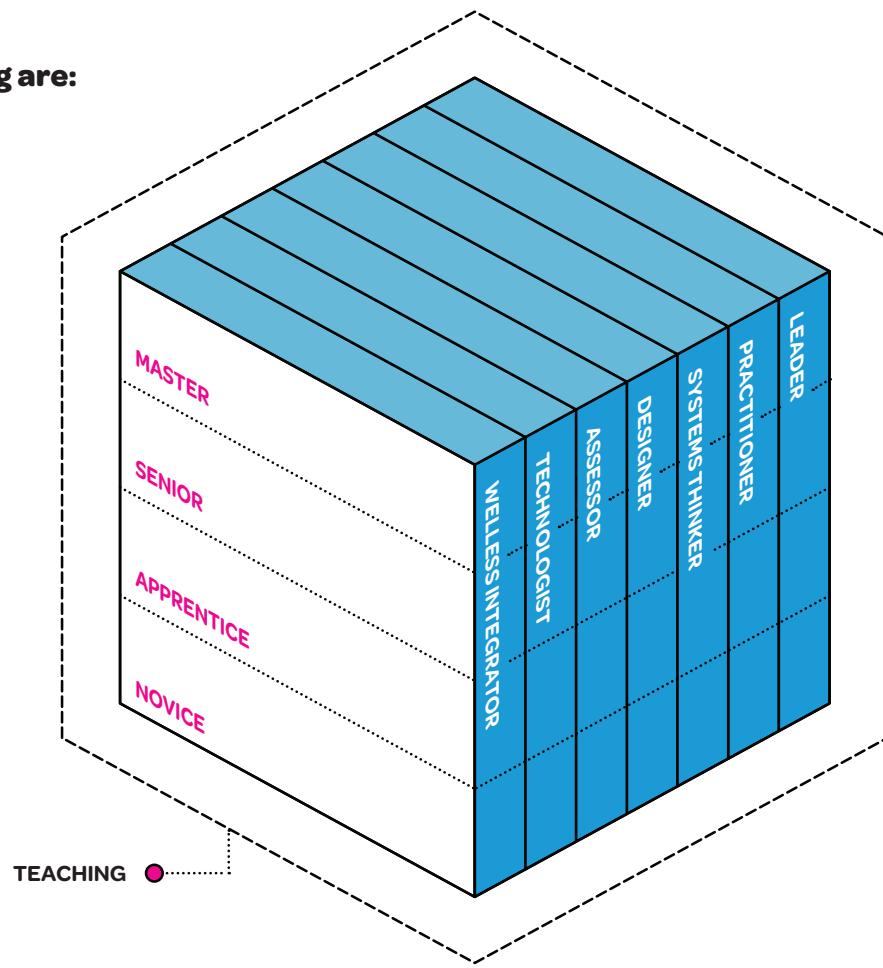
Teachers understand the architecture of dynamic systems and are able to think systemically. Teachers are able to see and manage complexity, and subsequently teach and model tools and ways of thinking to help students understand how systems work and how to change them in positive ways.

Wellness Integrator

Teachers understand dynamics among their students and with other members in the school community. Teachers are able to act on understandings of interpersonal and group dynamics to address student emotional, academic, physical and nutritional needs.

Technologist

Teachers seek out, identify, and use technology to enhance student learning. Teachers are able to find meaningful ways to use technology to expand student learning about complex problems beyond what analog tools allow.



Practitioner

Teachers exhibit exemplary pedagogical practices in areas such as differentiation, integrating content expertise, classroom management, communicating with parents, lesson planning, and engaging students in learning. Teachers are able to create safe and productive learning environments for all students and effectively connect support networks for students in and out of school.

Leader

Teachers exhibit professional commitment and act as leaders inside and outside of the school community. Teachers are able to continue their own professional growth as they initiate and lead projects that exemplify their strengths and develop their areas for growth as leaders.

Teachers use these dimensions of teaching at different times and in different combinations based on the classroom or school situation. One dimension is not more important than another one. A highly effective teacher will use all of them in the course of her teaching. From the first day of teaching, a teacher grows across these dimensions (from novice to apprentice to senior to master) and must be supported in an integrated manner throughout her years of teaching.

Teacher Dimensions in Action: Galactic Mappers!

In the 6th grade Humanities course, students engage in a game called Galactic Mappers. They have to help aliens, who are horrible with geography, create a map of their home planet. During this game, our 6th grade humanities teacher exemplifies five of the seven dimensions of teaching.

Before the game was created, the teacher (taking on the role of designer) worked with a game designer to build the game around one of the Mission's essential questions: how does an area's physical geography impact the culture of the people who live there? They then used learning goals to create the actual game. The learning goals were for students to practice using physical geography terms, creating maps, and using correct map labels and keys.

To prepare students to play the game, the teacher (as a practitioner and assessor) created specific opportunities for learning and assessing. Prior to the game, students learned geographic landforms and the structure and function of maps by making geography encyclopedias and flashcards. Then they were ready to play Galactic Mappers. During the game, the teacher asked a series of questions to gauge students' learning and understanding. Next, students reflected on their learning for homework. Finally, students took a final test on geography.

The teacher (as a wellness integrator) connected the group work needed to play Galactic Mappers to the socio-emotional



As a whole class, students identify different landforms on a map of one of their created worlds.



The teacher and students created this word wall to use as a resource during gameplay of Galactic Mappers.



Students create a landform for their world map with mountains, mesas, and volcanoes.

skill of teamwork. Students had to show evidence of their ability to work in teams by being good listeners, being respectful of all team members, and being a positive influence on the team; these skills were assessed on a rubric.

Lastly, the teacher's role as a systems thinker was evident, but it was more implicit than explicit. Map-making

involves parts and relationships among parts — both are systems thinking concepts taught at the 6th grade level. When students learn more about systems thinking later in the year, the teacher will refer back to Galactic Mappers and connect the game to the basic concepts of parts and relationships among parts.

Reflection Questions

What teacher dimensions are the most prevalent at your school among faculty? Why do you think this is so?

Which teacher dimensions would you like to strengthen at your school? Why?

After reading this section, what do you want to learn more about?

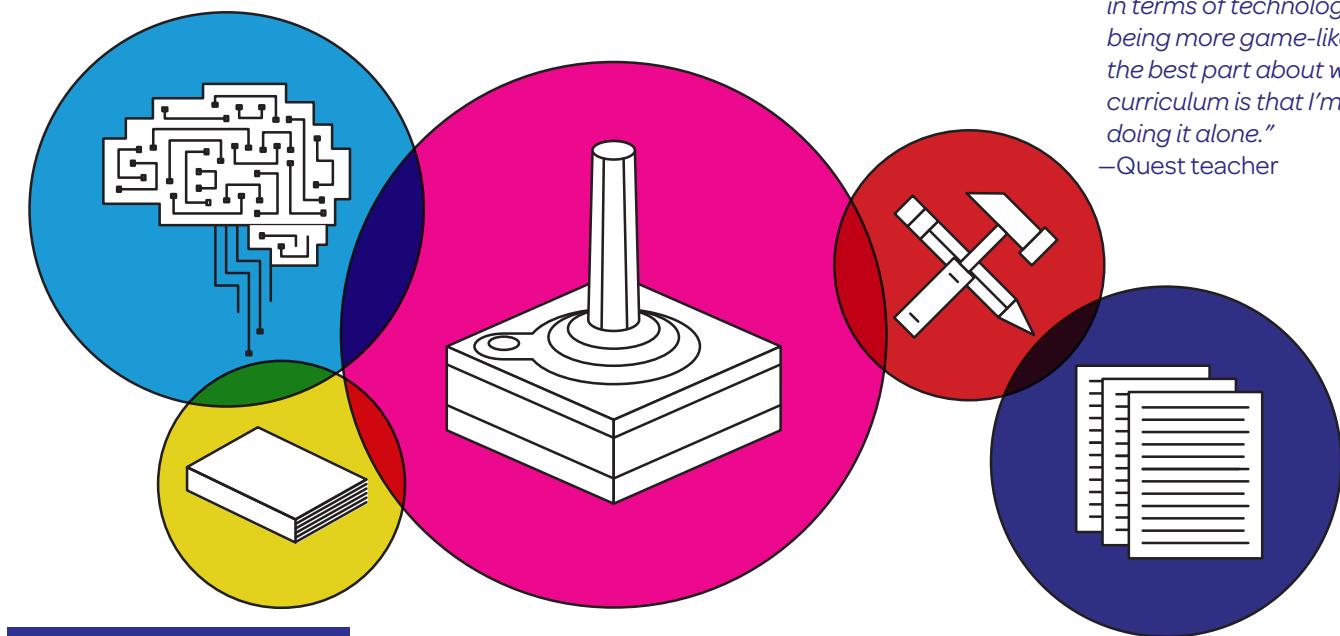
Next Steps

If you are interested in learning more about teacher dimensions, go to the **Games and Learning Design Pack**.

If you are interested in learning more about game-like learning, go to the Game-like Learning section of the **School Design Pack**.

Mission Lab

Collaboration among a group of experts gives rise to creativity and innovation.



As you read this section, think about a time when you collaborated with a group on a continuing project. What was helpful about it? What were some challenges?

Collaboration lies at the heart of the work of our schools. Collaborative environments foster professional growth, creativity, and reflection (Fullan, 1999; Lave & Wenger, 1991), all of which are vital to our work as educators. Furthermore, providing space and time for educators to collaborate has shown to significantly reduce teacher turnover at a school (Borman & Dowling, 2008).

Which collaborative spaces encourage teachers to be creative with their curriculum? In our schools, that space is Mission Lab.

Mission Lab is a design studio within our schools comprised of game designers and curriculum designers who support teachers in developing curriculum grounded in our game-like learning, systems thinking, and connected learning frameworks.

This unique design studio also provides professional development to teachers, develops learning tools, and engages in research and development around assessment, student development, technologies, and games.

Once or twice a week, a game designer and curriculum designer meet with a teacher. Each curriculum team member brings particular expertise: content, pedagogy, curriculum development, student development, or game design. This team works together to design curricula and individual games, both digital and analog.

This team is truly collaborative. All ideas brainstormed and ultimately developed integrate each team member's knowledge and skills. The power of this collaborative team is evident in student engagement,

displayed in classrooms when students dive into learning as they play digital and analog games and use new technologies and tools.

Mission Lab is unique to our schools, but some components of Mission Lab could be adopted at schools without the resources to house their own Mission Lab:

- **Scheduling common planning time for collaborative planning for pairs or teacher groups;**
- **Bringing in outside experts to work with teachers to shape curriculum (e.g. game designers, graphic designers, informal educators, etc.); or**
- **Use of design thinking (ideation, prototyping, playtesting, and iteration) in collaborative meetings to create new learning experiences involving games, technology, and field trips.**

Mission Lab in Action: Proteincraft!

"Get it, get it, match it to the mRNA!" exclaims a 9th grade student playing Proteincraft.

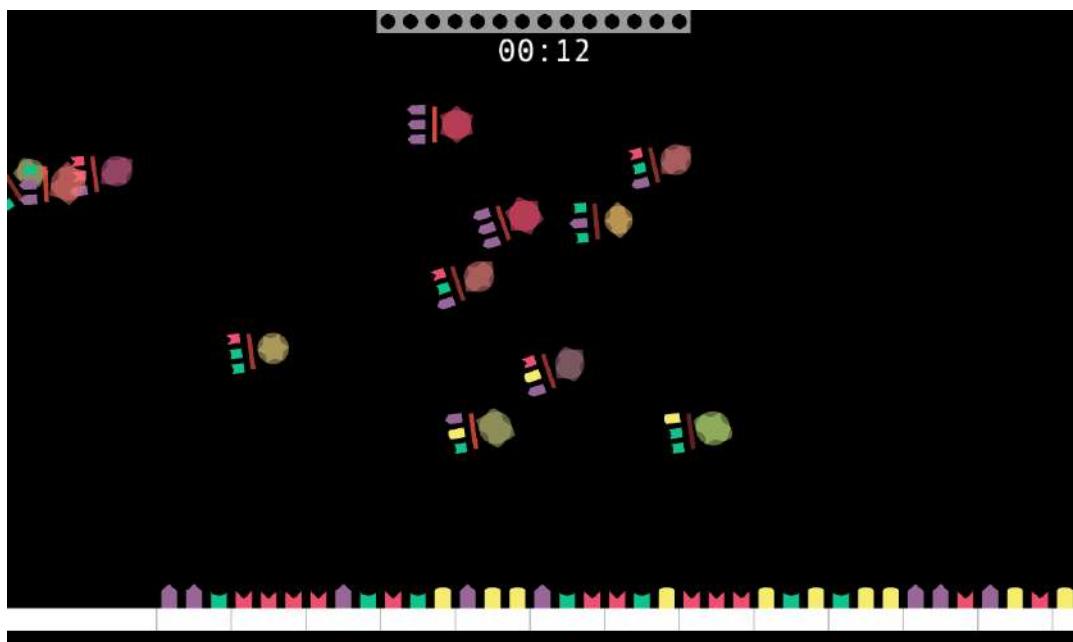
The spark for a new game stems from a teacher's need for support in helping students learn and understand a complex concept. In this case, a 9th grade science teacher wanted to design a game to help students understand the abstract concept of protein synthesis (the multi-step process of how DNA codes for proteins). Then the curriculum team identified the learning goals for the game based on that concept and began the design process (ideation, prototyping, playtesting, and iteration). For this game, the learning goal was for students

to explain how mRNA and tRNA work together to create a protein, made of a chain of amino acids

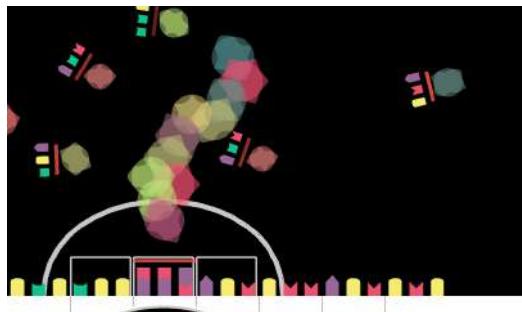
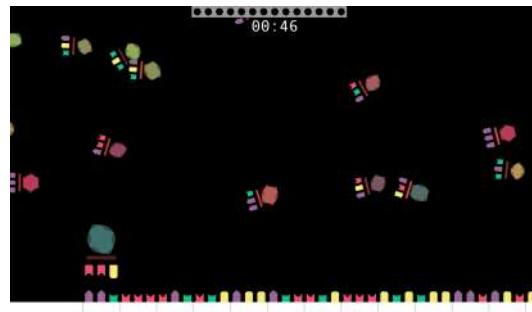
The next step involved the team brainstorming ideas of possible games by thinking about different game components: goal, parts, components, space, challenge, and mechanics. After some time, this team came up with an idea for an iPad game that requires students to build their own proteins using codes of mRNA and tRNA (two types of nucleic acids involved in protein synthesis) within a time limit.

Multiple iterations of the game occurred based on feedback from curriculum team and student playtests.

When the final iteration of the game was rolled out, the classroom energy rose exponentially as students competed against each other to create proteins accurately and quickly. At the end of class, after much coercing to stop game play, students received a homework assignment to explain protein synthesis using their own words and a list of relevant science vocabulary. A second question then asked students to brainstorm a different game idea for how to help their peers better understand protein synthesis.



Students must match tRNA (the floating entities) with the mRNA chain below to build a protein, a chain of amino acids.



The first matching (left) is occurring at the bottom left of the screen.

The chain of amino acids (right) grows as students match more and more tRNA to mRNA.

Reflection Questions

What are the spaces in your school that enable teachers to work collaboratively in developing curriculum?

How do you think some of Mission Lab's collaborative structures may work in your school? What challenges may you face in implementing those structures?

After reading this section, what do you want to learn more about?

Next Steps

If you are interested in learning more about Missions and Quests, go to the Mission and Quests section of the **School Design Pack**.

If you are interested in learning more about Mission Lab, see Institute of Play's case study about Mission Lab. ↗

Mission and Quests

A challenge that cannot be immediately achieved requires knowledge and skills built during the completion of a series of mini-challenges.



As you read this section, think about what game-like learning in a classroom looks like to you.

Imagine sitting in a middle school science classroom when the teacher rushes in. After catching her breath, she explains that she just received a package and a note that says “please use your microscopes to look at these slides... it is a matter of life and death.” What is happening in this classroom?

In our classes, students are given a Mission and faced with an immediate “need to know” to engage them in solving a mission’s complex problem. To solve the problem, they must complete a series of Quests that help them build essential knowledge and skills. Our approach

to curriculum design, consisting of Missions and Quests, is grounded in a theory of game-like learning. The theory of game-like learning draws from what we know games do best: drop players into inquiry-based, complex problem spaces that are leveled to deliver just-in-time learning and use data to help players understand how they are doing, what they need to work on, and where they need to go next.

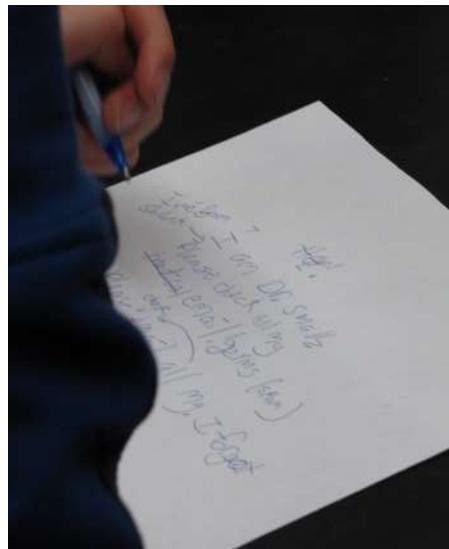
Mission-Quest Lesson Model



Mission and Quests in Action: Dr. Smallz

In our middle school science class, students are dropped into a problem space where they have to help a doctor save a woman's life using their knowledge of the human body. Students quickly learn from a microscopic postcard that a doctor named Dr. Smallz has been shrunk and is actually inside the sick woman's body. Dr. Smallz is normally an excellent doctor, but he lost his memory when he was shrunk. Subsequently, students take an active role immersing themselves in the identity of medical experts with the task of saving a woman's life.

Students build knowledge and skills needed for this mission by completing a series of Quests posed to them by Dr. Smallz as he travels to different parts of the body. Students only move forward in their Quests after they share their knowledge with Dr. Smallz about the structure of different body systems and whether their patient's specific body system is functioning correctly. Students track their learning journey in a journal order to move closer towards diagnosing the woman's disease. At the end of the Mission, and after diagnosing the disease, students engage in a debate about which controversial treatment to prescribe to the sick woman. Then they wait anxiously to hear if the woman was cured.



As a class, students work to puzzle out a message from Dr. Smallz spread across different postcards.

Students read the microscopic postcard from Dr. Smallz.



The teacher and whole class (above) finally decode his message.

Reflection Questions

How does your curriculum engage students in learning? How is it similar or different to Missions and Quests?

What did you learn about Missions and Quests that may be useful for you and your school?

After reading this section, what do you want to learn more about?

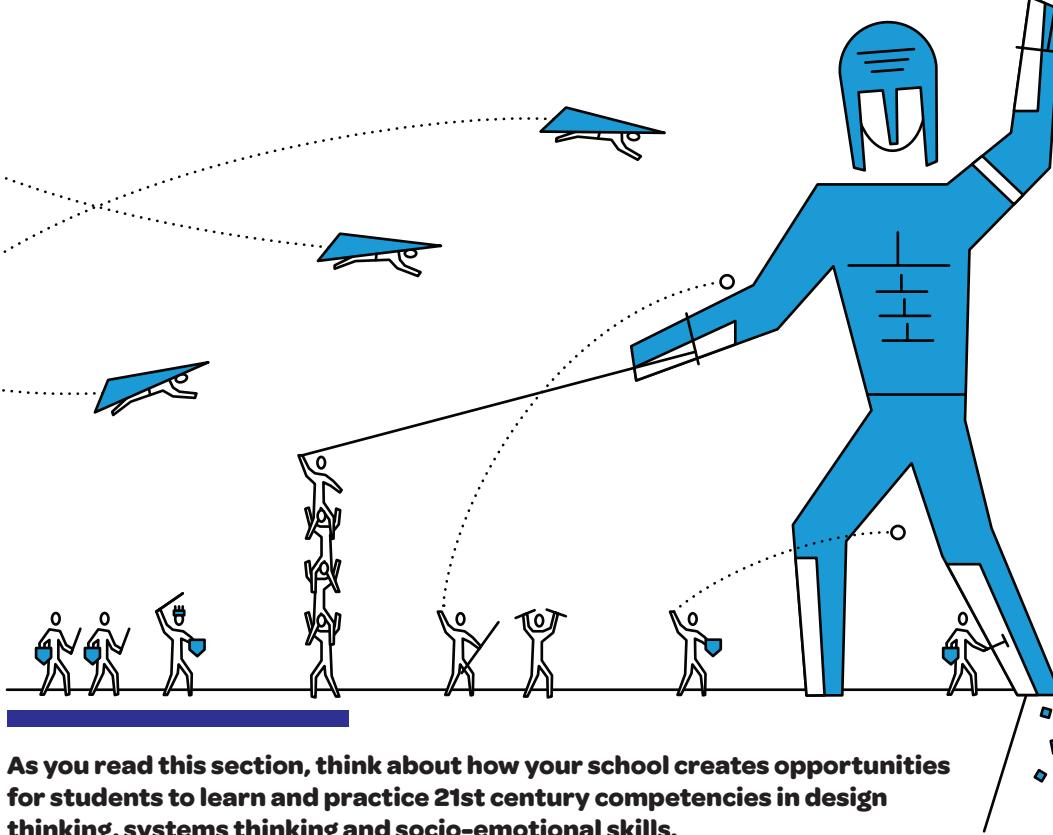
Next Steps

If you are interested in learning more about game-like learning, go to the Game-like Learning section of the **School Design Pack** for more information.

If you are interested in implementing Missions and Quests in your curriculum, go to the **Curriculum Design Pack** for more information and tools.

Boss Level

Boss Level is an intensive and immersive group challenge that happens at the end of the trimester.



As you read this section, think about how your school creates opportunities for students to learn and practice 21st century competencies in design thinking, systems thinking and socio-emotional skills.

A hush settles in the classroom as the eyes of all 11-year-olds and adults turn to a ball that begins to roll down a cardboard ramp, then hits a book—first in a row of several books that fall down like a set of dominoes. A cheer erupts as the last falling book lets loose a second ball down another ramp. What is going on in this middle school classroom? It is Boss Level.

The Boss Level is the final level in video games, when players must demonstrate their mastery by beating “the Boss.” The Boss Level calls into action all of a player’s skills and attention. We believe that Boss Level should bring out in our students a

similar level of focus, iteration, and high skill use. At our schools, Boss Level is an intensive and immersive weeklong learning experience grounded in design thinking, systems thinking, and socio-emotional learning that encourages students to use all their skills and knowledge to solve a complex problem.

For a week, at least twice a year, our schools’ regular schedules are suspended. Smaller teams of students are grouped together and faced with complex problems that have explicit links to systems thinking. Then, throughout the week, students go through the design process of brainstorming, prototyping and testing,

iterating, and, finally, public sharing of their chosen solution. During Boss Level, students take on roles of designers, engineers, poets, writers, museum educators, videographers, actors, etc., as they work to solve problems within or outside the school.

Although the content across Boss Levels in middle and upper schools varies, teachers focus on assessing additional competencies valued by our school model. Boss Level gives an opportunity for teachers and students to work together to build and hone these competencies in a unique, innovative way.

“Boss Level is a part of Quest to Learn that I tend to look forward to. Not only does it allow for small group interaction, which leads to stronger and deeper relationships between the students and teachers, but it allows students to dive into a topic and create a deliverable that has depth and reason. In Boss Level, we are also able to explicitly and continuously teach higher levels [of] systems thinking as a way to solve a problem, as a group.”
—Quest teacher

Boss Level in Action: Rube Goldberg Machine

Opening a locker or turning off a light is easy to do with one hand, but how do you make a simple machine to do it like Rube Goldberg did in his drawings? Our 6th grade students are faced with this challenge for their first ever Boss Level experience.

In small groups, students spend the first part of Boss Level engaged in workshops to learn about Rube Goldberg machines, strengthen their collaboration skills, practice their design skills (brainstorm, prototype, playtest, and iterate), and review concepts about simple machines learned previously in science class. During the second half of Boss Level, students decide on a simple goal, such as opening a locker, and then go through the design process to construct a Rube Goldberg machine with everyday materials.



Students work on putting together all the components of their Rube Goldberg machine.



On the final day of Boss Level, several judges from the larger learning community visit each group to evaluate the success of each Rube Goldberg machine, with one winner chosen from all the groups. The teamwork and creativity within student teams is clearly visible. The uniqueness of Boss



Level not only helps students strengthen their socio-emotional skills, but also strengthens their relationships with teachers and, ultimately, the school itself. Teachers also assess on the individual student level to evaluate students' socio-emotional skills along with design and systems thinking skills.

Reflection Questions

Do students have opportunities to experience learning beyond what happens during a typical day at your school?

What did you learn about Boss Level that may be useful for you and your school?

After reading this section, what do you want to learn more about?

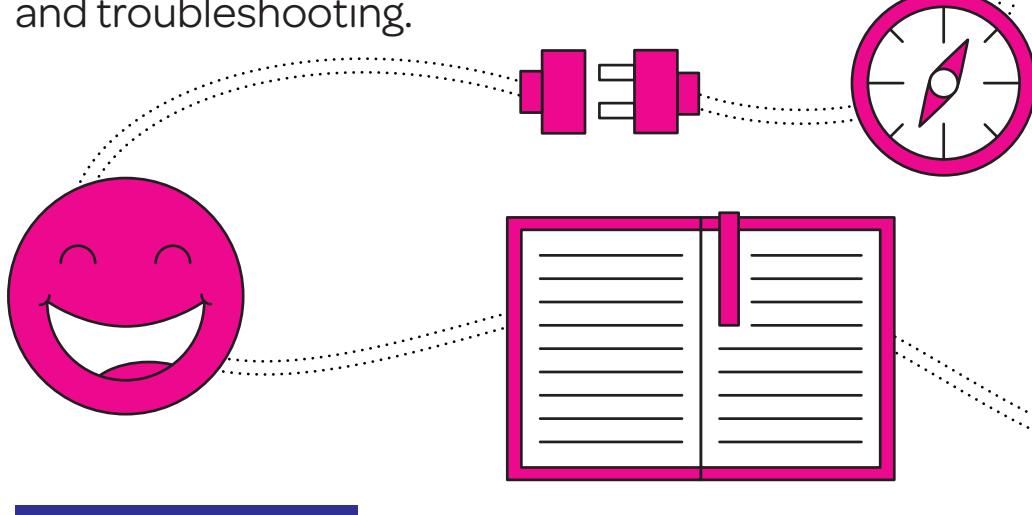
Next Steps

If you are interested in learning more about the foundations of Boss Level, go to the Assessment section of the **School Design Pack**.

For additional information about designing Boss Level for your students, go to the **Boss Level Design Pack** (not yet released).

Technology Integration

Effective integration of technologies requires much more than just hardware and software—it requires exploring, playing, learning, planning, and troubleshooting.



As you read this section, think about why you use certain digital technologies in your school.

“Does this look the same?” asks one student to another student in their digital and media arts class. They look back and forth between a drawn blueprint of a building and a computer screen. “Yeah, that looks good,” and with that statement, the first student returns to constructing her building using Minecraft, a sandbox-style, world-building video game.

Why do we use certain digital technologies in our school? We understand the power of digital technology in regard to student engagement. Students live in a digital world. We also know that we want to use technologies purposefully and meaningfully, rather than just to use them. If a technology allows students to build worlds, test ideas, and explore complex problems in ways that they cannot with other tools, like paper and a pen, then we work to integrate it into the curriculum. If students will reach a learning goal

equally as well or better with paper and a pen, then we stick with a pen and paper.

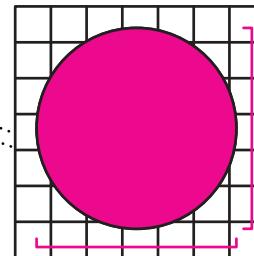
Learning how to use a technology takes time. And learning how to integrate that technology into classrooms takes even more time. Technology support staff work with teachers and students to successfully use innovative technologies for learning.

To make the technology integration process as effective and efficient as possible, we use a four-step approach. Keep in mind that this process is iterative and not always linear.

Step 1: Look for opportunities for meaningful integration. We start with identifying a teacher who is ready and/or wants to integrate a technology. Then we work with her to create rigorous learning goal(s) associated with the technology.

Step 2: Play and prototype. Teachers are empowered to use a technology

“I would say a big key thing is we don’t use technology just for technology. We use it as a tool, we use it when it is appropriate, so a lot of time is spent thinking about...the value added. And often times...if we do introduce a new technology into the classroom, we want to loop it throughout that trimester or use it again in a different grade.”
—Quest teacher



when they have a solid understanding of the technology themselves. Teachers need to play with technologies. Then they can brainstorm how to integrate a technology into their curriculum as they play.

Step 3: Plan backwards. We keep the learning goals of a technology and the final assessment connected to the technology. From there, we design and develop classroom curriculum and professional development experiences.

Step 4: Support. When a technology is ready to be introduced to students, we identify support needs and plan for extra staff to be available for in-class support, if necessary.

Technology Integration in Action: Minecraft

Minecraft is an extremely popular virtual world video game that is quickly becoming an instructional tool in classrooms all over the country.

We saw Minecraft as a tool to help students learn digital citizenship, negotiate collaborative online communities, design space and challenges in a virtual world, and experiment with basic computer programming. To start to integrate Minecraft into our classrooms, we proposed using the game to help students show their knowledge and skills in transforming 2-D art into 3-D art in our digital and media arts course (**Step 1: Look for opportunities for meaningful integration**).

Even though our digital and media arts teacher was not a gamer, she was willing to experiment with the idea of using Minecraft in the course. As a first step, the teacher completed a tutorial to help her learn navigation in the game. She then played Minecraft, and we brainstormed how using this video game may be beneficial in helping students learn about transforming 2-D art into 3-D art (**Step 2: Play and prototype**).

To further support the teacher's comfort level with using Minecraft, we designed a Minecraft project for students based on original learning goals. We then mapped and sequenced a series of lessons, created a set of student materials, and learned skills to manage Minecraft play as a teacher (**Step 3: Plan backwards**).



When we rolled out Minecraft, we asked students who were already experts at playing Minecraft to mentor more novice players. This structure of peer mentoring enabled all students to access Minecraft as a learning tool. Additional staff supported the teacher in helping students navigate and use Minecraft and deal with any technology issues (**Step 4: Support**).

Time, space, and extra work were needed to support Minecraft integration into the classroom. It was all worth it. Students' enthusiasm and excitement about learning in their digital and media arts course flourished as student conversations about Minecraft extended beyond the classroom and school.



Student examples of 3D houses built in Minecraft, based on their previously drawn 2D blueprints.

Reflection Questions

Why do you use certain digital technologies in your school?

Do you have a structure in place to support the use of technology in your school?

How is it similar or different to our approach?

After reading this section, what do you want to learn more about?

Next Steps

If you are interested in learning more about technology integration, go to the **Game Design and Media/Digital Arts Course Design Pack** (not yet released).

If you are interested in learning more about Minecraft use in the classroom, see Institute of Play's case study about MinecraftEDU on Playmakers. ↗

Continued Learning

Now that you've explored the School Design Pack, we hope you are inspired to learn more about components that you may want to integrate into your classroom or school.

Below is additional information to support you in continuing to build and share your own learning.

We want to hear from you

We want to hear from you about your experience with this design pack.

Did it change your teaching?
How did your students respond?
Would you use this design pack again?

We welcome your stories and sharing of your newly designed curriculum.

Email your feedback and thoughts to:
info@instituteofplay.org

We want you to learn more

If you are interested in learning more, please visit these following websites:

Institute of Play
www.instituteofplay.org

Quest to Learn, NYC
www.q2l.org

CICS ChicagoQuest
www.chicagoquest.org

We also offer other Design Packs

Q Design Pack: Curriculum ↗

This pack provides tools and methods for you to use to design game-like curriculum for your classroom.

Q Design Pack: Systems Thinking ↗

This pack provides tools and methods for you to use to integrate systems thinking into your teaching.

Q Design Pack: Games and Learning ↗

This pack describes our curriculum team model and includes tools and methods to help you begin to collaboratively design games.

We want you to share these resources

This resource is free and we want you to share it with others. When you do use and share it, please know this resource is licensed under a Creative Commons license.

Attribution-NonCommercial-ShareAlike

CC BY-NC-SA

This license lets others remix, tweak, and build upon your work non-commercially, as long as they credit you and license their new creations under the identical terms.



To view a copy of this license, visit Creative Commons ↗

We want to thank our partners

This design pack is a result of collaborative work done over the past years between Institute of Play, Quest to Learn, and CICS ChicagoQuest. These resources are made possible through the generous support of The Bill and Melinda Gates Foundation, Carnegie Corporation of New York, and the John D. and Catherine T. MacArthur Foundation.

References

Borman, G. and Dowling M. (2008). Teacher Attrition and Retention: A Meta-Analytic and Narrative Review of the Research. *Review of Educational Research*, 78(3), 367-409.

Fullan, M. (1999). *Change forces: The sequel*. Philadelphia, PA: Falmer Press.

Lave, J. and Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.

Wiggins, G. (1990). The truth may make you free, but the test may keep you imprisoned: Toward assessment worthy of the liberal arts. *The AAHE Assessment Forum*, pp. 17-31.

About Institute of Play

We design experiences that make learning irresistible.

The Institute pioneers new models of learning and engagement. We are a not-for-profit design studio, founded in 2007 by a group of game designers in New York City. We are now home to an interdisciplinary team of designers, strategists and learning practitioners. Our first project was the design and implementation of an innovative New York City public school, called Quest to Learn.

At the core of the experiences we design are games, play and the principles that underlie them.

Using these principles, we have created institutions, games, programs, events, digital platforms and products. Our work unlocks the transformative power of people as seekers and solvers of complex problems, risk takers, inventors and visionaries. We work wherever people are: in communities, businesses, schools, cultural and civic institutions.

We empower people to thrive as active citizens in a connected world.

We are not preparing for a distant future. We are about meeting people where they are and igniting their potential now. We work with a diverse set of partners to make it happen, such as Electronic Arts, Intel, Educational Testing Service, the Mozilla Foundation, the Smithsonian, Parsons the New School for Design, Chicago International Charter Schools, DePaul University, E-Line Media and others.

A selection of our work

GlassLab

An unprecedented collaboration between leaders in the commercial games industry and experts in learning and assessment, GlassLab aims to leverage digital games as powerful, data-rich learning environments that improve the process of learning with formative assessments teachers can trust.

Play@ Your Org

With a hands-on exploration of games and design, Play@ Your Org workshops are designed to help businesses, cultural institutions and other organizations integrate the power of play-based learning in their work to maximize participation and engagement.

Playtime Online

A live hour-long webinar series, Playtime Online explores the work of leading organizations in the field of games and learning, the people who do it and why it matters in the world today. The series also offer a live forum to share learning within the Playtime community.

For more information, please visit www.instituteofplay.org