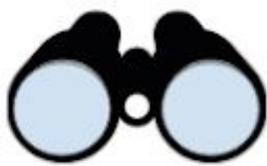




DESIGN THINKING



OBSERVE



IMAGINE



IMPROVE



MAKE



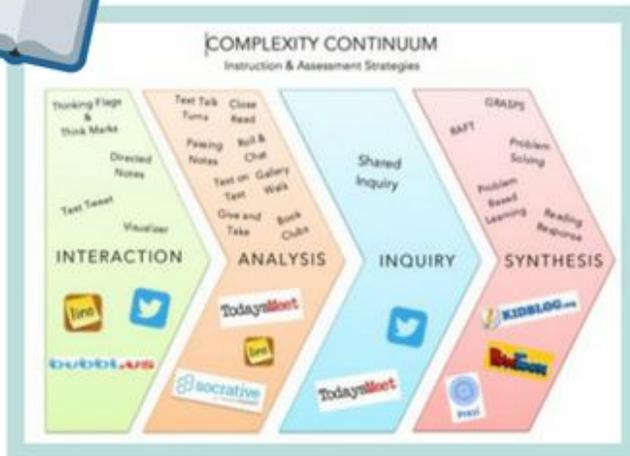
SHARE

JENNIFER CAMPEN

jennifer_campen@ipsd.org  [@jencampen](https://twitter.com/jencampen)

LITERATURE

+ DESIGN THINKING



INTERACT, ANALYZE & INTERPRET
This could occur over 2-3 days with a short text or over the course of multiple weeks for a novel.

GATHER INFORMATION
Explore Problems and Challenges presented within the text and evaluate any provided solutions.



SCOPE a DESIGN PROBLEM
Problem is generated by Teacher or collaboratively determined by students and teacher.



DESIGN a SOLUTION
Teams collaboratively and creatively determine a solution that would benefit a character and fits within text's limitations.



GATHER FEEDBACK
Teams provide constructive feedback and critique to fellow teams to increase the effectiveness of their solution.



SHARE, CELEBRATE, & REFLECT
Teams present completed solutions and reflect upon their experience.



"SCIENTISTS DISCOVER THE WORLD THAT EXISTS;
ENGINEERS CREATE THE WORLD THAT NEVER WAS."
-THEODORE VON KARMEN

Set Learning Targets

Interact, Analyze, Synthesize Text

Engineering Problem
Established by
Teacher

Engineering Problem
Realized by Students
with Teacher Guidance

Prompt
Planner

Guiding
Tips

Observe



Imagine



Improve



Make



Share



Evaluate

click bubbles to jump to
helpful pages for
getting started





DESIGN THINKING

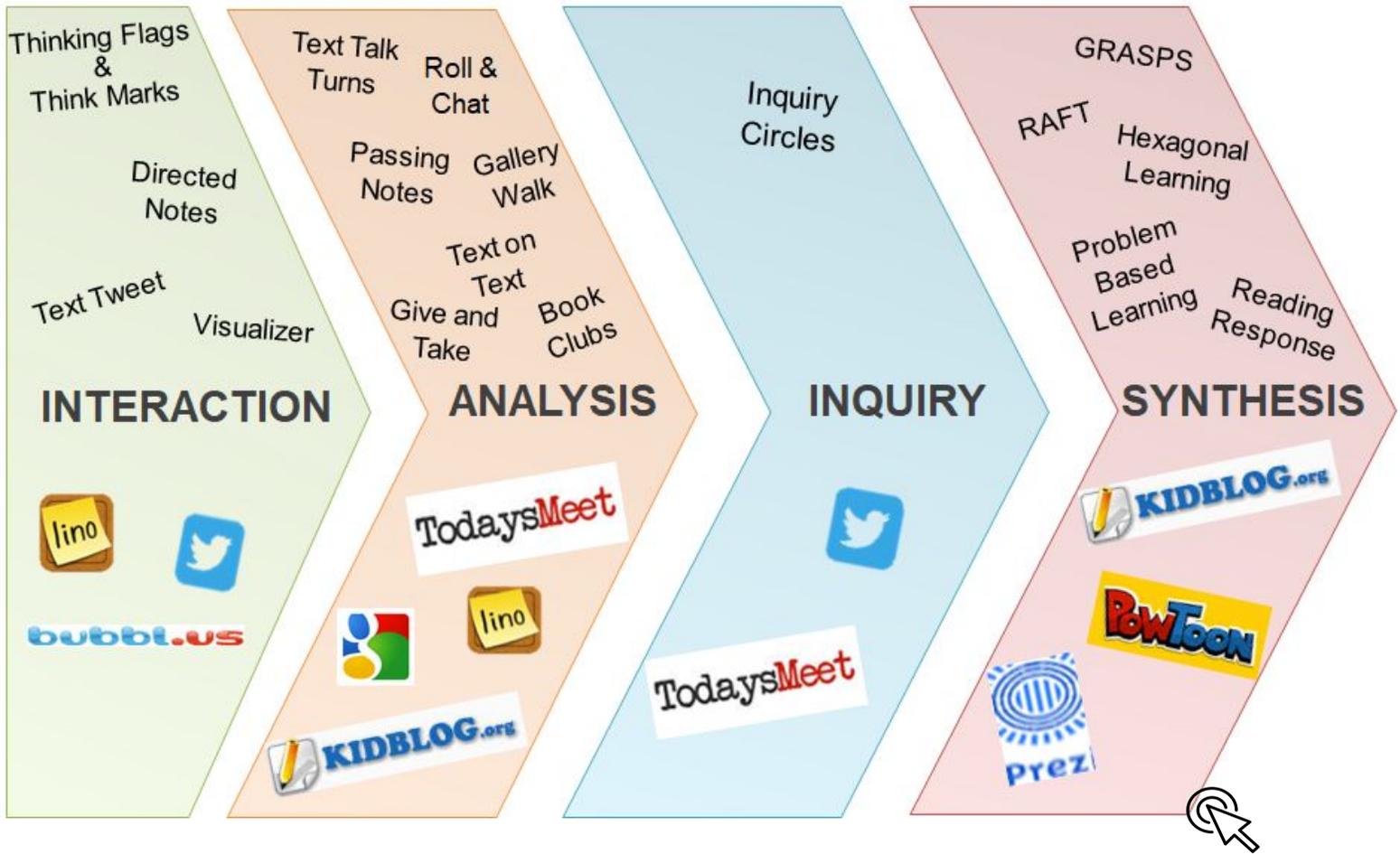
set learning targets





DESIGN THINKING

interact, analyze & interpret



DESIGN THINKING

prompt planner for teacher

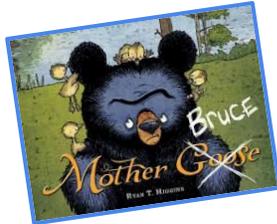
1

INTERACT

List the setting or settings that are within the text. Each setting should have at least two potential characters and at least 3 potential problems.

Settings

The forest



Characters

Bruce
Goslings
Mother Goose

Potential Problems

- Bruce likes to eat eggs
- Goslings mistake Bruce as their mother
- Goslings must learn to fly
- Goslings do not know how to migrate

2

ANALYZE

Choose a setting and write a statement that captures the situation. Use the prompt stems to the right to help. Stuck? Try a new setting or character!

Statement Stems

Redesign the ___(situation)___ experience for ___(character)___.

Design a way for ___(character)___ to better ___(situation)___.

How might we help ___(achieve a goal)___?

Sample: "Design a way for Bruce to better teach the goslings to migrate."

3

INQUIRE

Is your statement scoped for a rich design challenge? The two questions to the right can help you double check before moving forward.

Will the student have the opportunity to address multiple characters, problems, and character needs? If not, make the statement more broad.

Will the students be able to find similarities or connections between the characters, settings, problems, and needs? If not, make the statement more narrow.

DESIGN THINKING

guiding tips for students

1

INTERACT

List problems or challenges that are presented within the text that connect with thematic idea(s). Determine if a solution was presented and if a better or new solution could be engineered.



Problems or Challenges in the text:	How did the character deal with the problem? Was there a solution?	Is there a better solution? Could you engineer a solution?
<p><i>The loss of their father (husband)</i></p> 	<p><i>Each character (Filmore, Jodi, Mother) has a different way of coping with the loss of their father (husband)</i></p>	<p><i>Create an alternative outlet or way for one of the characters to cope with the loss of the father.</i></p>



TEACHER TIP: Consider offering at least two prompts to your class to choose from. This will allow for student choice, as well as limit the number of different problems that are being solved around the room.

2

ANALYZE

What does the character(s) ultimately need? What is available to them in the text that could be used to engineer an improved or new solution to their challenge?

NEEDS:

- A way to talk about father's death
- A tool to communicate with Filmore and her Mom about her worries, feelings, and questions.

Jodi

HAS:

- Beach "treasures"
- Materials found in home
- Supplies from Mr. Hogarth's shop
- Mr. Hogarth's tools

3

INQUIRE

Are the needs of the character and their limitations scoped for a rich design challenge? The two questions to the right can help you double check before moving forward.

Does your focus challenge address specific character(s) and their needs?

Would a possible solution to your select challenge positively and realistically impact the character and text?



*I have a challenge.
How do I approach it? How do I interpret it?*

Description of Phase

Design thinking is a user-centered design process, and the empathy that comes from observing enables design thinkers to uncover deep and meaningful needs. Observation also helps design thinkers process and organize the problem to narrow in on what they can act upon.



Ponder Points

What type of information do we have?
What patterns are there?
What is the experience of...?
What needs and insights can we uncover?



TEACHER TIPS

Before:
Students have interacted, analyzed, inquired, and synthesized text. Students identified problems within the text.

During:
Students detect needs of the client, determine what client has available as tools.



STUDENT OUTCOMES

Determine a deep, meaningful problem they can act upon.



MINI MOMENTS

Explore texts that teach Empathy
Create a class Empathy map



*I see an opportunity.
What do I create? How do I make it?*

Description of Phase

In this phase students generate ideas for solving the problem. This is the time for students to imagine possible prototypes and innovative solutions. Fluency, Flexibility, Originality, and Elaboration are key brainstorming expectations.



PONDER POINTS

What new ideas do we have that will meet the needs of our user?



TEACHER TIPS

Before:
Students have a defined problem: user, need, and insight.

During:
Encourage fluency (thinking of many ideas), flexibility (thinking from different perspectives), originality (new/unique ideas), and elaboration (build upon existing ideas)

After:
Select final idea for developing into a prototype.



STUDENT OUTCOMES

Students work in teams to plan and build a functional prototype that addresses the character's needs and constraints



MINI MOMENTS

Exercises for Brainstorming to encourage Fluency, Flexibility, Elaboration, and Originality



*I made an idea.
How do I improve it to ensure its successful?*

Description of Phase

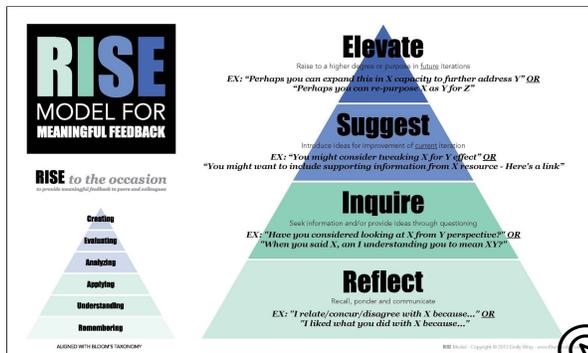
This is another interactive phase in which teams engage in rich discussions to explain their solutions and receive thoughtful critique and feedback in an effort to develop good working prototypes that will benefit the story's character(s).



PONDER POINTS

How will you record feedback?
Based on the feedback you received
what would you do next?

See slide 17 & 18 for feedback model



TEACHER TIPS

Before:
Students have a prototype ready to test and a clear idea of what they are testing, and how will they record and incorporate feedback.

During:
Students take good notes and ask follow up questions on feedback received.

After:
Students have a number of ideas of how to move forward and create a new, improved design.



STUDENT OUTCOMES

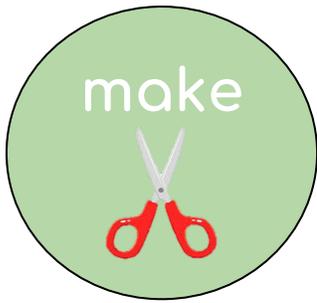
Get feedback Students test their solutions as they build and get feedback from their teacher and/or peers.

Improve designs Students use information gathered during testing and presentations to improve and revise their designs.



MINI MOMENTS

*If you are using class members to give feedback, be sure to coach them on effective and ineffective ways to give feedback. Peers are often reticent to give feedback to one another. *Coach teams on recognizing that feedback will only make their final design better.



I am ready to improve my idea.

What additions, revisions, and/or changes need to be made?

Description of Phase

During this important phase, students are creating their final prototypes. As challenges may still occur with their design at this stage, students are encouraged to make decisions through building, not just prolonged discussion or planning.



PONDER POINTS

What materials are needed?
Based on the feedback you received what changes should be made?
Is there an opportunity to incorporate technology tools in the final design?



STUDENT OUTCOMES

Final designs are developed using craft supplies and/or technology tools while incorporating feedback from peers.



TEACHER TIPS

Before:

Gather necessary materials needed by students. Remember, this is a perfect opportunity to use recycled and unwanted materials from families and other staff members!

During:

Continually circulate, monitor, and provide feedback to teams and members.

After:

Students have a completed design ready to present to other teams.



MINI MOMENTS

If students are using art materials, such as clay, consider asking your Art teacher to do a mini tutorial on how to effectively work with the material or your LMC director to model the use of a tech tool.



*I solved a problem.
What did I learn? What would I do differently next time?*

Description of Phase

Student teams communicate their vision and make their audience care about the character(s) for whom they are designing. The challenge is to concisely communicate the teams' insights, shows the value of the solution, and inspires the audience.



PONDER POINTS

How will you help the audience resonate with your perspective and insights as well as the solution?
How will you bring the "user" to life?
How might you "show", rather than tell?



TEACHER TIPS

Before:
Student have a clear plan for their presentation and are well practiced.

After:
Student teams reflect as a whole and as individuals on the work, process, and success as a collaborative team.



STUDENT OUTCOMES

Students practice a user-centered form of story-telling and are encouraged to show and inspire rather than report findings and work.



MINI MOMENTS

Consider sharing sample storytellers from TED Talks. Here are 25 of the most popular talks of all time: [here](#) 



DESIGN THINKING

assessment & evaluation tips

Suggested Summative Assessment Criteria

(Hung, 2008)

1. Necessary knowledge acquisition (content objectives)
2. Depth of study
3. Effectiveness & efficiency of research methods
4. Logical and effective reasoning
5. Conceptual integration of knowledge
6. Effective problem-solving strategies

(Barron & Darling-Hammond, 2008)

1. Use of evidence
2. Accuracy of information
3. Evaluation of competing views
4. Development of a clear argument
5. Attention to writing conventions
6. Collaboration

rubric resources



SCALE	Emerging	Developing	Advanced
Asking Questions and Defining Problems	<ul style="list-style-type: none"> Asks general questions that cannot be investigated but could be investigated with additional evidence. Writes a problem or design statement that addresses the needs of the problem or the need of the client. Makes models, diagrams, or other representations of the problem or the need of the client. 	<ul style="list-style-type: none"> Asks questions that require empirical evidence to answer. Writes a problem or design statement that addresses the needs of the problem or the need of the client. Makes accurate and labeled models, diagrams, or other representations of the process or system to be investigated and explores the model. 	<ul style="list-style-type: none"> Asks questions that require empirical evidence to answer and evaluates the feasibility of the questions. Writes a problem or design statement that addresses the needs of the problem or the need of the client. Makes accurate and labeled models, diagrams, or other representations of the process or system to be investigated and explores the model.
Developing and Using Models	<ul style="list-style-type: none"> Explains the limitations of model with minor errors. 	<ul style="list-style-type: none"> Explains the limitations of the model as a representation of the system or process. 	<ul style="list-style-type: none"> Explains the limitations of the model as a representation of the system or process and discusses how the model fits the system.
Planning an Investigation or Designing a Solution	<ul style="list-style-type: none"> Plans an investigation that will not produce relevant data to answer the empirical question. Plans a design that does not match the criteria, constraints, and intent of the problem. 	<ul style="list-style-type: none"> Plans an investigation that will produce relevant data to answer the empirical question. Plans a design that matches the criteria, constraints, and intent of the problem. 	<ul style="list-style-type: none"> Plans an investigation that will produce relevant data to answer the empirical question and identifies the dependent and independent variables when applicable, and writes an explanation that accurately and completely matches the criteria, constraints, and intent of the problem. Plans a design that matches the criteria, constraints, and intent of the problem.
Conducting Investigation or Testing a Design	<ul style="list-style-type: none"> Writes procedures that lack several steps that another person could not replicate (but do not conduct a sufficient number of trials). 	<ul style="list-style-type: none"> Writes detailed, replicable procedures with descriptions of the measurements, materials, and constants and accurate number of trials. 	<ul style="list-style-type: none"> Writes detailed, replicable procedures with descriptions of the measurements, materials, and constants and accurate number of trials.

	Below Standard	Approaching Standard	At Standard	Above Standard
Critical Thinking Opportunity or Phenomenon of a Practice				
Learning the Phenomenon, Asking Questions and Defining Inquiry	<ul style="list-style-type: none"> Identifies one central aspect of the Driving Question, but may not use complication or consider more central aspects of the problem or the need of the client. 	<ul style="list-style-type: none"> Identifies more central aspects of the Driving Question, but may not use complication or consider more central aspects of the problem or the need of the client. 	<ul style="list-style-type: none"> Identifies the Driving Question, defined from multiple and varied sources (CC.12.12.10) using the resources or needs of the practice. 	<ul style="list-style-type: none"> Identifies the Driving Question, defined from multiple and varied sources (CC.12.12.10) using the resources or needs of the practice, and explains why they will be used to understand the problem.
Building Knowledge, Understanding, and Gather and Evaluate Information	<ul style="list-style-type: none"> Is unable to integrate information to address the Driving Question, but does not include, track, or highlight information, or first use the source. Accepts information at face value (does not evaluate its validity). 	<ul style="list-style-type: none"> Integrates relevant information to address the Driving Question, but does not include, track, or highlight information, or first use the source. Evaluates the validity of information and explains why they will be used to understand the problem. 	<ul style="list-style-type: none"> Integrates relevant and relevant information to address the Driving Question, defined from multiple and varied sources (CC.12.12.10) using the resources or needs of the practice. Evaluates the validity of information and explains why they will be used to understand the problem. 	<ul style="list-style-type: none"> Integrates relevant and relevant information to address the Driving Question, defined from multiple and varied sources (CC.12.12.10) using the resources or needs of the practice, and explains why they will be used to understand the problem.
Developing and Using Models and Prototypes	<ul style="list-style-type: none"> Explains the limitations of model with minor errors. 	<ul style="list-style-type: none"> Explains the limitations of the model as a representation of the system or process. 	<ul style="list-style-type: none"> Explains the limitations of the model as a representation of the system or process and discusses how the model fits the system. 	<ul style="list-style-type: none"> Explains the limitations of the model as a representation of the system or process and discusses how the model fits the system.
Planning an Investigation or Designing a Solution	<ul style="list-style-type: none"> Plans an investigation that will not produce relevant data to answer the empirical question. Plans a design that does not match the criteria, constraints, and intent of the problem. 	<ul style="list-style-type: none"> Plans an investigation that will produce relevant data to answer the empirical question. Plans a design that matches the criteria, constraints, and intent of the problem. 	<ul style="list-style-type: none"> Plans an investigation that will produce relevant data to answer the empirical question and identifies the dependent and independent variables when applicable, and writes an explanation that accurately and completely matches the criteria, constraints, and intent of the problem. Plans a design that matches the criteria, constraints, and intent of the problem. 	<ul style="list-style-type: none"> Plans an investigation that will produce relevant data to answer the empirical question and identifies the dependent and independent variables when applicable, and writes an explanation that accurately and completely matches the criteria, constraints, and intent of the problem. Plans a design that matches the criteria, constraints, and intent of the problem.
Conducting Investigation or Testing a Design	<ul style="list-style-type: none"> Writes procedures that lack several steps that another person could not replicate (but do not conduct a sufficient number of trials). 	<ul style="list-style-type: none"> Writes detailed, replicable procedures with descriptions of the measurements, materials, and constants and accurate number of trials. 	<ul style="list-style-type: none"> Writes detailed, replicable procedures with descriptions of the measurements, materials, and constants and accurate number of trials. 	<ul style="list-style-type: none"> Writes detailed, replicable procedures with descriptions of the measurements, materials, and constants and accurate number of trials.



DESIGN THINKING

student self-evaluation

RISE MODEL FOR SELF-EVALUATION

The RISE Model for self-evaluation was developed to guide students in reviewing their comprehension of concepts/techniques and in assessing their own progress.

Self-evaluations allow students to thoughtfully consider their performance or contribution as it relates to their growing understanding of a topic or skill. This process also offers students the opportunity to voice future personal and professional goals.

More Info: www.RISEModel.com

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ELEVATE

Raise to a higher degree or purpose in FUTURE iterations

How will you approach similar situations in the future? How will this experience inform your personal and professional goals?

SUGGEST

Introduce ideas for improvement of CURRENT iteration

What could you have done differently to improve your performance or contribution? What if you had more time?

INQUIRE

Seek information and/or provide ideas through questioning

What concepts/techniques do you need to revisit to master the material? What resources are available to you?

REFLECT

Recall, ponder, and articulate

How did your attitude, logic, and behaviors influence your performance or contribution? What worked? What didn't?



RUBRIC

RISE MODEL FOR SELF-EVALUATION

The RISE Model for self-evaluation was developed to guide students in reviewing their comprehension of concepts/techniques and in assessing their own progress.

Self-evaluations allow students to thoughtfully consider their performance or contribution as it relates to their growing understanding of a topic or skill. This process also offers students the opportunity to voice future personal and professional goals.

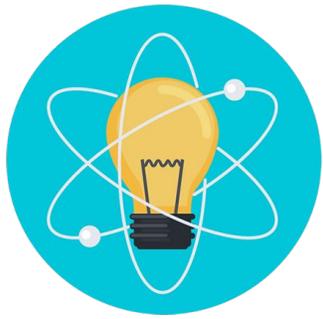
More Info: www.RISEModel.com

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	Meets Objective	Does NOT Meet Objective
ELEVATE Raise to a higher degree or purpose in <u>FUTURE</u> iterations	Meaningfully connects performance or contribution outcome to goals and next steps <i>EX: How did this experience inform/support your future objectives? How will you use this in your career?</i>	Makes no connection between performance or contribution outcome to goals or next steps
SUGGEST Introduce ideas for improvement of <u>CURRENT</u> iteration	Analyzes performance or contribution and offers insight into to what could/should have been done differently <i>EX: What would you have done with more time? More resources? What advice would you give to future students?</i>	Offers vague or no suggestions for improvement of current project/discussion
INQUIRE Seek information and/or provide ideas through questioning	Asks thought-provoking questions that might lead to a new perception of self <i>EX: Where do you want to dig deeper? What did you learn about yourself - either personally or professionally?</i>	Displays no curiosity about performance or contribution outcome
REFLECT Recall, ponder, and articulate	References specifics of performance or contribution including effort and intent <i>EX: How did your attitude, logic, and behaviors influence your work? Did you use your time wisely? How?</i>	Offers no insight into the effort or intent of performance or contribution

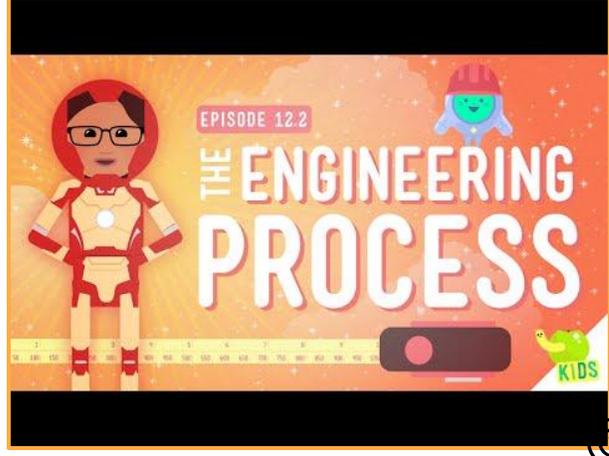
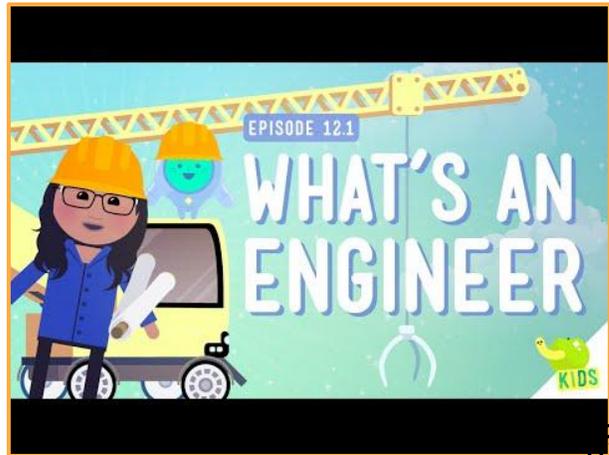
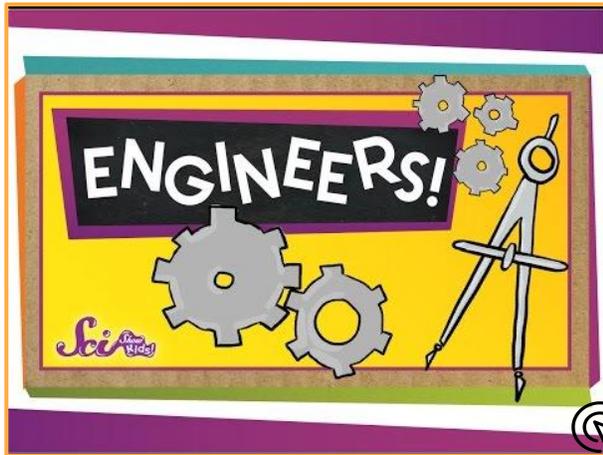




DESIGN THINKING

implementation tips

Introductory Videos for Students



TIMING



2-3 Day Unit:
Short Stories &
Picture Books

4-6 Week Unit:
Novels Studies

2-2.5 Hours:
Design Thinking
Steps from start to
finish



SCHEDULING

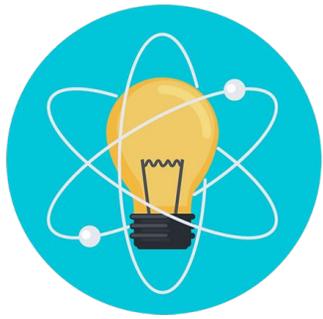
Whole Class ELA

Center Time /Daily 5

Guided Reading

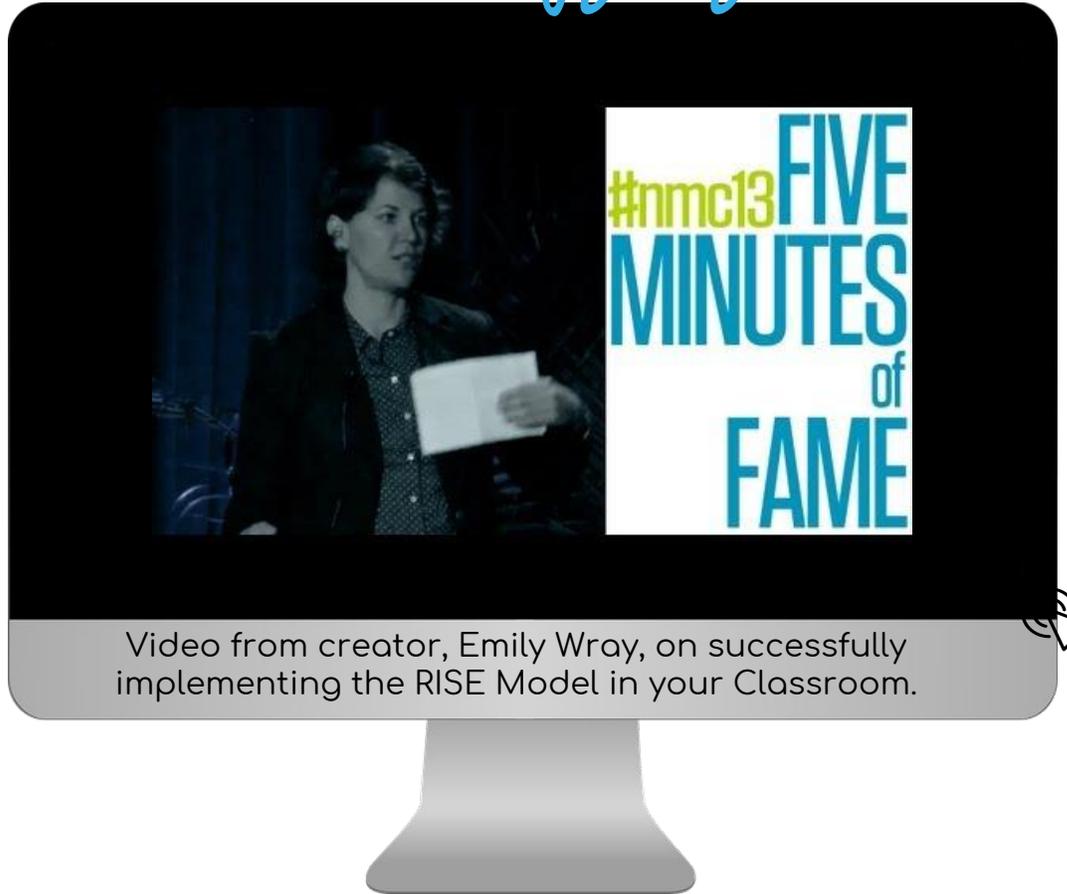
Intervention Block

Science Block

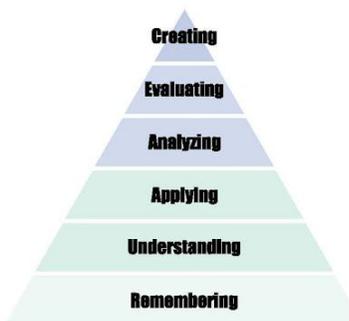


DESIGN THINKING

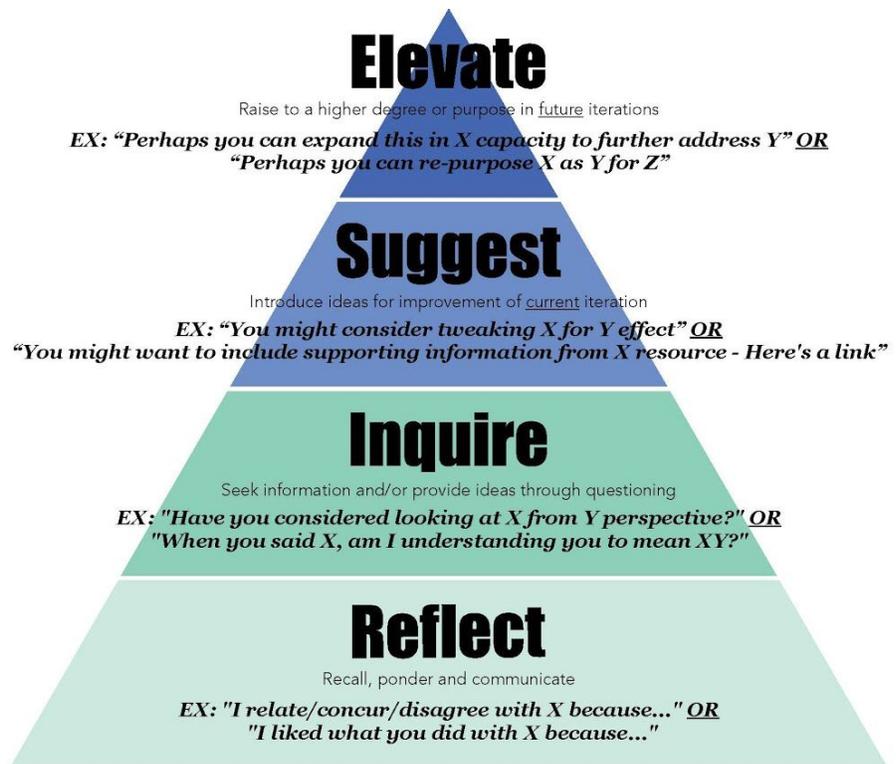
model meaningful feedback



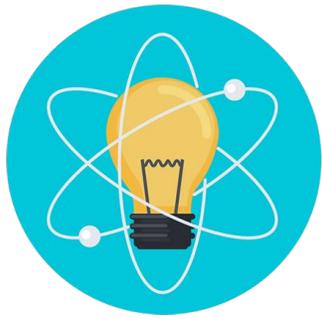
RISE to the occasion
to provide meaningful feedback to peers and colleagues



ALIGNED WITH BLOOM'S TAXONOMY



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DESIGN THINKING

model meaningful feedback

RUBRIC

RISE MODEL FOR PEER FEEDBACK

The RISE Model was developed to guide the peer feedback process. It helps steer student conversations towards positive and productive critiques.

Aligned with Bloom's taxonomy for higher order thinking, the four tiers of the model prompt students to reflect, then build their constructive analysis through inquiry, providing suggestions to help elevate each others work.

More Info: www.RISEModel.com

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	Meets Objective	Does <u>NOT</u> Meet Objective
ELEVATE Raise to a higher degree or purpose in FUTURE iterations	Proposes specific ideas for how to expand the project/discussion beyond its original scope <i>EX: Perhaps you can expand this in X capacity to further address Y. Perhaps you can re-purpose X as Y for Z.</i>	Proposes no ideas for expansion beyond the defined assignment criteria
SUGGEST Introduce ideas for improvement of CURRENT iteration	Offers specific suggestions for improvement of current project/discussion based on assignment criteria <i>EX: You might consider tweaking X for Y effect. You might want to include supporting information from X resource.</i>	Offers vague or no suggestions for improvement of current project/discussion
INQUIRE Seek information and/or provide ideas through questioning	Asks thought-provoking questions that might lead to a new perception or clarifying questions for a deeper understanding <i>EX: Have you considered looking at X from Y perspective? When you said X, am I understanding you to mean Y?</i>	Asks passive questions that require a one-word answer or provoke no response at all
REFLECT Recall, ponder, and articulate	References specific parts of the project/discussion and relates insight to course content <i>EX: I relate/concur/disagree with X because Y. I liked what you did with X because Y.</i>	Responds to the project/discussion in vague terms and does not expound upon what was referenced

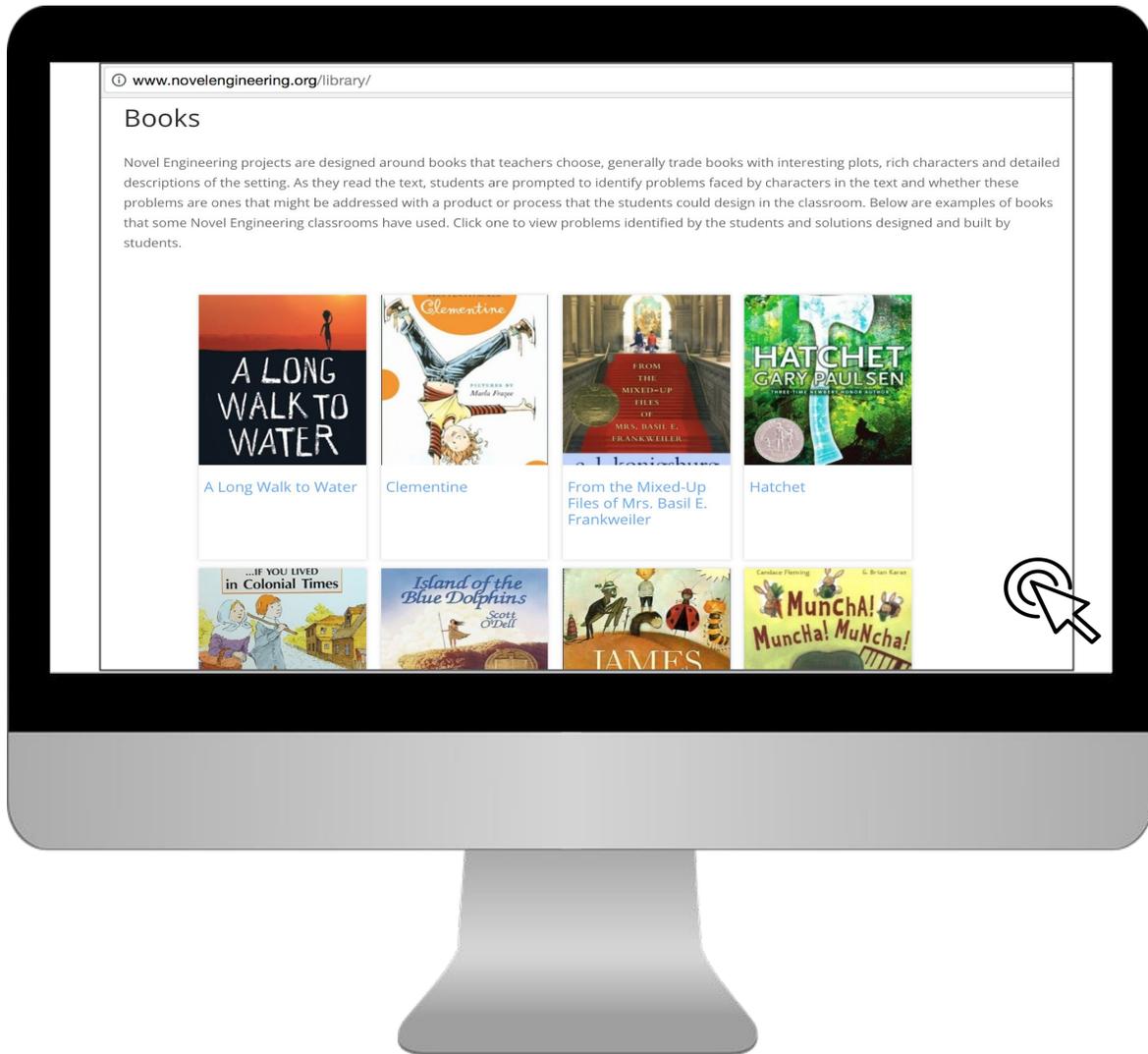




DESIGN THINKING

sample texts & challenges

Click below to View Samples





DESIGN THINKING

resources

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Lintner, T. & Puryear, A. (2015). Inquiry Based Learning for Gifted Students in the Social Studies Classroom. *Teaching for High Potential*. Pp 1-5.

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<https://docs.lib.purdue.edu/ijpbl/vol3/iss1/3/>



DESIGN THINKING

resources

[Novel Engineering Presentation from Tufts University](#) 

[How Novel Engineering Links to Common Core and Next Generation Science Standards](#)

[Tufts University Center for Engineering Education and Outreach](#)

[Novel Engineering Challenges Competition](#)

[Novel Engineering Guide for Novel Engineering Challenges](#)

[Slate Magazine Article: "A Novel Way to Teach Children About Engineering"](#)

[Mind Shift Article: "A Literacy-Based Strategy to Help Teachers Integrate Science Skills"](#)

[Teacher Blog Post on Novel Engineering](#)

[NSTA Novel Engineering Article](#)

[Tufts University Intro. to Novel Engineering, includes classroom clips](#)

NOVEL ENGINEERING



Tufts University | Center for Engineering
Education and Outreach



HASSO PLATTNER
Institute of Design at Stanford