Starting Differentiation:
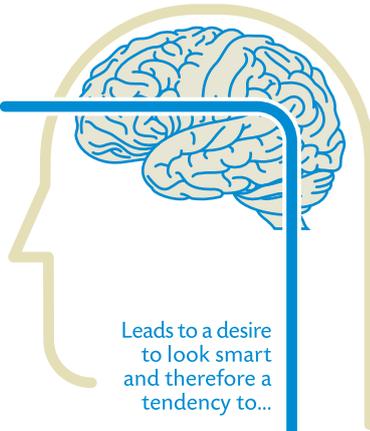
Setting the Stage and Providing the Tools

Merritt Alden Booster

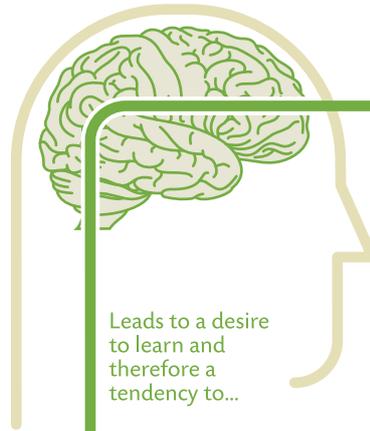*CAG Conference 2017*

Handouts from Presentation

Fixed Mind-set
Intelligence is static

Growth Mind-set
Intelligence can be developed

Leads to a desire to look smart and therefore a tendency to...

Leads to a desire to learn and therefore a tendency to...

CHALLENGES

...avoid challenges

...embrace challenges

OBSTACLES

...give up easily

...persist in the face of setbacks

EFFORT

...see effort as fruitless or worse

...see effort as the path to mastery

CRITICISM

...ignore useful negative feedback

...learn from criticism

SUCCESS OF OTHERS

...feel threatened by the success of others

...find lessons and inspiration in the success of others

As a result, they may plateau early and achieve less than their full potential.

All this confirms a **deterministic view of the world.**

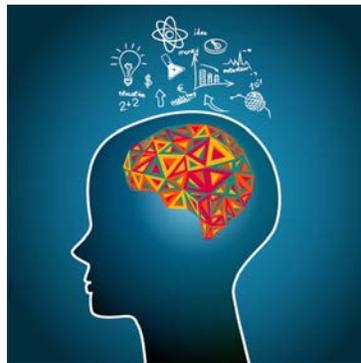**As a result,** they reach ever-higher levels of achievement.

All this gives them a **greater sense of free will.**

GRAPHIC BY NIGEL HOLMES

When You Believe In Your Students They Do Better

by Jo Boaler

Stanford Professor of Mathematics Education, Online Course Experimenter,

Co-Founder of Youcubed, author of the new book: Mathematical Mindsets.

It may seem obvious that students achieve at higher levels when teachers believe in them, but few would have predicted how much a simple message from teachers can change students' whole trajectories and achievement.

A study many years ago that probably would not be allowed today, showed something remarkable about teacher beliefs. Researchers told teachers that some classes of students – across six grade levels – had been tested and were capable of greater intellectual growth than other students. In reality, those students were of the same achievement levels as other students and were randomly chosen for the classes. At the end of one year the students' scores on IQ tests matched the teachers' false beliefs. When teachers were told that students had higher intellectual ability their students scored at significantly higher levels on IQ tests than students whose teachers were not told anything (Rosenthal and Jacobs, 1968). This study is a powerful illustration that teachers' expectations and beliefs about students matter.

In a much more recent study, researchers illustrated just how powerful a single message can be. Hundreds of students were involved in an experimental study of high school English classes. All of the students wrote essays and received critical diagnostic feedback from their teachers, but half the students received an extra sentence on the bottom of the feedback. The students who received the extra sentence achieved higher grades a year later, even though the teachers did not know who received the sentence and there were no other differences between the groups. It may seem incredible that one sentence could change students' learning trajectories to the extent that they achieve at higher levels a year later, with no other change, but this was the extra sentence:

"*I am giving you this feedback because I believe in you.*"

Students who received this sentence scored at higher levels a year later. This effect was significant for students of color, who often feel less valued by their teachers (Cohen & Garcia, 2014). I share this finding with teachers frequently, and they always fully understand its significance. I do *not* share the result in the hope that teachers will add this same sentence to all of their students' work. That would lead students to think the sentence was not genuine, which would be counterproductive. I share it to emphasize the power of teachers' words and teachers' beliefs they hold about students, and to encourage teachers to instill positive belief messages at all times. Furthermore, belief in students alone is not enough (Shouse, 1996). Teachers must couple these beliefs with an academic environment that values open, growth mathematics, mistakes , and high quality assessments.

Teachers can communicate positive expectations to students by using encouraging words, and it is easy to do this with students who appear motivated, who learn easily, or who are quick. But it is even more important to communicate positive beliefs and expectations to students who are slow, appear unmotivated, or struggle. It is also important to realize that the speed at which students appear to grasp concepts is not indicative of their mathematics potential (Supekar et al, 2013). As hard as it is, it is important to not have any preconceptions about our students.

We must be open at all times to any student working hard and achieving at high levels.

Some students give the impression that math is a constant struggle for them and they may ask a lot of questions or keep saying they are stuck, but they are just hiding their mathematics potential and are likely to be suffering from a fixed mindset; often these students are scared to take a risk or to get anything wrong. Some students have had bad math experiences and messages from a young age or have not received opportunities for brain growth and learning that other students have, so they are at lower levels than other students. This in no way means they cannot excel with good mathematics teaching, positive messages, and, perhaps most importantly, high expectations from their teachers and parents.

You can be the person who turns things around for students and liberates their learning path.

It usually takes just one person—a person whom students will never forget.

This article contains excerpts from Jo Boaler's new book, Mathematical Mindsets: Unleashing Students' Potential Through Creative Math, Inspiring Messages and Innovative Teaching

[kleo_gap size="12px" class="" id=""]

References:

Boaler, J. (2015). *Mathematical Mindsets*: *Unleashing Students' Potential Through Creative Math, Inspiring Messages and Innovative Teaching.* San Francisco, CA: Jossey-Bass.

Cohen, G. L., & Garcia, J. (2014). Educational Theory, Practice, and Policy and the Wisdom of Social Psychology. *Policy Insights from the Behavioral and Brain Sciences, 1*(1), 13-20.

Rosenthal, R., & Jacobson, L. (1968). Pygmalion in the classroom. *The Urban Review*, *3*(1), 16-20.

Shouse, R. C. (1996). Academic press and sense of community: Conflict, congruence, and implications for student achievement. *Social Psychology of Education*, *1*(1), 47-68.

Supekar, K.; Swigart, A., Tenison, C., Jolles, D., Rosenberg-Lee, M., Fuchs, L., & Menon, V. (2013). Neural Predictors of Individual Differences in Response to Math Tutoring in Primary-Grade School Children. PNAS, 110, 20 (8230-8235)

Scholars are always ready to learn more.

Scholars ponder ideas.

Scholars set goals.

Scholars have questions and seek answers.

Scholars exercise their intellect.

Scholars communicate ideas.

Scholars think creatively.

Scholars are ready with their tools.

Scholars look at the world through many perspectives.

Scholars use many resources.

Scholars see mistakes as learning opportunities.

Enduring Understandings

Enduring understandings are statements that summarize important, core ideas central to a discipline and have lasting value beyond the classroom. They synthesize what students should understand—not just know or do—as a result of studying a particular content area. Moreover, they articulate what students should "revisit" over the course of their lifetimes in relationship to the content area.

Enduring understandings:

- frame the big ideas that give meaning and lasting importance to such discrete curriculum elements as facts and skills
- can transfer to other fields as well as adult life
- "unpack" areas of the curriculum where students may struggle to gain understanding or demonstrate misunderstandings and misconceptions
- provide a conceptual foundation for studying the content area and
- are deliberately framed as declarative sentences that present major curriculum generalizations and recurrent ideas.

Students should understand <u>that</u>…

- **people migrate to meet specific needs.**
- **living things adapt to their environment in order to survive.**
- **the world we live in is reflected in literature.**

Essential Questions

Essential Questions derive from Enduring Understandings and are used to awaken, heighten, or challenge thought. These questions should provoke the student to investigation and hopefully will lead students to the enduring understanding.

Essential Questions

- have no one obvious right answer.
- raise other important questions, often across subject-area boundaries
- address the philosophical or conceptual foundations of a discipline.
- are framed to provoke and sustain student interest.
- should be framed for maximal simplicity.
- should be worded in student-friendly language.
- should provoke discussion.
- should lead to larger essential and unit ideas.

- **What causes a revolution to begin?**
- **What is the purpose of language?**
- **Why write?**
- **What makes a convincing argument?**
- **How do effective writers hold their readers?**
- **What can numbers show better than words?**

KUDs – Having Clarity About Learning

- What do you want students to **Know**
  - facts, vocabulary, definitions

- What do you want them to **Understand**
  - Principles/generalizations
  - Big ideas of the discipline

- What do you want them to be able to **Do**
  - Processes
  - Skills

A Primary KUD example:

- **KNOW**
  - Vocabulary related to plants
- **UNDERSTAND**
  - Plants have different parts that work together to help them live.
    - Plants are living things.
    - There are many different kinds of plants.
    - Plants have different parts.
    - Plants need certain conditions to grow.
    - Plants go through stages as they grow.
- **DO**
  - Find the illustration, or object within the illustration of a book, that is being described.
  - Ask or answer questions beginning with who, what, where, when, why.
  - Plant, care for & record observations of a plant, noting the parts of the plant, needs, development & life cycle.

An Intermediate KUD example:

- **KNOW**
  - Names of New World Explorers
  - Key contributions and supporting details
- **UNDERSTAND**
  - Exploration involves:
    - Risk
    - Costs and benefits
    - Success & failure
- **DO**
  - Use resource materials
  - Write an expository report to illustrate & support ideas

Excerpt from: Universal Themes & Gifted Education

by: Carol Fertig

My dad had a wonderful way of explaining things. Because he was a doctor, he often needed to describe how the parts of the body worked and what happened when those parts did not work properly. Frequently he compared the systems of the body to common machinery or household systems. He helped his patients understand their illnesses by making connections to objects and experiences that were already familiar to them.

Our children and students also learn best when they relate new information to things and ideas that are familiar. We can help them with this by teaching universal themes/concepts. By using this technique, we also help students to form "big ideas" that are transferred to future experiences. Gifted students are capable of taking these big ideas in-depth and becoming quite complex with them. This can actually be used as a differentiation tool.

1. Rather than have kids just memorize math facts, show them the patterns of numbers. This will make the memorization much easier.
2. Rather than learn a lot of historical facts—dates, names, battles—teach the concept of cause and effect. Then the dates, names, and battles will fall into place.
3. When studying literature, instead of checking only for comprehension, discuss the theme of the book in relation to responsibility, or conflict, or survival.

Universal themes can make the difference between knowledge and understanding—learning many facts vs. being able to apply those facts to something meaningful.

It is especially helpful if a theme is carried across all disciplines for months or even an entire year. Some schools have a different universal theme for each year.

…By studying geography using these themes, students learn not only place names, but they learn about communication, transportation, trade, languages, the cultures of the world, why people settle in certain areas, and how landscape and weather influence areas. Studying geography using themes provides a better understanding of history, interactions between countries and cultures, and a better understanding of current events.

Universal themes can also be used at home. Having a common vocabulary and relating many experiences to the same theme will help students learn in all aspects of their lives. For instance, if the theme were "systems," your family could discuss the characteristics of a system and then see how different systems meet those characteristics. Some systems that you might find around home are

1. a bicycle
2. aquarium
3. plumbing
4. electrical
5. structure of living quarters (rooms for different purposes)
6. systems for accomplishing work around the house
7. systems for doing homework

Once children have an idea about systems in general, they will be more ready to learn about other systems, such as

1. circulatory
2. respiratory
3. digestive
4. nervous
5. government
6. structure of the school community

UNIVERSAL THEMES AND GENERALIZATIONS

THEMES

1. **Change**
2. **Conflict**
3. **Exploration**
4. **Force or Influence**
5. **Order vs. Chaos**

6. **Patterns**
7. **Power**
8. **Structure**
9. **Systems**
10. **Relationships**

THEMES AND GENERALIZATIONS/BIG IDEAS
(Note: these are examples of generalizations; feel free to make others with the class.)

1. Change

- Change generates additional change
- Change can be either positive or negative
- Change is inevitable
- Change is necessary for growth
- Change can be evolutionary or revolutionary
- Change can be planned or spontaneous

2. Conflict

- Conflict is composed of opposing forces
- Conflict may be natural or human made
- Conflict may be intentional or unintentional
- Conflict may allow for synthesis and change
- Conflict can inspire fights or flight

3. Exploration

- Exploration requires recognizing purpose and responding to it
- Exploration confronts "the unknown"
- Exploration may result in "new findings" or the confirmation of "old findings"
- Exploration involves risk
- Exploration can be successful or unsuccessful but always involves learning

4. Force

- Force attracts, hold or repels
- Force influences or changes
- Force and inertia are co-dependent
- Force may be countered with equal or greater force
- Force can be used with positive or negative intentions

5. **Order (vs. Chaos)**
   - Order may be natural or constructed
   - Order may allow for prediction
   - Order is a form of communication
   - Order may have repeated patterns
   - Order and chaos are reciprocals
   - Order leads to chaos and chaos leads to order

6. **Patterns**
   - Patterns have segments that are repeated
   - Patterns allow for prediction
   - Patters have an internal order
   - Patterns are enablers
   - Patterns can limit

7. **Power**
   - Power is the ability to influence
   - Power may be used or abused
   - Power is always present in some form
   - Power may take many forms (chemical, electrical, political, mechanical)
   - Power can be used for good or bad

8. **Structure**
   - Structures have parts that interrelate
   - Parts of structures support and are supported by other parts
   - Smaller structures may be combined to form larger structures
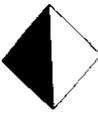   - A structure is no stronger than its weakest component parts

9. **Systems**
   - Systems have parts that work to complete a task
   - Systems are composed of sub-systems
   - Part of systems are interdependent upon one another and form symbiotic relationships
   - A system may be influenced by other systems
   - Systems interact
   - Systems follow rules

10. **Relationships**
    - Everything is related in some way
    - All relationships are purposeful
    - Relationships change over time
    - All relationships have rules

Thinking Keys for Depth of Learning

Dimensions of Depth and Complexity ***summarized and including relevant thinking skills***	Depth **Language of the Discipline** *Academic language, vocabulary, using correct terms, language and tools used by the discipline studied*	Depth **Details** *Facts, attributes, traits, noting evidence, observation, description, comparison*
Depth **Patterns** *Noting repetition, observation, relevance vs. irrelevance, prediction, order*	Depth **Rules** *Understanding structure and cause, generalizing, judging with criteria, "…because…"*	Depth **Trends** *Noting influences, forces, direction, course of action, determine cause and effect, predict*
Depth **Unanswered Questions** *Missing parts, unclear or incomplete ideas, discrepancies, noting ambiguity, fact/fiction/opinion, unresolved issues*	Depth **Ethics** *Differing opinions, values, morals, discrimination, argumentation, judging with criteria, determining bias, controversy*	Depth **Big Idea** *Generalizations, identifying main ideas, how do ideas relate to overarching concepts or themes, principles, theories, summarize*
Complexity **Relate over time** *Relationship between past, present, and future, sequence, order, prediction, connecting, comparing and contrasting*	Complexity **View from different perspectives** *Opposing viewpoints, multiple perspectives, differing roles and knowledge, determining bias, classifying, arguing*	Complexity **Across disciplines** *Relationships within and between subjects or disciplines, common elements, Making connections & associations, integration*
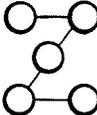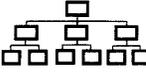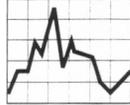
The elements of depth encourage deeper, focused study. The elements of complexity make connections and relate the subject to other studies and help clarify the relevance of what is studied – to the student, to the discipline, and to the larger world.

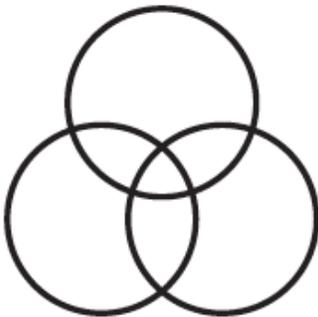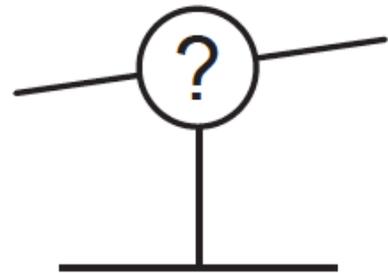# New Prompts of Depth and Complexity

Impact

Proof

Motive

Original

Process

Translate

Context

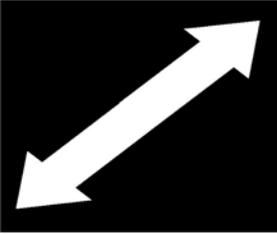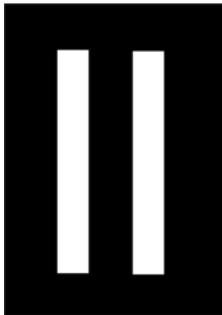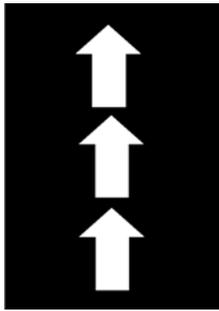**Judgment**

Content Imperatives

Paradox
- Thingsthatareopposite or oppose eachother.
- What arethe opposing ideas?
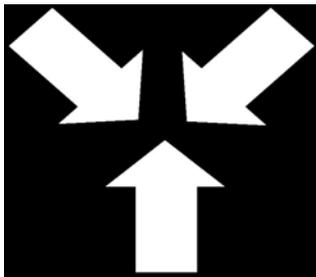- What are theinconsistencies?
- What isthe dilemma?

Parallel
- Ideas or events that are similar and can be comparedtooneanother.
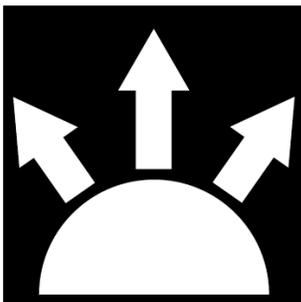- What issimilar?
- What is comparable?
- What seems the same as?

Contribution
- The effects orconsequences of something.
- Howlongdidthisbuild?
- Whatthingscame together tocausethis?
- Whatwasthevalue?

Convergence
- How or where things intersect or cometogether.
- Howdidthisallcometogether?
- How did things merge?
- Whatwerethemeetingpoints?

Origin
- The beginning or cause; the roots or catalyst
- Where/when did this begin?
- How did it begin? What was the cause?
- Who started it?

Applying Depth and Complexity Through
Goldilocks and the Three Bears
(Adapted from Santa Ana Unified School District by Merritt Booster)

Purpose: The purpose of this lesson is to teach the students how to utilize seven of the elements of depth and complexity. Goldilocks and the Three Bears is the vehicle (common body of knowledge) with which to teach a new concept (depth and complexity). This lesson also serves as an example of how to overlay depth and complexity into an already existing body of knowledge or content.

Objective: The student will learn to identify Language of the Discipline ⬯, Details ✿ , Patterns ⬡, Unanswered Questions ❓❓❓, Multiple Perspectives ✾ Rules ⬛, and Ethics   in literature using the fairytale Goldilocks and the Three Bears. The students will show evidence of their understanding of the elements of depth and complexity by rewriting Goldilocks and the Three Bears from a different perspective drawing information from the six elements of depth and the one element of complexity discussed.

Model of Instruction: Teacher directed using an advanced organizer.

Motivation: Provide students with copies of the text [post-it notes - optional]; read Goldilocks and the Three Bears. Point out that students will need to pay close attention to the story in order to recall specific information.

Practice with Advanced Organizer: Make seven large charts and lable each with the chosen elements of depth and complexity. The icons may be introduced in this order as it facilitates an easier understanding and each icon becomes the foundation for the next. 1) Language of the Discipline, 2) Details, 3) Patterns, 4) Unanswered Questions, 5) Multiple perspectives, 6) Rules, and 7) Ethics.

      [At this point in the lesson it is important to remember this is the students' first introduction to depth and complexity. The type of thinking needed to complete the task must be modeled, and the students will need to be prompted in order to think deeply and to ponder. A discussion of each icon should follow the completion of it. The time involved will vary as to grade level -- from several days, introducing one to two icons a day, to two days, introducing three or four -- or with upper grades introducing all at once. You may either review and/or reread the story each time an icon is introduced and specify what it is the students are attempting to identify and discuss.]

Summarize and Integrate the Advanced Organizer: After the icons have been taught, review and discuss each icon. The students will then demonstrate understanding of the elements of depth and complexity by rewriting Goldilocks and the Three Bears from a different perspective. Each element of depth and complexity taught should be reflected in the writing. The extent of which each element of depth and complexity is reflected will vary largely per student and age group. The writing may be guided, shared, or independent depending on the age group of the students.

Language of the Discipline 👄

(Vocabulary of the story)
- Romp
- Porridge
- peeped
- snug

(Language of Literature)
- Fairytale
- Rhythm
- Character
- Plot
- Conflict
- Resolution
- Setting
- Artist
- Author
- Anthropomorphic

(Language of a Sociologist)
- Indifference
- Family unit
- Discipline
- Self-reliance
- Cultural
- Supervision / unsupervised
- Morals
- Justice
- Society
- Social services
- Parents

(Language of a Naturalist)
- natural environment
- habitat
- food supply
- forest

Details ✳

- Played in forest
- found empty house
- went in uninvited
- found porridge
- tasted all three
- biggest: too hot
- middle: too cold
- ate all the smallest
- found chairs
- Tried all three
- biggest: too hard
- middle: too soft
- broke the smallest
- found beds
- biggest: too high
- middle: too low
- slept in smallest
- Bears come back
- Discovered porridge tasted and smallest all gone
- Discovered chairs used and smallest broken
- Discovered beds used and smallest had a girl in it
- Goldilocks woke up
- Goldilocks fled
- Goldilocks never seen again by bears

Patterns 🔗

- Great Big Bear
- Middle-sized Bear
- Wee Little Bear

- Great big bowl
- Middle-sized bowl
- Wee little bowl

- Great big chair
- Middle-sized chair
- Wee little chair

- Great big bed
- Middle-sized bed
- Wee little bed

- Great big voice
- Middle-sized voice
- Wee little voice

- Language pattern of discovery:
  - Great Big Bear **growled**
  - Middle-sized Bear **said**
  - Wee little Bear **cried**

- Tried everything biggest to smallest

- extreme/middle ground/extreme

Unanswered Questions

???

- Where were Goldilock's parents?

- Didn't she know it's illegal and unsafe to enter into a strange house uninvited?

- Why hadn't she eaten?

- Why was she so destructive?

- Why were three bears living in a house?

- What would they have done with Goldilockshad they caught her?

- Do society's laws apply in the forest?

- Whose laws do bears abide by?

- What were bears doing eating porridge anyway?

Multiple Perspectives

Within story:
- Goldilocks: hungry, tired, curious, inquisitive, innocent

- Great Big Bear: Father-like, gruff, justice-oriented, leader

- Middle-sized bear: motherly, gentle, enabler, peace-maker

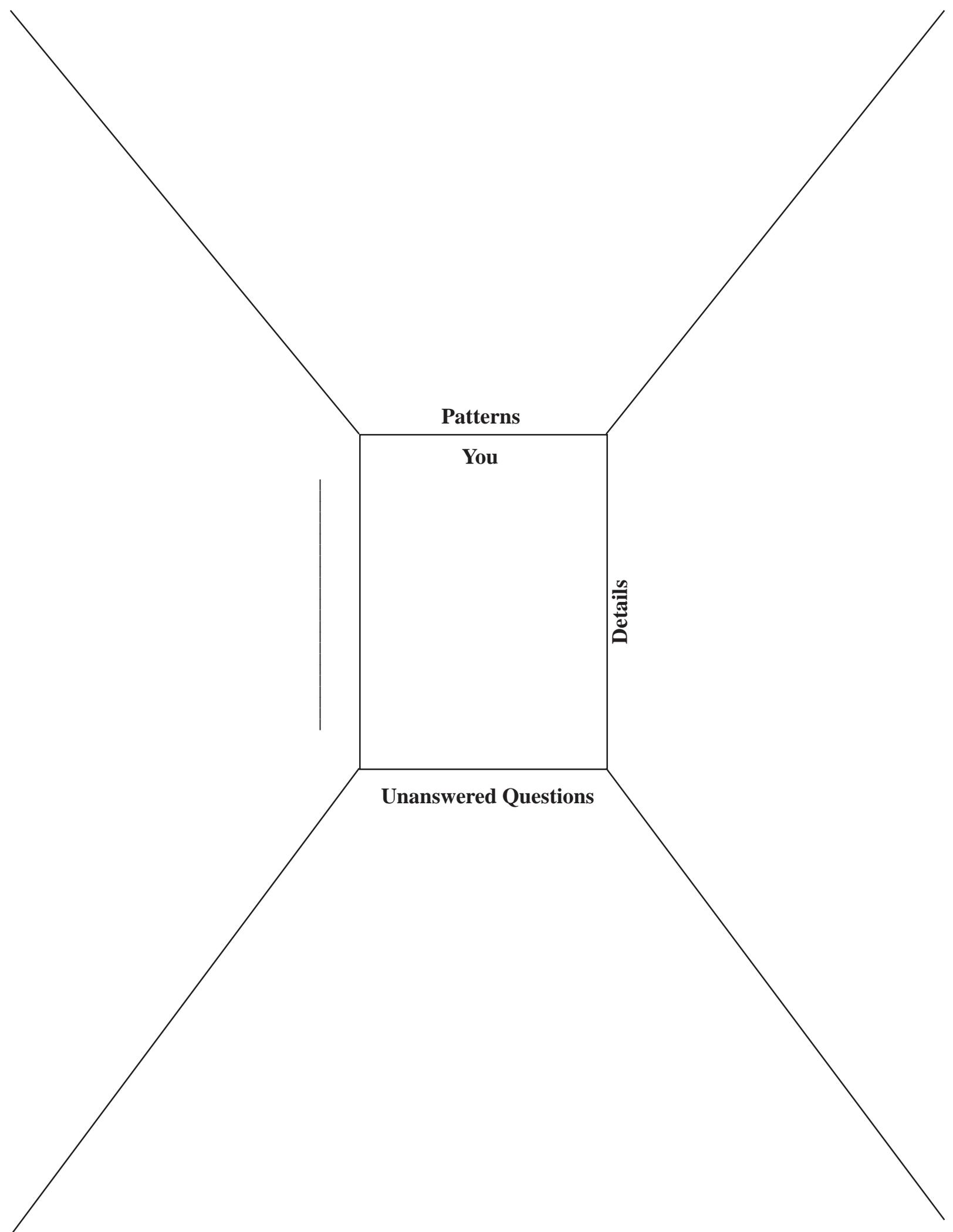- Wee Little Bear: babyish, whiner, victim, innocent, "cried"

Outside story:
- Sheriff

- Social Worker

- Council of Animals

- Environmentalist

- Biologist

- Parent

Rules
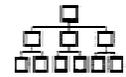
- Rule of three:
  3 bears
  3 bowls
  3 beds
  3chairs
  3 parts to bears' names
  (also recurrence of patterns of three in other fairy tales (e.g. three wishes?))

- Rules of language in fairy tales: "Once upon a time" and "The end"

- Large to small order consistent through story

- Moral of story - lesson learned

- Societal rules

- Safety rules

- natural laws about what bears do

- parental rules

Ethics:

Is it against the law to break into someone's house?

Whose law? (man's law, natural law?)

What if Goldilocks were an orphan and was lost, scared, and hungry?

What if the bears were starving?

Should Goldilocks be punished for breaking and entering?

Should she have to pay for the chair?

Should her parents be taken to court?

Should the bears be always wary and lock their doors?

What does that say about society?

Patterns

You

Details

Unanswered Questions

Mathematics:
Equations

Science: Plant/Animal
Life Cycles

Systems have parts that interrelate or work together

Language Arts: Paragraph

Social Studies:
California Missions