Inquiring about Inquiry

Experiences of Scientific Inquiry in Early Childhood

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WESTED

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What is it?

in·qui·ry

- a request for information
- an official effort to collect and examine information about something
- the act of asking questions in order to gather or collect information

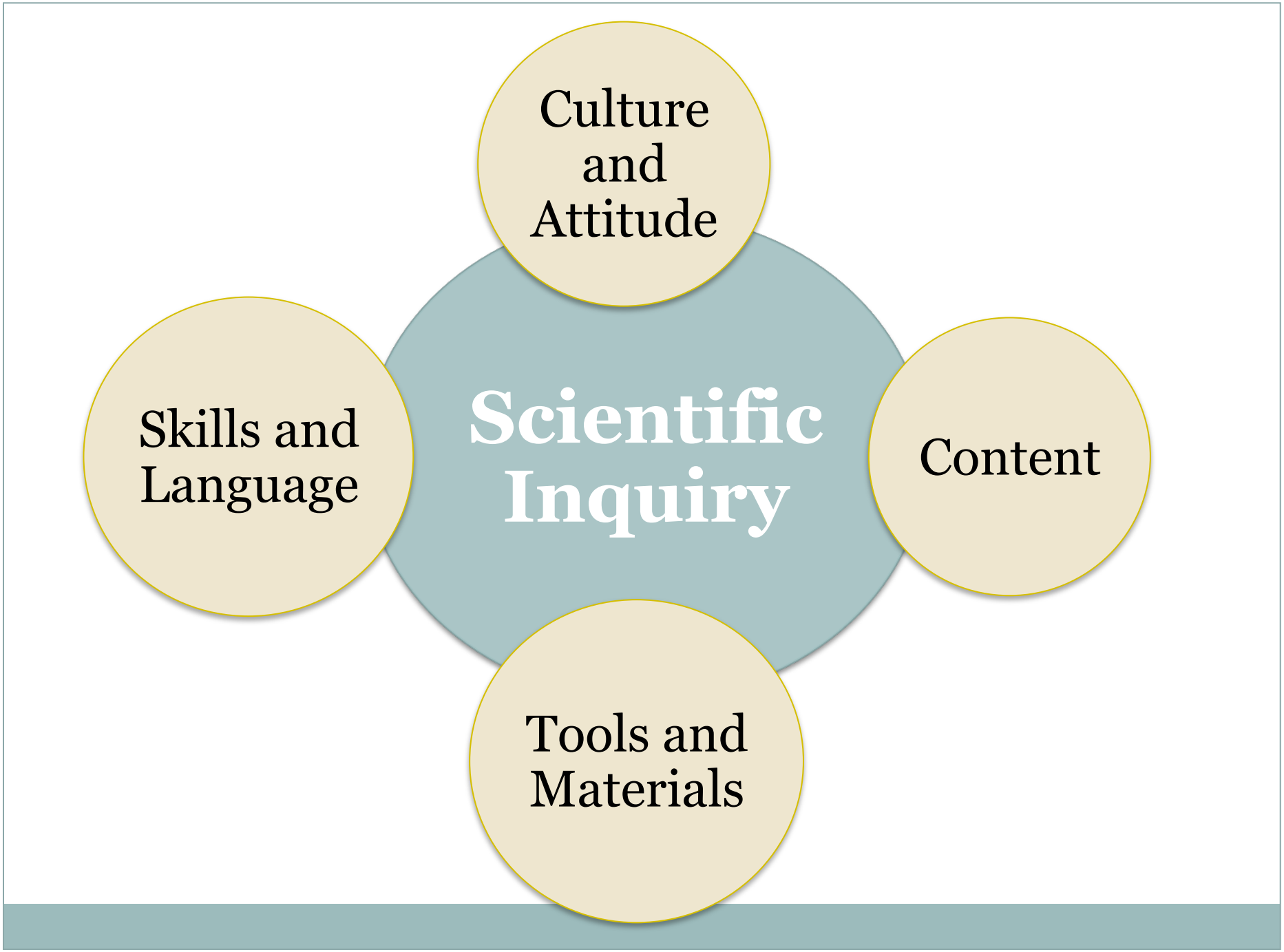
(Merriam-Webster)

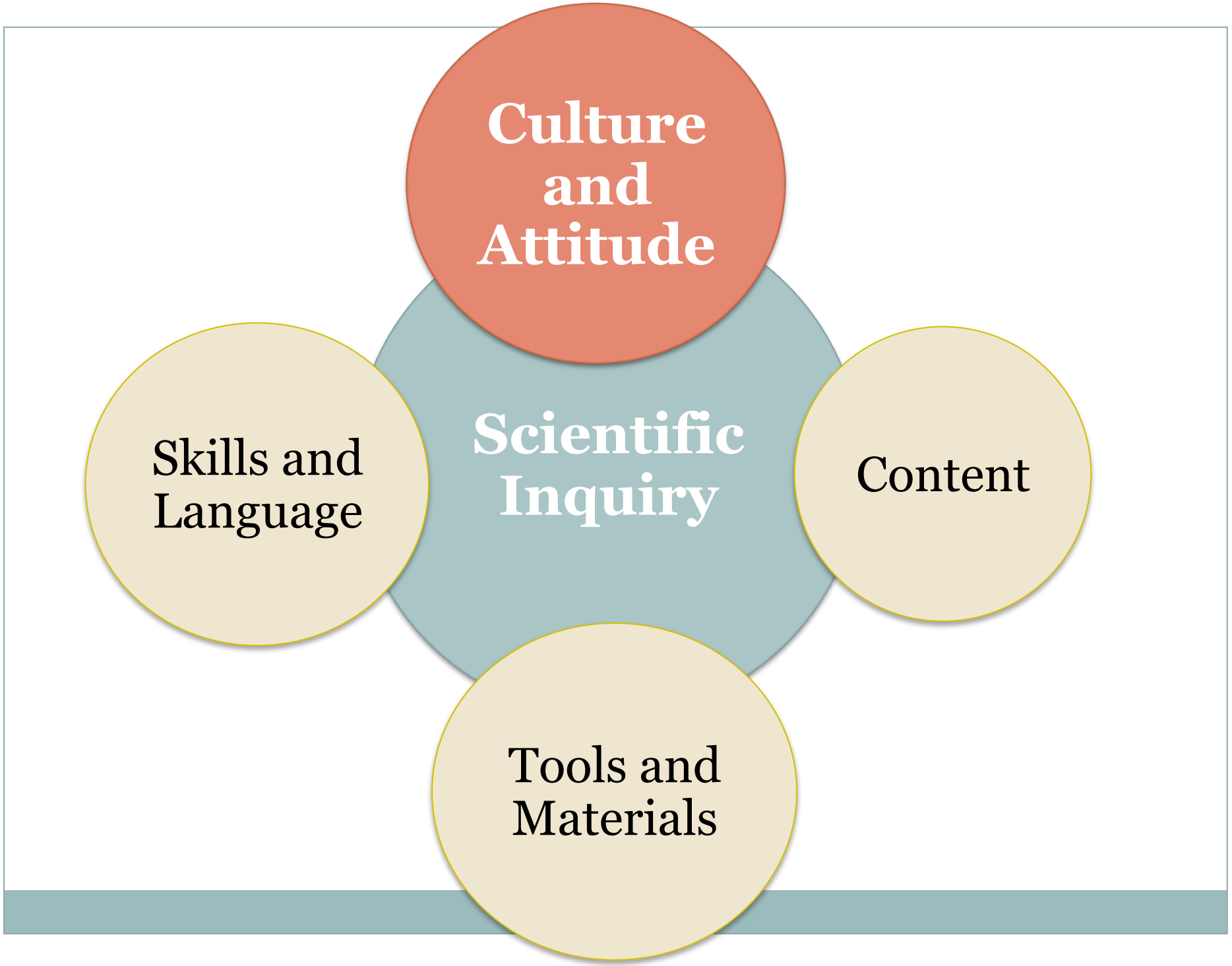
What Did You Notice?

- What were the children doing?
- What was the teacher doing?

Key Aspects of Scientific Inquiry

- Culture and Attitude
- Content
- Tools and Materials
- Skills and Language


Culture and Attitude
Skills and Language
Scientific Inquiry
Content
Tools and Materials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Let's Observe:
Establishing a Culture of Inquiry

- What is the child doing?
- What is the teacher doing?
- What is the teacher saying?

Culture of Inquiry

- Teachers and children become scientists together:
  - They express curiosity
  - Ask Questions
  - Explore and investigate
  - Express their ideas
- It's a collaborative inquiry process.
- Teachers MODEL a questioning mind.

Shifting Teachers' Mental Models

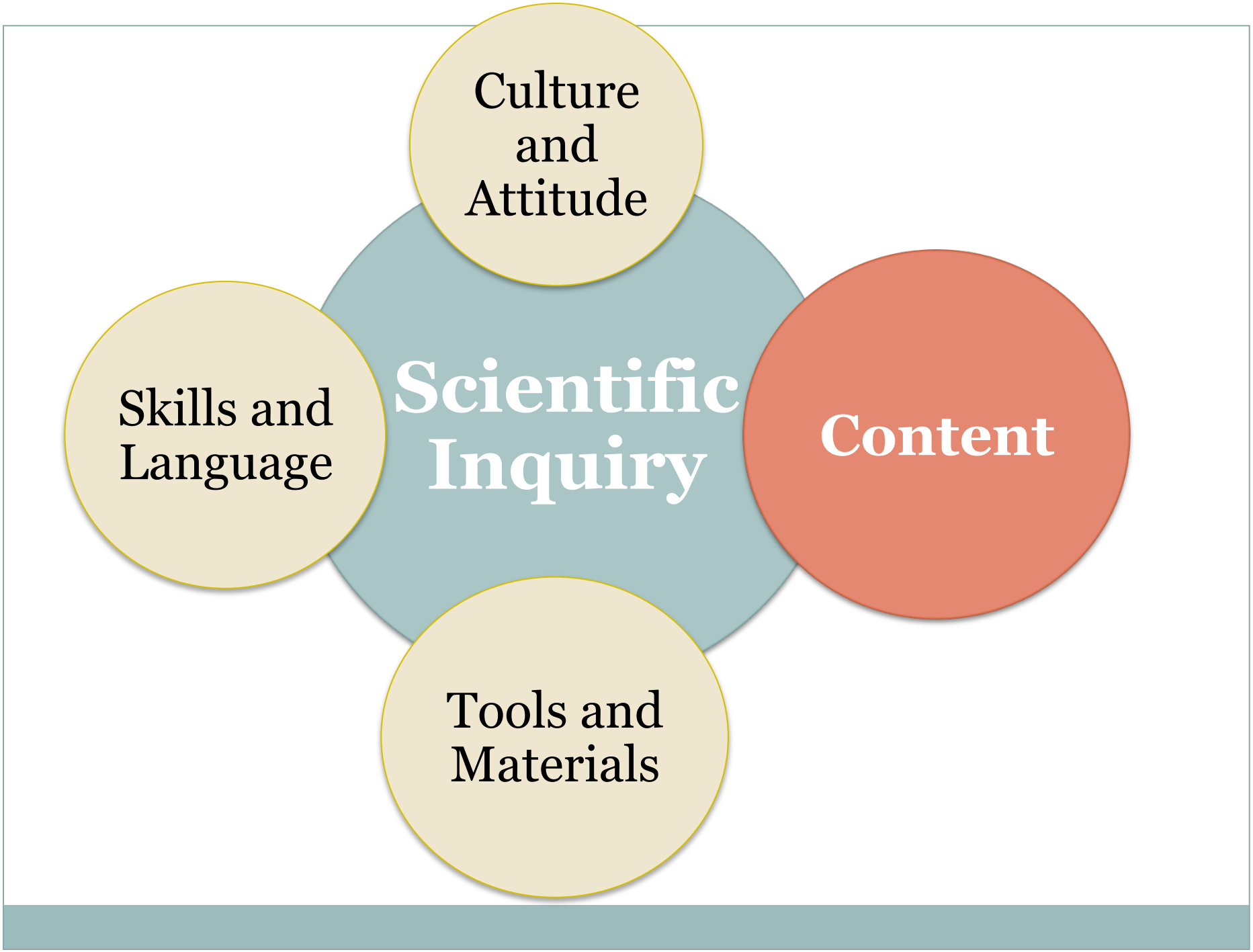
- **From:** "I am going to teach children lots of information about this topic"
- **To** "I listen to children's questions and model a questioning mind. We explore together."

- **From:** "As a teacher, I am the expert and I need to have answers to all the questions they ask."
- **To:** "I can say: I don't know. Let's find out together."

Culture of Inquiry

- Positive Approach Towards Learning
  - Attention
  - Engagement and Persistence
  - Curiosity and initiative
  - Problem-solving

- Develops and maintains joy of discovery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Content of Inquiry

- What is the focus of Inquiry?
  - What are we investigating?
- What scientific concepts are developmentally appropriate in preschool?

Focus of Inquiry

- Based on children's intuitive knowledge in biology and physics.
  - Building new knowledge and understanding on the foundation of existing knowledge
- Can be explored directly in the everyday environment.
- Interesting and engaging for Both, children and teachers.

The Preschool Learning Foundations in Science

- Identify key concepts and skills developmentally appropriate for preschool children.
- Represent milestones to be reached at around 48 and 60 months of age.

The Process and Content of Science

Process: **Scientific Inquiry**

Content:

- **Physical Sciences**
- **Life Sciences**
- **Earth Sciences**

Physical Sciences

Properties and Characteristics of Non-Living Objects and Materials

- Size, shape weight, texture and other properties of objects and materials
- Form and function of objects
- Cause and effect
- Changes in objects and materials (mixing, cutting)
- Force, stability and motion

Life Sciences

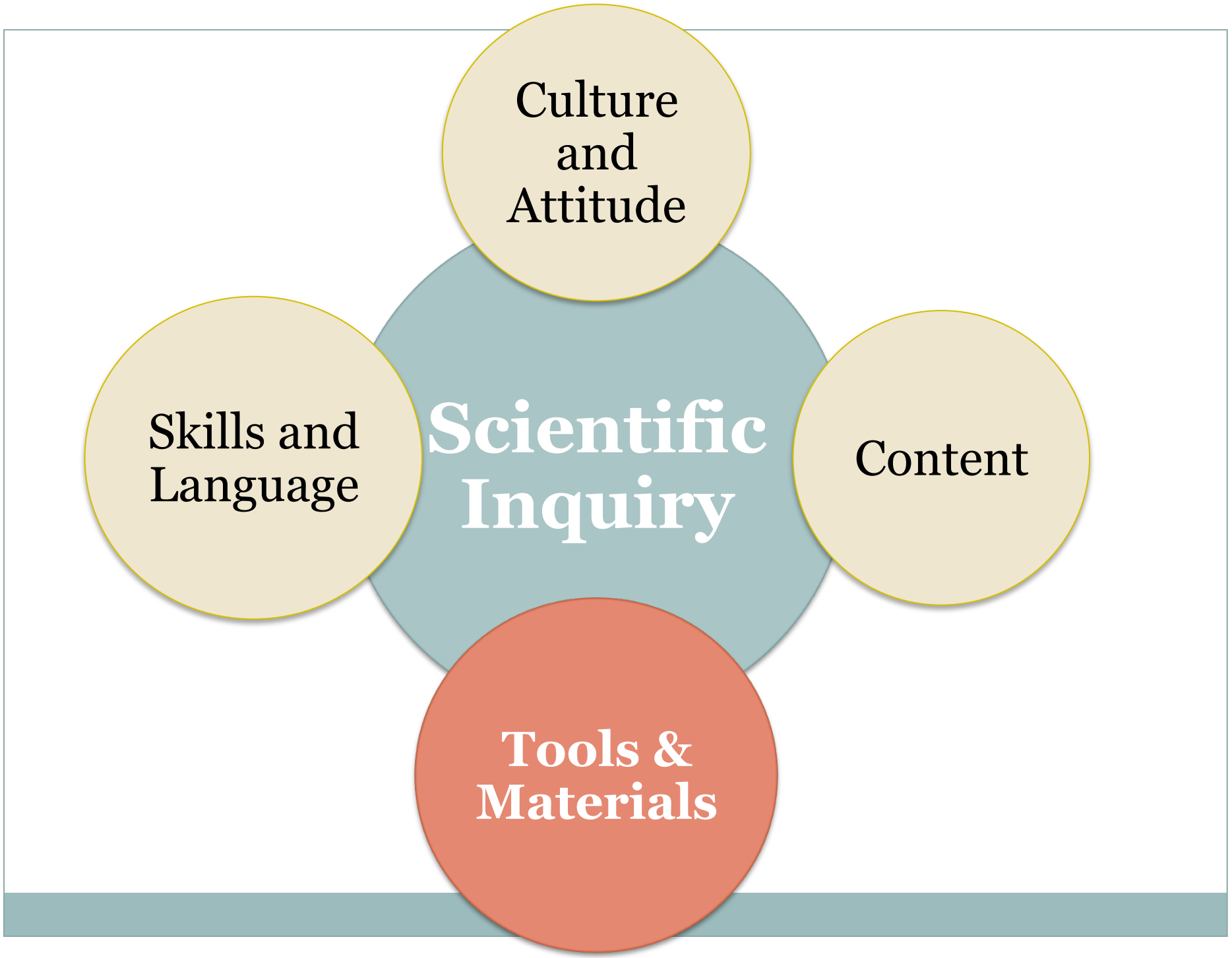
Characteristics of Living Things

- Appearance & Behaviors
- Body Parts and Bodily Processes
- Habitats
- Growth and Transformations
- Basic Needs

Earth Sciences

Characteristics of Earth Materials and Phenomena

- Earth materials
- Natural objects in the sky (e.g., sun, moon), and how they appear to move
- Changes in the weather
- Changes in the environment
- Caring for and respecting the environment.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Tools & Materials

Inquiry Experiences are Hands-On

- Children are NOT taking in knowledge in a passive way.
- Children ACTIVELY explore, investigate, and observe.
- The physical environment is stimulating, interesting, encouraging experimentations.

Materials: Open-Ended

- Materials that can be used in multiple ways and allow for creativity, investigation, problem-solving.

Materials: Varied

- A variety of different materials and objects varying in size, shape, texture.

Materials: Relevant

- Related to the concept of interest in the classroom

Tools of Inquiry

- **Observation tools**

  Magnifiers and hand lenses to help children observe details

- **Measurement tools**

  Measuring cups, balance scale, measuring tape

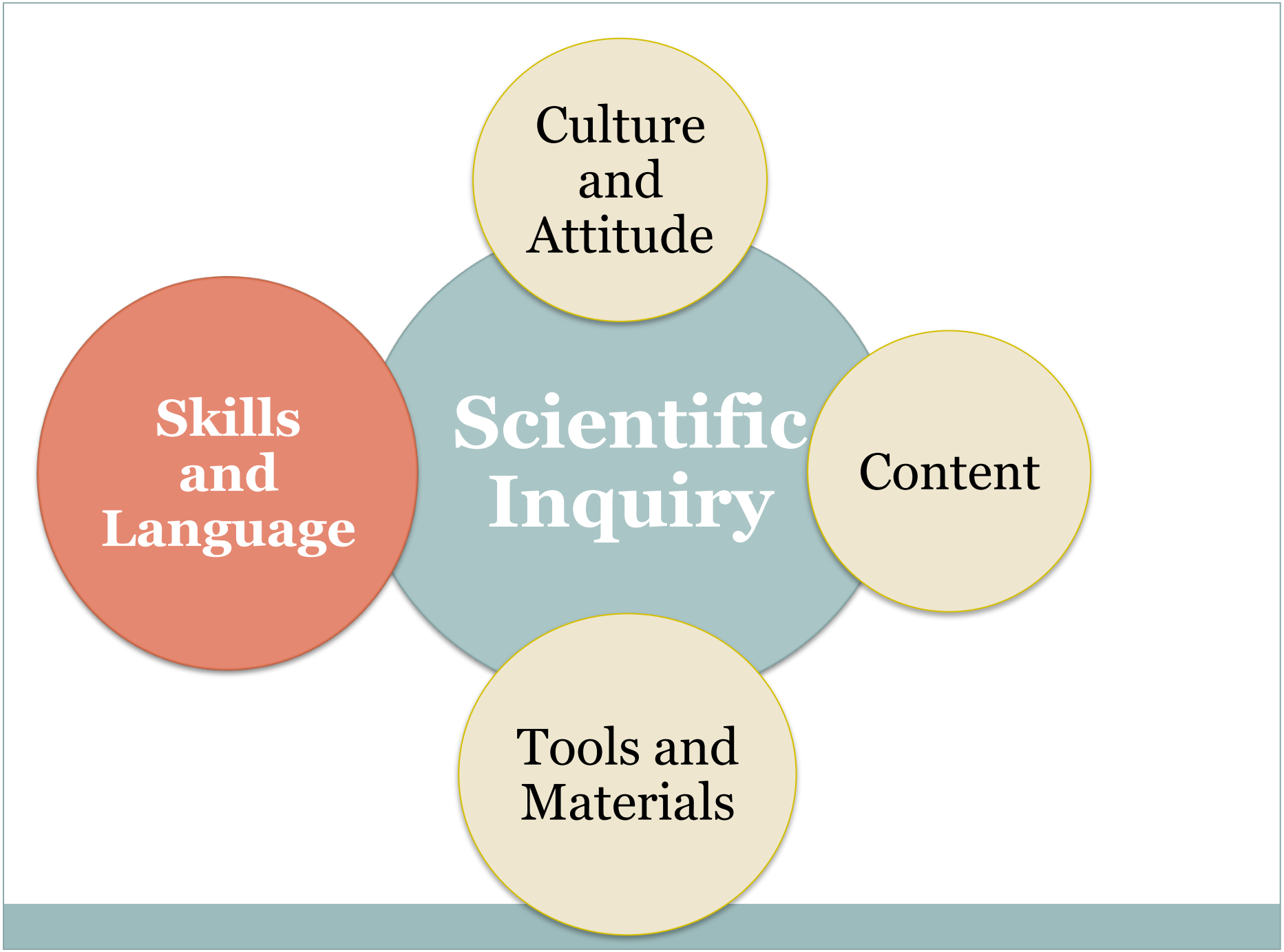
- **Recording tools**

  Paper journals, pencils, markers, cameras

Tools are Accessible

Observation Tools

Measuring Tools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Inquiry Experiences are Minds-On

- Introduce Children to Basic Inquiry Skills
- Invite children to communicate (share observations, compare; make predictions, explanations)
- Guide children's thinking and reasoning

Basic Inquiry Skills

- Observe & describe
- Use scientific tools
- Compare and contrast
- Predict and check
- Draw inferences
- Record observations
- Share findings and explanations

Let's Observe: Inquiry in Action

- How does the teacher facilitate children's explorations?
- How does the teacher invite children to communicate?

Children describe their observations

Teachers-

- Ask questions to guide their observations:
  - "How do they move their bodies?"
  - "What do you see happening?"
- Do not correct children or judge them for being right or wrong
- Model for children
  - "You observed the eyes" "Let me write it down."

Children record observations

Teachers-

- Encourage children to draw a representation of their observation
- Record children's observations by writing down their words
  - "He has one eye."
  - "He is eating the muscle."
  - "I see the shell."
- Encourage children to describe their drawings
  - "Tell me about your picture. I see a circle with lines. Tell me about what you drew."

Children compare and contrast

The teacher-

- Ask open-ended questions to encourage children to notice similarities and differences:
  - "What's the difference between octopus leg and a crab leg?"
  - "What makes them different?"
  - "What's the difference between the duck and Twitter?"

Children predict and check

Teachers-

- Encourage children to first ***predict*** **and then** ***check***;
  - They learn to compare what actually happens with what they thought would happen

- Elicit children's predictions by asking questions
  - "What do you think is going to happen when I pour water on it ?"
  - "How do you think it's going to look like? (the baby crab)
  - "What is your prediction?"

Children share their ideas and explanations

Children try to figure out how to get the Chlorophyll out the leaves:

- "Maybe these leaves are not strong enough."
- "Maybe they are too dry."
- "Maybe we need some water in here."
- "You see green is coming out of there."

- What do you see happening?
- What's working and what's not working?

Children use language and other forms of communication

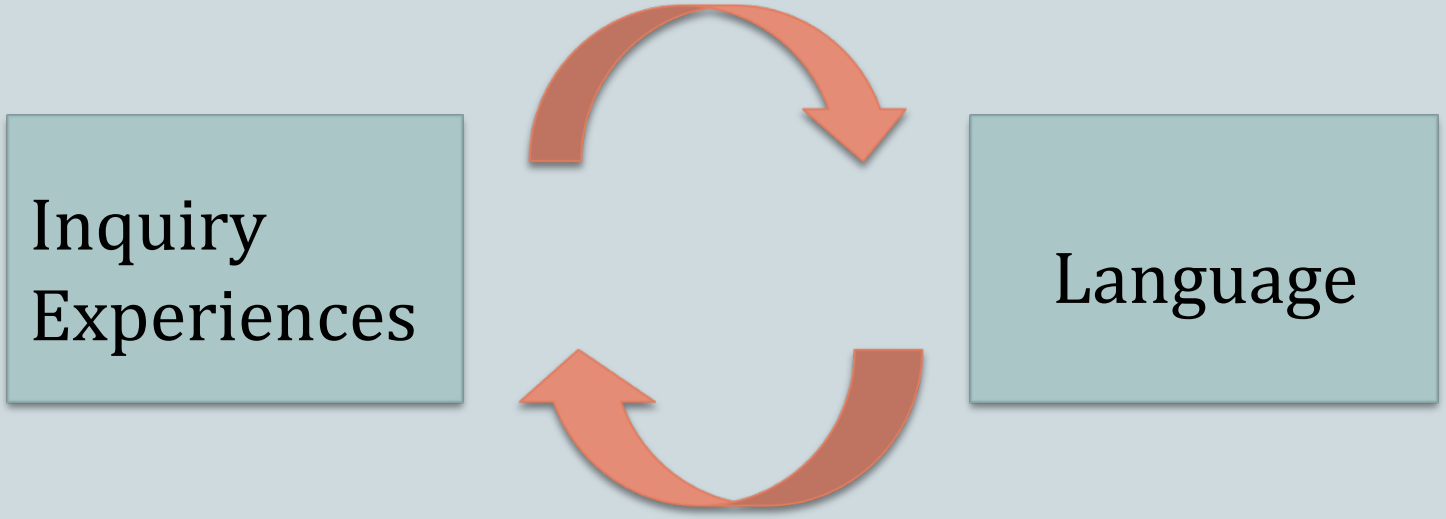
- Children use language to describe, record, predict, explain, compare and contrast, share findings and explanations
- Language allows children to describe their observations and express their thoughts.
- Guided discussions support deep learning and foster an attitude of inquiry

Experiences of Inquiry Support Language Development

- Children learn new content words in meaningful context
  - Nouns: seeds, hermit crab, octopus, Chlorophyll, eye, shell
  - Verbs: flying, moving, mixing
  - Adjectives: squishy, hard, tiny, big, small
- They develop communication skills
- They learn scientific vocabulary such as “observe” “predict” “similar” “different”

Communication Supports Inquiry

- Inquiry experiences support language development



- Guided discussions support conceptual growth

..Each child is born with what Einstein called “the holy curiosity of inquiry.”

Our role is to nurture and support children’s holy curiosity.