Creating a Culture of Scientific Inquiry among Educators in an Early Childhood Context

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An Educator Culture of Scientific Inquiry

All Educators at Boulder Journey School begin the school year by getting to know students and families. Additionally, this time of year signifies when each Educator outlines his own professional goals. These goals are often framed as a question in order to engage Educators in a process of scientific inquiry. Educator questions are closely linked to observations of students and consider the potential for contributions to the field of Early Childhood Education.

The process of documentation is integral to scientific inquiry, as it provides the data for research findings. Educators observe and document using a variety of tools, such as photographs, video, transcribed conversations, charts, graphs, and/or samples of work. They reflect on the collected documents in order to analyze classroom learning experiences, with the goal of better understanding teaching and learning.

When analyzing photographs, videos, transcribed conversations, charts, graphs, sounds, notes, and/or samples of work, our Educators ask:

- What do you notice? What is surprising? What makes you laugh, wonder, or pause? How are these documented observations similar or different from others?
- What does this communicate about children? What are the children doing? What are the children not doing? What are their goals, strategies, and theories?
- What does this communicate about Educators? What are the Educators doing? What are the Educators not doing? What are the Educators' goals, strategies, and theories? How are their goals, strategies, and theories similar or different from those of the children?
- What does this communicate about families? What opportunities are presented for more actively partnering with families?
- What does this communicate about human learning? How does this relate to 21st Century skills? What is the purpose of education and what connections can we make with what we have documented?
- How might this experience be extended? How might you further challenge the children? How might you further challenge the adults (yourself, your colleagues, and/or the families)? What learning opportunities might you offer children and adults?

Such an analysis of documented observations turns daily moments into opportunities for scientific inquiry for Educators. Children and adults are learning together from the same daily moments. The process of documentation offers Educators an opportunity to make connections between classroom experiences and theories of learning.
motivation, and child development. Plans for future learning experiences are then developed based on new understandings. In this way, the process of scientific inquiry includes ongoing observation, reflection, and action, and is a process that unfolds throughout the year, resulting in a curriculum that is contextual, relevant, and challenging for both children and adults.

Additionally, Educators share their documented observations and their discoveries publicly — on classroom walls, in booklets, on family blogs, on social media, in meetings. Rather than sharing a list of classroom experiences in their entirety, they are sharing their most significant research findings, the results of their scientific inquiry, which are intended to be provocative and spark new thinking in others (parents, colleagues, visitors, community members). In this way, documentation does more than tell the story of what happened — it makes a statement about children, teaching, learning, and the field of Early Childhood Education. Sharing with children, families, the school community, and colleagues world-wide invites multiple perspectives and creates an even larger body of work from which to make meaning and co-construct learning.

Examples of Educator Scientific Inquiry

Teaching is a worthy and complex profession. Thus, topics for scientific inquiry by Educators are countless and range from social-emotional development or mathematics to our work with clay or family participation. A sampling of research questions unfolding at Boulder Journey School includes:

- How do we define technology? What technological tools are appealing and appropriate for toddlers?
- How can we weave inspiration from Educators Frances and David Hawkins into the daily life of a classroom?
- What role can the environment play in developing classroom community?
- What mathematical concepts are being developed through children’s play with an overhead projector?
- What strategies do children use to build relationships?
- How can experiences with sand and water help us understand what children know about volume?
- How can we learn more about the value of games, such as peek-a-boo?
- How can we collaborate with families to better understand the transitions that happen at school?
- How can we improve the quality of our outdoor experiences?
- How can we engage preschoolers in philanthropy? What is developmentally appropriate and interesting to preschoolers?
- What can we, as adults, learn about the potential of paint in order to support higher quality classroom painting experiences?
- How can we promote sustainability in a school for young children? Can children and families be actively involved? How can we partner with children to be better stewards of the world?
- Can we improve the quantity and quality of musical experiences in the school? Can we offer young children access to real instruments, a wider variety of recorded music, live music?
- Can we engage community businesses in a collection of discarded materials that can be useful in schools?
- Can our knowledge of the process of documentation support the work of a local, public, after-school science program?
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- How do teachers respond when children express their emotions?

**Scientific Inquiry Leads to Implications for Teaching**

Infant Educators engage in scientific inquiry surrounding the question, “How can we document and share documentation in a way that communicates the value of the infants’ experience?” They observe that their strategies for documenting are not fully capturing and communicating what the infants are experiencing. There is so much to document when observing infants. They are continuously absorbing and processing new information, and this often goes unnoticed. The Educators realize that in order to communicate the value of the infants’ experiences, they first must truly value the experiences. They experiment with new strategies for documenting the infants. They begin to zoom in on their mouths, their hands, their feet. They experiment with taking photographs from the infant’s perspective by placing the camera at the infant’s eye level. Capturing the infant’s perspective from this vantage point causes them to re-evaluate some of the decisions they are making as Educators, such as placing children underneath dangling materials when they are sad. By analyzing the photographs they have taken from the infants’ perspectives, the Educators realize this can be disturbing, and they re-think this practice.

They also re-discover the many ways that infants explore the world with their entire bodies, their entire beings.
Infant Educators

Often, what the infant is gazing at is not the focus of his attention. Instead, his focus may be on what his feet are touching or the sounds he hears. For example, as a child manipulates a shell in his hands, he is processing a great deal of information about the shell: its shape, its temperature, its texture. His gaze may shift to other places, but he continues to manipulate the shell in his hands, indicating to the Educators that his focus remains on the feel of the shell. The Educators begin to make additional discoveries that they did not anticipate. They observe that children’s experiences outdoors possess a different quality than their experiences indoors. The infants appear more relaxed, focused, and at ease outdoors. They wonder if this is related to the harmonious environment offered by nature and begin to think about how they can alter indoor spaces — the sounds, the smells, the light, the materials and furniture — in order to replicate what is appealing about the outdoor spaces.

The process of scientific inquiry engaged in by these Infant Educators leads to further questions for continued reflection:

■ Do we value the role of the infant teacher as one that is more than just caring for infants?
■ Do we recognize what we can understand about human learning from observing our youngest citizens?
■ Do we understand that it is only through collaboration that Educators can become more skilled at scientific inquiry and the process of documentation?

Toddler Educators

Toddler Educators engage in scientific inquiry surrounding the question, “How can we promote collaborative experiences among Toddlers through the use of open-ended media?” and “In how many ways can we consider aspects of collaboration when setting up experiences for Toddlers?” While analyzing documentation of classroom experiences, they notice that our language often unintentionally grants ownership of materials. For example, Educators make statements, such as, “Can you give him his pencil back?” or “Is this your painting or his?” They begin to wonder who has the right to a particular classroom material: the child who needs it or the child who has already incorporated it into her work?

The Educators debate how to best support such strife, which occurs daily in a classroom setting, so that the work and ideas of each child are valued. They continue to review and discuss video footage of children in conflict over materials and analyze the Educators’ responses. They wonder if children have to share materials, if they have to have equal amounts, and if the adults’ desire to make sure everyone shares and has the same amount contributes to children’s possessiveness of materials. They begin to speculate that, rather than assigning ownership to particular materials when conflicts arise, the role of the Educator can be to help the children find ways to use materials together. They support one another in integrating this technique into their daily practice. While doing so, they note that instances of collaboration most frequently exist within pairs of children. They wonder if having a third or fourth person in the group is more challenging because more than one other person’s perspective must be taken into consideration. They wonder if offering more opportunities for children to work in pairs would build their competence with regard to collaboration and support them in working more successfully in larger group configurations.

The process of scientific inquiry engaged in by these Toddler Educators leads to further questions for continued reflection:

■ In how many ways can we understand the formation of learning groups? What are the differences between groups of children that adults form and groups of children that children form? How is a learning experience affected by the number of children and adults in the group?
■ Do we fully understand the complexity of our work? Do we understand that every moment, every decision, every word is worthy of consideration?
■ Do we have a growth mindset in our work as Educators — a mindset that accepts mistakes as a natural part of understanding our work — a mindset that places more emphasis on new understandings and less on blame?

Preschool Educators

Preschool Educators engage in scientific inquiry surrounding the question, “How can we offer preschool students more challenging materials?” The Educators note that many of our preschool students have been at the school since infancy, and thus, have mastered many of the typical preschool materials. They wonder about more sophisticated materials and whether or not wood and wood glue would offer the children new challenges. They collect many pieces of wood with children and families and offer a variety of ways for children to attach or combine pieces of wood — wood glue, as well as string, composition, hammers and nails. Noticing the children’s interest in natural materials themselves, they expand their collection from wood to all treasures found in nature. They invest time, many weeks, collecting and sorting these materials with children and families, and together, theyrediscover the beauty of nature: the patterns, the textures, the continual changes, the many shades of brown.
The process of scientific inquiry engaged in by these Preschool Educators leads to further questions for continued reflection:

- Do we accept the materials that are marketed to early childhood classrooms (glitter, pom-poms, googly eyes, chenille stems) or are we open to considering what materials might best support the children in developing their thoughts and ideas?

- Can we brainstorm hundreds of possibilities for our work, so that we do not limit ourselves to the few materials that are deemed appropriate for early childhood classrooms?

- Do we recognize that children and adults have the right to be surrounded by beauty? If so, doesn’t this mean that we will not accept anything in the school that is not beautiful? Can this thought be applied to every aspect of our work (the environment, the collections of materials, the presentation of student work, parent-teacher conference reports)? In what ways can we work together to improve our understanding of the role aesthetics plays in school and in life?

- Do we recognize that the thoughts and contributions of parents can improve the quality of classroom experiences for students, families, and Educators? What examples in our work do we have to support this idea, and what examples do we have of missed opportunities?

**Pre-kindergarten Educators**

Pre-kindergarten Educators engage in scientific inquiry surrounding the question, “How can we better interpret experiences with paint and drawing through the lens of mathematics?” The Educators observe that when they offer the children a reference (a photo or model of an object or idea) for their drawings and paintings, the children rely on mathematical concepts, such as symmetry, shape, pattern, addition, subtraction and multiplication, to replicate the object or idea. The children read the image in the reference and decide how to recreate it on their canvas, relying on the concept of one-to-one correspondence. The children evaluate their work by ensuring that different parts of their drawing or painting have the same quantity of details or by ensuring that both sides match. This matching process is the foundation for subtraction, the difference between two quantities. When comparing two similar objects, such as a photograph and a drawing of that photograph, the children see the difference between the two. The Educators refer to the children’s observations as one representation having ‘less than’ or ‘more than’ the other, laying the foundation for both subtraction and addition.

The process of scientific inquiry engaged in by these Prekindergarten Educators leads to further questions for continued reflection:

- What specific mathematical challenges are embedded in representing something that is two-dimensional in a three-dimensional manner, and vice versa?

- Is our view of mathematics in early childhood too narrow?

- In how many ways can we encourage and extend the mathematical thinking that is embedded in daily classroom experiences, such as drawing and painting?

- How can mathematics be integrated into all classroom experiences rather than isolated to a particular time of day?

- How can we use documentation to develop strategies to support each child’s zone of proximal development?

**Conclusion**

Because human learning is complicated and multi-faceted, all Educators have the right to the time, support, and resources necessary to engage in scientific inquiry related to numerous aspects of their profession. This is how we can ensure quality education and how we can ensure that our approaches to education continuously evolve to meet the needs in our ever-changing world. With this in mind:

- What potential for scientific inquiry exists in your context?

- What aspects of teaching and learning spark your curiosity?

- What time, support, and resources are necessary to make scientific inquiry possible?

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For more information about the Boulder Journey School Teacher Education Program, please visit: [http://educators.boulderjourneyschool.com/teacher-education-program.html](http://educators.boulderjourneyschool.com/teacher-education-program.html).

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