# A Teacher's Interpretation and Use of Learning Trajectories

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# Why Teach with Learning Trajectories

- **Everyday Math Study**  
  - Few teachers conducting in-depth discussions see themselves not as moving through a curriculum, but as helping students move through a progression or range of solutions (Fuson, Carroll & Drueck, 2000).
  
- **CGI and ENRP**  
  - Teachers' knowledge about children's thinking enables them to evaluate children's knowledge and adapt instruction.

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# Comparison

- Multiple topics (more than CGI, more similar to ENRP)
- Correlated curriculum and software
- PreK rather than elementary

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# Rationale

- Guidance for curriculum developers, professional development
- Need for research with different grade levels and populations

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# Research Questions

- How does a teacher's use of the trajectories change?  
- What understandings develop (of students, curriculum, teaching and mathematics) as the teacher uses the trajectories?  
- What support is needed to use trajectories?

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# Background on Teacher/Researcher

- **Role:** Teacher/Researcher
- **Background**  
  - Graduate assistant
  - Former Head Start teacher, first semester early childhood doctoral student
  - Familiar with curriculum through field testing, pretesting
  - Prior experiences with one trajectory

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# Methodology

- **Participant observer** (Spradley, 1980)  
- Numerous data sources  
  - Lesson planning notes  
  - My observational notes  
  - Group debriefing notes
- **Analyses**  
  - Peer rec  
  - Examined all sources for evidence of interpretations and use of trajectories

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# How My Use of the Trajectories Changed

- **Early Fall—Trajectory Level as Label**  
  - Trajectories are a reference source  
  - Similar to a dictionary  
  - Something you checked when you needed a word (in this case a label)
**Early Fall—Trajectory Level as Label**
- E.g., read trajectories; team attempts to locate children on number trajectory.
- My reflections: How do I make sure children are moving through the trajectories and finish this curriculum?

**Late Fall—Trajectories as Ordered Labels**
- What children are doing successfully.
- Strategies children are using, but still labeling.
- Know where the children are, focusing on the results of teaching (not thinking, processes, or levels of understanding).

**Late Fall—Trajectories as Ordered Labels**
- Constant team conversation—what did on the (LT based) pretest or curriculum work to name “behavior?”
- For example, a child who was counting “1, 2, 3, 5,” was identified as a reciter, not yet corresponder.
- Did not examine trajectories for planning
- Instead, followed curriculum plan—Not using LT even when deciding on “review” center

**Early Winter—Trajectories as Levels of Strategies**
- Focus and reflect on children’s strategies.
- And use of materials/activities to facilitate their development.

**Early Winter—Trajectories as Levels of Strategies**
- E.g., Geometry center—free explore paper shapes.
- Cory produces a symmetrical picture.
- Anticipated some “design” to the children’s work but not his symmetrical design.
- Thought—Interesting! Where does this fit on the trajectory?
- What does that tell me about his understanding?
- What do I do with him now?

**Early Winter—Trajectories as Levels of Strategies**
- E.g., 2, Regular teacher believed students confused by more/less
- I examined recent activities—Where confusion, and why?
- What type of activities might help the children?

**Early Winter—Trajectories as Levels of Strategies**
- Another precipitating event was biweekly meetings.
- Questions arose as I tried to use the trajectories to explain children’s thinking and learning.

**Early Winter—Trajectories as Levels of Strategies**
- E.g., identity how high each child could count.
- Realized that “how high” depended on the situation.
- Also, wondering how children could count objects but not consistently produce
- Did they not understand stopping?
- Why were these two activities different for a child?

**Early Winter—Trajectories as Levels of Strategies**
- Struggled with shape trajectory, as curriculum moved through trajectory but teacher wanted checklists.
- Reflecting on why the children seemed confused from day to day
- What activities would scaffold a child’s learning?
- What activities or problems could we include that would help them construct these ideas?
Later Winter—Trajectories as Levels of Understanding

- Explaining behaviors and strategies
- What mental models generated the strategies
- Reflect on: Where do children’s strategies fit?
- Comparison: Classroom teacher feels there is no “math” during math, e.g., Dinosaur Shop and Places Scenes

Later Winter—Trajectories as Levels of Understanding

- Planning now includes:
  - Curriculum, My noted observations, Trajectories
- Conjectured Learning Processes:
  - Levels of Understanding
  - Levels of Strategies
- Place Scenes: During math, e.g., Dinosaur Shop
- Some children were using shape matches but using sticks to identify shapes
- Trajectories focused attention on their strategies in different situations
- Where they are now because they have seen
- Trajectories recognize attributes
- What do trajectories indicate about behavior or non-behavior? What do they indicate about behavior or non-behavior?
- Difference in what is seen and “not seen” based on beliefs what does math look like?: considering alternative courses of action

Spring—Trajectories as Learning Processes

- Conjectured Learning Processes (Simon)
- Tool for assessing children’s understanding and planning paths of learning based on correlated activities

Discussion

- Change to Interpret and use trajectories as:
  - Labels
  - Ordered Labels
  - Levels of Strategies
  - Levels of Understanding
  - Conjectured Learning Processes

Discussion

- Initially a reference source was confused about how to use it as:
- Gradually grew to see:
  - Sequence
  - Themselves used as a lens to interpret more complex behavioral units (categories)
  - And ways of thinking and understanding
  - Trajectories connected to learning and teaching

Discussion

- What understanding did I develop as I utilized the trajectories?
- Precipitating Events
  - Team discussion and expectation of their use (it may be unique to setting)
  - Need for knowledge of children’s achievement for assessment and planning
  - Desire to understand children
  - Need to connect all this in integrated fashion

Discussion

- What support did I need to utilize the trajectories?
- Ongoing support to ask questions (interpreting the research, understanding terminology)
- Continued discussions about observed behaviors and what the observations tell me about a child’s development
- Shorter definitions and examples

Discussion

- Eventually provided direction to what activities would be most beneficial to children
- The need to simplify
### Conclusions
- Teacher awareness of how children learn influences the teaching and understanding of what is happening in the classroom.
- Trajectories make more sense as you use them; not just easier with familiarity but depth of understanding.
- If trajectories are based on research and knowledge about children's learning, a curriculum based on them should provide a good basis for learning.
- Trajectories can provide tools to guide teachers in assessing and planning.

### Implications
- Teachers need to understand the relationship between trajectories, assessment, and planning.
- Publishers may not see power or purpose and omit them.
- Format must be readable, inclusion of examples that make sense to teachers, interpret the research not just reporting of it.

### Professional Development Needed
- ENRP
- CGI
- TRIAD model (Technology-enhanced, Research-based Instruction, Assessment, and Professional Development)