A Pedagogical Foundation for Teaching ELLs Mathematics

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Crossing the River

Three adults and two children need to cross a river. They have a small boat. The boat can carry either one adult, **or** one or two children. How many one-way trips will it take for all children and adults to cross the river?

Guiding Principles for Shaping Pedagogy

1. **Challenging Mathematical Tasks**
2. **Multimodal Representation**
3. **Academic Language Application**

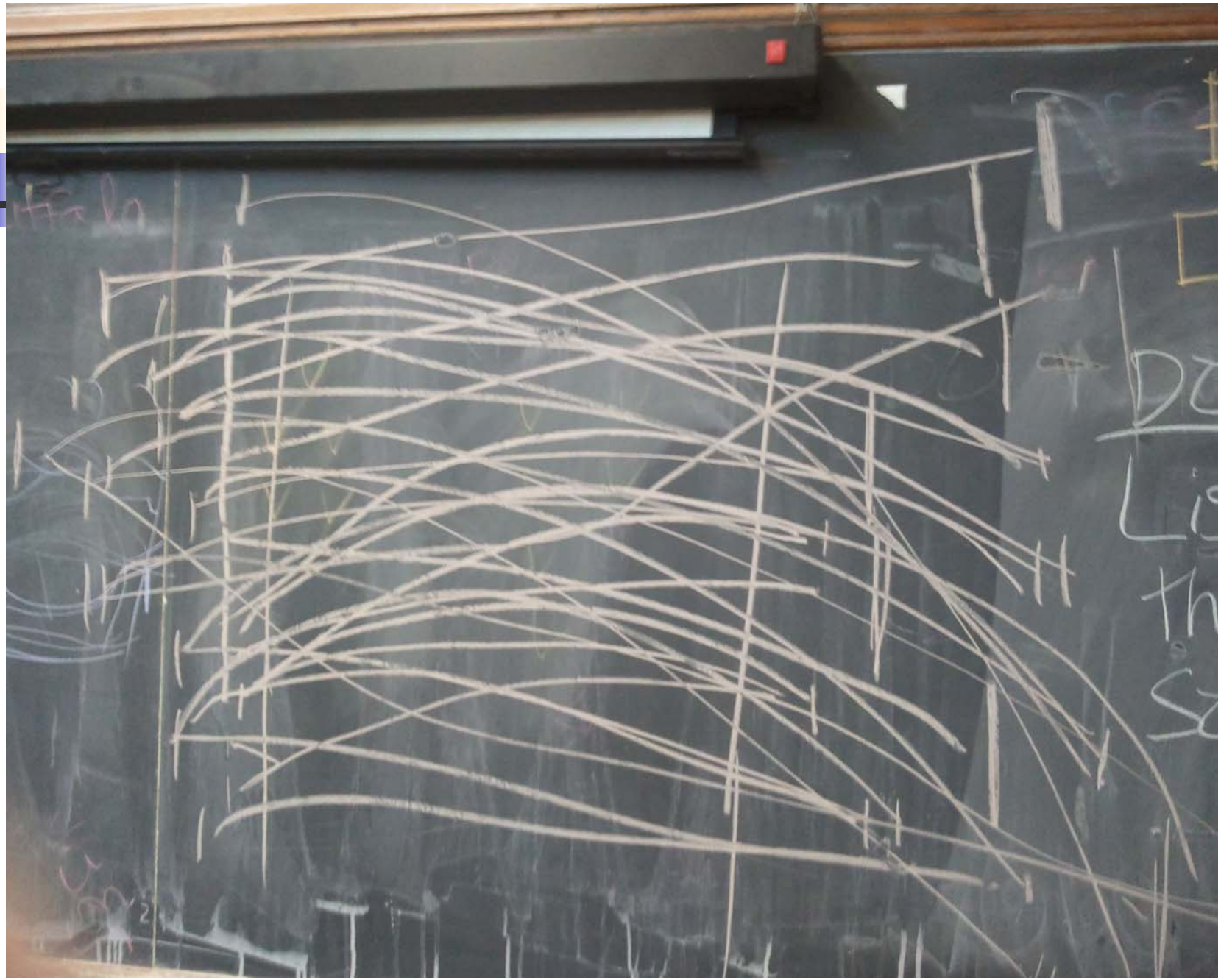
Challenging Mathematical Tasks Principle

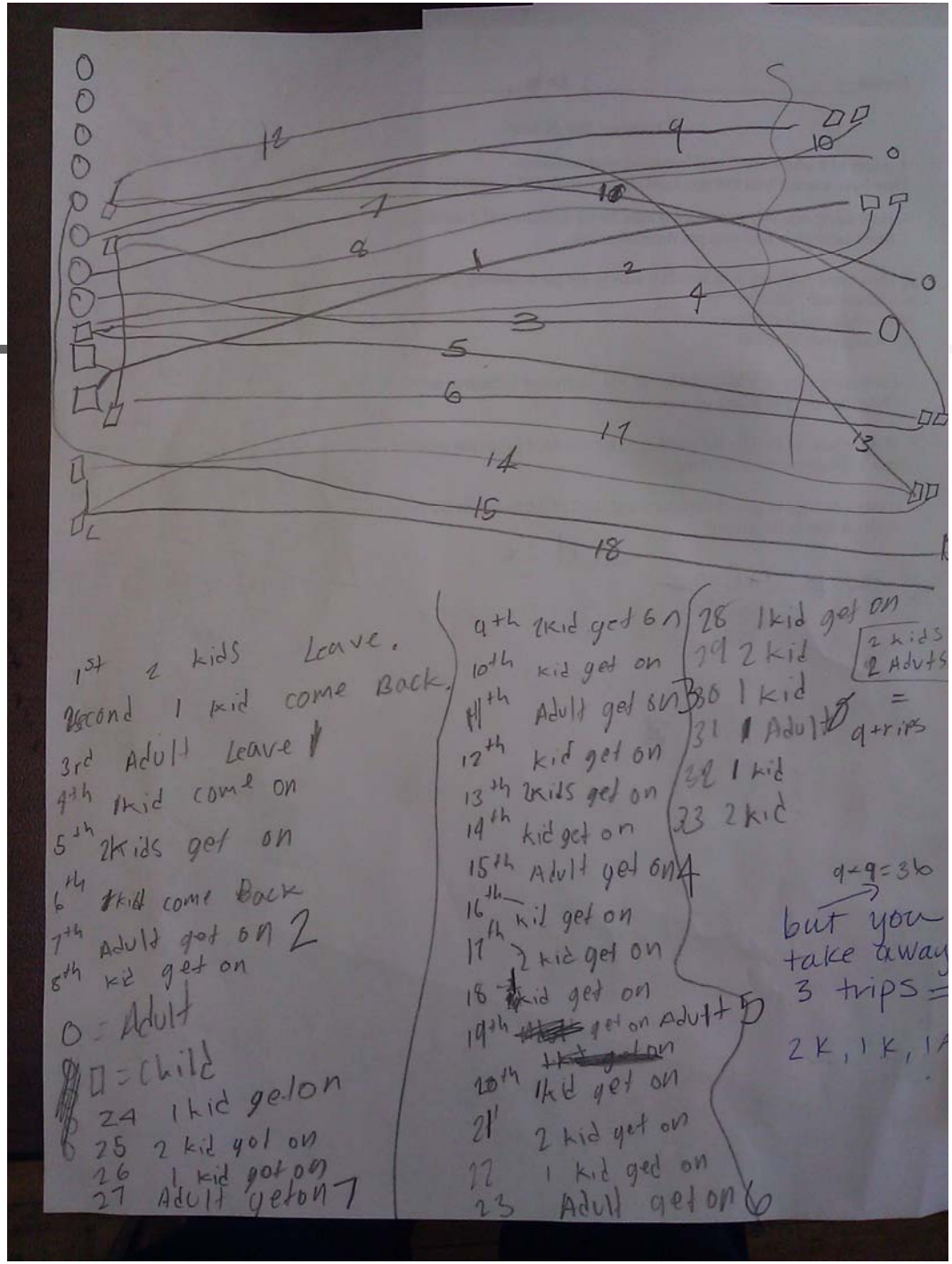
- **Engagement, accessibility,** and **success**
- Introducing the mathematical ideas and challenges in the lesson **without lowering the demand**
- Questioning students to **extend their thinking** and **promote sense-making**

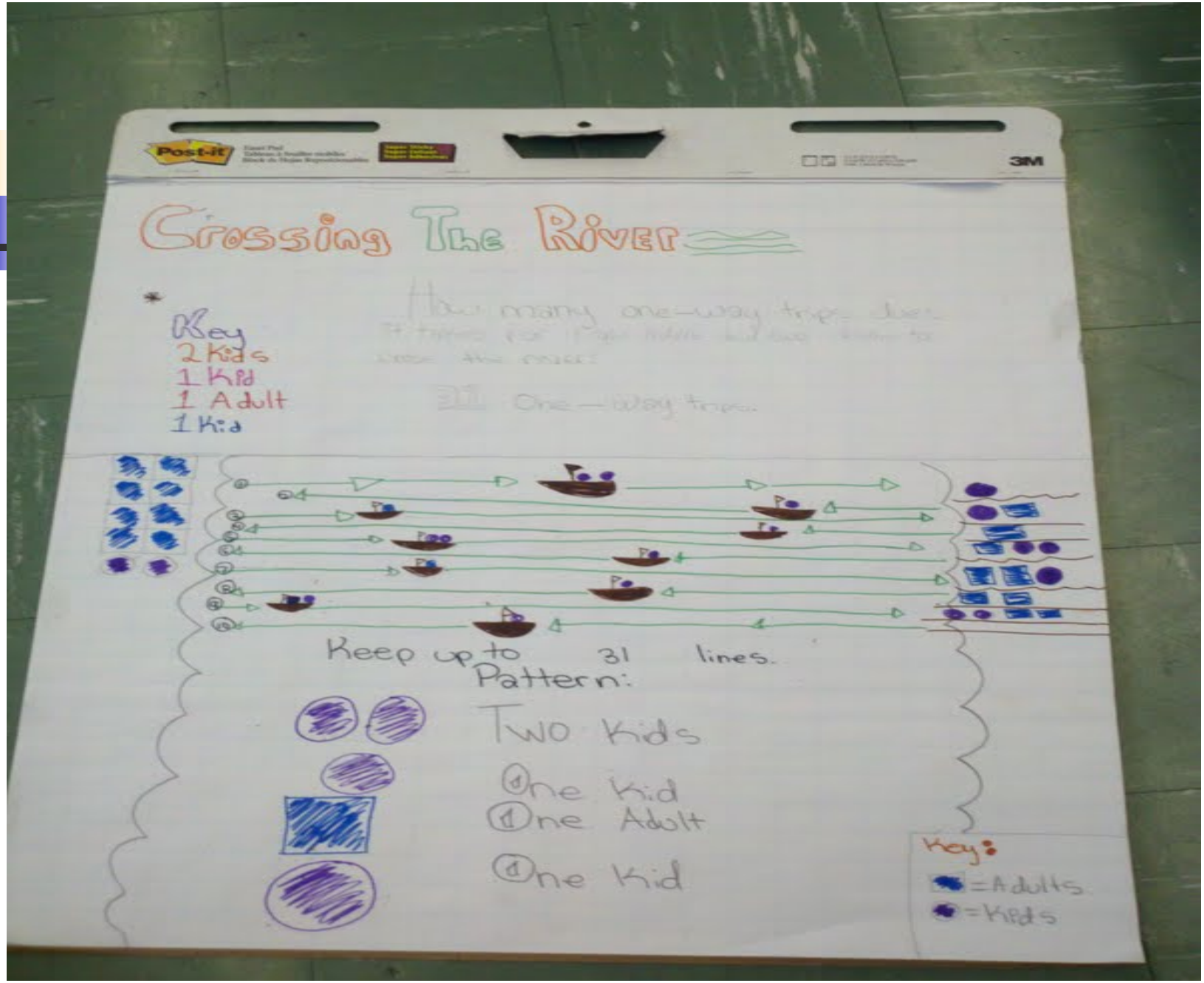
Multimodal Representation Principle

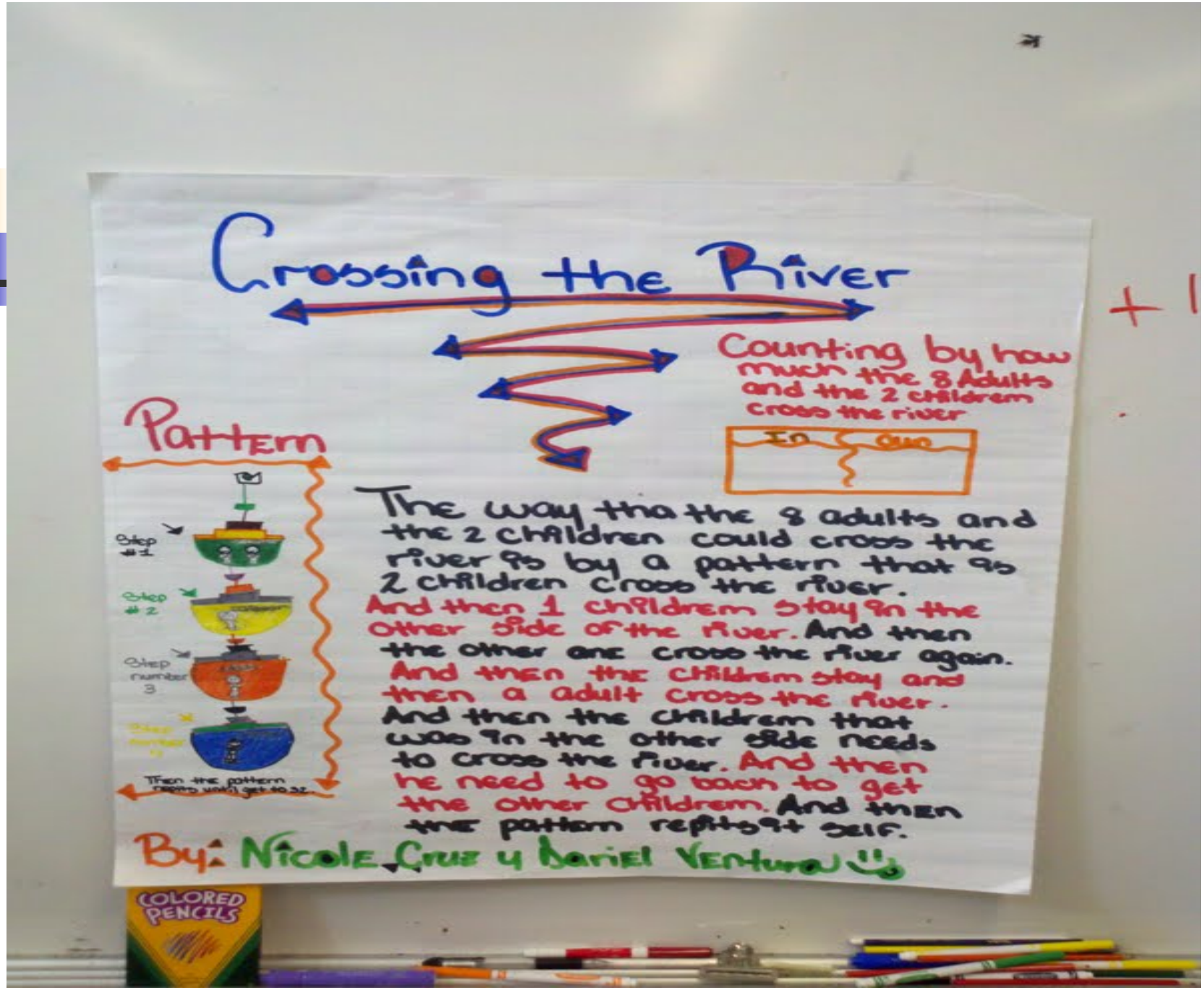
- Giving opportunities for students to **use mathematical diagrams, drawings, gestures, physical models, symbols,** or **technology**

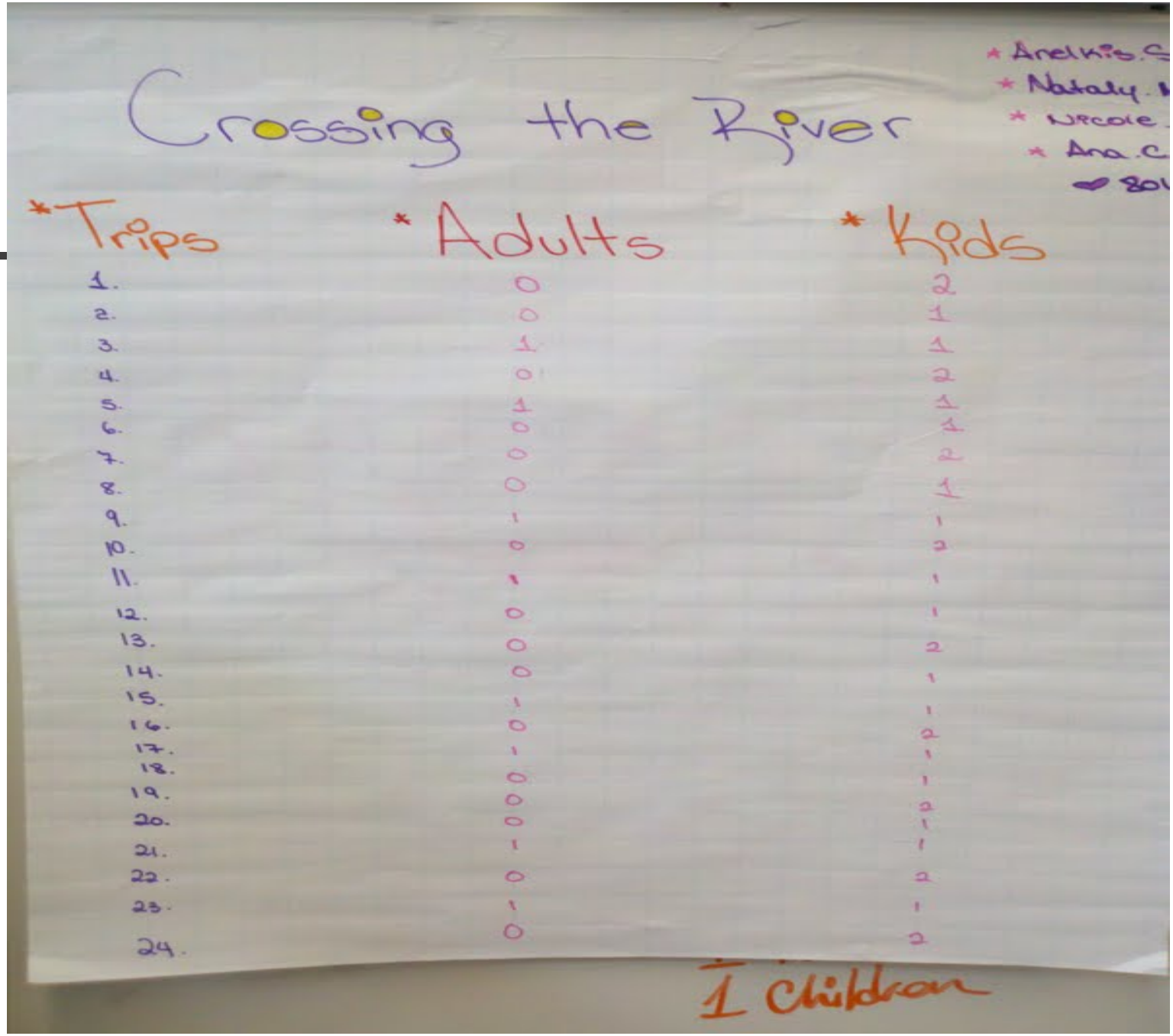
- Helping students learn **how to diagram mathematically in a way that makes sense**




1st 2 kids Leave.
2nd 1 kid come Back.
3rd Adult Leave
4th 1kid come on
5th 2kids get on
6th 1kid come Back
7th Adult get on
8th kid get on
O = Adult
□ = child
24 1kid get on
25 2 kid get on
26 1 kid get on
27 Adult get on
9th 2kid get on
10th kid get on
11th Adult get on
12th kid get on
13th 2kids get on
14th kid get on
15th Adult get on
16th kid get on
17th 2 kid get on
18 kid get on
19th get on Adult
20th 1kid get on
21 2 kid get on
22 1 kid get on
23 Adult get on
28 1kid get on
29 2 kid
30 1 kid
31 1 Adult
32 1 kid
33 2 kid
2 kids
2 Adults
=
9 trips
9 x 9 = 36
but you
take away
3 trips =
2K, 1K, 1A


Crossing The River
Key
2 Kids
1 Kid
1 Adult
1 Kid
Keep up to 31 lines.
Pattern:
Two Kids
One Kid
One Adult
One Kid
Key:
=Adults
=Kids


Crossing the River
Counting by how much the 8 Adults and the 2 children cross the river
In
Out
Pattern
Step #1
Step #2
Step number 3
The way tha the 8 adults and the 2 children could cross the river is by a pattern that is 2 children cross the river. And then 1 children stay in the other side of the river. And then the other one cross the river again. And then the children stay and then a adult cross the river. And then the children that was in the other side needs to cross the river. And then he need to go back to get the other children. And then the pattern repits it self.
By: Nicole Cruz y Dariel Ventura
COLORED PENCILS


Crossing the River
* Trips
* Adults
* kids
1. 0 2
2. 0 1
3. 1 1
4. 0 2
5. 1 1
6. 0 1
7. 0 2
8. 0 1
9. 1 1
10. 0 2
11. 1 1
12. 0 1
13. 0 2
14. 0 1
15. 1 1
16. 0 2
17. 1 1
18. 0 1
19. 0 2
20. 0 1
21. 1 1
22. 0 2
23. 1 1
24. 0 2
1 children

Crossing the River

Adults with 2 children.	Trips
2	9
3	13
4	17
5	21
6	25
7	29

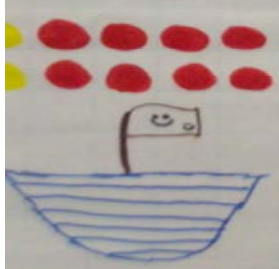
Equation

$y = 4x + 1$

Key

● = 1 adult

● = 1 kid



Academic Language Principle

- Students **connect mathematical language to mathematical symbols**
- **Prompting** students to use mathematically accurate language
- **providing** students ample **opportunity** to read, write and speak about mathematics
- **Rephrasing students everyday language** with proper mathematical language

Recommendations

- **Teacher collaboration** for planning and inter-visitations
- **Ample Time** to negotiate meaning of tasks and solutions
- **Questioning Techniques** to advance student thinking
- **Rephrasing students everyday language** with proper mathematical language