Interactive Ink Inscriptions in K-12

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INK-12: Interactive *Ink* Inscriptions in K-12

- **Technology:** set of Tablet PCs
  - *Pen-based interaction:* Draw and write to create “ink” inscriptions
  - *Wireless communication:* Share in-class work anonymously

- **Explore in science and math:**
  - *Inscriptions:* Handwritten sketches, graphs, notes, etc.,
  - *Classroom communication:* Real-time sharing of student work
  - “*Understanding*” *student expression:* To facilitate classroom discourse
INK-12: Model of Interaction

CREATE

Students create and share ink inscriptions, e.g., when working problems or entering data.

supports

Teachers communicate privately with students.

supports

INTERPRET

Freehand writing and drawing; use of structured vocabulary

Artificial intelligence interpretation and aggregation of student work

supports

SHARE

Teacher chooses student work for discussion.

Class discusses the problem displayed.
INK-12 : Research Questions

1. How do inscriptions created using pen-based technology differ from those created using pen and paper?

2. How can “structured vocabularies” enhance student inscriptions and the ability of software to interpret student work?

3. What tools can effectively support teachers in selecting student work for classroom discussion?

4. How does the use of technology for submitting and sharing student work change classroom participation structures?
INK-12: Curricular Context

• Investigations in Number, Data, and Space: K-5 mathematics

• The Inquiry Curriculum: 3-5 science focusing on the nature of matter
INK-12: Students Create Explanations

- Ink

- Audio

7. Number puzzles! For each puzzle, find an answer that matches the clues and record an explanation of how you found it.

a. This number is a multiple of 5. This number is odd. This number is greater than 50. This number is less than 70.

55
INK-12: Students Create Explanations

- Stamps

- Tiles

2. Keelin has 15 candies. She divides them among 3 bags. How many candies are in each bag?

3. Alex and Honry are washing dirty dishes. What a moo!

There are 7 stacks of plates. Each stack has 9 plates.

How many plates are there in all? 7 × 9 = 63.

Use the stamp or tiles or draw a picture to explain your answer.
INK-12: Sharing Student Work

- Students submit via wireless network
- Teacher views and selects work for display and discussion
INK-12: Interpretation for “Smart” Sorting of Work

Graphs

A plant grew slowly for 2 or 3 days, then grew quickly for 2 or 3 days. After this fast growth, it slowed down. In a few days it stopped growing. It had reached its full height.

5. Mrs. Nichols is making 8 flower bouquets for a friend’s party. Each bouquet has 6 flowers in it. How many flowers does Mrs. Nichols need?
   
   a. Create a picture that explains your reasoning.

   b. Write a number sentence and circle the number that is the answer to the question.

   \[6 \times 8 = 48\text{ flowers in all}\]
INK-12: Interpretation for “Smart” Sorting

Handwriting

\[ 8 \times 6 = 48 \]

\[ 6 \times 8 = 48 \text{ flowers in all} \]

\[ 8 \times 6 = 48 \]

\[ 6 \times 8 = 48 \]

Shading

\[
\begin{array}{c}
\text{blue shading} \\
\begin{array}{c}
\text{grid shading} \\
\text{random shading}
\end{array}
\end{array}
\]
INK-12: Technology for Expressing and Sharing Meaning

- Continuing to work with fourth and fifth grade teachers and students
- Working on professional development for supporting classroom conversation
- “Dynamic” representations to express reasoning

When a number is subtracted from one addend and added to the other addend the sum is the same.