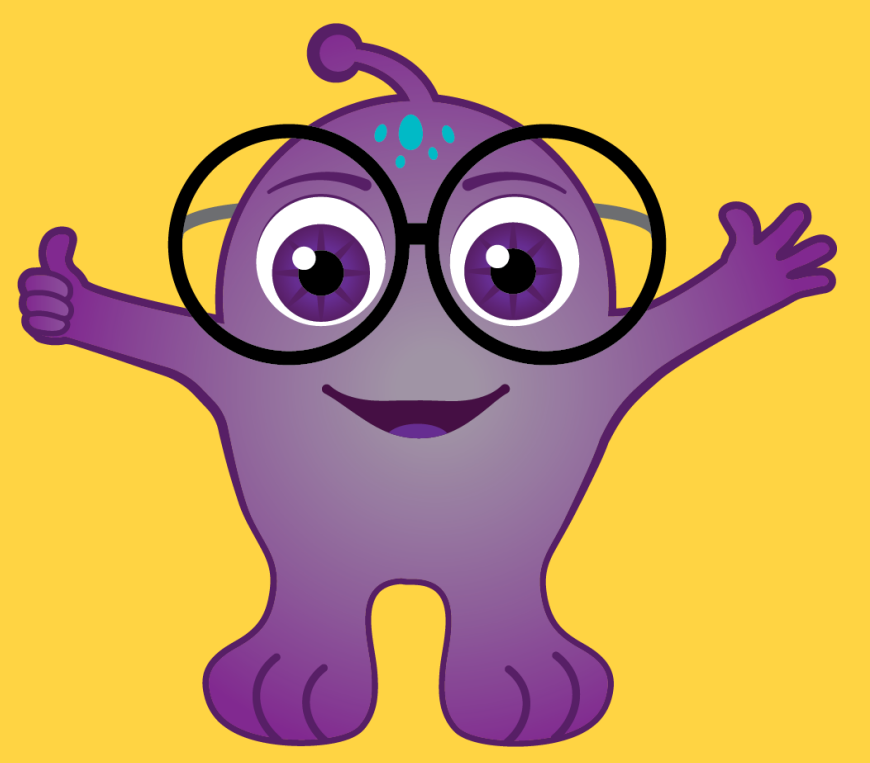# Meet ELCII and TeLCI: Personalized, Fully Automated Inference Making Training in K-2

## Panayiota Kendeou, Kristen McMaster & The ELCII and TeLCI Teams

## Background

Approximately **31% of 4th graders read below a basic proficiency level** (NAEP, 2017)—they fail to make simple inferences and understand the overall meaning of texts.

**Inference making is a unique, significant *predictor of reading comprehension,*** with a possible causal link from poor inferencing to poor reading comprehension (Oakhill & Cain, 2012).
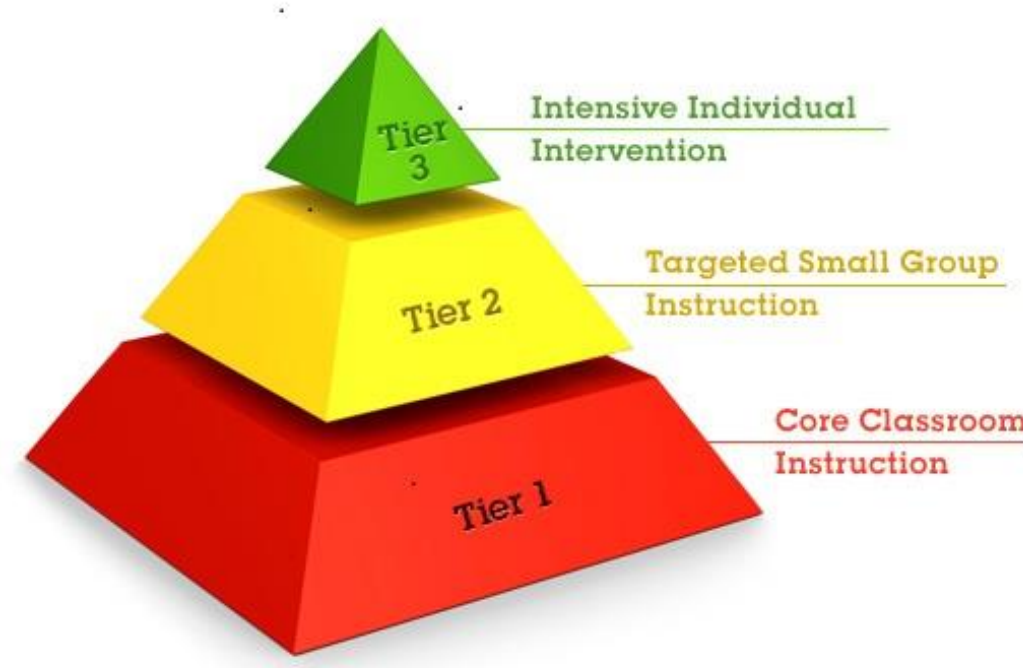


**The ability to draw inferences is a *general skill*—** it is not specific to reading (Kendeou et al, 2008; Kendeou, 2015).

Inference skills can be improved using **questioning that includes scaffolding and specific feedback** (McMaster et al., 2012).

## Method

TeLCI and ELCII are interactive, cloud-based applications, consisting of 24 learning modules that **teach inferencing in a non-reading context** through the use of age-appropriate **fiction** and **nonfiction videos.**

Students respond to each of five questions, in either an online or offline condition. If a student selects the **incorrect answer**, they **receive scaffolding** to support the creation of the inference and are **provided with another attempt to answer.**

### Measures
- Assessment modules
- Intervention modules
- CELF 5 Understanding Spoken Paragraphs
- Minnesota Executive Function Scale
- aReading (ELCII only)

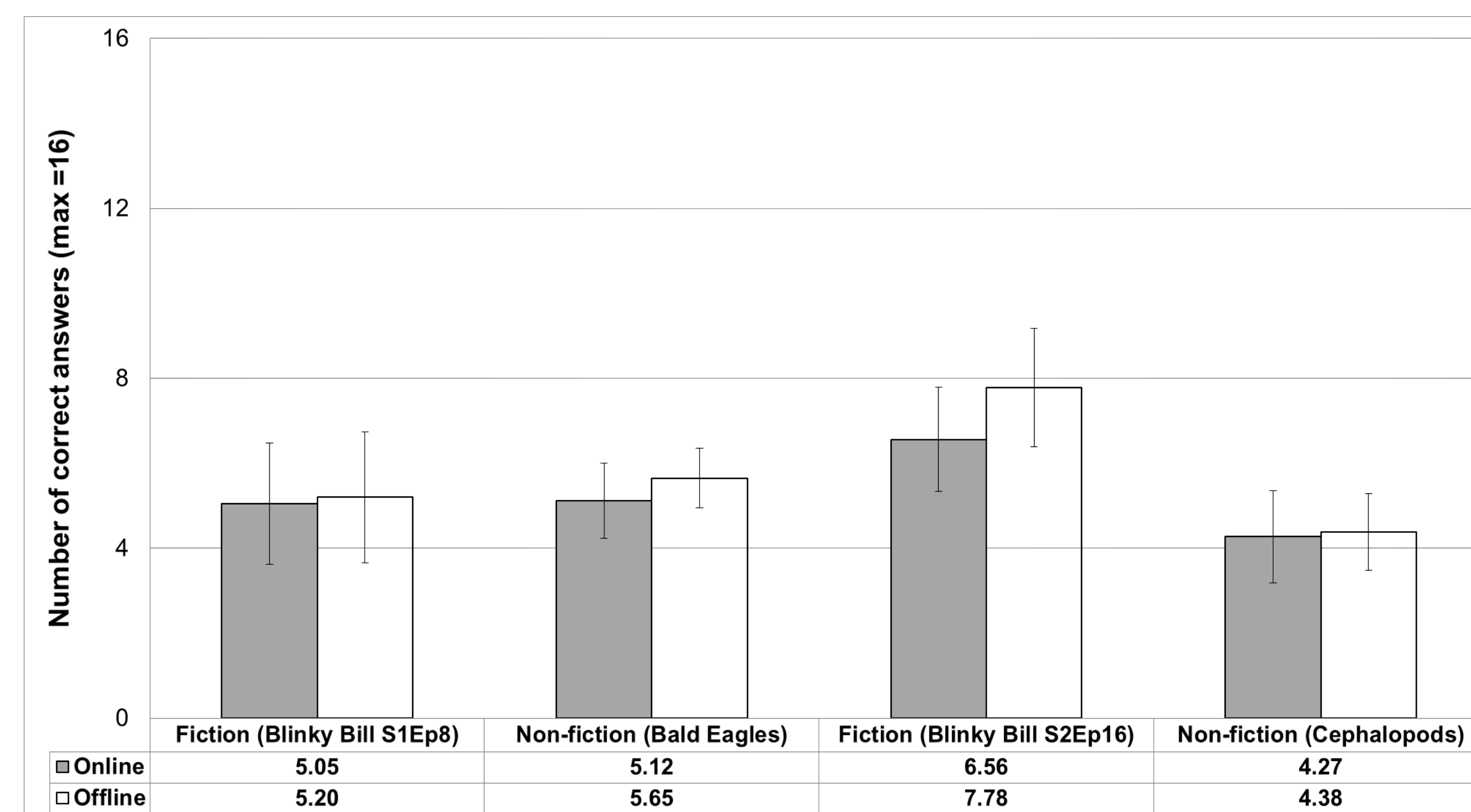## ELCII — Year 1

Designed **as a Tier 1** to improve reading comprehension by developing **inference making** for **all students** in **Kindergarten.**

### Participants

67 kindergartners completed screening measures, 4 assessment modules, and 4 ELCII intervention modules.

We explored initial feasibility and relations between **inference making skills and other language and cognitive abilities.**

### Results – Year 1



| | Fiction (Blinky Bill S1Ep8) | Non-fiction (Bald Eagles) | Fiction (Blinky Bill S2Ep16) | Non-fiction (Cephalopods) |
|---|---|---|---|---|
| Online | 5.05 | 5.12 | 6.56 | 4.27 |
| Offline | 5.20 | 5.65 | 7.78 | 4.38 |

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 1. ELCII | | 0.270 | 0.227 | 0.175 | 0.072 | 0.047 | 0.170 | 0.316 |
| 2. CELF | | | 0.461 | 0.459 | 0.381 | 0.366 | 0.241 | 0.411 |
| 3. MEFS | | | | 0.383 | 0.282 | 0.447 | -0.029 | 0.227 |
| 4. ERECS | | | | | 0.920 | 0.793 | 0.074 | 0.813 |
| 5. LSWRCM | | | | | | 0.667 | 0.051 | 0.728 |
| 6. NWRCM | | | | | | | 0.091 | 0.484 |
| 7. OSICM | | | | | | | | 0.049 |
| 8. WSICM | | | | | | | | |
| *M* | -1.02 | 8.24 | 101.13 | 44.16 | 19.27 | 4.82 | 22.83 | 14.38 |
| *SD* | 0.85 | 3.48 | 11.96 | 8.30 | 13.03 | 5.27 | 110.94 | 14.41 |

*Note.* ELCII = Early Language Comprehension Individualized Instruction assessment modules (two fiction, two no-fiction, and two linking modules) theta scores; CELF = Clinical Evaluation of Language Fundamentals (CELF) scales score in the understanding spoken paragraph subtest; MEFS = Minnesota Executive Function Scale (MEFS) standardized score; ERECS = Early Reading English Composite Score; LSWRCM = Letter Sounds Words Read Correct per Minute; NWRCM = Nonsense Words Read Correct per Minute; OSICM = Onset Sounds Items Correct per Minute; WSICM = Word Segmenting Items Correct per Minute; All black colored values were significant ($p < .05$). The gray colored values were not significant

## TeLCI — Year 2

Designed as a **Tier 2 intervention**, TeLCI aims to reading comprehension by training of **inference making** in struggling readers in Grades 1&2

### Participants

61 first graders identified as struggling comprehenders completed three TeLCI modules (both fiction and nonfiction) each week for 8 weeks.

Students were randomly assigned to the online (questioning during) or offline (questioning after) condition.

### Results – Year 2



| | T1[Week2-3] | T2[Week4-5] | T3[Week6-7] | T4[Week8-9] |
|---|---|---|---|---|
| TeLCI | 56.34 | 55.63 | 62.95 | 65.25 |



d = .76
d = .58

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