

Collaborative-Computing Observation Instrument (C-COI)

<http://ccoi.education.illinois.edu>

Collaborative Computing Observation Instrument

GET STARTED

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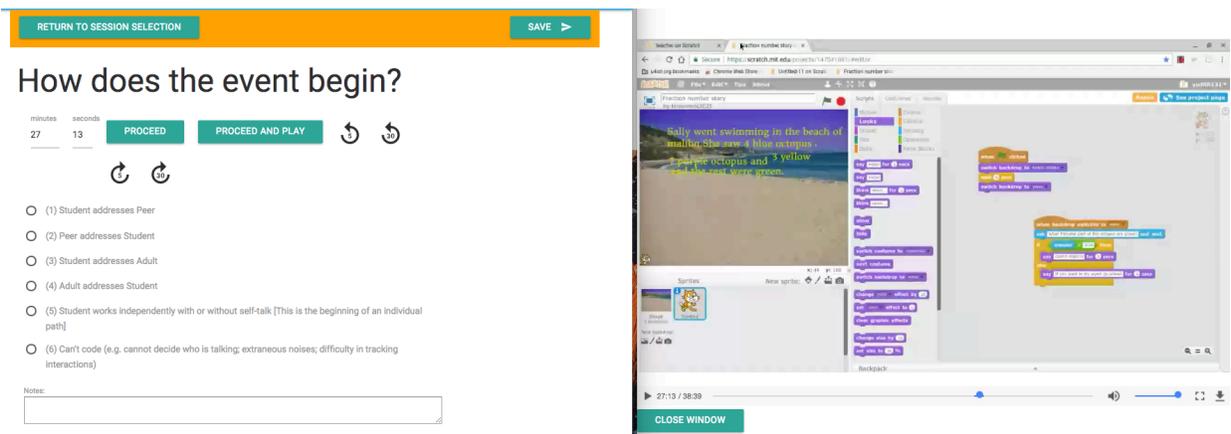
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The C-COI is an observation instrument used in conjunction with video screen capture software. It allows researchers to observe videos of students' the computer screens and listen to their conversations as they engage in computer programming. With the C-COI, researchers can analyze areas such as time on task, students' collaborative problem solving, social behaviors, persistence, and help seeking behaviors.

The C-COI works in conjunction with the video screen recording.

Screen Capture of the C-COI



As the video of the student engaging in a computing activity plays, the researcher can code the video. Once a code is entered, the video automatically stops, records the time stamp, and allows the researcher to either:

- Proceed: Continue coding without playing the video
- Proceed and Play: Start the video again and continue coding
- Rewind or fast-forward either 5 seconds or 10 seconds

All code fields include an option for taking field notes.

This instrument is intended to code one student at a time. The codes all relate to that one student. For example, if another student interacts with the student, that student is coded as “Peer”.

Data reveals four primary C-COI coding scenarios/paths:

- Independent work: Student works either strategically or non-strategically on a problem without support or interaction with peers or adults.
- Problem solving: Student works with a peer (either receiving help or giving help) on a computing-related project.
- Computing-based conversations: Most of these conversations involve students describing their computing projects, expressing curiosity or amazement about their peers’ projects, or expressing pride in their own projects.
- Socialization: These conversations do not relate to the computing task (e.g., plans for the weekend).

Example Data Transcript

Time Interval	Sub-node	C-COI Subnode Description	Field Notes
Begins 4:12		Student works independently (This is the beginning of an interactive path).	
	0-A	Student verbally addresses a peer or adult	Student says, “[Peer 2]”
	1-B	Student expresses need for help but is not explicit to the problem/topic	“Can you help me?”
	3A	Problem/topic is related to computing/programming	Student had a problem with writing a code that moves the Sprite to a designated location
	4	Peer and student interact	Peer responds, “Yup.”
	4-A	Peer and student discuss the problem/difficulty	Peer asks, “What have you tried already?” Student responds, “I’m tried going ‘right, forward, left.”” Peer responds, “Try ‘right, right, left.””
	5-A	Problem was not solved	Student tried the suggestion but was unsuccessful.
	11-B	Student continued working independently on the same problem or topic (path continues)	Student is persisting on solving the problem
	0-A	Student verbally addresses a peer or adult	Student says, “[Peer 4]”
	1-A	Student clearly expresses how he/she needs help with a problem/topic	Student says, “Help me move the bird to the treasure”

Ends 10:52	3-A	Problem/topic is related to computing/ programming Peer and student interact	Student had problem with moving the sprite to a location Peer responds “What have you tried already?” Student responds, “I have tried ‘right, right, left.’”
	4-C	Peer recites all steps of the solution	Peer says, “But I think you should try right, up, up, left.”
	5-B	Problem was solved	The student applies suggestion and the problem was solved.
	11-C	Student begins working independently on a different problem or topic	[Student begins to work on a new problem/topic]

Data Output:

Paths

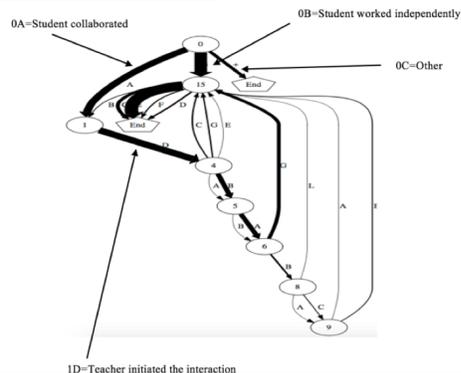
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Path #1

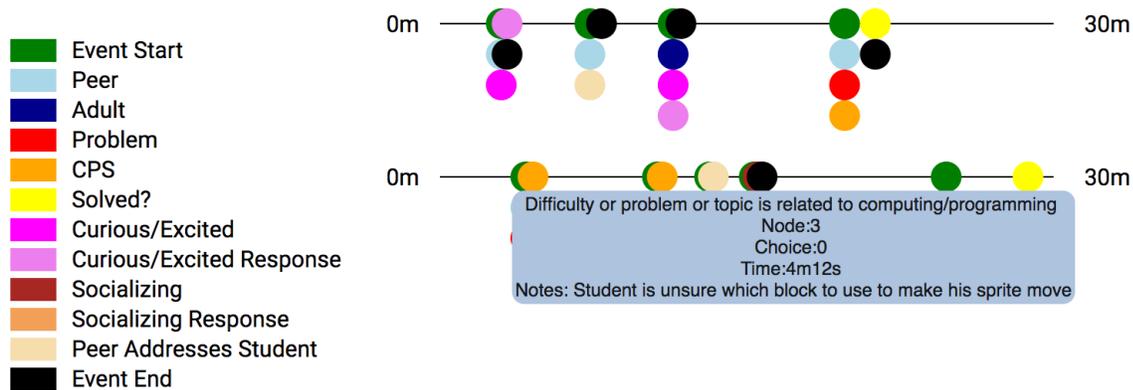
1. (4:12) 0-1: Student addresses Peer "2"
2. (4:12) 1-2: Student expresses a need for help, but is not explicit to the difficulty or problem
3. (4:12) 3-1: Difficulty or problem or topic is related to computing/programming
4. (4:33) 4-1: Peer and student discuss the difficulty or problem
5. (4:33) 5-1: Problem was not solved
6. (4:33) 11-2: After interacting or attempting to interact, problem was not solved, the student continues working independently on the same problem or topic [Interaction path]
7. (10:38) 0-1: Student addresses Peer "4"
8. (10:38) 1-1: Student clearly expresses how he or she needs help with a difficulty or problem
9. (10:38) 3-1: Difficulty or problem or topic is related to computing/programming
10. (10:52) 4-3: Peer recites all steps of the solution at once (e.g., Peer does not give the student the chance to talk)
11. (10:52) 5-2: Problem was solved
12. (10:52) 11-3: After interacting, problem was solved and student begins working independently on a new problem or topic [Interaction Path]—END

Data Visualization: (Under Development)

Directed graphs



Time-line visualizations



References:

- Israel, M., Shehab, S., Wherfel, Q., Melvin, O., & Lash, T. (2017). Describing elementary students' interactions in K-5 puzzle-based computer science environments using the Collaborative Computing Observation Instrument (C-COI). In *Proceedings of the 2017 ACM Conference on International Computing Education Research* (pp. 110-117). ACM.
- Israel, M., Wherfel, Q., Shehab, S., Ramos, E., Metzger, A., & Reese, G. (2016). Assessing collaborative computing: Development of the Collaborative-Computing Observation Instrument (C-COI). *Computer Science Education*, 26(2-3), 208-233.
- Israel, M., Melvin, O., Wherfel, Q. M., Lash, T., Heeren, C., & Shehab, S. (2017). Updated Collaborative Computing Observation Instrument (C-COI 2nd Ed.). Board of Trustees of the University of Illinois at Urbana-Champaign. <http://ccoi.education.illinois.edu>.