Where are We? Understanding and Improving how Children "Translate" from a Map to the Represented Space and Vice Versa

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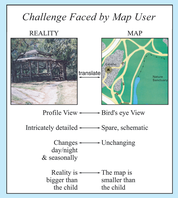
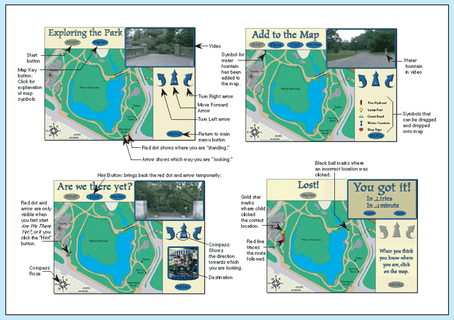
What does *Where Are We?* try to accomplish?

Where Are We? aims to help elementary school children master the skill of "translating" between a portion of the real world and a spatial representation of that same terrain by setting up circumstances in which students must repeatedly make connections between a park map and a video filmed in the park.



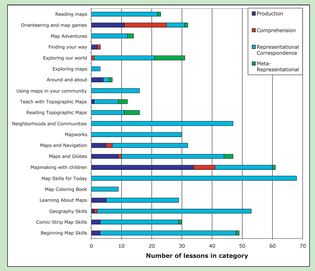


The *Where Are We?* software and curriculum are available from Tom Snyder Productions:

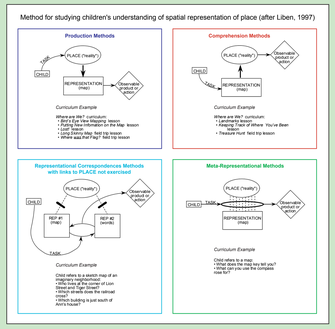
http://www.tomsnyder.com

Why was a new curriculum approach needed?

Our curriculum analysis shows that most map skills curriculum materials do not require students to think about the real world; the tasks can be completed entirely within the frame of reference of the representation, i.e. the map.

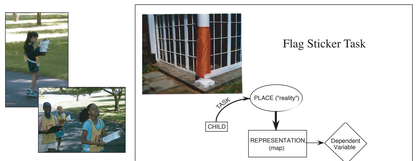


These types of representational correspondence tasks are useful, but not sufficient for students to learn to use maps for real world tasks.

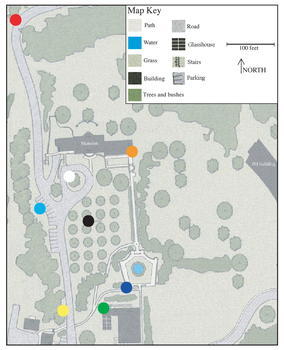


Where does the difficulty lie in using a map in the real world?

To explore why some people have difficulty with maps, we developed a field-based map skills assessment:



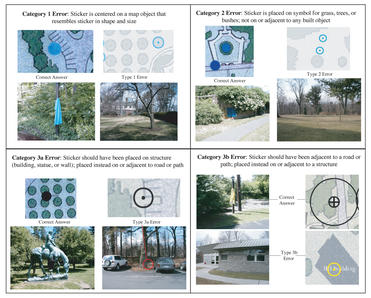
We placed eight colored flags around campus and gave each student a paper map and eight colored stickers. The student's task was to place each sticker on the map to show where the corresponding-colored flag was located in the real world.



Types of errors fourth-graders make on the Flag-Sticker Task:

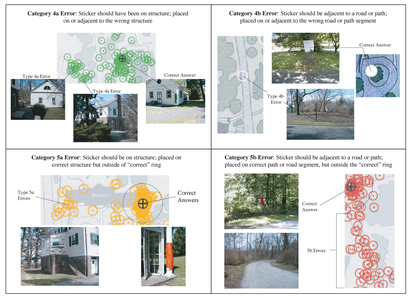
Representational Correspondence Errors:

We interpret these error types to indicate that the student has not fully understood the basic correspondence between symbols on the map and the categories of objects which the symbols are representing.



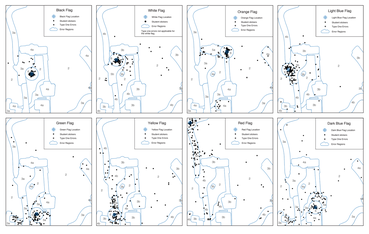
Configurational Correspondence Errors:

We interpret these error types to indicate that the student has understood the representational correspondence between symbols on the map and categories of object, but they have not successfully used the configuration of the features on the map to disambiguate between multiple occurrences of the same symbol on the map or to pinpoint the correct location within a large map symbol.



Experiment 1: *Baseline*

Task: Students do the flag-sticker task without instruction or scaffolding.

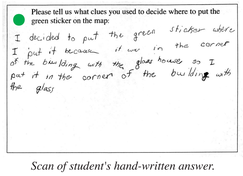


Results: Although some children do very well on this task, misplaced stickers are common. Both representational correspondence and configurational correspondence errors (error types 4, 5, and 6) are seen.

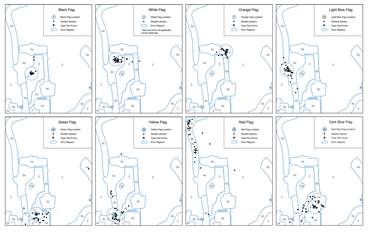
Experiment 2: *Reflecting*

Goal: To glimpse the puzzling thought processes of students who make the most wrong sticker placements.

Task: Same as Baseline; however, students also write down "what clues you used to decide where to place the sticker."



Scan of student's hand-written answer.



Result A, Sticker placement: Reflecting students did much better on sticker placement than the baseline students. In particular, representational correspondence errors became much less common.

Interpretation: The requirement to reflect upon and articulate one's thought processes (meta cognition) by itself, in the absence of instruction or feedback, improved students' performance.

Result B, Clue answers:

Did the clue answer invoke at least one landmark present both on the map and in the real world?

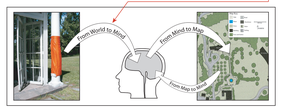
Category	*Definition*	*Examples and Notes*	*Number of clue-answers*
Viable Landmark for this map	The student's answer mentions at least one physical object that exists in the real world and is shown on the map.	• (black) "I went to the **statue** and I saw the black flag." • (red) "went to **curve in road** • (white) "near the **mansion**" • (white) "First I tried to find the **piece of land that looked like an island.**" • (dark blue) "I used the **pentagon around t he pond** to decide."	178
Non-viable landmark(s) for this map	The student's answer mentions one or more physical objects that exist in the real world but none of the mentioned-objects is shown on the map.	• (yellow) *"Yellow buses"* • (dark blue) "next to *a wall of flowers*" • (light blue) "What do you use when the light is not out a *light post*" • (green) "I walked straight past the blue flag and saw the *green flag*."	44
No Landmark	The student's answer mentions no physical objects (other than the flag itself).	• "I just saw it" • "I walked and spotted it" • "when I got there I traced back my steps" • "I looked around and I found it" • "I saw the green flag when I came in" • "It said map skills marker on it"	41
No answer	No answer, or answer was illegible or incomprehensible	• "When I was walking I saw a green and black thing and there was a black flag but it was almost camouflaged."	17

Note: **Boldface** marks words for physical objects that occur both in the real world and on the map. *Italic* marks words for physical objects that occur in the real world but not on the map.

Students clue-answers may be

* inaccurate descriptions of the environment (rare),
* accurate, but irrelevant to the task because they mention objects that are in the real world but not on the map (common),
* accurate and relevant, but insufficient for the task at hand (very common).

Interpretation: The step of environmental perception, extracting necessary and sufficient information from the visually complex environment to complete the map task, presents substantial difficulty.



Experiment 3: *Verbal Description*

Goal: To assess the difficulty of the mind-to-map part of the sticker placement task, on a task where environmental perception is not needed.

Task: Students placed stickers on map after seeing and hearing a verbal description of sticker location (description was still in view as they placed sticker).

Verbal Descriptions of Sticker Locations used in Experiment 3

BLACK STICKER
• The bl ack sticker is on the statue.

ORANGE STICKER
• The o range sticker is on a corner of the mansion.
• It's on the corner closest to the path that leads to the pond.

RED STICKER
• The re d sticker is along the main road.
• It is far away from any buildings.
• It is at a place where the road makes a sharp bend.

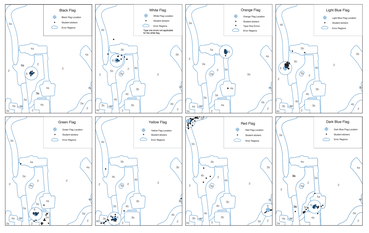
DARK BLUE STICKER
• The da rk blue sticker is near the pond.
• There is a path that goes all the way around the pond, and the sticker is at a corner of that path.
• It is at the corner closest to the glasshouse.

WHITE STICKER
• The w hite sticker is near the mansion.
• It is on a tree in the center of the circular driveway in front of the mansion.

YELLOW STICKER
• The ye llow sticker is alongside the main road.
• It is near where a small path intersects the main road.
• It is on the same side of the road as two small buildings.

GREEN STICKER
• The g reen sticker is on the building with the glasshouse.
• It is on a corner of the building, close to an intersection in the path.

LIGHT BLUE STICKER
• The li ght blue sticker is on the parking lot.
• It is at the end of the parking lot that is closest to the mansion.



Results: The verbal description group did better than either the baseline group or the reflecting group.

Interpretation A: Understanding the map per se, is not presenting serious difficulties. When they are givin information which is exactly sufficient, rather than having to extract relevant information from a visually complex environment, most children can place the stickers accurately.

Interpretation B: Mastery of verbal-map representational correspondence curriculum tasks does not imply that a student will be able to use a map in the real world.

Curriculum Examples.