Idea Garden: Situated Support for Problem Solving by End-User Programmers

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Idea Garden: Motivation

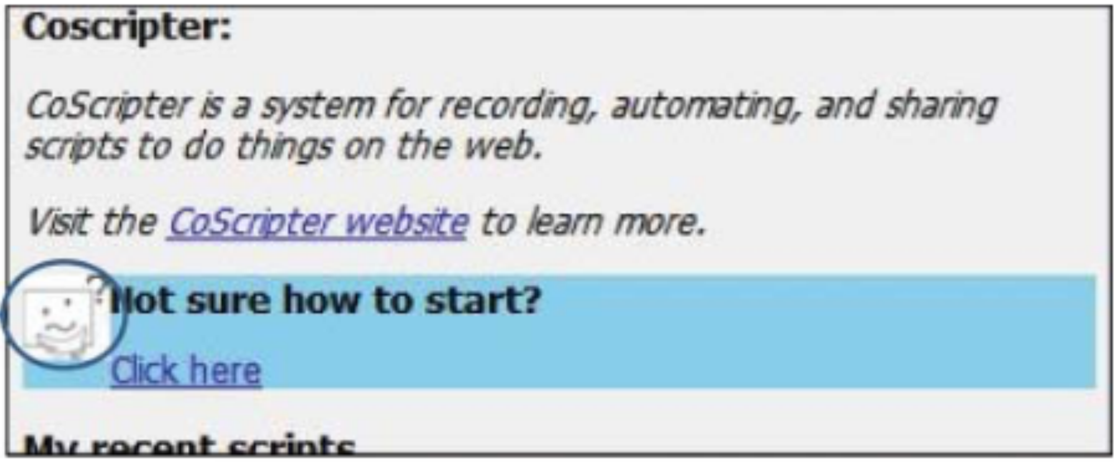
- Offer end-user (and novice) developers specific advice that steers users towards learning to solve programming problems themselves
    - Identify specific barriers novices experience in a specific programming environment
    - Scaffold problem-solving strategies in context of real tasks
    - Offer users the *option* to look at specific advice on how to overcome barriers

Barriers in mashup programming

- Problem solving strategies
  - Low metacognition reduced flexibility, not thinking about problem solving process & how to make progress
- Programming knowledge
  - Creating loops
  - Understanding how to use APIs
  - Understanding how to get started
  - Going down the wrong path

Idea Garden Interactions

Gardening Consultant



Coscripter:

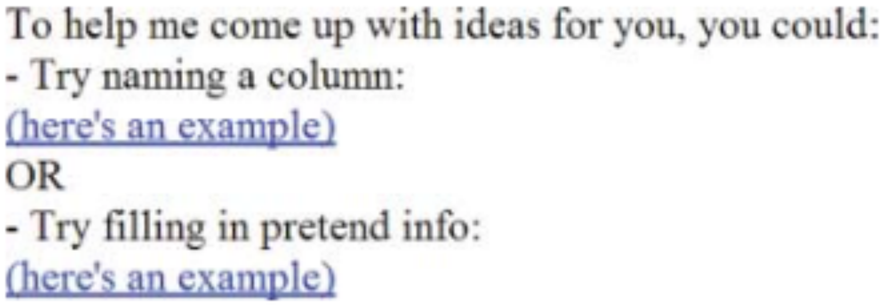
CoScripter is a system for recording, automating, and sharing scripts to do things on the web.

Visit the CoScripter website to learn more.

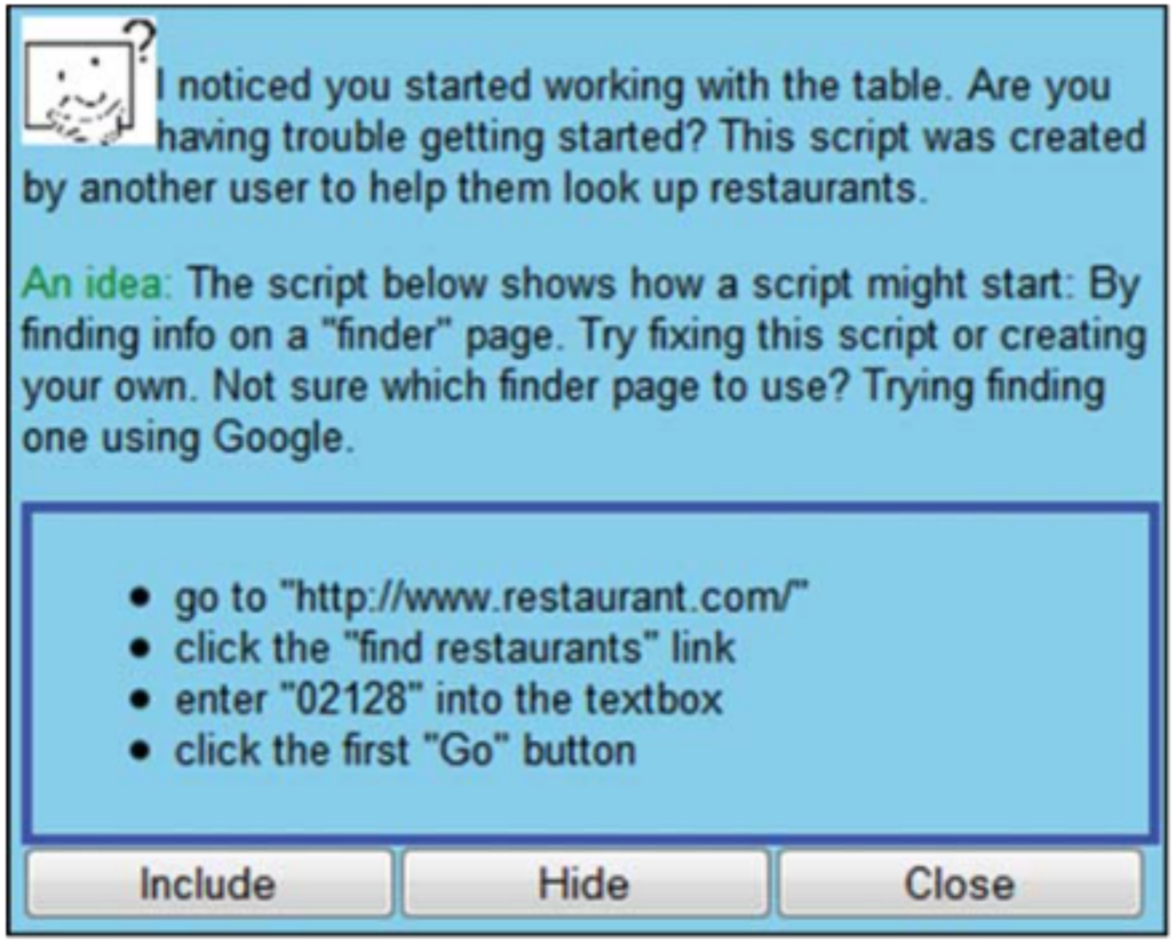
Not sure how to start?

Click here

My recent scripts



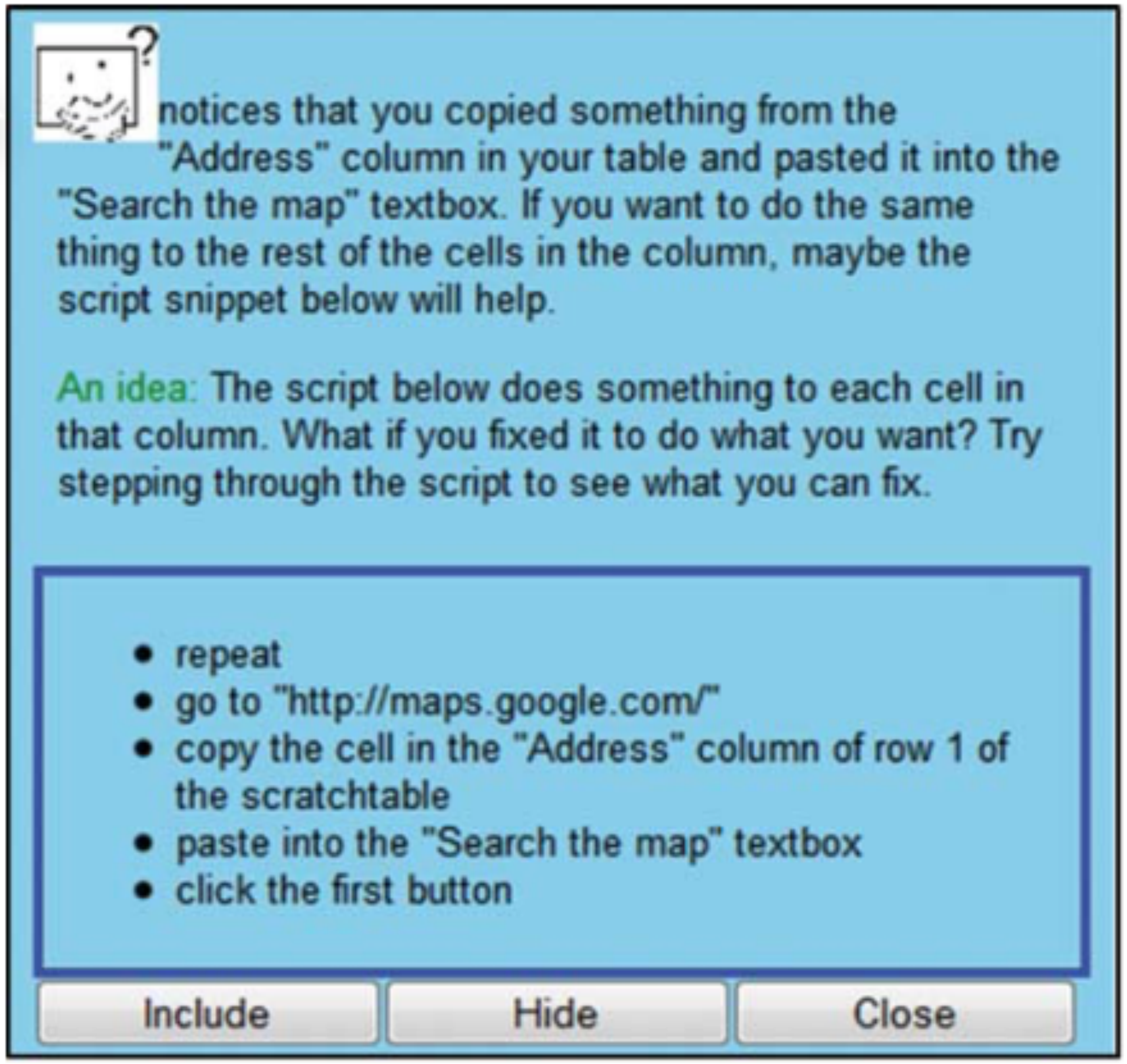
To help me come up with ideas for you, you could:
- Try naming a column:
(here's an example)
OR
- Try filling in pretend info:
(here's an example)



I noticed you started working with the table. Are you having trouble getting started? This script was created by another user to help them look up restaurants.

An idea: The script below shows how a script might start: By finding info on a "finder" page. Try fixing this script or creating your own. Not sure which finder page to use? Trying finding one using Google.

- go to "http://www.restaurant.com/"
- click the "find restaurants" link
- enter "02128" into the textbox
- click the first "Go" button

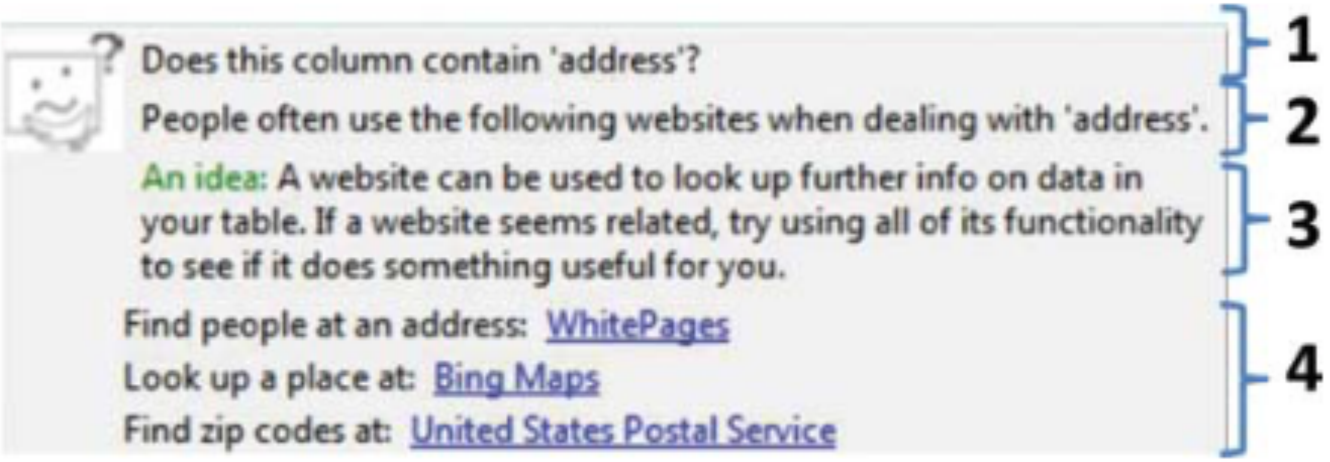


notices that you copied something from the "Address" column in your table and pasted it into the "Search the map" textbox. If you want to do the same thing to the rest of the cells in the column, maybe the script snippet below will help.

An idea: The script below does something to each cell in that column. What if you fixed it to do what you want? Try stepping through the script to see what you can fix.

- repeat
- go to "http://maps.google.com/"
- copy the cell in the "Address" column of row 1 of the scratchtable
- paste into the "Search the map" textbox
- click the first button

Generating suggestions



Does this column contain 'address'?

People often use the following websites when dealing with 'address'.

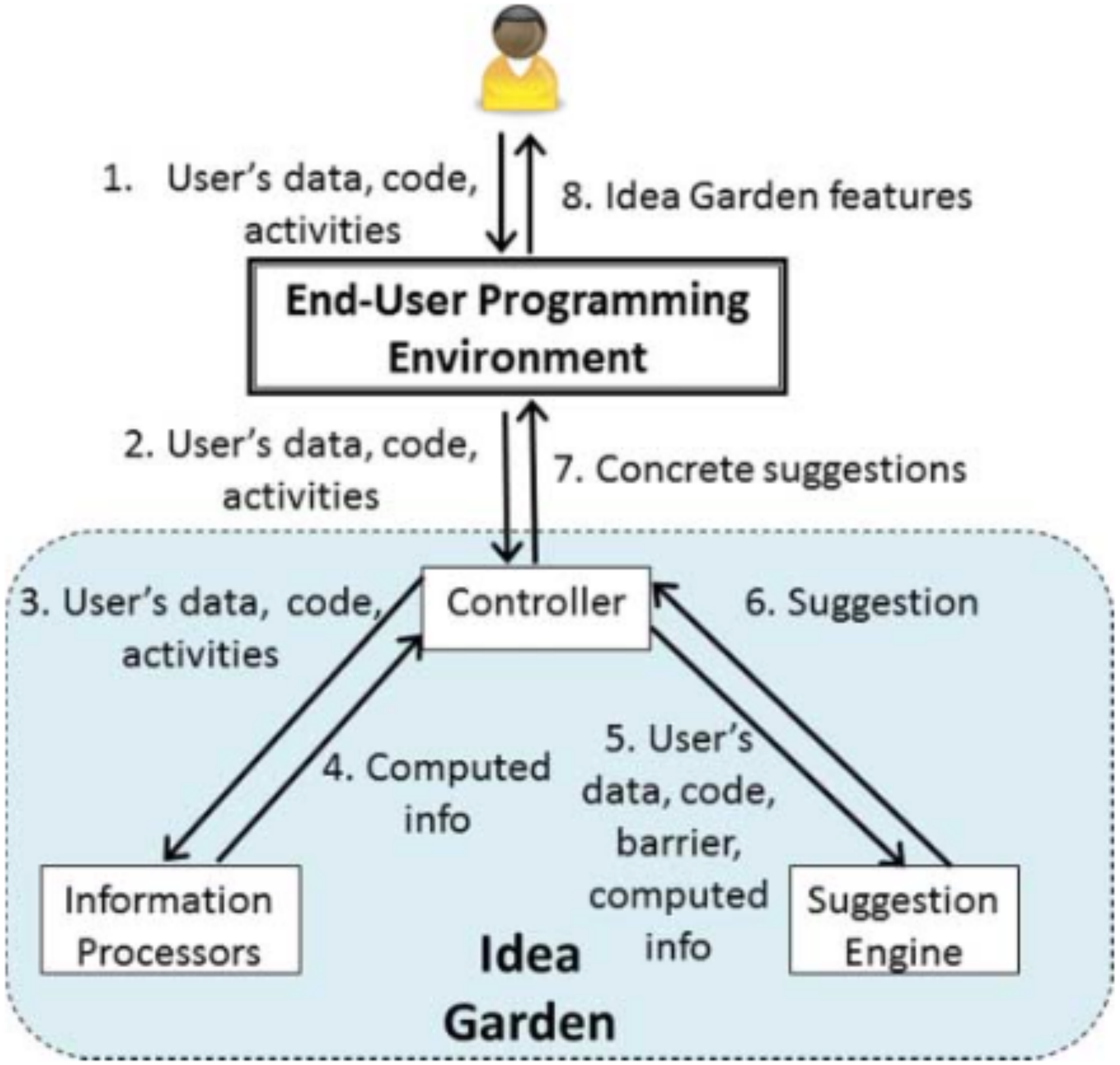
An idea: A website can be used to look up further info on data in your table. If a website seems related, try using all of its functionality to see if it does something useful for you.

Find people at an address: WhitePages

Look up a place at: Bing Maps

Find zip codes at: United States Postal Service

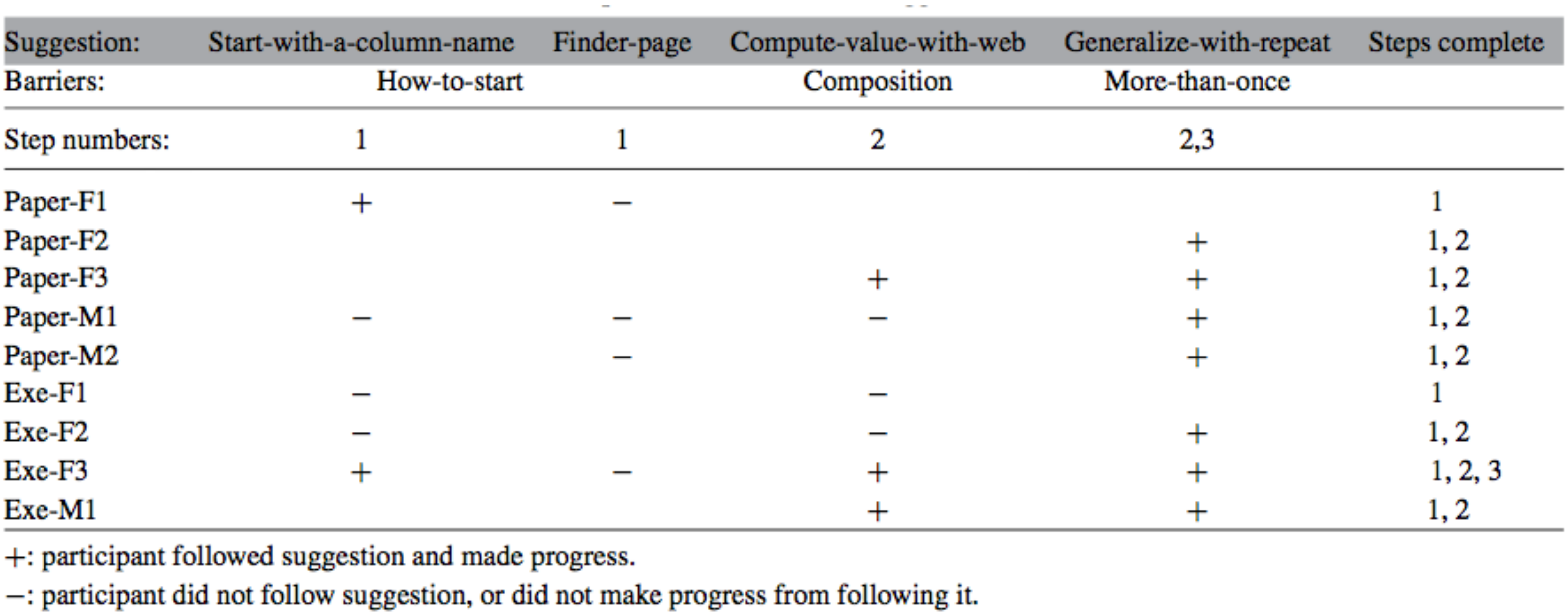
Figure 8. Suggestion structure. (1) The Gardening Consultant 'wonders' about context and (2) comments on this context to provide rationale for concrete examples in 4. (3) The Gardening Consultant summarizes the gist/essence of the idea and (4) suggests concrete examples as action items. (Start-with-a-column-name (Fig. 4) does not include 1 and 2 because the user has already told the system their context by the time he/she invokes this suggestion.)



1. User's data, code, activities
8. Idea Garden features
End-User Programming Environment
2. User's data, code, activities
7. Concrete suggestions
3. User's data, code, activities
Controller
6. Suggestion
4. Computed info
5. User's data, code, barrier, computed info
Information Processors
Suggestion Engine
Idea Garden

Lab Study

- 9 undergrads that worked to write script for finding specific 2 bedroom apartments



Suggestion:	Start-with-a-column-name	Finder-page	Compute-value-with-web	Generalize-with-repeat	Steps complete
Barriers:	How-to-start		Composition	More-than-once	
Step numbers:	1	1	2	2,3	
Paper-F1	+	−			1
Paper-F2				+	1, 2
Paper-F3			+	+	1, 2
Paper-M1	−	−	−	+	1, 2
Paper-M2		−		+	1, 2
Exe-F1	−		−		1
Exe-F2	−		−	+	1, 2
Exe-F3	+	−	+	+	1, 2, 3
Exe-M1			+	+	1, 2

+: participant followed suggestion and made progress.

−: participant did not follow suggestion, or did not make progress from following it.

Design recommendations

- Use context to support multiple user approaches
  - Users sometimes had wrong *frame* for a problem, leading them to ignore suggestions
- Understand attention investment
  - Make it as clear as possible how suggestion is relevant to current context
- Make clear that concrete examples should not be used as is and are only examples
  - Suggestions that were not quite what users were looking for were ignored rather than generalized

Questions for discussion

- Overall reaction to the paper
- Are you convinced that that Idea Garden provides better learning experience over traditional tutorial content?
    - Or Codecademy style tutorials?
- Could a similar approach help professional developers?
    - e.g., learning an API