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

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Summary by Prof. Thomas LaToza
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Software Engineering Environments
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

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

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

**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.)
Lab Study

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

<table>
<thead>
<tr>
<th>Suggestion:</th>
<th>Start-with-a-column-name</th>
<th>Finder-page</th>
<th>Compute-value-with-web</th>
<th>Generalize-with-repeat</th>
<th>Steps complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barriers:</td>
<td>How-to-start</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step numbers:</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2,3</td>
<td></td>
</tr>
<tr>
<td>Paper-F1</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Paper-F2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1, 2</td>
</tr>
<tr>
<td>Paper-F3</td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td>1, 2</td>
</tr>
<tr>
<td>Paper-M1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>1, 2</td>
</tr>
<tr>
<td>Paper-M2</td>
<td></td>
<td>-</td>
<td></td>
<td>+</td>
<td>1, 2</td>
</tr>
<tr>
<td>Exec-F1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Exec-F2</td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td>1, 2</td>
</tr>
<tr>
<td>Exec-F3</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td></td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Exec-M1</td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td>1, 2</td>
</tr>
</tbody>
</table>

+: 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 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