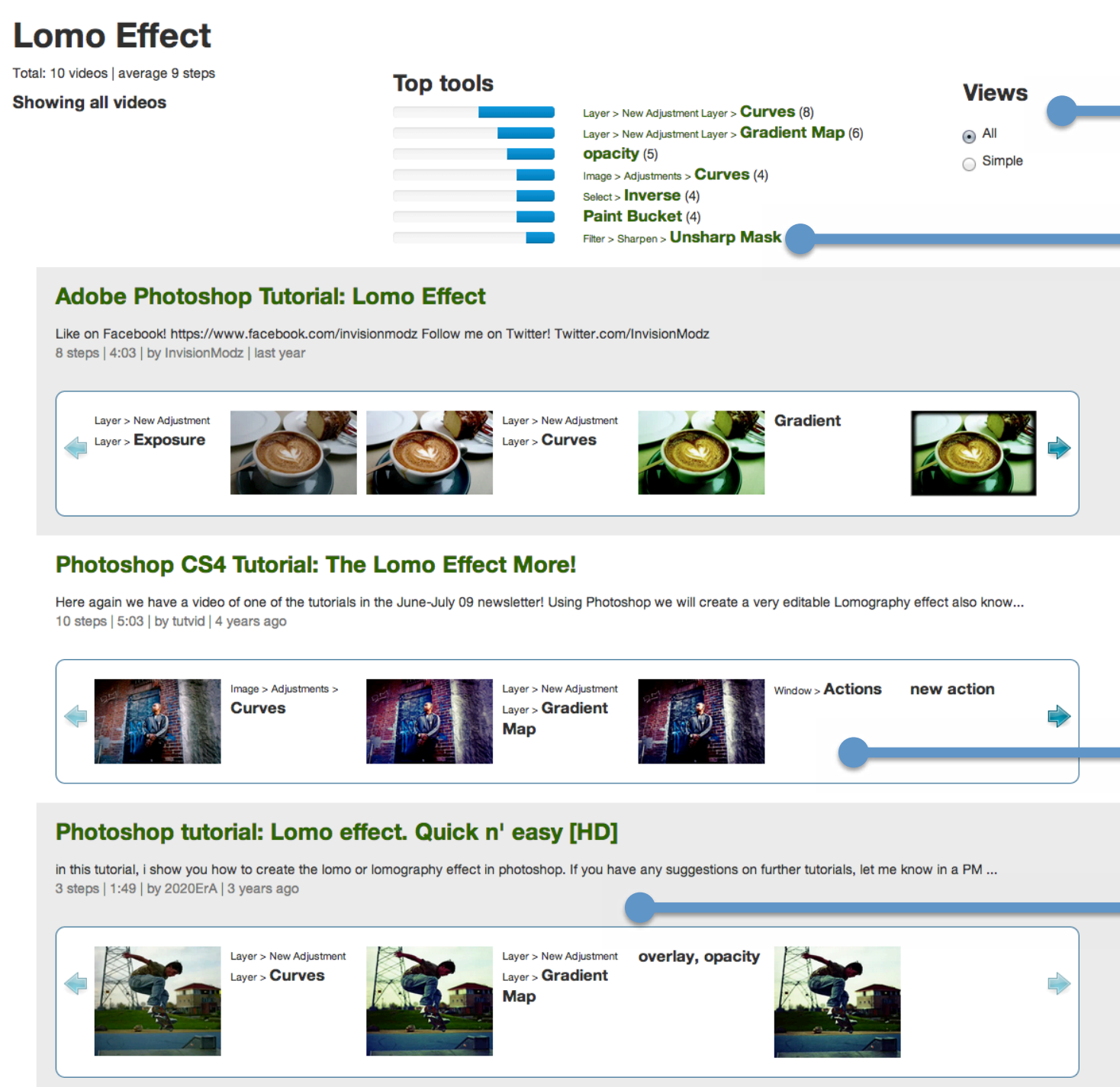# User Interfaces and Crowdsourcing Workflows for
Enhancing the Video Learning Experience

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ToolScape: Interactive browsing and watching

Storyboard summarization: actions and work-in-progress

Two view modes:
All reveals the Storyboard, while **Simple** opens only before and after images.

Top tools show most frequently used tools in videos covering the currently searched effect. **Faceted navigation** presents only workflows that include selected tools.

Storyboard lists each step in the workflow (image) and a means to reach a step from the previous one (command).
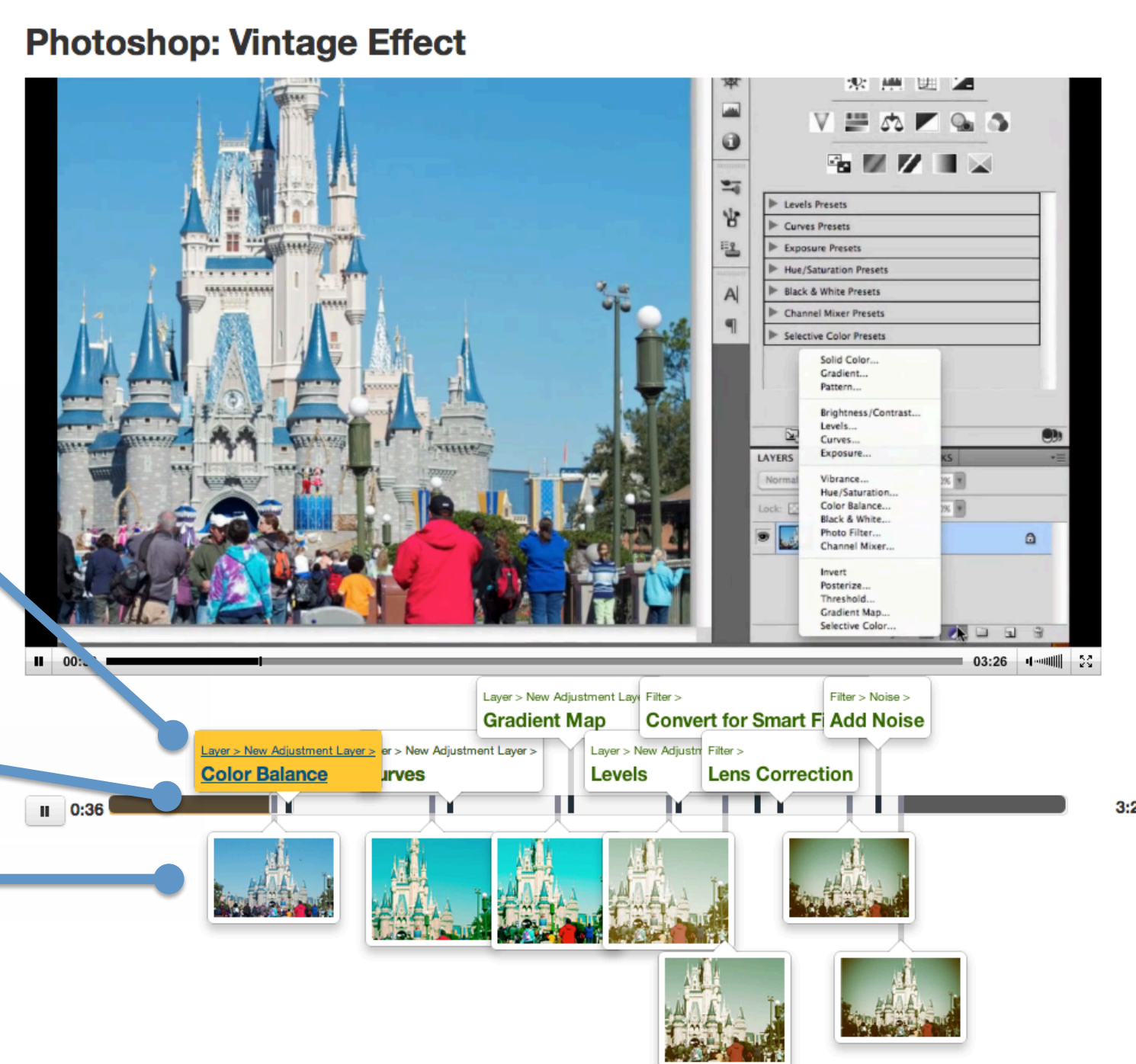
The number of steps is calculated from the workflow and displayed to hint at the difficulty level of the video.

Interactive timeline: stepwise repeat / skip / jump

Each step in the workflow is marked on an interactive timeline to allow per-step navigation.

Parts of video with no visual progress are grayed out to allow skipping to the main content.

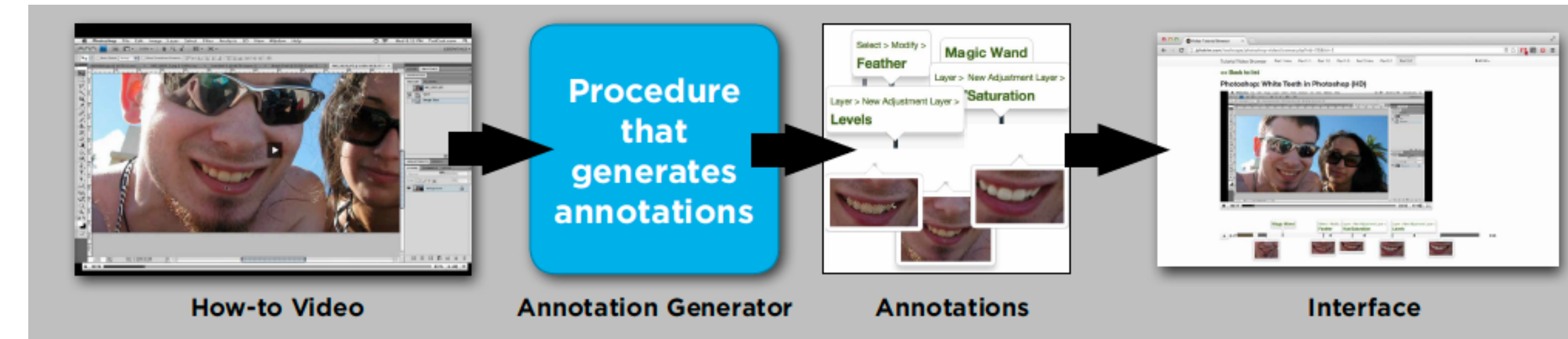Images in progress allow visual comparisons between intermediate steps in the workflow.

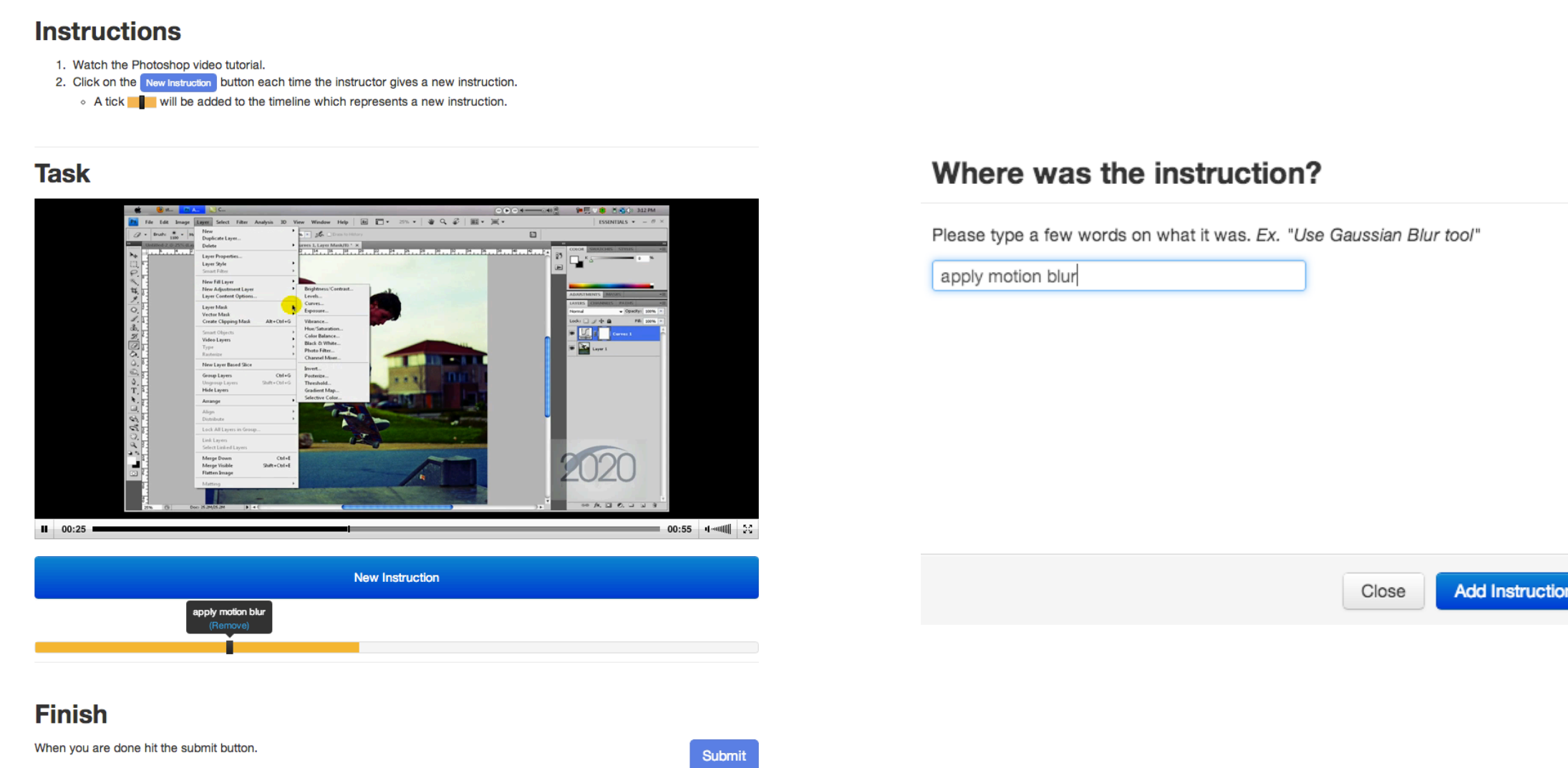### User study: Photo manipulation tasks in Photoshop

Learners with ToolScape
- Gained more self-efficacy in their skills
- Rated their own work higher
- Frequently used interactive navigation (9 times per task)
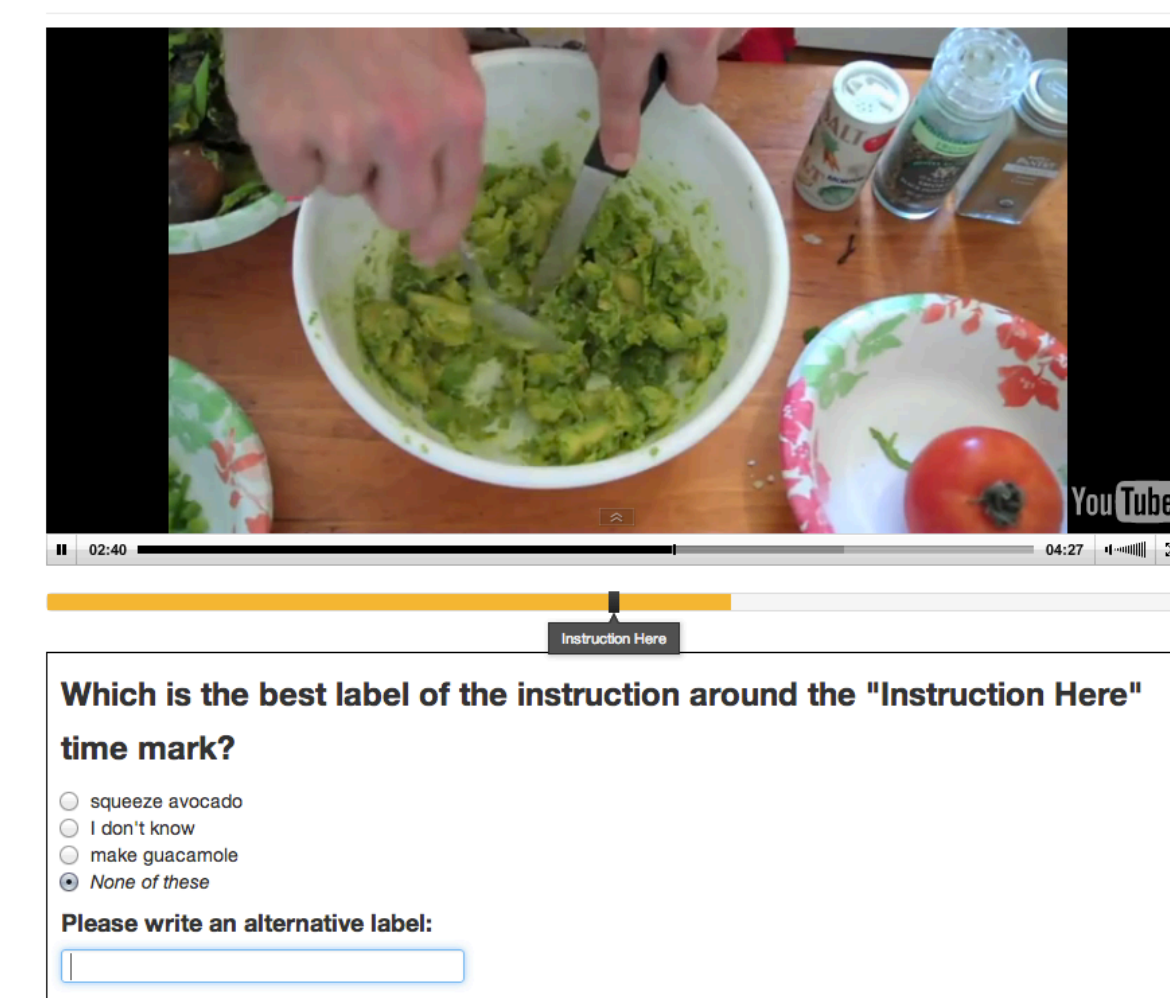- **Produced better designs by external rating**

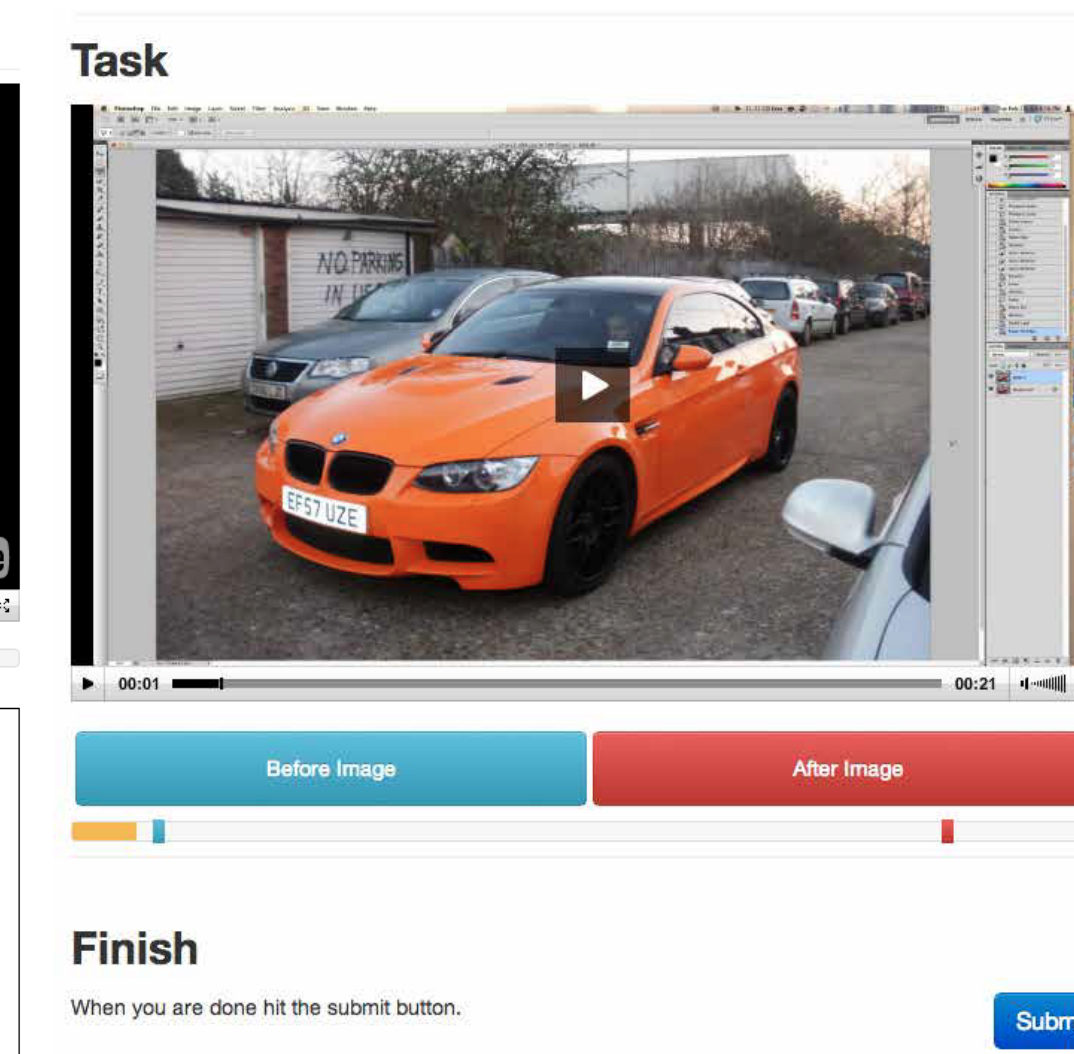## Crowdsourcing Workflow for Annotating How-to Videos

How-to Video → Annotation Generator (Procedure that generates annotations) → Annotations → Interface

Stage 1: Capture time marks with labels

Instructions
1. Watch the Photoshop video tutorial.
2. Click on the New Instruction button each time the instructor gives a new instruction.
   - A tick ⏷ will be added to the timeline which represents a new instruction.

Stage 2: Vote or improve labels

Which is the best label of the instruction around the "Instruction Here" time mark?
- squeeze avocado
- I don't know
- make guacamole
- None of these
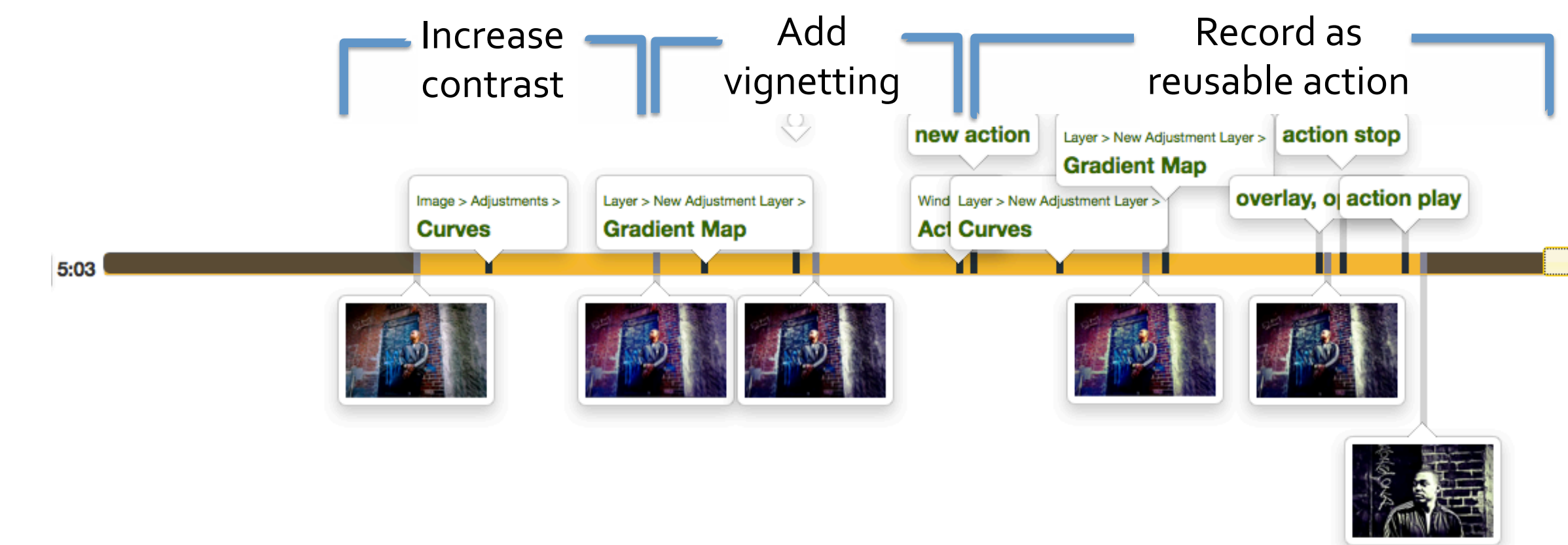
Please write an alternative label:

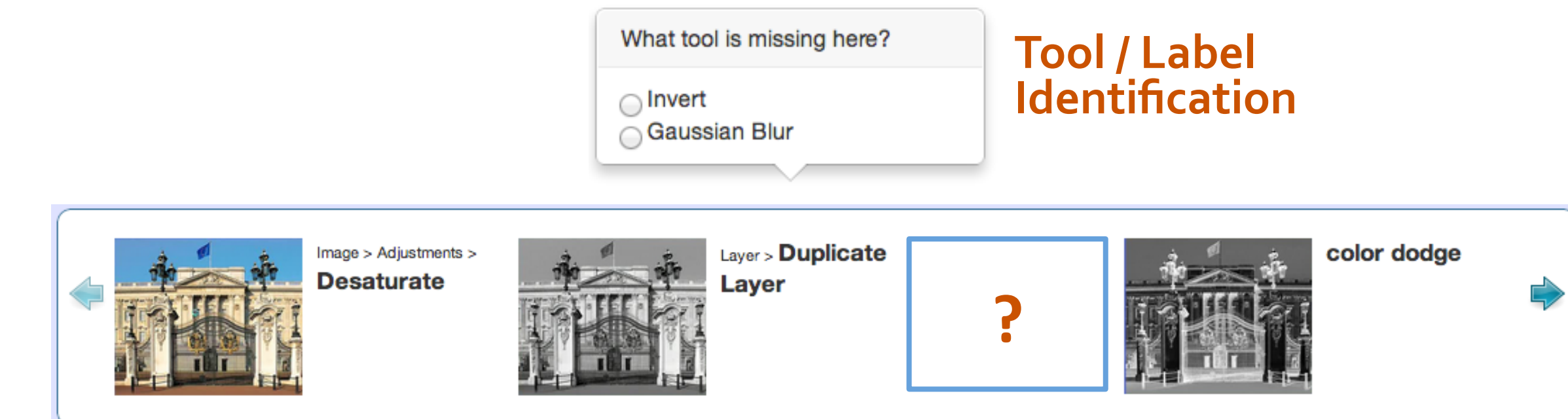### Stage 3: Capture before / after images of a step

Learnersourcing: Channeling learner activities into useful input

Subgoal labeling* supports learning new knowledge by clustering a group of steps into a high-level conceptual unit.

* Catrambone, R. The subgoal learning model: Creating better examples so that students can solve novel problems. Journal of Experimental Psychology: General, 127, (1998), 355-376.

Inject quizzes before / during / after watching a video

Tool / Label Identification

What tool is missing here?
- Invert
- Gaussian Blur

Rationale / Intention
What is the reason for applying this tool?
e.g., Why S-curve in RGB? To maximize contrast.

Clustering Steps
Which tools go together to accomplish a goal?
e.g., *Desaturate* should be applied before *Invert*

Self-Explanation
Natural language description of a step.
e.g., Make the person look as if he's rapidly moving.

Future Work

- Other educational videos: MOOC-style lecture videos, TED-style talk videos, and 1-to-1 tutoring videos
- Techniques for mediating diverse, noisy learner input
- Video analytics to add social navigation and interaction

Acknowledgement