Collaborative Design Curation: Supporting Creativity in Teams

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Abstract

This proposed research investigates new media and interaction techniques to address creativity challenges facing design teams. I propose role-based layers within zoomable spaces, as a novel technique for reducing collaborative fixation, while maintaining shared awareness and shared visual context. My research will enable design teams to create layered, multiscale design curation spaces which can *modulate* individual and collaborative creative processes.

Author Keywords

Curation; design; design curation; creativity; collaboration; zoomable user interfaces; multiscale.

Introduction

Student design teams face creativity challenges, such as collaborative fixation, evaluation apprehension, and free riding [3, 12]. To address creativity problems, my research focuses on new ways for supporting collaboration in processes of design curation. We define *design curation* as, the ways in which designers organize artifacts to think about, represent, communicate, present, and archive design processes [15]. Prior design curation methods include design workbooks [5], mood boards [13], annotated portfolios [2], pictorials [1]. We choose to frame these activities through the lens of *curation*, which is the process of bringing together elements, to conceptualize and create a new

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Figure 1: Example collaborative design curation from the start of an ideation phases. The student design team divided their curation into quadrants, one for each member. They placed some information about the design task in the center.

Figure 2: Following their individual work stage, the team shares viewing permissions to their individual layers. to support discussing possible design proposals.

context, for purposes of reflection and communication [18].

My research question is: how can design curation spaces support a gradient of individual and collaborative creative processes? To explore this question, I am developing a Collaborative Design Curation (CDC) probe which supports groups of people working together, in real-time, to organize design artifacts in a shared zoomable space. The use of a flexible, multiscale space seeks to capitalize on human spatial reasoning, to facilitate understanding, communication, collaboration, and creativity.

To help reduce team design fixation [21], the CDC probe will incorporate role-based visual layers as a way to partition territories [20] within the shared zoomable space. Figures 1, 2, and 3 show the same design curation at three points of the team's ideation process: dividing the curation space (Figure 1), working independently (Figure 3), and coming together (Figure 2). I hypothesize that role-based layers will support both shared awareness [4] and articulation work [19] among team members. Student design teams will be able to create layered spaces which can modulate individual and collaborative creative processes. *Modulation*, in this case, we use to encompass ways in which students vary their levels of participation or engagement between individual and collaborative activities during group work. The CDC probe will provide a wide spectrum of collaborative configuration options. We seek to highlight how transitioning between points along this gradient can foster team harmony or dissonance. Figure 3 shows an example curation from a student design team engaged in a design ideation process where they have used both spatial arrangement and role-based layers to coordinate their team activities.

Figure 3: The team created separate layers for each member to work independently. Two students, Brian and Michael decided to combine their layers and work together. The figure shows their view of the curation space. They are able to see and manipulate each others' curation elements, but other layers remain blurred.

Background

Prior research has investigated supporting designers in collaborating on design processes. TeamStorm enables co-located designers to work across personal and large collaborative displays to organize and share their ideas [7]. Freed supports designers in reflecting on their processes, as well as integrating multiple types of media into a single design artifact, to help prevent fragmentation [17]. ReflectionSpace explores how design artifacts support communication and reflection-on-action [22].

Collaborative Design Curation extends prior work on *free-form web curation*, a type of new media—designed to support users in creating new conceptual, spatial contexts—in which they discover and interpret relationships visually, while composing a variety of elements to form a connected

Figure 4: This curation shows the students' prototype development process. The instructor has added their suggestions about the prototype, in red. Their design collaborative has added a note, in blue.

whole [10]. Free-form web curation supports visual thinking [16] and creatively engaging with prior work [10].

Collaborative Design Curation also builds on recent work on collaborative live media curation, which furthers free-form web curation, supporting not one, but multiple users collecting and assembling together [8]. Like collaborative live media curation, collaborative design curation probe supports integrated live video and audio streaming within the curation space. Inspiration for CDC's focus on levels of scale and visual layers comes from observed practices of multiscale design, in which designers use visual scale to explore, juxtapose, and communicate relationships among design elements [14]. The present investigation of collaborative design curation departs from prior curation probe studies by focusing on supporting creativity in design teams.

Research Methods

We employ the *technology probe* method, in which prototypes are deployed in real-world settings to: meet user needs, field test new techniques, gather qualitative and quantitative data, and inspire both users and researchers to think about the transformative potentials of new capabilities [9]. Through the deployment, we are able to gather qualitative and quantitative data. Qualitative data comes from interviews with students and instructors and from the created design curations as visual data. Quantitative data comes from the serialized representation of the design curations and from collected operation logs.

Feedback gathered from students and design instructors guides the development of the CDC probe. Before deploying the CDC probe in a course, we work with the instructors to develop design curation tasks for the students.

A version of the CDC probe, which does not include role-based layers, was recently used by 680 students across 6

courses in the Fall 2018 and Spring 2019 semesters. This has resulted in 1043 design curations and millions of logged operations. These design curations come from a mix of both individual and team design tasks, depending on the specific course assignments.

Because these curations were created before the inclusion of the proposed features, I plan to analyze them to form an initial data point. I will look at the curations and operation logs for evidence of collaborative activities, such as multiple students working in the space simultaneously or manipulating the same elements. These metrics, in addition to curation and ideation metrics [11], will be used to measure effects of new collaborative design curation techniques.

We plan on deploying the new CDC probe in two situated design studio undergraduate courses: Interactive Design Studio in the Visualization Sciences department, and Landscape Architecture Design Studio. Data gathered from these course deployments will be analyzed with the developed metrics and then compared to data collected from the previous version of the CDC probe. While these comparisons will not be from identical courses, assignments, or participants, I assert that the comparison will be able to elicit interesting findings about the effectiveness of added features. I also plan on making comparisons between teams within a specific deployment contexts and comparing their respective creativity metrics and CDC feature usage.

Layers for Creativity in Teams

The developed CDC probe will include the novel technique of role-based visual layers to help prevent team fixation. Fixation is a cognitive block that obstructs someone's ideation process by keeping them mentally occupied with previously expressed ideas [23]. Prior work has shown that designers are more creative when they first work individually, before being exposed to each others ideas [21, 12].

This work proposes that visual layers mechanisms, inspired by design tools such as Adobe Photoshop, can be combined with the CSCW notion of roles to affect team collaboration and creativity. Roles are a set of associated concerns and activities of users in a CSCW system [6].

Role-based layers will enable users to configurable different levels of access for both manipulation and visibility. I hypothesize that providing users with a gradient of visibility settings, such as blurred, or outline-only, will reduce team fixation while still allowing for shared awareness of teammates activities. Shared awareness is “an understanding of the activities of others, which provides a context for your own activity” [4]. A key aspect of awareness is shared feedback, which is information about activities performed by users in a collaborative space.

Similar to prior design tools, the CDC probe will support a gradient of layering possibilities through a *scene index*, an ordered list showing the visual stacking order of the layers. The elements in lower layers appear behind elements in layers on top. Layers can be re-ordered on the Z-axis through the scene index. In tandem with enabling visual organization of content elements in layers, the new scene index will facilitate using the layers to organize cooperative work, based on roles and activities. Each layer in the scene index will enable setting CSCW permissions for visibility and manipulation.

The curation space will initially support four layer visibilities: hidden, outline, blurred, and visible. The blurred and outline visibility will show shapes of elements in a layer, possibly with some color information, without showing the specific content of the elements. These visibilities are not intended for creating visual effects, but rather to hide the specifics of the layer from other collaborators, while still showing approximations of their activity in the shared curation space.

By seeing the blurred shapes or outlines of other members' elements, users can continuously organize their curation, so that when the layers are viewed together, elements are not unintentionally covered (shown in Figures 2 and 3).

Layers will provide configurable view and edit permissions. Students will be able to use layers to divide design tasks and separate individual work spaces. They can use layers to create spatial territories [20] and avoid collaborative fixation effects, while still using the shared space to relate their design team contributions.

Layers will be useful for redlining and other instructional feedback processes. *Redlining* is the process of adding visual critique on top of student design work. Instructors will redline by adding annotations or sketches in a new layer (shown in Figure 4). Redlining in the students' design curation will support instructors in conceptualizing and providing evaluation feedback and help students track feedback.

Expected Contributions

Through this research, I expect the following contributions: (1) collaborative design curation as a design methodology; (2) role-based layers as a new technique for supporting shared awareness and ideation in zoomable spaces; (3) evaluation methods for analyzing collaborative creativity; (4) implications for facilitating creativity student design teams.

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