Public Social Private Design (PSPD)

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Overview

Understanding creativity

- Creativity in design
- Four empirical studies
  - A diary study, a field study, an evaluation and an experiment
- Requirements for supporting creativity

Supporting creativity

- Existing support tools
- Public Social Private Design (PSPD)
  - The framework, hardware and software
- An initial evaluation + experiment
- Future developments and studies
Creativity is receiving increasing attention in the HCI community.

What is creativity?

A definition: ‘Creativity is the generation of ideas, which are a combination of two or more matrices of thought, which are considered unusual or new to the mind in which the ideas arose and are appropriate to the characteristics of a desired solution defined during the problem definition and preparation stage of the creative process’

Warr and O’Neill

... in design?

‘courses of action aimed at changing existing situations into preferred ones’ Herbert Simon
Overview:
- 70 students formed 12 design teams as part of an interaction design course.
- Each team member completed a diary (e.g., ideas, context), each week over 12 weeks.

Key Findings:
- Design phase gave rise to most new ideas, where latter phases involved more refinement of ideas.
- Early phases of design were performed individually, moving towards group activity. Refinement was a group activity.
- Ideas were represented using sketches with annotation and textual representation.
A Field Study

Overview:
- Same 12 teams from the diary study participated
- Design teams were observed using recording equipment to capture an instance of the design process in the field

Key findings:
- Teams verbally communicated with one another
- Breakdowns caused externalisations to be adopted
- Social influences were common: production blocking, evaluation apprehension and free-riding
- Design teams shifted between individual, sub-group and group compositions
An Evaluation

Overview:
- 7 groups of 4 participants performed an urban design planning task using the Envisionment and Discovery Collaboratory (EDC)

Key findings:
- The EDC allowed users to frame problems, generate ideas and evaluate ideas by externalising knowledge
- The technologies introduced a new social influence: technological production blocking
- The group interaction space inhibited the dynamic change of group composition
An Experiment

Overview:
- 96 participants formed 24 groups of 4 across 4 conditions: nominal, nominal-real, real-nominal and real group compositions.
- The experiment observed the effect of the group composition on creativity when social influences were controlled.

Key findings:
- Real groups were found to be equally as creative as nominal groups - quantity, divergent thinking and quality
- Real groups duplicated less ideas than nominal groups
- Real groups refined more ideas than nominal groups - groupthink
Requirements

- Support multiple representations of ideas - verbal, sketched and annotated
- Support the various group compositions of the design team - individuals, sub-groups and the entire group
- Control social influences that are known to inhibit creativity: production blocking, evaluation apprehension and free riding
- Support all the phases of the creative process: problem framing, idea generation and idea evaluation
Existing Tools

The Envisionment and Discovery Collaboratory (EDC)

Caretta

iLAND
Public Social Private Design (PSPD)
Public Social Private Design (PSPD)

The Framework

The Hardware

The Software

a PSPD Project
The Framework
The Hardware

Tabletop: This technology provides a public interaction space, allowing all group members to engage around the technology, collaborate with each other and interact simultaneously with the technology. Multi-user, synchronous interaction through the tabletop is enabled by an ultrasonic pen-based sketching application.

Tablet PCs: This technology provides a social interaction space, allowing a sub-group to collaborate with each other and interact with the technology. Due to the constrained interaction space, it is not possible for all members of the group comfortably to collaborate around this technology, therefore providing a feeling of social inclusion for its users and exclusion for others.

PDAs: This technology provides a private interaction space, allowing members of a group to work individually. Due to the constrained interaction space, it is not possible for all members of the group, or even a sub-group, comfortably to collaborate around this technology, therefore providing a private environment for an individual.
The Software

PSPD supports the activity of concept design - the creative process of getting ideas represented quickly through the use of sketching and annotation.

The development of the application was informed by previous research observing Disney animators and our own studies observing how users sketch - 12 participants performed an individual sketching task and 6 pairs performed a collaborative sketching task.

Requirements:

1) The sketch application should be as a piece of paper
2) Menus accessed through pie menus and gestures
3) The ability to change tool attributes - size, pressure and colour
4) The ability to transform the sketch - move, rotate, scale and zoom
5) To maintain high quality - vector graphics
6) The ability to annotate sketches - without cluttering the drawing space
7) The ability to share sketches
An Initial Evaluation

Overview:
- 8 participants/4 pairs of participants used either the sketch application on the PDA or the Tablet PC for an individual/collaborative sketching task.

Key findings:
- PDA:
  - Difficult to represent ideas - “I normally draw quite big”, “the screen is too small on the PDA”
  - The PDA allowed outline ideas to be sketched, but constrained detail from being added

- Tablet PC:
  - Stylus introduced turn taking - technological production blocking
  - Verbal communication and interactions were frequent, facilitating social creativity.

a PSPD Project
The Effect of Screen Size on Sketching

Overview:
12 participants as part of a within experimental design (counterbalanced) sketched 10 images - 5 outline, 5 detailed - using a small screen (PDA sized) and large screen (Tablet Sized) on a Tablet PC

Key Findings:
- Sketching on the small screen was faster than on the large screen for both outline and detailed sketches
- There were no differences between the small and large screen sizes for errors sketching the outline sketches
- When sketching the detailed sketches there were more errors on the small screen than on the large screen
Future Developments and Studies

- Developments:
  - Complete the software development for the individual technologies
  - Need to get the technologies talking to one another and seamlessly transferring sketches between them

- Studies:
  - The Effect of Interaction Spaces on Creativity (Undergraduate Final Year Project)
  - The evaluation of PSPD - does PSPD support creativity in design?
  - PSPD and architects
  - PSPD and artists
  - PSPD... the future... Public Participation in Creative Design (PPCD)
Questions?

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