CREATIVITY RESEARCH FINDINGS AT THREE LEVELS OF ANALYSIS

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Decades of research on creativity and innovation suggest three basic levels of analysis: the individual, the group, and the organization. Each of these levels tends to be studied by different scholars within different disciplinary traditions—for example, individual creativity is studied by psychologists, whereas organizational creativity is typically studied by management scholars in schools of business.

Because creative work in organizations always involves individual factors, group factors, and organizational factors, the Learning Spaces Collaboratory is interested in research at all three levels. There is substantial evidence that learning—often considered to be a solitary, individual act—benefits from group interaction. If our goal is to prepare graduates to contribute effectively to our modern innovation economy, they need to be prepared to participate in highly collaborative creative environments—because this is the reality of creative work today.

The Individual

> *How can space facilitate the process of "making" knowledge that requires substantial skill and domain expertise?*

Creativity researchers refer to "the ten year rule," derived from the observation that most creators do not achieve their most influential innovation until after they have worked in an area for at least ten years.

The moment of insight—the "having" of an idea—is overrated. Creative people have literally hundreds of ideas every week. But rather than one big flash of insight, each idea is a tiny spark that advances the work a small amount. Sometimes the ideas lead to a dead end; other times, the idea leads to a shift in direction.

All new ideas are combinations of existing ideas and concepts. Researchers have discovered that the most surprising and original new ideas are combinations of very different concepts—called "remote associations" or "distant combinations." This helps explain why interdisciplinary research so often results in innovation, and why diverse teams are more creative.

Creativity is not found only in the brain; creativity involves action in the world. Creators externalize their ideas and represent them—in notebooks, sketches, 3D models. Unexpected things happen when ideas are being externalized; the materials speak back. The creative process involves an ongoing dialogue with the work.

What kind of environment nurtures creativity?

Freedom, novelty, and a sense of being at the edge

A critical mass of creative people

A competitive atmosphere

Mentors and patrons.

— Nancy C. Andreasen, *The Creating Brain: The Science of Genius.* Dana Press, 2005.

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In 2012, with support from the Alfred P. Sloan Foundation, the LSC undertook a project focusing on Cognition and Context: How Space Affects Learning and Creativity in the Undergraduate Setting. Sawyer was a member of the project team.

The Group

How and when are groups more creative than solitary individuals?

- Individuals are often better at generating long lists of ideas. Groups are better than individuals at evaluating the quality of ideas.
- Individuals are often better at "additive creativity"—if a task can be decomposed into subtasks, with the subtasks assigned to different individuals, then that task is probably better done by a group of solitary individuals who later pool together their work. However, groups are better when the task is not additive—what one might call "synergistic" or "improvisational" creativity—when each person's work is interdependent with the others, and when one person's advance could spark a new insight in another.
- Groups are generally superior to solitary individuals when working on a visual or spatial challenge.
- Groups are generally superior to solitary individuals when working on a complex task with many interrelating parts.

The creativity of a group is enhanced in the presence of cognitive diversity—when the members of the group have different conceptual representations, ways of working, and expertise. There is some evidence that efficiency declines in such groups, so if creativity is not necessary for a task or project, then a homogenous group might be more appropriate.

The most creative groups are like improvisational ensembles, like a jazz or theater group. They listen closely to each other, and respond by building on each other's contributions. What results could not have been predicted at the beginning, not even by the participants, because the flow of the group's interaction is improvisational and emergent. It unfolds contingently through the course of the encounter.

These improvisations require a high degree of trust among members, because in the most creative groups, the meaning of each person's action is determined, retrospectively, by the ensuing flow of the encounter. That's because each creative contribution is intentionally ambiguous, it has multiple potential meanings, and it is this equivocality that leads to greater group creativity. This means that your partners could make you look brilliant, or they could make you look stupid. When a group begins to trust each other, they learn that their partners are going to make them look brilliant, whatever they say, and that leads to more of the equivocal contributions that foster group creativity.

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Successful group creativity requires a degree of familiarity among members, but there can be too much familiarity. For example, there is evidence that frequent turnover and reassignment leads to greater creativity.

The Organization

Innovative cultures

- There is true acceptance of mistakes, failures, and inefficiency in the pursuit of new ideas.
- There is zero tolerance for a lack of innovation effort.
- There are high standards for innovative performance.
- There is genuine respect for diverse people and ideas, and a willingness to hash out differences respectfully and honestly.
- There is a focus on results, not on credit, status, or ego.
- There is an emphasis on playfulness and fun.

Innovative leadership

- Leadership in innovative organizations is often distributed, such that the leadership function is "spread out" across the organization, with everyone participating in decision making and activities traditionally associated with the leader role.
- Teams and groups are often self-organizing or self-managed, meaning that leadership is an emergent property of the organization, rather than being centralized in one office or position.
- Leaders of innovative organizations:
  - often operate more like a "creative director" than a traditional executive;
  - articulate a compelling vision;
  - actively manage the norms and culture;
  - provide structure and direction, responsively, as needed.

Incentives that foster innovation

- Incentives should reward risk-taking and failure but without rewarding lazy free-riders.
- Individual incentives often lead to possessiveness and interfere with the sharing and collaboration associated with the most innovative organizations. It is challenging to appropriately recognize individual effort without leading others to feel that their collaborative contributions have not been recognized.
- Rather than reward successes, reward magnificent effort, even if the result is failure. Many innovative organizations celebrate failures—even displaying prototypes of failed products in their offices, or maintaining a "museum of failed ideas."