

10 HANDS-ON EXERCISES TO SPARK STUDENT CREATIVITY AND INNOVATION

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Abstract

Ten theoretically-based exercises are described in order to help instructors expand students' creative capacity and encourage the development of innovations.

Introduction

Creative processes and ideation play a crucial role in the development of innovations. University students in technical fields become well-equipped with key theories, equations, and knowledge during their time in classes, but they don't often have exposure to or experience with effective creative processes that can build upon that knowledge and help them develop useful innovations on their own. This paper is not proposing that a separate course be offered, but rather offers a set of classroom tools and interactive techniques designed to help instructors give their students more experience with the creative process within existing courses.

The tools and techniques presented in this paper have a theoretical basis drawn from three areas: experiential learning, psychological ownership, and the triarchic theory of intelligence. Together, these theoretical streams form a foundation of pedagogical attributes of the tools:

- experiential and interactive,
- focused on developing creative process and output, and
- emergent from the students' own ideas and interactions.

Theoretical Foundation: Experiential Learning

Experiential learning involves “a guided process of questioning, investigating, reflecting, and conceptualizing based on direct experience. The learner is actively engaged in the process of learning, has freedom to choose, and experiences directly the consequences” (Stehno 1986, 35). Kolb (1984) developed a model of experiential education that depicts learning as a cyclic process involving four modes: (1) concrete experience (i.e., engaging in a hands-on activity), (2) reflective observation (i.e., thinking, recording, discussing the experience), (3) abstract conceptualization (i.e., thinking at a more abstract level about why the observed processes work as they do), and (4) active experimentation (i.e., testing hypotheses that emerge). Students with entrepreneurial motivations or hands-on learning styles are likely to enjoy the fact that they have some control over the design of their work (Wilson 1986). For effective learning to occur, students must be actively engaged in the education process (DeLay 1996). Experiential education may achieve much of its success because it actively involves and empowers students through a “bottom-up” versus “top-down” educational process (Margerison 1988).

Theoretical Foundation: Triarchic Theory of Intelligence

A series of studies by Sternberg (1988, 1997, 2006) proposed a model of intelligence referred to as the triarchic theory. According to this theory there are three types of intelligence: (1) analytical, the ability to solve a problem by looking at its components; (2) creative, the ability to



use new or ingenious ways to solve problems; and (3) practical, referring to street smarts or common sense (Sternberg et al. 1995). Sternberg underscores the importance of using all three types of intellectual skills by highlighting the difference between academic problems and real-world, practical problems:

...the characteristics of academic problems tend to be (a) formulated by others;(b) intrinsically uninteresting for the most part; (c) self-contained, in that all needed information is available from the beginning; (d) disembedded from an individual's ordinary experience; (e) well defined; (f) characterized by a 'correct' answer; and (g) characterized by a single method of obtaining the correct answer. In contrast, practical problems tend to be (a) unformulated or in need of reformulation; (b) personally interesting; (c) lacking information necessary for solution; (d) related to everyday experience; (e) poorly defined; (f) characterized by multiple correct or at least "acceptable" solutions, each with liabilities as well as assets; and (g) characterized by multiple methods for picking a problem solution (Sternberg et al. 1995, 352).

Theoretical Foundation: Psychological Ownership

Another theoretical foundation is found in the research stream of "psychological ownership." Management scholars have advocated for years that satisfaction in organizations can be improved when those managing a group promote "psychological ownership" or "empowerment" among the group members (see Allport 1946; Druskat and Pescosolido 2002; Lee and Koh 2001; Reeve and Smith 2001). Pierce, Kostova, and Dirks (2001) defined it as "a state of mind ... in which individuals feel as though the target of ownership (material or immaterial in nature) or a piece of it is 'theirs'" (299). Prior research by Wood (2003)

empirically demonstrated that classroom instructors can improve student learning and satisfaction by increasing students' level of psychological ownership in group exercises. In the study, a sense of ownership was promoted in the classroom by allowing students to make choices about aspects of their assigned work or by encouraging them to provide their own ideas or materials for projects. This study provided empirical reinforcement to what many instructors have known for years—that students' sense of ownership can improve their satisfaction with experiential projects. The results support the idea that when students are given incrementally more control over how their education product is configured and delivered, their overall level of self-reported learning will increase. Buchko (1992) found that ownership affects group members' attitudes primarily through greater perceived influence and control. Efforts to increase ownership by customers in the product design and production process have been shown to improve relationships and customer satisfaction (Duray and Milligan 1999).

Research in management has generally recommended that managers use a flexible, adaptive leadership style (Mescon, Albert, and Khedouri 1988). The framework developed by Hersey and Blanchard (1982) shows that leadership styles characterized by participation and delegating are more effective when group members are more mature, and "selling" and "telling" styles are more effective for less mature individuals. This suggests that educators should consider a wide range of teaching tools for their classes and choose a pedagogical approach based on their students' overall maturity level, evidenced by their willingness and ability to take responsibility for the work involved in group projects. For those classes that demonstrate a higher level of maturity, participative and delegating styles are appropriate.

A service (as a category of consumer products) has been defined as "... the production of

an essentially intangible benefit, either in its own right or as a significant element of a tangible product, which through some form of exchange, satisfies an identified need” (Palmer 2007). Higher education is primarily a service product. One aspect of service products that distinguishes them from goods is the “inseparability” of services or the fact that services are often produced and consumed at the same time. This attribute reflects the idea that customers can become involved in tailoring the design of the service product they purchase (e.g., giving instructions to a barber as a haircut is performed). Customers are being viewed increasingly as active collaborators in creating value (Liechty, Ramaswamy, and Cohen 2001), and products may be differentiated along the inseparability dimension by increasing or decreasing the customers’ involvement in production or delivery (Song and Adams 1993).

The Ten Tools

The tools and techniques presented here are designed to help an instructor achieve a variety of purposes, and are brief enough to be used as a module within a normal class session or lecture. Some tools help start a discussion about the nature of innovation origins. Others help students learn a process or technique they can use in future group projects. Several get students working in teams through a creative exercise designed to teach them a principle of innovation. The tools don’t require any special equipment, and have been successfully field tested over several years in university courses, executive education programs, and workshops for high school students.

1. The “Wall of Fame/Shame”

- The instructor (or students) find real, everyday examples of innovation from around the world or local sources and briefly present them to the class. These can include examples of new products designed for the “bottom of the pyramid.”

Some of the best discussion stems from “bad examples” – i.e., consumer products that the student or teacher believes may not succeed. After introducing the item, the student/teacher passes the item around the room and explains why they believe it will succeed or fail. The items may be purchased at a store, or students may bring in news items about new product releases.

- Lesson 1: Creativity by itself is not the same as innovation, but is the foundation for innovation. Innovations solve real problems and add value in unique ways.
- Lesson 2: When “bad examples” are presented, there is often an opportunity for the instructor to turn the discussion into one focused on finding potential. The instructor may ask the group “We know its flaws, but what may be *good or promising* about this idea?” This helps keep the classroom environment positive, and helps students see and voice the potential in even dubious new ideas.

2. Two Buckets

- Students form teams of three to five. Each team randomly chooses an index card from each of two buckets. One set of cards has major brand names (including international brands). One set has product categories (including developing nations’ needs). The instructor opens with “You work for the company on the one card, and they now require you to develop a product for them that is on the other card.” The groups are given five to seven minutes to develop the product’s features, benefits, target audience, and perhaps promotional ideas. One spokesperson from each team briefly presents to the class while the instructor records their ideas on the board.
- Lesson: Forced association (combining disparate ideas) is a helpful and practical way to get ideas for potential innovation, and a skill that can be developed in students.

3. Innovation You

- Although there are key principles of innovation, each student will approach the process differently depending on their individual talents and strengths. To help students better personalize and internalize the innovation process, this take-home assignment asks students to “create a poster about YOU.” This exercise requires a bit of advanced reading and discussion, and some class time for their presentations when the posters are due.
- Lesson 1: Innovation requires regular doses of inspiration, so they should include their favorite quote, and a photo and short bio of a person they find inspirational.
- Lesson 2: Promising innovations are most likely to derive from a well-developed knowledge base (see Gladwell 2008). The students should include a description and photo of a skill, hobby, or field that they know the most about (outside of family and school). They may also include a brief description of experiences where they have experienced “flow” (see Csikszentmihalyi 1990).
- Lesson 3: Variety and diversity is good. The students take a free online Jung typology test and report the result on the poster. They also read the list of Gardner’s “multiple intelligences” and report the ones that fit them best.
- Presentation is important. I require a physical, 3D item of some sort on their poster that reflects their interests or expertise, and encourage them to think broadly about the idea of a “poster” and how they present their work.

4. 100 Uses

- This exercise is a way to warm up a group and lower their inhibitions for sharing their ideas with others in their team. The task is simple: In ten minutes, come up with 100 uses for old newspapers (or unused pizza boxes, or outdated computer materials).
- Lesson: The teams need every conceivable idea their members can offer to approach

the target number, so they learn the value of building on each others’ ideas and not to inhibit ideas from others. They should be encouraged to recall this lesson when their team is asked to develop ideas in new contexts.

5. iWish

- This exercise is designed to reinforce the idea that innovations need to solve a human problem of some kind. First, students are asked to work individually and think of a problem or hassle that people they know often face. The instructor can also direct the students to focus on people with special needs (e.g., blind, elderly) or in developing nations. Then, students are asked to form teams of three to five, discuss each of their ideas together, and decide on one that can best be solved with a smartphone app (“I wish a cell phone could _____”). The next step is for them to draw a large outline of an iPhone on a page (or use one provided by the instructor), and sketch the app interface on their iPhone drawing. Each team presents the human problem they sought to solve and their app solution to the class.
- Lesson 1: Ideas in groups tend to be better if the members work individually first, then compare notes with the rest of the team.
- Lesson 2: The best innovations solve real problems.

6. R&D

- In many engineering-focused industries, the technology comes first and then an application for the technology is sought—this is the reverse of the standard innovation process. Instead of starting with problems and developing many possible innovations, students will start by examining the latest technological developments and then consider their application to many possible problems. For example, looking through a website such as rdmag.com, the instructor can show examples of recent R&D developments (e.g., spider silk, nanobatteries, sprayable

metals) and ask “What types of products or applications can you think of for this?” Other examples may be purchased through sites such as inventables.com, discussed in the context of 3D printing or with a Makerbot demonstration, or through a visit and tour to a local FabLab.

- Lesson: Ideas for innovations can come as we scan outside publications about trends, technology, and R&D news.

7. Visioning

- This exercise uses a type of “judo” approach to pull ideas from students rather than push them out. For example, if the challenge is to think of new programs that a school can implement to increase its reputation, the instructor can create a fictional, super positive news story about the students, school, or organization using a very realistic-looking newspaper article generator:
 - <http://www.fodey.com/generators/newspaper/snippet.asp>
 - The instructor should reveal the article, and—because the story only shows the headline and part of the beginning text—ask the group to offer three to five ideas about what the organization must have done to deserve this recognition or win this award. The ensuing ideas are often things nobody had thought of before.
 - Lesson: Sometimes a “pull” works better than a “push.”

8. Card-io

- At IDEO, the developers of Design Thinking, the teams begin their ideation sessions by asking a question with the prefix “How might we...?” Put challenge questions at the top of large index cards using “How might we” as the start to a number of problems you want the class to consider. Give a card to each student in the class, and ask them to write an idea for solving that problem just beneath the question. Then, each student passes their card to the person on their right. Each time

a student receives a card, they should try to build on the ideas already presented, if possible. After passing the cards three to four times, ask each person—on the next round—to write down a “wild idea.” Then, pass the cards once more and ask them to build on that. Have the students report on their favorites to the class.

- Lesson: When we consider others’ input and build together, we can get better outcomes.

9. Perceptual Maps

- Perceptual maps are used in strategy sessions and by advertising agencies to illustrate visually the rationale for a marketing strategy or to identify new product opportunities. Students form teams of three to five, and draw X-Y axes on paper. The instructor gives the class a product category to consider (e.g., restaurants, theaters, grocery items). The group identifies two attributes that consumers consider important when buying that product, and label their axes with those attributes. Next, they plot all the competitors on their map according to how they are perceived by consumers. By looking at the open spaces, or considering new attributes or dimensions, students may see new possibilities for products and services.
 - Lesson: Innovations may be viewed as filling “holes” in the competitive landscape so that customers may be better served.

10. Innovation Challenges

- A larger, more robust challenge often brings out the best in students. One form is a campus-wide innovation challenge using a specific kind of material. The instructions are to simply “Add Value” using the materials (e.g., post-it notes, unused pizza boxes, old computer diskettes and CDs). This type of challenge is an opportunity to reach out to other colleges on a campus, and into the community for judges. Social innovation challenges can also generate interest by rewarding the team with the

best idea for addressing a nagging social issue in their own community or abroad.

- Another way to inspire students with a larger challenge is to take on a project for a non-profit organization in the city. It is a prime opportunity for them to employ design thinking across a semester, by starting with Empathy, moving to Ideation, and finally to Implementation.
- Lesson: Innovation is needed by all organizations, both for-profit and non-profit.

Conclusion

Over the years, we have found that it helps instructors and students manage the development and implementation of these tools and activities if they have a flexible working space available—one that includes rolling tables, plenty of whiteboards, and an interesting décor. Because students are also intensely interested in for-credit opportunities that allow them to develop their innovative capacities, we have also found that a certificate program with additional professional contacts and support resources allows them to pursue projects of individual interest, thus further tailoring and customizing their degree program to their passions and interests. At the University of Tulsa, examples of these resources are Studio Blue (www.utulsa.edu/studioblue) and The Nova Fellowship (www.novafellowship.org).

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