Constructive Controversy in Graduate and Professional Courses

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Constructive Controversy for Innovation (CCI)
Expert Panel
ETHZ – Psychology of Work Research Group (PdA)
FHNW – School for Applied Psychology (APS)

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Context: Constructive Controversy in Graduate and Professional Courses

• University of Minnesota – Technological Leadership Institute – Professional MS Programs
  – Management of Technology (MOT)
  – Infrastructure Systems Management & Engineering (ISME)
• Purdue University – School of Engineering Education – PhD Program
  – Foundation Course: History and Philosophy of Engineering and Engineering Education
• Conferences and Universities
  – ASEE/IEEE Frontiers in Education Conference
  – Nanyang Technological University, Singapore
What is Constructive Controversy?

• “Constructive controversy is an instructional procedure that combines cooperative learning (in which students work together in small groups to develop a report on an assigned topic, for example) with structured intellectual conflict (in which students argue the pro and con positions on an issue in order to stimulate problem-solving and reasoned judgment).” (p. 30)


Constructive Controversy Procedure

<table>
<thead>
<tr>
<th>Step</th>
<th>Typical Phrase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare</td>
<td>Our Best Case Is...</td>
</tr>
<tr>
<td>Present</td>
<td>The Answer Is...Because...</td>
</tr>
<tr>
<td>Open Discussion</td>
<td>Your Position is Inadequate Because...</td>
</tr>
<tr>
<td></td>
<td>My Position is Better</td>
</tr>
<tr>
<td></td>
<td>Because...</td>
</tr>
<tr>
<td>Perspective Reversal</td>
<td>Your Position Is...Because...</td>
</tr>
<tr>
<td>Synthesis</td>
<td>Our Best Reasoned Judgment Is...</td>
</tr>
</tbody>
</table>
Theory and Evidence

• **Theory**: Processes through which intellectual conflict leads to positive outcomes has been theorized by developmental, cognitive, social, personality, communication, and organizational researchers (Johnson & Johnson, 2009)

• **Evidence**: 39 studies (41% Higher Ed), meta-analysis
  – Achievement, Retention, and Quality of Decision Making and Problem Solving – Effect Size, ES = 0.70 (concurrence seeking), 0.62 (debate), 0.76 (individualistic)
  – Cognitive and Moral Reasoning – ES = 0.84 (concurrence seeking, 1.38 (debate), 1.10 (individualistic)
  – Similar ES's for Perspective Taking, Open-Mindedness, Creativity, Task Involvement, Motivation to Improve Understanding, Attitude Change on the Issue, Attitudes toward Controversy and Toward the Task, …

Reflection and Dialogue

• Reflect on (~ 30 seconds)
  – Key features and how to cultivate innovation in project and team environments
  – Record your ideas

• Turn to the person next to you (~ 1 minute)
  – Exchange ideas
  – Develop a list to share with whole group

• Whole Group discussion (~2 minutes)

- Remember that you are not the sole fount of ideas
- Enable collaboration
- Enhance diversity
- Map the stages of creativity and attend to their different needs
- Accept the inevitability and utility of failure
- Motivate with intellectual challenge

The Innovation Journey

The innovation journey is a nonlinear cycle of divergent and convergent activities that may repeat over time and at different organizational levels if resources are obtained to renew the cycle, p. 16.

IDEO – Deep Dive Video

ABC News
Nightline - 7/13/99

http://vimeo.com/16456835


IDEO’s Method

Observation - Brainstorming - Prototyping - Implementation

user desirability
business viability
technical feasibility

insights and opportunities
implementation

www.ideo.com
Innovation is the adoption of a new practice in a community - Denning & Dunham (2010)

1. What is the distribution of innovations?
2. Did it change over time? If so, how?
3. Where does your innovation fit?
Serious Play

Prototyping, Innovation, Collaboration

Prototyping is probably the single most pragmatic behavior the innovative firm can practice.

Innovation isn't what innovators do....it's what customers and clients adopt.

Innovation is more social than personal

Project and Knowledge Management

- University of Minnesota – Technological Leadership Institute – Professional MS Programs
  - Management of Technology (MOT)
  - Infrastructure Systems Management & Engineering (ISME)
- Constructive Controversy
  - Rationale
  - Assignment

Types of Projects – Exploitation vs Exploration (March, 1991)

<table>
<thead>
<tr>
<th>Exploiting Old Ways: Organizing for Routine Work</th>
<th>Exploring New Ways: Organizing for Innovative Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive out variance</td>
<td>Enhance variance</td>
</tr>
<tr>
<td>See old things in old ways</td>
<td>See old things in new ways</td>
</tr>
<tr>
<td>Replicate the past</td>
<td>Break from the past</td>
</tr>
<tr>
<td>Goal: Make money now</td>
<td>Goal: Make money later</td>
</tr>
</tbody>
</table>

Explore - Exploit

- Roger Martin (2010) *Design of Business* – Characteristics of exploration and exploitation, Table 1-1, p. 20
- Govindarajan and Trimble (2010) *The Other Side of Innovation*, Key differences between typical planning processes for the Performance Engine and best practices for innovation, Table 4.1, p. 99

### Characteristics of exploration and exploitation
(Martin, R. (2010) *Design of Business*, Table 1.1)

<table>
<thead>
<tr>
<th></th>
<th>Exploration</th>
<th>Exploitation</th>
</tr>
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<tbody>
<tr>
<td>Organizational focus</td>
<td>The invention of business</td>
<td>The administration of business</td>
</tr>
<tr>
<td>Overriding goal</td>
<td>Dynamically moving from the current knowledge stage to the next</td>
<td>Systematically honing and refining within the current knowledge stage</td>
</tr>
<tr>
<td>Driving forces</td>
<td>Intuition, feeling, hypotheses about the future, originality</td>
<td>Analysis, reasoning, data from the past, mastery</td>
</tr>
<tr>
<td>Future orientation</td>
<td>Long-term</td>
<td>Short-term</td>
</tr>
<tr>
<td>Progress</td>
<td>Uneven, scattered, characterized by false starts and significant leaps forward</td>
<td>Accomplished by measured, careful incremental steps</td>
</tr>
<tr>
<td>Risk and reward</td>
<td>High risk, uncertain but potentially high reward</td>
<td>Minimal risk, predictable but smaller rewards</td>
</tr>
<tr>
<td>Challenge</td>
<td>Failure to consolidate and exploit returns</td>
<td>Exhaustion and obsolescence</td>
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Selecting a Project Management Approach

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<tr>
<th>Process Clarity</th>
<th>Goal/Task/Deliverables Clarity</th>
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<td>Low</td>
</tr>
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<td>High</td>
<td>Adaptive Project Management (APM)?</td>
</tr>
<tr>
<td>Low</td>
<td></td>
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</table>

Distribution of PM Activity Between Supporting Innovation and Supporting On-Going Operations – 80 Engineers

Response

- 25-75: 40
- 50-50: 30
- 75-25: 10
Percentage of Current Work that is Project Work – 80 Engineers

Number of Projects Currently Working On
Selecting a Project Management Approach

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Project and Knowledge Management

Constructive Controversy Topics

- Make project management certification, e.g. PMI-PMP, a part of the MOT program?
  - Yes
  - No
- Who makes the best project manager?
  - Generalist
  - Specialist
- **Brooks’ Law:** “adding resources to a late project makes it later”
  - Right on!
  - Way off!
- Scope Creep
  - Parkinson’s Law: Work expands to fill the time available for completion (manageable)
  - Progressive refinement rules! (unavoidable)
- Peters: “Tomorrow’s corporation is a collection of projects”
  - Accurate portrayal
  - Inaccurate portrayal
- The future work environment is remotely distributed
  - Future is already here (it’s just not evenly distributed) - Gibson
  - Fad
Constructive Academic Controversy: The Art of Arguing to Enhance Learning

ASEE/IEEE Frontiers in Education
FIE 2009: Special Session

Holly Matusovich, Virginia Tech
Karl Smith, Purdue University/U of MN

Do Outcomes Defined in ABET Define Engineering?

• One pair will argue YES ABET outcomes define engineering

• One pair will argue NO ABET outcomes do not fully define engineering

• Later each team will strive for agreement on what engineering is or on how it can be defined
Two Approaches to Decision Making

<table>
<thead>
<tr>
<th></th>
<th>Advocacy</th>
<th>Inquiry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept of decision</td>
<td>A contest</td>
<td>Collaborative problem solving</td>
</tr>
<tr>
<td>making</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purpose of discussion</td>
<td>Persuasion and lobbying</td>
<td>Testing and evaluation</td>
</tr>
<tr>
<td>Participants’ role</td>
<td>Spokespeople</td>
<td>Critical thinkers</td>
</tr>
<tr>
<td>Pattern of behavior</td>
<td>Strive to persuade others</td>
<td>Present balanced arguments</td>
</tr>
<tr>
<td></td>
<td>Defend your position</td>
<td>Remain open to alternatives</td>
</tr>
<tr>
<td></td>
<td>Downplay weaknesses</td>
<td>Accept constructive criticism</td>
</tr>
<tr>
<td>Minority views</td>
<td>Discouraged or dismissed</td>
<td>Cultivated and valued</td>
</tr>
<tr>
<td>Outcome</td>
<td>Winners and losers</td>
<td>Collective ownership</td>
</tr>
</tbody>
</table>

Controversy References


Thank you!

An e-copy of this presentation will be posted to:
http://www.ce.umn.edu/~smith/links.html