Creating and Using Interdisciplinary Teams to Teach Critical Thinking

CT² Summer Faculty Institute, Clemson University
June 6, 2018
CRITICAL THINKING IS AN ANCIENT RICH CONCEPT

The practice and concepts are 2500 years old.

http://criticalthinking.org/pages/defining-criticalthinking/766
IT CAN BE TRACED IN THE WEST TO ANCIENT GREECE WITH ITS SOCRATIC METHOD AND IN THE EAST TO ANCIENT INDIA WITH THE BUDDHIST KALAMA SUTTA AND ABHIDHARMA LITERATURE.

http://openmindspace.org/CriticalThinking
Socratic method

• Father of philosophy.
• **Questions** were asked to determine logic, ethics, fairness, and constancy.
• Inspired the scientific method (develop a hypothesis and then investigate validity.)

http://en.wikipedia.org/wiki/Socrates
https://plato.stanford.edu/entries/socrates/
ps://www.amazon.com/SOCRATES-Translated-Introductory-Huntington-Illustrations/dp/B01DRMUZ8Y

Sculpture by Constantin Brancusi
CRITICAL THINKING IS AN INTELLECTUALLY DISCIPLINED PROCESS

http://criticalthinking.org/pages/defining-criticalthinking/766
Critical thinking

• Critical thinking happens when we think about how we think... we track our own thoughts and decision making processes (Vincent, 2013).

• Critical thinking...the awakening of the intellect to the study of itself (Scriven & Paul, 1987 from the Foundation for Critical Thinking Defining Critical Thinking at http://www.criticalthinking.org ).
Critical thinking intellectual traits

- Intellectual humility
- Intellectual autonomy
- Intellectual integrity
- Intellectual courage
- **Intellectual empathy**
- Intellectual perseverance
- Confidence in reason
- **Fairmindedness**

The Foundation for Critical Thinking
http://www.criticalthinking.org/pages/critical-thinking-where-to-begin/796
critical thinking
DEFINING INTERDISCIPLINARY

http://criticalthinking.org/pages/defining-criticalthinking/766
The terms **multidisciplinary**, **interdisciplinary** and **transdisciplinary** are increasingly used in the literature, but are ambiguously defined and interchangeably used.
Dictionary definitions

**Multidisciplinary:** Combining or involving several academic disciplines or professional specializations in an approach to a topic or problem.

**Interdisciplinary:** Relating to more than one branch of knowledge.

**Transdisciplinary:** Relating to more than one branch of knowledge; interdisciplinary.

https://en.oxforddictionaries.com/definition/us/multidisciplinary
https://en.oxforddictionaries.com/definition/us/interdisciplinary
https://en.oxforddictionaries.com/definition/us/transdisciplinary
Research definitions

- **Multidisciplinarity** draws on knowledge from different disciplines but stays within their boundaries.
- **Interdisciplinarity** analyzes, synthesizes and harmonizes links between disciplines into a coordinated and coherent whole.
- **Transdisciplinarity** adds knowledge and production from outside the academy to the multiple disciplines within the academy.

Academic/field applied definitions

• **Multidisciplinary** teams involve people from different disciplines.

• They agree to work as a team to create solutions for a specific issue/problem.

• Each discipline develops one or more solutions for consideration and presents these to the leader or the group for consideration.

From personal conversations between Dr. Vincent and Dr. Frank Fear
Multidisciplinary teams

- Landscape planners
- Landscape installers
- Landscape designers
- Landscape maintenance
Academic/field applied definitions

- **Interdisciplinary** teams involve people from different and varied disciplines.
- They agree to work as a team to create solutions for a specific issue/problem.
- They are willing to **learn from the other team members and change their mind about how to solve the issue/problem.**

From personal conversations between Dr. Vincent and Dr. Frank Fear
Interdisciplinary teams

Discipline specialists and project leaders share information with each other and seek varied perspectives.
## Academic applied definitions

<table>
<thead>
<tr>
<th>Multidisciplinary</th>
<th>Interdisciplinary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relevant disciplines involved</td>
<td>Varied yet relevant disciplines involved</td>
</tr>
<tr>
<td>Meets at least once then continues work within one’s own discipline</td>
<td>During group meetings seeks to learn about the problem from other people’s perspectives</td>
</tr>
<tr>
<td>Submits work to leader or group for consideration</td>
<td>Continues to meet with larger diverse group (or relevant portions of) while developing solutions</td>
</tr>
<tr>
<td>Makes changes based on feedback</td>
<td>Team members have capacity to listen deeply</td>
</tr>
<tr>
<td></td>
<td>Team members are willing to change their mind based on new information</td>
</tr>
</tbody>
</table>

From personal conversations between Dr. Vincent and Dr. Frank Fear
Interdisciplinary Communicator: Oliver Sacks

• British neurologist, practicing physician at New York University, and acclaimed author who explored the “mysteries of the brain”.
• Wrote case studies that looked for novel connections between science and the human condition.
• He perceived resilience and beauty where few dared to look.
• Author:
  – *The Mind’s Eye* (2011) Amazon $11.05

http://www.amazon.com/Minds-Eye-Oliver-Sacks/dp/0307435254/ref=sr_1_1?ie=UTF8&qid=1441068138&sr=8-1&keywords=Oliver+Sachs
http://www.amazon.com/Move-Life-Oliver-Sacks/dp/0385352549/ref=sr_1_1?ie=UTF8&qid=1441062889&sr=8-1&keywords=Oliver+Sachs
http://www.amazon.com/Minds-Eye-Oliver-Sacks/dp/0307435254/ref=sr_1_1?ie=UTF8&qid=1441068138&sr=8-1&keywords=Oliver+Sachs
http://www.amazon.com/Move-Life-Oliver-Sacks/dp/0385352549/ref=sr_1_1?ie=UTF8&qid=1441062889&sr=8-1&keywords=Oliver+Sachs
WHY USE INTERDISCIPLINARY WORK GROUPS IN THE CLASSROOM?

To contribute to positive solutions in the workplace and world
Sustainability defined

Gro Harlan Brundtland, Chair of World Commission; Former Prime Minister of Norway

https://www.britannica.com/topic/Brundtland-Report
“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” (1987, p. 8).

Shared leadership

The Elders meet in 2007

http://desertpeace.files.wordpress.com/2009/09/the_elders.jpg
CREATING INTERDISCIPLINARY TEAMS IN THE CLASSROOM

Fair, random
Tool: Form mixed major teams

- **Form interdisciplinary teams by mixing majors**
  - Sort by major, shuffle cards, student rep from various majors select cards for team in full view, no personal names visible
Tool: Group exercises

- Provide clipboards and worksheets to professionalize the experience
- Worksheets contain space for name and major
Group exercise: Sustainable Communications

<table>
<thead>
<tr>
<th>Name</th>
<th>Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brittany Lapple</td>
<td>Architecture</td>
</tr>
<tr>
<td>Rachel Edwards</td>
<td>Hort</td>
</tr>
<tr>
<td>Jay Gervais</td>
<td>Civil Engineering</td>
</tr>
<tr>
<td>Austin Allen</td>
<td>LAHC</td>
</tr>
</tbody>
</table>

State a claim (clear and obvious) made by authors (like a hypothesis) about engagement and/or dialogue:

In order for a group to be successful every member must be included and energetically engaged, through maintenance and facilitation.

Validity checks (search for truth) using three methods/sources:

1-Experiential (personal or others)

Multi- or interdisciplinary work with conflicting or multiple opinions. (e.g. lab work, architecture projects)

2-Authoritative (professors, .gov; .edu; non-profit organizations)

A contractor who has to deal with and help
<table>
<thead>
<tr>
<th>2-Authoritative (professors, .gov; .edu; non-profit organizations)</th>
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</thead>
</table>

A contractor who has to deal with and help converge ideas from a number of different professions on a daily basis.

<table>
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<tr>
<th>3-Disciplined (peer reviewed lit, published surveys and experiments)</th>
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</table>

Published peer reviewed article on the subject of communication and engagement.

**Alternate views/perspectives**
Identify people or organizations who may disagree with the claim.
State the source of the view.

- A CEO who wants to have the final say on decisions, despite other opinions
- Control oriented people in positions of power
- A tenured professor who doesn't have intellectual humility

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Dr. Ellen Vincent  ellenav@clemson.edu  HORT 3080 CT2
Sustainable Landscape Garden Design Installation and Maintenance
<table>
<thead>
<tr>
<th>Name</th>
<th>Major</th>
<th>Name</th>
<th>Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lauren C.</td>
<td>LA</td>
<td>Raye A.</td>
<td>EA HORT</td>
</tr>
<tr>
<td>Austin A.</td>
<td>LA</td>
<td>Anna Fisher</td>
<td>Hort</td>
</tr>
</tbody>
</table>

**Viewpoint from your discipline**

Beliefs/claims (clear and obvious) of authors (like a hypothesis):

Be mindful of design process in working with other disciplines.

**Methods/sources for checking validity**

Experiential (personal or others):

How we feel and know about the claim through our own LA and design experience.

Authoritative (professors, .gov; .edu; non-profit organizations):

Ask professors about personal experience working with collaboration/local consultants/viewpoints from books.

Disciplined (peer reviewed lit, published surveys and experiments):

Clemson extension for published surveys.
Ask professors about personal experience. Include collaboration/local consultants/viewpoints from books.

Disciplined (peer reviewed lit, published surveys and experiments):

Clemson extension for published surveys.

**Multiple views:** Perspectives (your own or imagined others) that do not support your claim. State the source of the view.

Prestigious design artists in different states or countries.

- They have been so highly regarded, they have "faith" in their design and don't plan to look and listen to outside sources.

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Use reverse side if needed

Dr. Ellen Vincent  
ellenav@clemson.edu  
Sustainable Landscape Garden Design, Installation, and Maintenance
1. Identify a claim/belief/assumption from the readings or class that personally connect with.
2. Investigate the validity of the claim/belief/assumption.
3. Explore or look at the issue using multiple viewpoints.
4. Reflect from your past and tell the story.
5. Conclude with personal informed actions.
6. Add an image that supports your search.
7. Cite the image.
Critical Thinking Protocol in Visual Essay

Grading rubric: 100 points total

Each essay should contain a header that includes: Name; Class title; Date; CT2 Visual Essay
Save the essay with your last name and the essay # in the saved file name: e.g. Vincent_CT2 essay1

<table>
<thead>
<tr>
<th>Critical Thinking Essay Item</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Identify a claim/belief/assumption from class or readings that you personally connect with:</strong></td>
<td>10</td>
</tr>
<tr>
<td>Identify and clearly state a specific claim/belief/assumption that you perceive. Include the source(s) you are using in the text. Do not use quotes-use your own words.</td>
<td></td>
</tr>
<tr>
<td><strong>Investigate the validity of the claim/belief/ assumption:</strong></td>
<td>20</td>
</tr>
<tr>
<td>How can you check the author’s claim/belief/assumption for accuracy and validity? Be specific and use a minimum of two methods to determine the legitimacy of the author’s claims.</td>
<td></td>
</tr>
<tr>
<td><strong>Experiential</strong> (personal experience); <strong>authoritative</strong> voices (professors, .gov, .edu sites); <strong>disciplined</strong> (peer reviewed literature; surveys; fact checks; repetition of experiments, etc.)</td>
<td></td>
</tr>
<tr>
<td><strong>Explore alternate possibilities/conclusions using multiple viewpoints:</strong></td>
<td>10</td>
</tr>
<tr>
<td>What other possible perspectives, explanations, or interpretations can you suggest for a deeper understanding of the claim/belief/assumption? State the source of the view.</td>
<td></td>
</tr>
<tr>
<td><strong>Reflection from your past:</strong></td>
<td>10</td>
</tr>
<tr>
<td>Using your own personal experiences share a story from your past that was triggered by the claim/belief/assumption. Make it vivid so the reader feels as though they were there with you.</td>
<td></td>
</tr>
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</table>
INTERDISCIPLINARY COMMUNICATION TOOLS

Engagement, dialogue
Dr. Frank Fear, Professor Emeritus
Michigan State University,
engagement author; Kellogg consultant

Amazon $49.88
Engagement

• *Critical*: conveys the central importance of treating **self and subject as text to be examined** (Introduction p. xiii)

• *Engagement*: is a stance which is expressed in **answers to core questions**: Why do you engage? With whom do you engage? Towards what tend do you engage? How do you engage? (p. xiii)

• *Communities of practice* are grounded in a theory of engaged learning: learning is social: members learn with others; from others, and through others...Engagement involves trust and shared leadership (Introduction, p.xvi)

Fear et al., 2006. *Coming to critical engagement*. University Press of America
Engagement

• ...“Grounded in an ethos of **mutuality, respectfulness, and stewardship**, proceeding through dialogue, and fostering inclusive well being.”

• Engagement is a way of being- both on campus and off-energized by the norms of engagement.

• Framed this way, engagement becomes a leadership and management practice.---*Dr. Frank Fear*
Engagement

• “Engaged learning is an approach, an expression of being, a leadership ethic, and a way for scholars, practitioners, and administrators to connect otherwise diverse activities thematically, coherently, and meaningfully.”

Engagement


• If you are accomplished in a discipline or area consider yourself a specialist instead of an expert (Denny, personal communications, 2006).

• Stay open to outcome, i.e. allow your mind to be changed (Arriens, A., workshop, 2004).
Engagement

Dialogue is essential to successful engagement.
Dialogue: 3 core components

- Equality
- Empathetic listening
- Airing assumptions and not judging them (or the speaker)

(1) Equality: All participants are treated as equals. No arm-twisting, no pulling of rank, no overt or indirect attempt to influence.

(2) Listening with empathy: Try to grasp each others viewpoint, even when they differ.

(3) Bring assumptions into the open: Examine one’s own and other participants assumptions. Once exposed (in the open) treat them with respect.

“When your deepest-rooted assumptions about who you are and what you deem most important in life are attacked, you react as if you were attacked personally.”—David Bohm

County Mayo, Ireland
## Dialogue vs debate

<table>
<thead>
<tr>
<th>Dialogue</th>
<th>Debate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assuming many people have pieces of the answer and that together they can craft a solution.</td>
<td>Assuming that there is one right answer and you have it.</td>
</tr>
<tr>
<td>Is collaborative: participants work together toward common understanding.</td>
<td>Is combative: participants attempt to prove the other side wrong.</td>
</tr>
<tr>
<td>About exploring common ground.</td>
<td>About winning.</td>
</tr>
<tr>
<td>Listening to understand, find meaning and agreement.</td>
<td>Listening to find flaws and make counter-arguments.</td>
</tr>
</tbody>
</table>

## Dialogue vs debate

<table>
<thead>
<tr>
<th>Dialogue</th>
<th>Debate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revealing assumptions for reevaluation.</td>
<td>Defending assumptions as truth.</td>
</tr>
<tr>
<td>Reexamining all positions.</td>
<td>Critiquing the other side’s position.</td>
</tr>
<tr>
<td>Admitting that others’ thinking can improve on one’s own.</td>
<td>Defending one’s own views against those of others.</td>
</tr>
</tbody>
</table>

## Dialogue vs debate

<table>
<thead>
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<th>Debate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Searching for strengths and values in others’ positions.</td>
<td>Searching for flaws and weaknesses in other positions.</td>
</tr>
<tr>
<td>Discovering new options, not seeking closure.</td>
<td>Seeking a conclusion or vote that ratifies your position.</td>
</tr>
</tbody>
</table>

Dialogue vs debate group exercise

- When do you recall experiencing dynamic dialogue or debate?
- Share your recollection with your neighbor.
EXIT SURVEY RESPONSES
Exit survey student responses

What one belief/thought has changed or altered as a result of taking this class?

• “Listen to other people because they have opinions that matter.” FORESTRY

• “Being open to listen and plan with the landscape maintenance team during the planning stages.” HORTICULTURE

• “That all majors and disciplines are capable of working in a group and learning from each other.” ANTHROPOLOGY
Exit survey student responses

What one belief/thought has changed or altered as a result of taking this class?

• “I have become more open to others’ opposing viewpoints on controversial topics.” AGED

• “I learned to be open-minded. I have learned to look at things from a different perspective than just my own. There are 2 or more sides to every story.” TURF
Exit survey student responses

What one belief/thought has changed or altered as a result of taking this class?

• “I now use empathy when listening to other people’s viewpoints. I now look at a person’s viewpoint with a better understanding of how they feel about an issue.” HORT
Exit survey student responses

What one belief/thought has changed or altered as a result of taking this class?

• “Personally, my outlook to the overall design process has shifted to a more sustainable mindset. To get all parties involved in the design process from the beginning will save a lot of hassle on the back end of the install and maintenance.” ARCHITECTURE
Exit survey student responses

What one belief/thought has changed or altered as a result of taking this class?

- “That I need to [take] into account other peoples thoughts and feelings more.” TURF

- “I take working in groups [to be] more intriguing and helpful. I get to see how others think.” HORT
Exit survey student responses

What one practice/behavior has changed or altered for you as a result of taking this class?

• “The ability to think from more than one perspective.” AG MECH

• “I am a better critical thinker because of my ability to listen and fair mindedness I learned from this class.” AG EDUCATION
Exit survey student responses

What one practice/behavior has changed or altered for you as a result of taking this class?

• “Working in interdisciplinary groups is a relatively new concept for me. Throughout this class my openness to other viewpoints has changed during the duration of this class.” ARCHITECTURE

• “Working in groups and being fair minded with everybody.” HORT
Exit survey student responses

What one practice/behavior has changed or altered for you as a result of taking this class?

• “The ability to collaborate with multiple disciplines.” ARCHITECTURE

• “Group work” MARKETING/MGT

• “I will listen to everyone’s opinions with a more open mind.” AG EDUCATION
Ellen Vincent, Ph.D.
Lecturer Horticulture
Environmental Landscape Specialist

CT2 Faculty Scholar 2014-2018
CAFLS Excellence in Teaching 2015
ISA Certified Arborist

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