Critical thinking for transformative research

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Scientific progress is driven by curiosity and a need for problem solving. While, all research activities fulfil both these requirements, very few can dramatically change perspective and practice. So, what kind of research can drive transformation, shift in the paradigm, and generate new frameworks. We will explore some of these concepts and learn how to implement them in our research in this workshop.
Keep yourself muted. Unmute when you want to speak.

We understand that English might not be your native language or participants are at different levels in their research careers. This workshop provides a safe and friendly environment for participation regardless of English proficiency, previous research experience, and field of study.
PRESENTATION
MULTIPLE CHOICE QUESTIONS
GROUP DISCUSSION
PERSONAL REFLECTION
Question (1): What is the central purpose of research?

- Improve human condition
- Change society
- Create knowledge
- Academic promotion
Some research goes beyond these modest aims and creates new opportunities for further research. In such instances, research is capable of transforming an entire field.
Question (2): How does research transform the field?
• Change the way we do science
• Change the way we think
Transformative research involves ideas, discoveries, or tools that radically change our understanding of an important existing scientific concept or educational practice or leads to the creation of a new paradigm or field of science or education. Such research challenges current understanding or provides pathways to new frontiers.
The Structure of Scientific Revolutions
Second Edition, Enlarged
Thomas S. Kuhn

"A landmark in intellectual history." —Science

The Kuhn Cycle

Pre-science

Paradigm Change

Normal Science

Model Revolution

Model Drift

Model Crisis
Question (3): What can be considered transformative research?

• Excellent
• Strategic
• Innovative
• Published in high impact factor journal
• Patentable
• Funded
Activity 1: Discussion (5 min) + Report (10 min)

**Paradigm** is a set of concepts and practices that define a scientific discipline at any particular period of time. *Thomas Kuhn*

What type of research is more important?
- Incrementally adds to knowledge
- Shifts paradigms (transformative)

Could you think of an example for each type of research?
Who can engage in transformative research?

• Transformative innovations can arise from a wide variety of individuals and groups, from a wide variety of intellectual sources, including older and long-ignored ideas, and through revolutionary and evolutionary paths.

Requirements for transformative research:

• An open innovation system in academic sciences and research can encourage the exchange of information, even among competing groups

• The promotion of rapid communication among innovators and adopters

How can we identify potential transformative ideas?

• There are no established indicators that would identify specific individuals or concepts as sources of transformative innovation prior to the conduct of research.
Imagine that you have enough research funding. How can you change your current research to be transformative?
Three pillars of transformative research

• How do we engender **collaborations and partnerships** that cross boundaries, intersect disciplines, and empower communities and networks from global to local?

• How do we **train students** to do transformative research, and further, to support it financially as well as intellectually?

• How do we **see and appreciate the unexpected**, to know why it’s unexpected, to be curious about what is creating the unexpected result, and how it all fits into a broader framework?
Wheel of transformative research

Activity (3): Discussion (10 min), Report (5 min)
Which of these are more important for transformative research?
Pick one and give reason.

1. Focus on transformations
2. Focus on solution processes
3. Approach research as occurring from within
4. Work with normative aspects
5. Seek in-transcend current thinking and approaches
6. Take a multi-faceted approach to change
7. Acknowledge the value of alternative roles of researchers
8. Encourage second order experimentation and change
9. Be reflexive

https://cchange.no/2018/02/ten-essentials-for-transformative-research/
Organizational requirements for transformative research

- Leadership
- Resource Allocation
- Communication
- Structure & Process
- Capacity
- Learning Agenda
- Policy Environment

https://www.gettingsmart.com/2015/06/does-your-school-have-a-culture-of-innovation/
Activity 4: Discussion (7 min) + Report (5 min)

What are some of the barriers to transformative research in your institution?

Provide solutions to overcome them in short term.

Provide a suggestion for long-term changing of the institutional culture?
Although thinking is the core business of scientists, we rarely ponder how it thrives best.

Do we think?
Do we think deeply?
Do we think critically?
Do we think creatively?
Much of our thinking is biased, distorted, partial, uninformed. Critical thinking is when the thinker improves quality of their thinking by skillfully taking charge of the structures inherent in thinking and imposing intellectual standards upon them.

Paul & Elder (2014) Critical Thinking (2nd ed.)
Outputs of Critical Thinking

- Raises vital questions and problems, formulating them clearly and precisely
- Gather and assesses relevant information and effectively interprets it
- Comes to well-reasoned conclusions and solutions, testing them against relevant criteria and standards
- Thinks open-mindedly within alternative systems of thought, recognizing and assessing, as need be, their assumptions, implications, and practical consequences
- Communicates effectively with others in figuring out solutions to complex problems

Paul & Elder (2014) Critical Thinking (2nd ed.)
Fairmindedness

Understand and appreciate the viewpoints of others

Willing to change their views when faced with better reasoning

Willing to listen to arguments they do not necessarily hold

Use thinking in an ethical reasonable manner and rather than use their thinking to manipulate others and to hide from the truth

Paul & Elder (2014) Critical Thinking (2nd ed.)
The Intellectual Standards

Clarity  Relevance  Logicalness

Accuracy  Depth  Significance

Precision  Breadth  Fairness

Paul & Elder (2014) Critical Thinking (2nd ed.)
Definitions

• Clarity: Could you elaborate on that point? Could you express that point another way? Could you give me an illustration/example?

• Accuracy: Represent something in accordance with the way it actually is. Is that actually true? How could we check to see if that is accurate? How could we find out if that is true?

• Precision: A clear and accurate statement is not enough, need to be precise. Could you give me more details? Could you be more specific?

• Relevant: Needs to directly connect with and bears upon the issue at hand. How does this idea connect to the question? How does this idea relate to this other idea? How does your question relate to the issue we are dealing with?

• Depth: Go beneath the surface and identify the complexities inherent in it and deal with those complexities in an intellectually responsible way. How does your answer address the complexities in the decision? How are you taking into account the problems in the question? How are you dealing with the most significant factors in the problem?

• Breadth: Consider the issue at hand from multiple points of view. Do we need to consider another point of view? Is there another way to look at this question? What would this look like from the point of view of ...?

• Logicalness: When we think, we bring together a variety of thoughts in some order. When the combined thoughts are mutually supporting and make sense in combination, the thinking is logical Does this all fit together? Does this really make sense? Does that follow from what you said? How does that follow from the evidence?

• Significance: To reason through things, we need to concentrate on the most important information in our reasoning. Just because things are relevant doesn’t make them all equally important. What is the most significant information we need to address this issue? How is that fact important in context? Which of these ideas or concepts is the most significant?

• Fairness: If the other standards hold, fairness should follow. Is my thinking justified given the evidence? Am I taking into account the weight of the evidence that others might advance in the situation? Are these assumptions justified? Is my purpose fair given the implication of my behaviors/actions? Is the manner in which I am addressing the problem fair or is my vested interest keeping me from considering the problem from alt viewpoints? Am I using concepts justifiably or am I using them unfairly in order to manipulate someone?
Question (4): Which one of these elements are more prone to human bias?
Intellectual Habits to cultivate

- Intellectual integrity
- Intellectual humility
- Intellectual sense of justice
- Intellectual perseverance
- Intellectual confidence in reason
- Intellectual fairmindedness
- Intellectual empathy
- Intellectual autonomy
- Intellectual courage

Paul & Elder (2014) Critical Thinking (2nd ed.)
Unreflective Thinker
Challenged Thinker
Beginning Thinker
Practicing Thinker
Advanced Thinker
Accomplished Thinker
Activity 5: Discussion (7 min) + Report (5 min)

“"I was obligated to accept": A qualitative exploration of contraceptive coercion

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How do we shift the culture in research?
What is the measure of impact?

What constitutes advancement of science?