Navigating the Research Labyrinth: Preparing Winning
Research Projects Using Concept Mapping
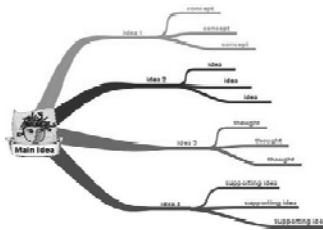C858

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October 8 3:45-4:45pm

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Concept Map

- Diagram of relationships
  - Leads to, causes, drives
- Organizes ideas- images-words
- Structures knowledge

Why Use Concept Maps for Research?

- The initial conceptualization of a research project is the <u>most difficult element</u> in developing a successful research project
- How well the project is <u>initially conceptualized</u> is the basis for right choices for design & analysis
- Conceptualization refers to the articulation of thoughts, ideas, or hunches and the representation in objective form
- In the planning process, concept maps help the researcher conceptualize:
  - major goals & objectives, needs, resources, & capabilities
  - programs or treatments
  - samples & settings
  - measures & desired outcomes
  - strengths & weaknesses   Trochim 1989

Origin

- Developed by Joseph Novak & research team beginning in the 1960's at Cornell University
- Work based on theories of David Ausubel (1968), which stressed the importance of prior knowledge in being able to learn about new concepts
- Novak concluded that learning that matters requires integration of new knowledge and propositions into existing cognitive structures
- A concept map was defined as a graphical representation where nodes (points or vertices) represented concepts, and links (arcs or lines) represented the relationships between concepts.
- The concepts, and sometimes links, are labeled
- The links between the concepts can be one-way, two-way, or non-directional
- The concepts and links may be categorized
- The concept map may show temporal or causal relationships between concepts
- Concept maps are powerful tools for learning
- Use has expanded beyond the classroom

  - **http://www.ericdigests.org/1998-1/concept.htm**

Concept Map
Novak & Cañas   2008   http://cmap.ihmc.us/docs/theory-of-concept-maps.

- Graphical tool to organize &/or represent knowledge
- Includes concepts placed in circles or boxes
- A concept is an event or object or reality described by a label
- Relationships between concepts are indicated by connecting lines
- Words placed on a line are linking words to describe the relationship between the two concepts
- The label is most often a word(s), although symbols can be used
- Propositions are statements about the event or object either naturally occurring or constructed
- Propositions contain two or more concepts connected using linking words or phrases to form a meaningful statement
- Sometimes these are called semantic units, or units of meaning

Concept Mapping
for Planning, Evaluation & Research Rosas & Kane, 2012

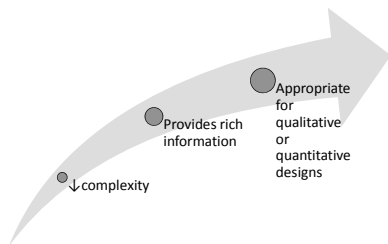Integrated mixed method approach to plan, evaluate & research

Concept mapping generates valid & reliable results

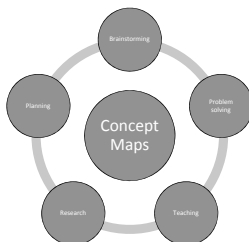Purpose varies considerably- confirms the broad use of mapping outside education

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Concept Mapping

Village & Greig et al. 2012

Appropriate for qualitative or quantitative designs

Provides rich information

↓complexity

There is no domain of knowledge or skills for which concept maps cannot be used
Novak 1990

Brainstorming

Planning

Concept Maps

Problem solving

Research

Teaching

Concept Mapping

Rosas & Kane 2012

- Public Health
- Business Strategic Planning
- Biomedical Research
- Needs Assessment Program Evaluation
- Research & Theory Development

Why does concept mapping work?

Ausubel 1968

- What does the researcher already know?
- Concept Mapping Process
- New knowledge is acquired & mastered with mapping to existing knowledge
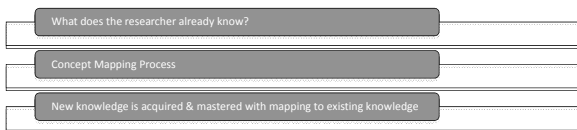
Concept Maps

- Drives focused thought & understanding
- Visualizes ideas
- Complements the physiology of brain work
- Helps construct knowledge

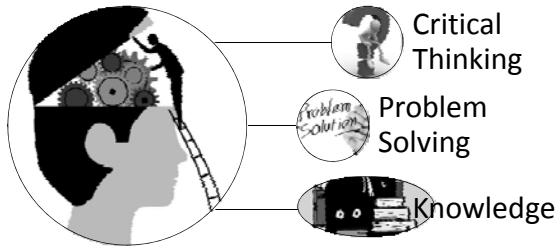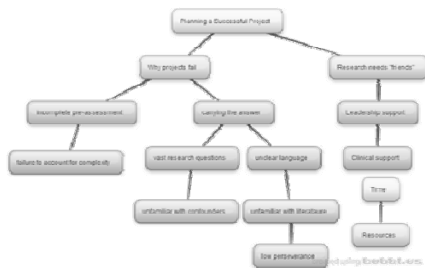### The primary benefit accrues in construction
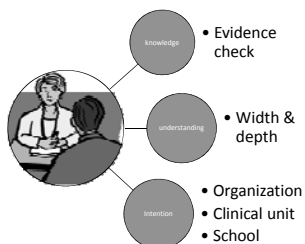
Novak, 1990

Concept Maps Stimulate Metacognition
Harrison & Gibbons 2013

Critical Thinking

Problem Solving

Knowledge

Key to successful research projects

The First Discussion

- Evidence check

- Width & depth

- Organization
- Clinical unit
- School

The First Map

Goals

Map

Project
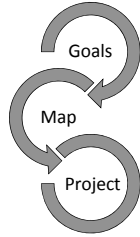
How Concept Maps Drive Successful Research

interpret	organize
compare	plan
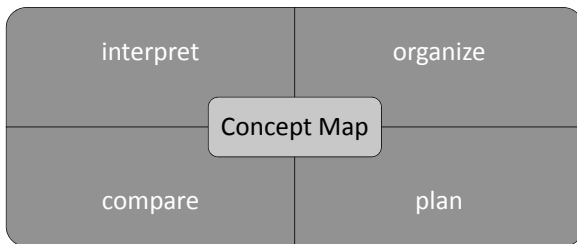
Concept Map

Successful Map Construction
Yeo CM 2014

Facilitator

Shared language

Openness

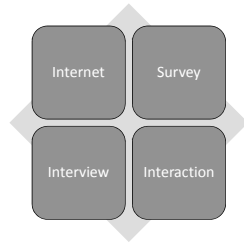Success
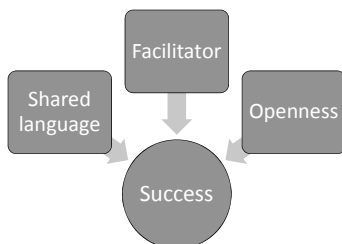
Data Collection for Concept Mapping
Rosas & Kane 2012


Map Construction

- Define the problem
- Define the context
- Write the questions- all of them!
- Identify the key concepts- usually 15 to 25 concepts will suffice
- Place the key concepts in the "parking lot"
- Concept maps are never finished. After a preliminary map is constructed, it is always necessary to revise this map & add concepts
- Good maps usually result from three to *many revisions*
- After a preliminary map is constructed, start cross linking
- Begin focus, limiting and choose
  - **Novak & Canas 2008**
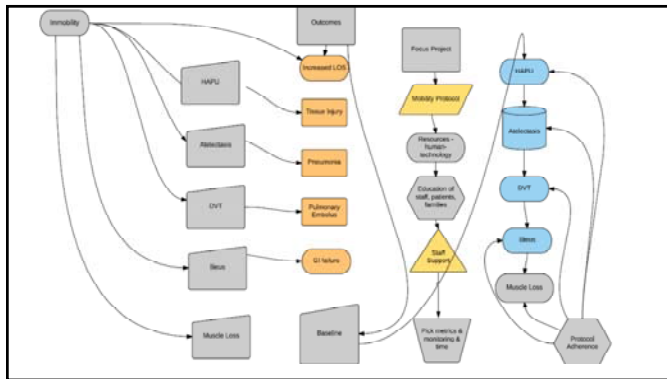
Concept Map Progression Torre, Durning, Daley, 2013
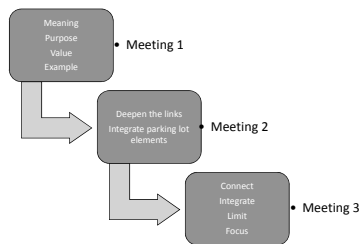
Group Concept Mapping Trochim WM 1989

- Concept mapping focuses group to stay on task/track
- Relatively "quick" results reduces ambiguity
- Interpretable related to use of participant's language
- Provides an image which simultaneously reveals ideas & interrelationships
- Can help to improve group communication, cohesiveness, morale
- Provides a structure for a successful research project

Creating the project

Resources

Ausubel, D. P. (1968). Educational psychology: a cognitive view. New York: Holt, Rinehart and Winston.

Harrison S & Gibbons C. Nursing student perceptions of concept maps: from theory to practice. Nurs Ed Perspec. 2013; 34(6): 395-399.

Novak JD & Cañas AJ. The theory underlying concept maps and how to construct and use them. Institute for Human and Machine Cognition.Pensacola Fl, 32502. www.ihmc.us. Technical Report IHMC CmapTools 2006-01 Rev 2008-01. Available at: http://cmap.ihmc.us/docs/theory-of-concept-maps.

Novak, J. D. (1990). Concept maps and vee diagrams: two metacognitive tools for science and mathematics education. *Instructional Science, 19,* 29-52.

Rosas SR & Kane M. Quality and rigor of the concept mapping methodology: A pooled study analysis. Evaluation and Program Planning. 2012; 35:236–245.

Torre DM, Durning SJ, Daley B. Twelve tips for teaching with concept maps in medical education. Medical Teacher. 2013; 35: 201–208.

Trochim, WM. Concept mapping: Soft science or hard art? Evaluation and Program Planning. 1989; 12(1): 87-110.

Trochim WM. AN INTRODUCTION TO CONCEPT MAPPING FOR PLANNING AND EVALUATION. *Evaluation and Program Planning. 1989; 12: l-16*

Village J, Greig M, Salustri F, Neumann. Linking human factors to corporate strategy with cognitive mapping techniques. Work. 2012; 41: 2776-2780.

Yeo CM. Concept mapping: A strategy to improve critical thinking. Singapore Nursing Journal. 2014; 41(3): 1-7.

Web Resources

https://bubbl.us   Great brainstorming web site

http://web.stanford.edu/dept/SUSE/projects/ireport/articles/concept_maps/The%20Theory%20Underlying%20Concept%20Maps.pdf
The Theory Underlying Concept Maps and How To Construct Them Joseph D. Novak, Cornell University

Canas AJ & Novak J. Constructing your first concept map.   http://cmap.ihmc.us/docs/constructingaconceptmap

free mapping software   http://cmap.ihmc.us/ [for Windows, OS X, iPad, Linux]

concept map building site   http://simplemapper.org/

Penn State Library Resources
https://www.libraries.psu.edu/psul/lls/students/research_resources/conceptmap.html

The birth of concept mapping   http://www.ericdigests.org/1998-1/concept.htm

Texas Collaborative for Teaching Excellence-concept mapping
http://www.austincc.edu/adnfac/collaborative/onsite_conceptmap.htm

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