



# Northern Illinois University

**Nicole D. LaDue, M.A.T., Ph.D.**

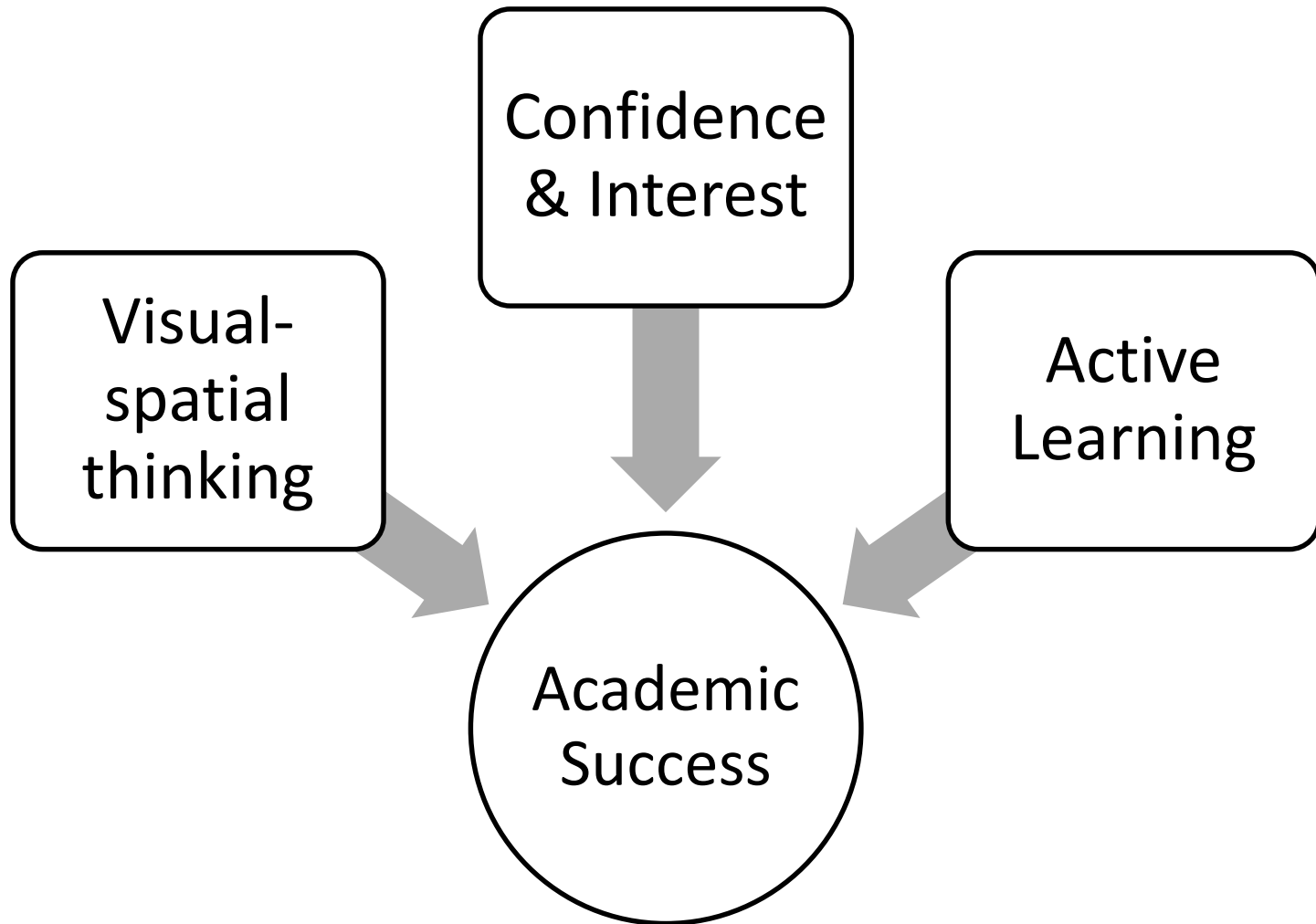
**Associate Professor**

Geology & Environmental Geosciences

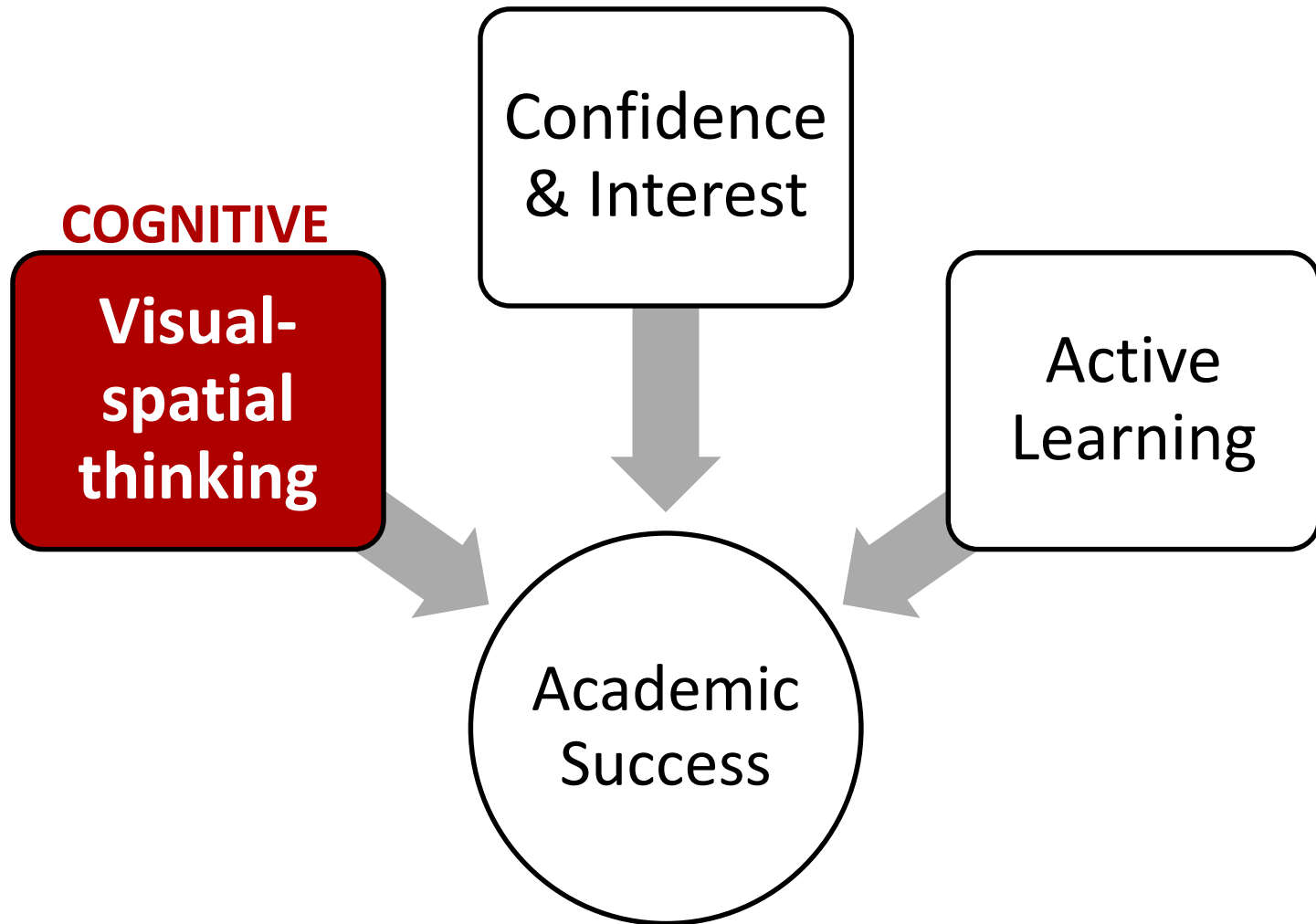
...and here's a chart that shows what you might see if you looked at a mountain range through a tennis racket.



# Research Themes



# Research Themes



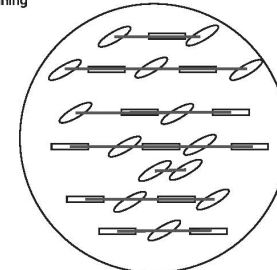


# What is visual -spatial thinking?

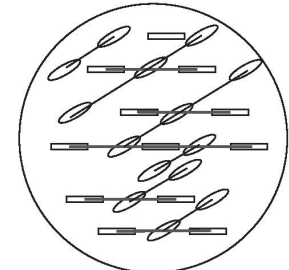


- Recognizing patterns
- Integrating parts into whole
- Mentally animating
- Inferring 3D from 2D

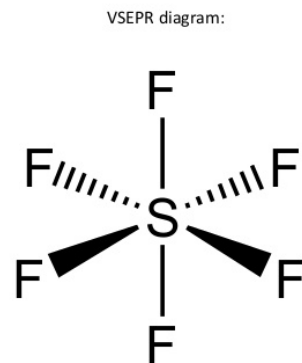
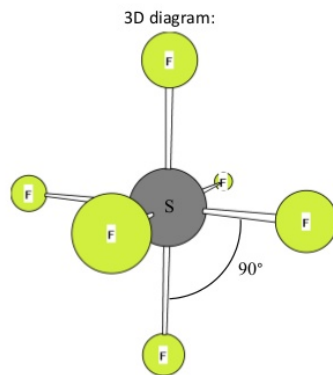
Combining



What the novice sees



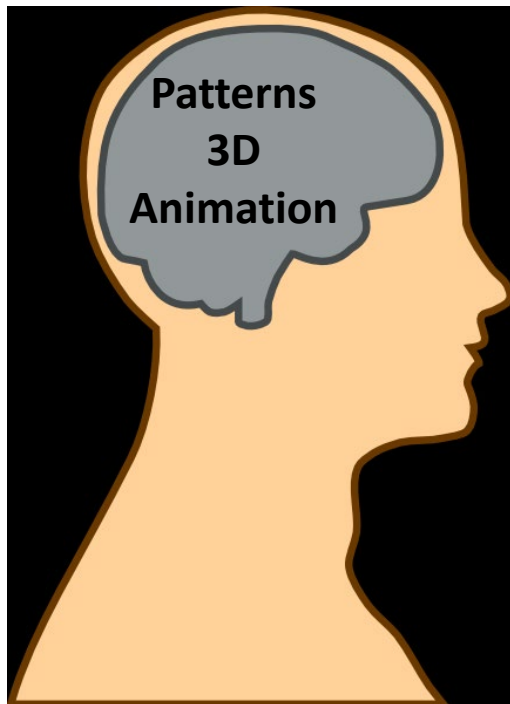
What the expert sees



# Importance of Spatial Skill



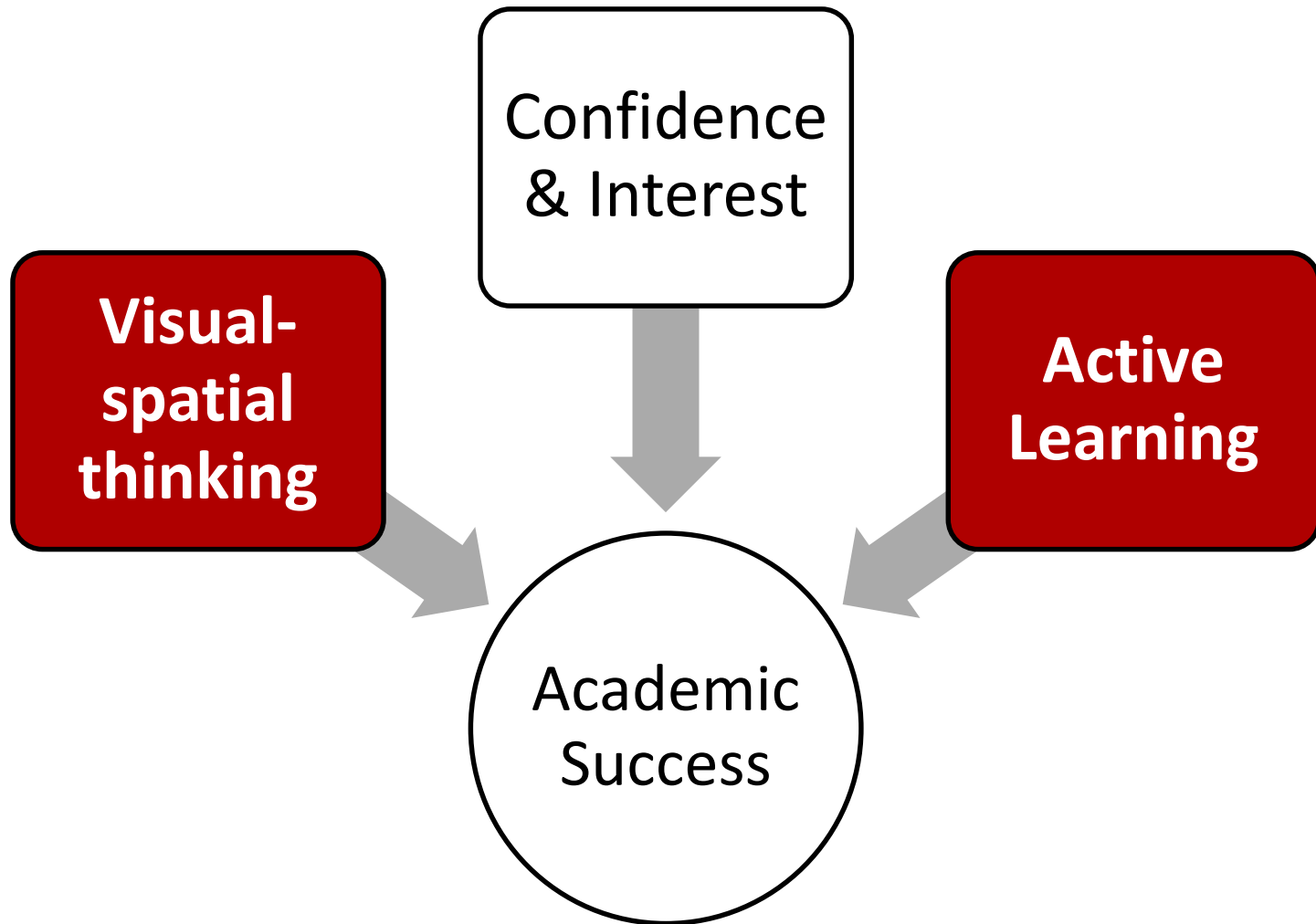
Spatial Skill



STEM Careers



# Research Themes



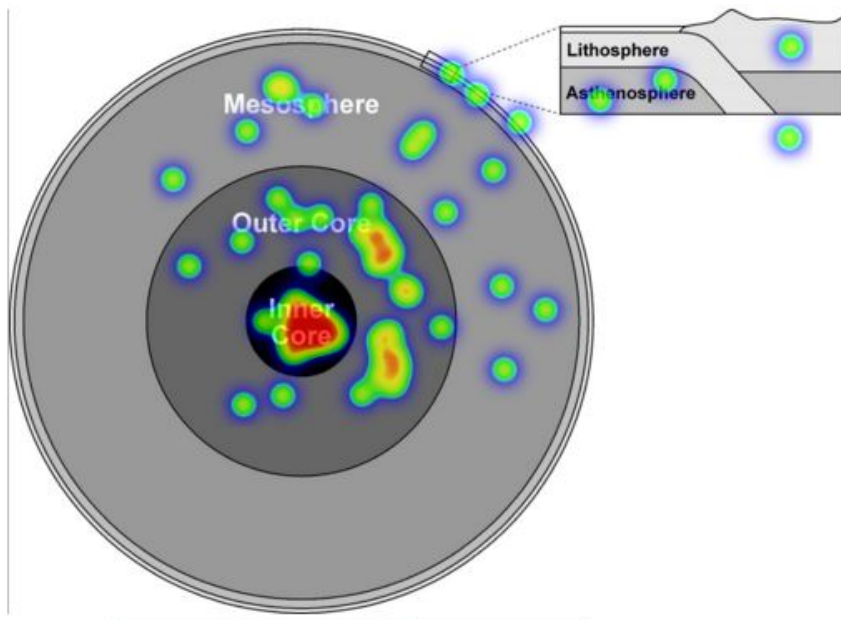
# Fostering Spatial Skill



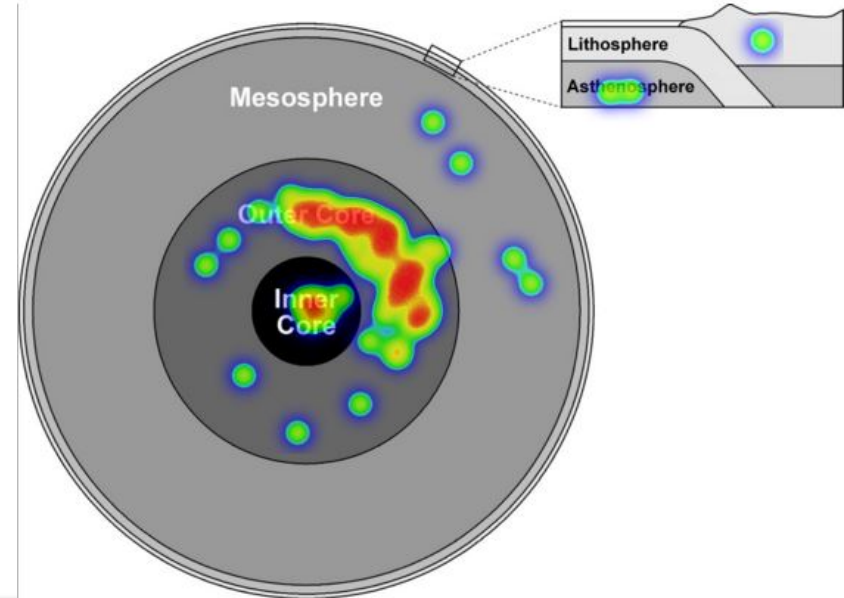
Clicker Study: Top Hat web-based system for smart devices

Prompt: *“Click within the layer that is liquid”*

Pre-instruction



Post-instruction

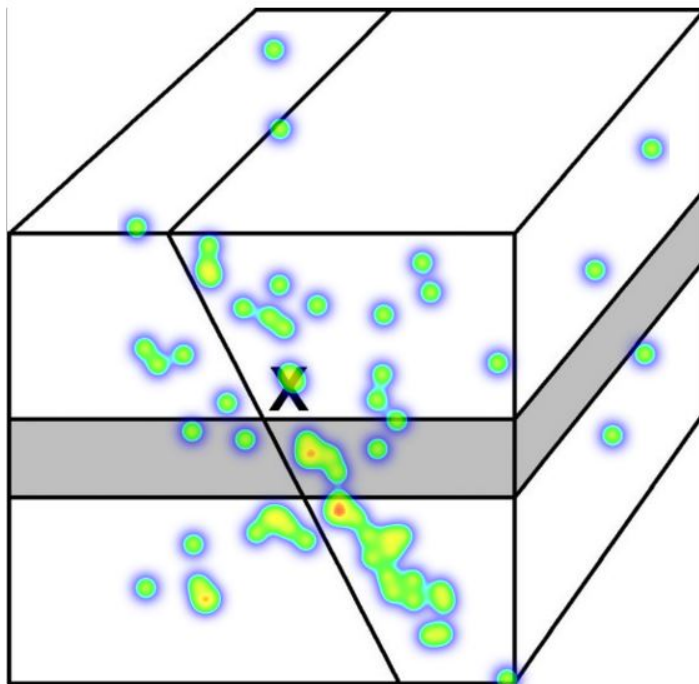


# Fostering Spatial Skill

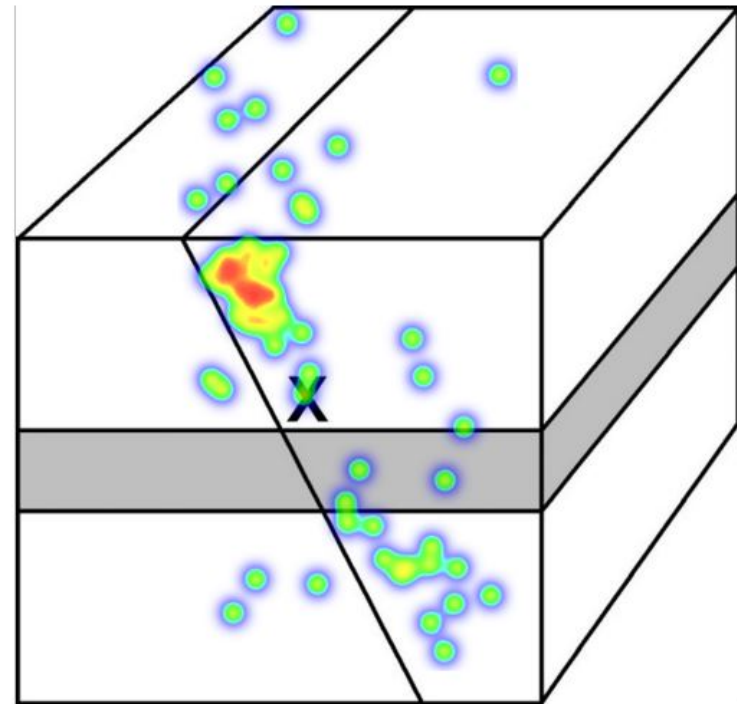


Prompt: *“If the block represents a reverse fault, click where the X will move after faulting”*

Pre-instruction



Post-instruction





# Fostering Spatial Skill



Scores increased

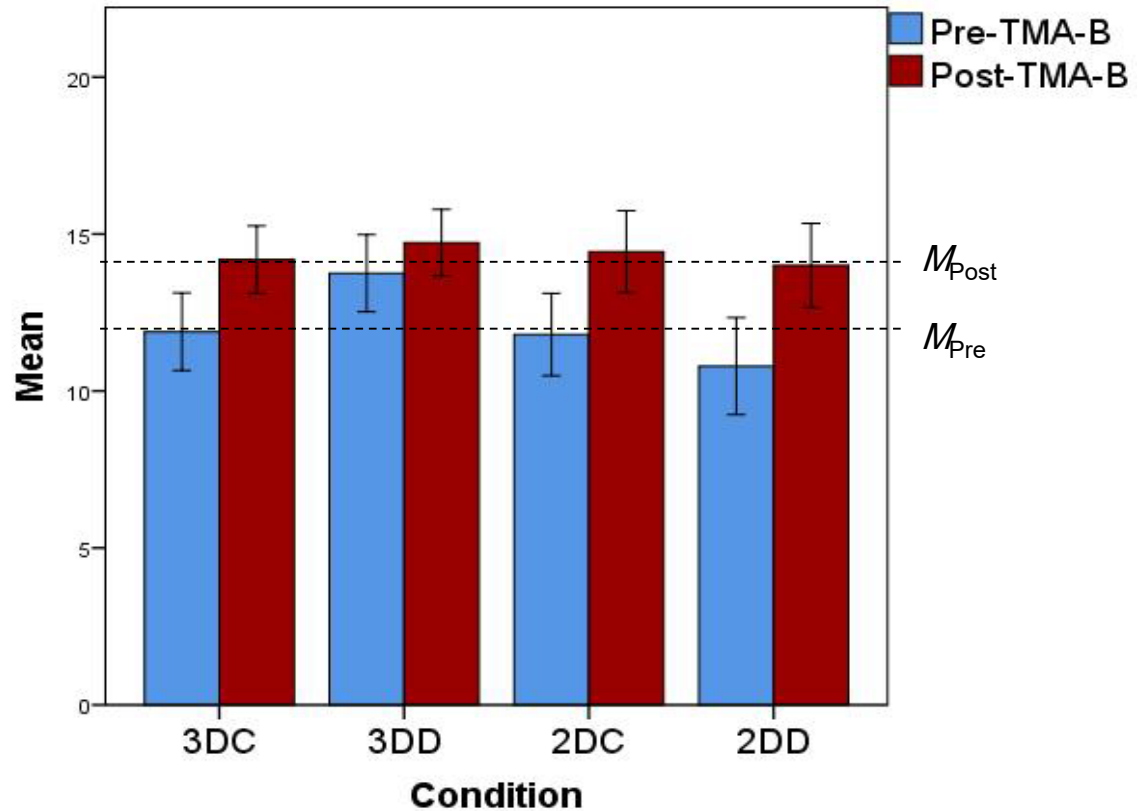
Significant gains

Prediction + Feedback



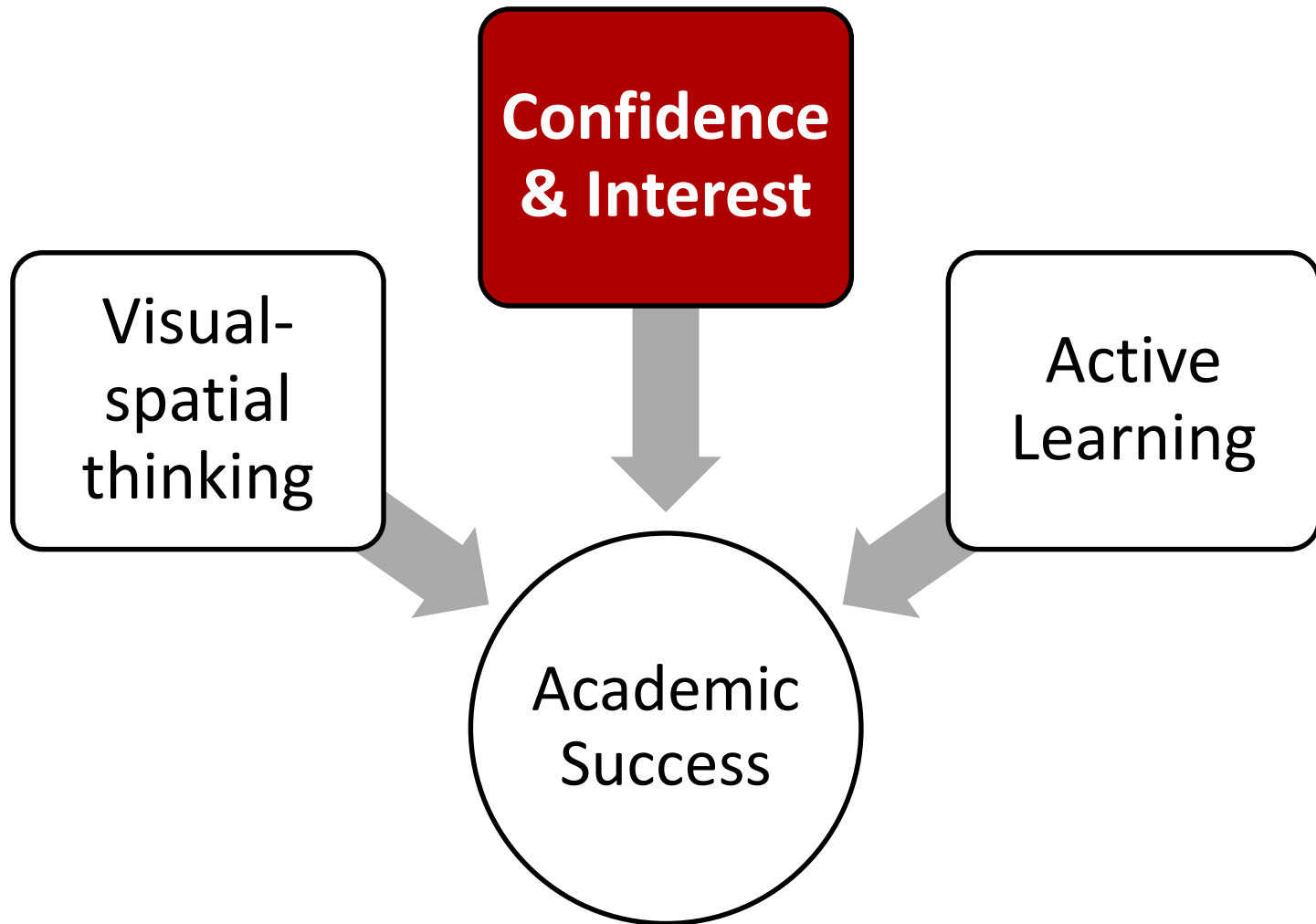
Learning

Pre- and Post-TMA-B Scores by Condition



Error Bars: 95% CI

# Research Themes





# BELONG in STEM Scholars



Building Engagement in Laboratories, Networking  
and Peer Groups (BELONG) in STEM Scholars

\$1M in funding

\$5,000 scholarships

Academically successful, financially struggling

Research  
Experiences

Professional  
Development

Peer  
Mentoring

# U.S.–Estonia Research Partnership



Engaging community college students and teachers in field- and laboratory-based research on climate change

10-week international research experience

2 semester mentored research experience

Team approach with grad student mentors

Science  
Identity

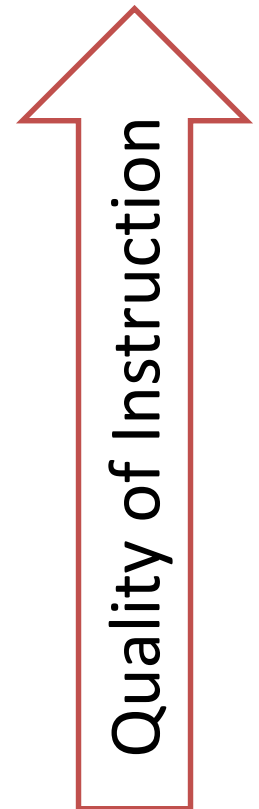
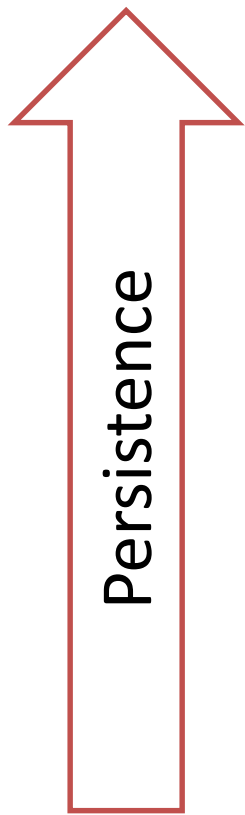
Confidence

Peer  
Mentoring

# STEM Education Research



## NIU Student Success



# Contact me:



Nicole D. LaDue, Associate Professor

Department of Geology & Environmental Geosciences

Center for Secondary Science and Math Education

Northern Illinois University

DeKalb, IL 60115

[nladue@niu.edu](mailto:nladue@niu.edu)