# GEOSPATIAL TECHNOLOGIES IN HIGHER EDUCATION: INTERACTIVE EXPERIENTIAL LEARNING

**Amber Ignatius, Ph.D.**

Assistant Professor of Geography and Geospatial Science

Institute of Environmental and Spatial Analysis

University of North Georgia

# GEOGRAPHY/GIS CLASSROOMS

## Value of spatial thinking

- Globalization
- Global issues require spatial solutions
  - biodiveristy, urban sprawl, energy, water, hazards, health
- Increasing use by the general public (GPS, GoogleMaps, IOT, mobile devices, etc.)

Introduction to GIS
UNG Institute for Environmental and Spatial Analysis

*(Kerski)*

# GEOGRAPHY/GIS CLASSROOMS

## Technology Rich

- GIS
- UAV (drones)
- GPS
- LiDAR
- sand/light tables
- augmented & virtual reality
- surveying total stations

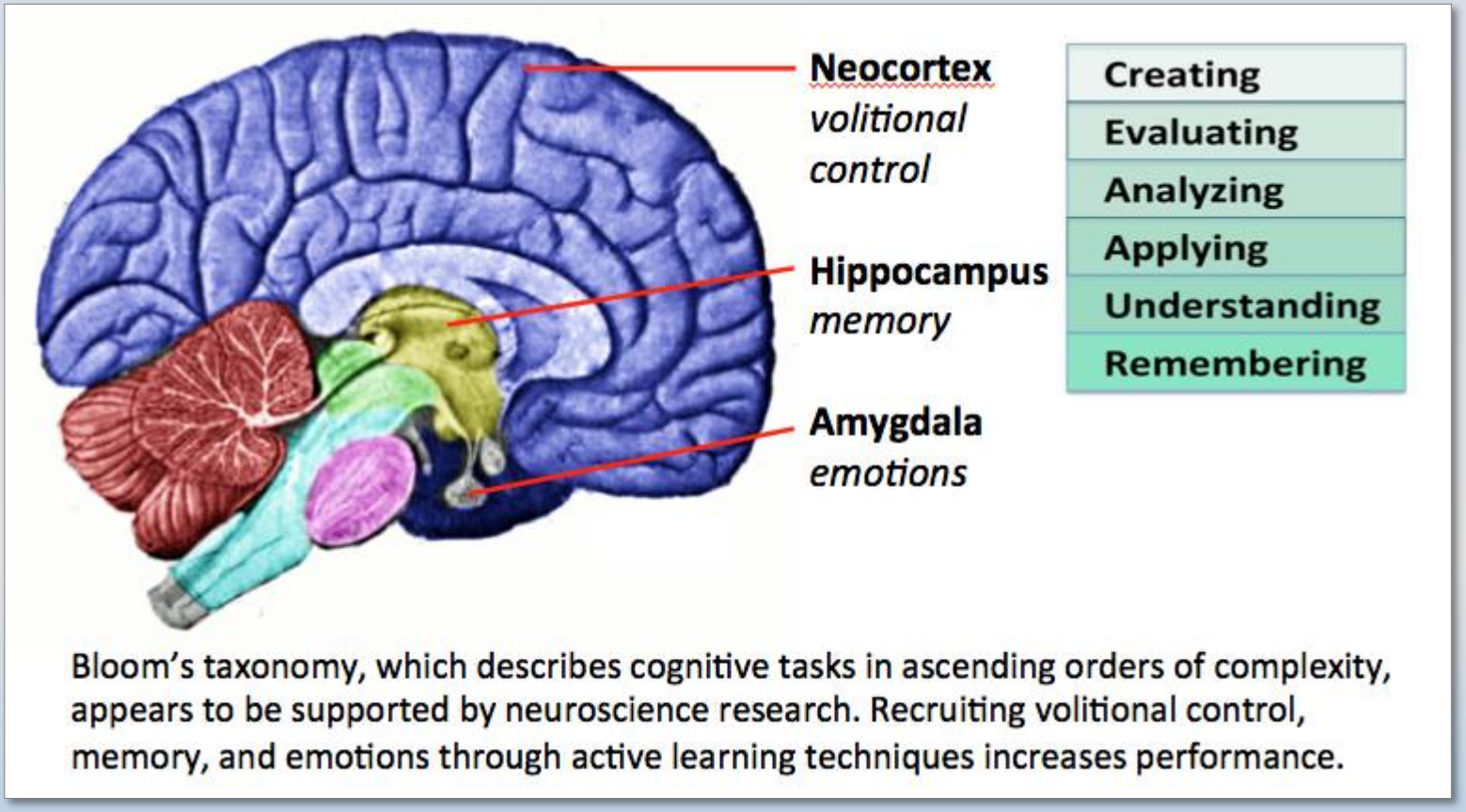
Introduction to Physical Geography, Fall 2018
Thermal Infrared UAV Image

## Benefits of Technology

- student engagement
- deeper understanding of material
- inquiry-based learning


Surveying I
UNG IESA

# (NEURO)SCIENCE-BASED PEDAGOGY



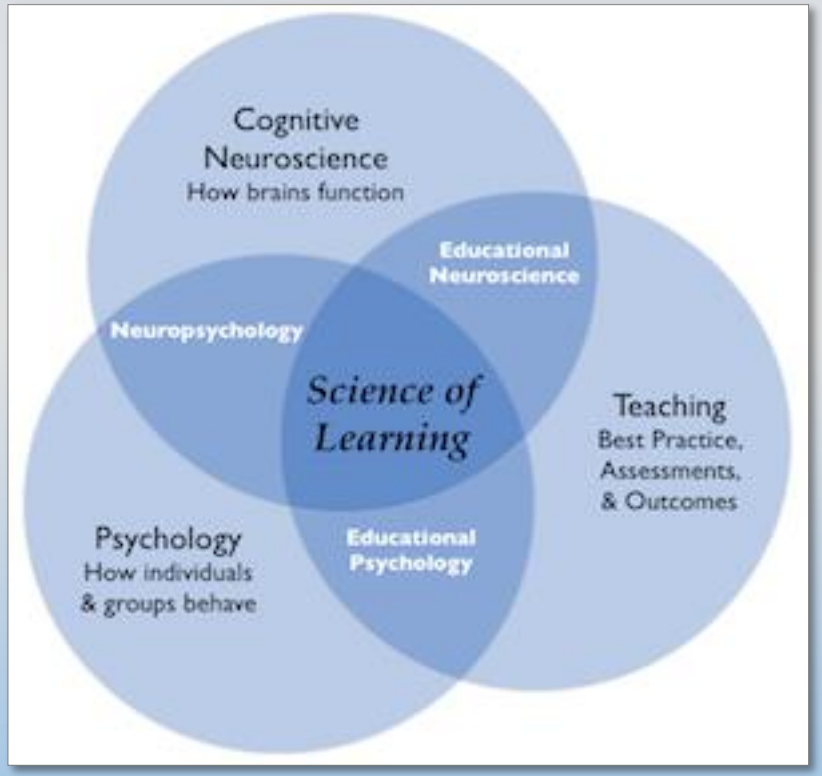

Bloom's taxonomy, which describes cognitive tasks in ascending orders of complexity, appears to be supported by neuroscience research. Recruiting volitional control, memory, and emotions through active learning techniques increases performance.

https://gsi.berkeley.edu/gsi-guide-contents/learning-theory-research/neuroscience/

# PEDAGOGY

## Science-Based Learning Strategies

- active experiential learning
- field-based inquiry
- metacognition
- retrieval practice
- story-telling

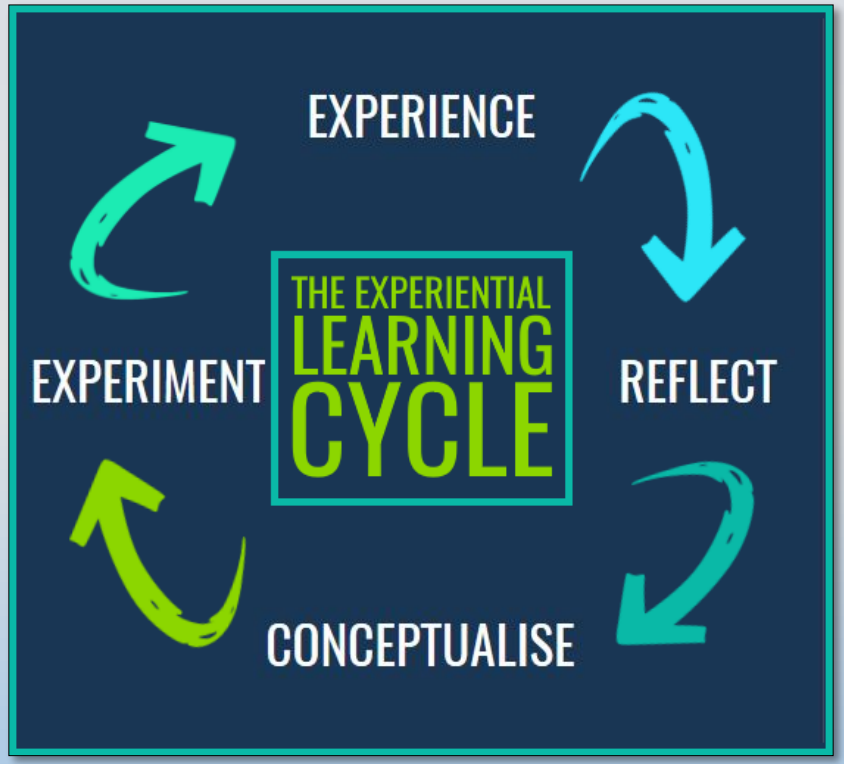



*Eyler, 2018*

http://sites.bu.edu/neuro-ed

# ACTIVE EXPERIENTIAL LEARNING

- Learning through experience
- Learning through ***reflection*** on doing



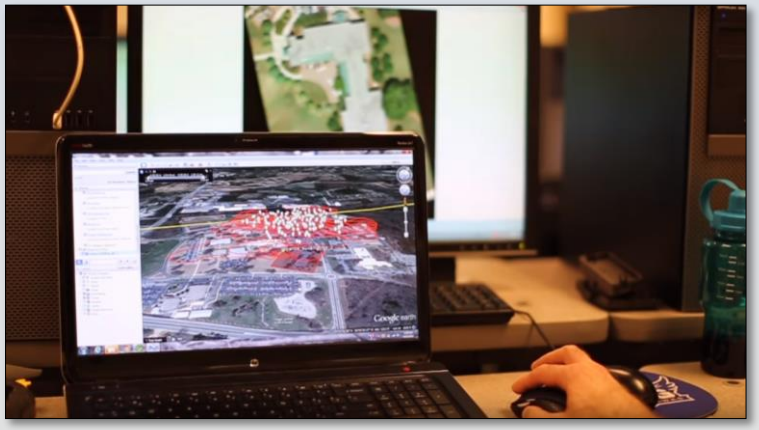

https://www.growthengineering.co.uk/what-is-experiential-learning/

# ACTIVE EXPERIENTIAL LEARNING

## APPLICATION: Geographic Information Science

Geography Courses

- explore spatial data…
  - interconnectedness
  - identify patterns/trends
  - embrace complex systems



GIS Courses

- encourage exploration/active experiences
- scaffolding
  - avoid reliance on “cook-book” procedures
  - iteratively remove detail, encourage students to explore

# FIELD-BASED LEARNING

## Experience Inquiry

Hypothesis-Testing & Experimentation

- science as iterative process
- location awareness
- spatial critical thinking

Challenge and achievement of real-world scientific investigation

- embrace the unexpected
- experience **failure**!


https://serc.carleton.edu/research_on_learning/synthesis/field_resources.html

# FIELD-BASED LEARNING

## APPLICATIONS: GPS, Surveying

- Experimentation
- Location awareness
- Service-based learning

GPS Data Collection

Surveying I, UNG IESA

# METACOGNITION

## Metacognition: thinking about thinking

- awareness of own learning process
- monitor/assess learning strategies and effectiveness (self-regulation, self-monitoring, self-assessment)
- consciously manage motivation/attitude toward learning

https://serc.carleton.edu/NAGTWorkshops/metacognition/introduction.html

# METACOGNITION

## APPLICATIONS: Sand/Light Tables, Citizen Science

- brainstorm educational applications
- creatively discuss *how* to tools can promote learning

Fundamentals of Remote Sensing
Spring 2019

Fundamentals of Remote Sensing
Spring 2019

# RETRIEVAL PRACTICE

**Retrieval practice**: strategy in which calling information to mind enhances long-term learning.

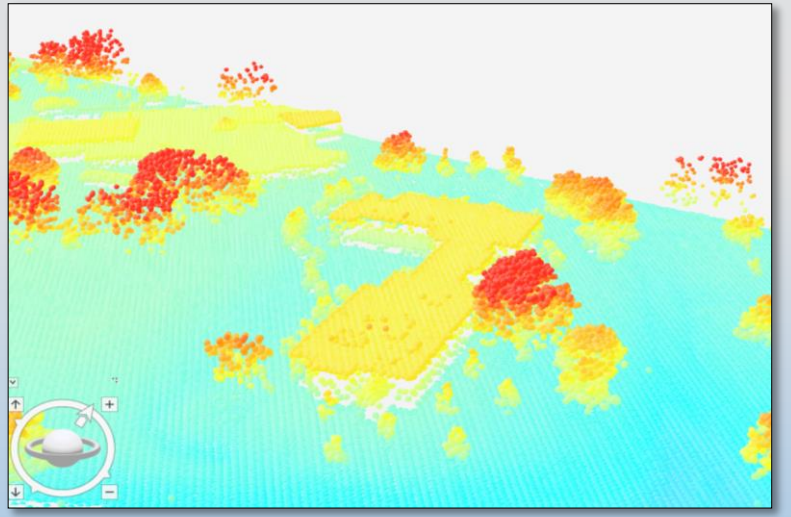
How to implement

- staggered review of concept within varying contexts
- low stakes and no-stakes assessment

# RETRIEVAL PRACTICE

## APPLICATION: REMOTE SENSING

- recall and reframe principles of electromagnetic radiation



UNG Science Building LiDAR Point Cloud

Remote Sensing of Environment
Fall 2018

# STORYTELLING

- humans learn through narrative
- memory is linked to emotion


https://www.forbes.com/sites/steveolenski/2015/11/30/4-benefits-of-using-storytelling-in-marketing/#27152b574616
https://www.nytimes.com/2012/03/18/opinion/sunday/the-neuroscience-of-your-brain-on-fiction.html

# STORYTELLING

## APPLICATION: Unmanned Aerial Vehicles

- teach history of technological innovation *using narrative*
- discuss applications *as stories*

Civil engineering applications of UAV
Dr. J.B. Sharma

Student flies DJI Phantom 4 as part of a class assignment

https://www.youtube.com/watch?v=1PKsTUinh6c

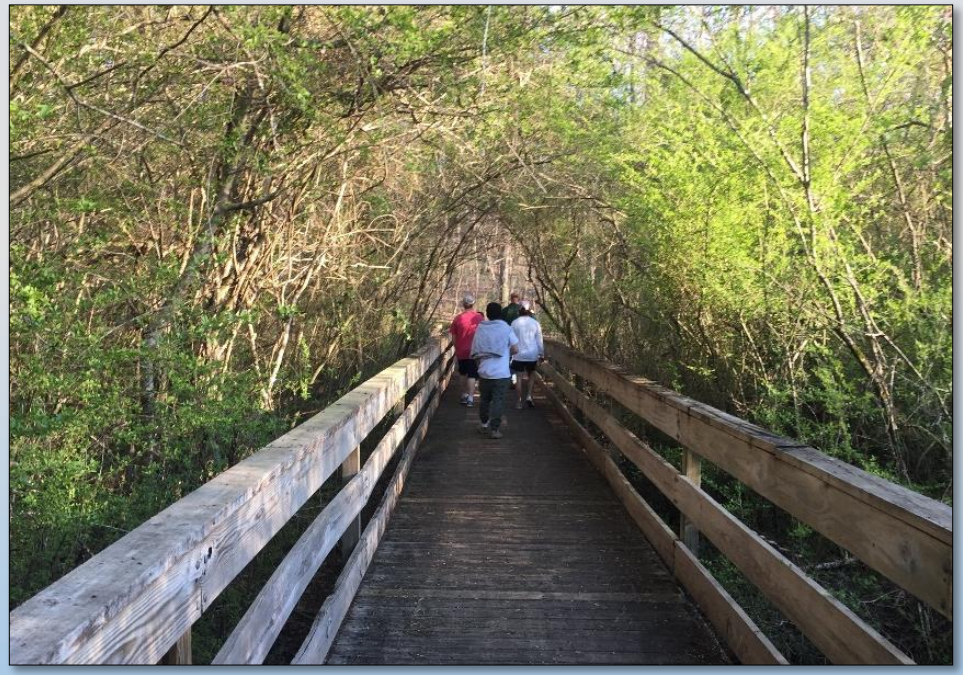
# SUMMARY


field-based inquiry
active experiential learning
Best Practices
metacognition
retrieval practice
storytelling

# CONCLUSIONS

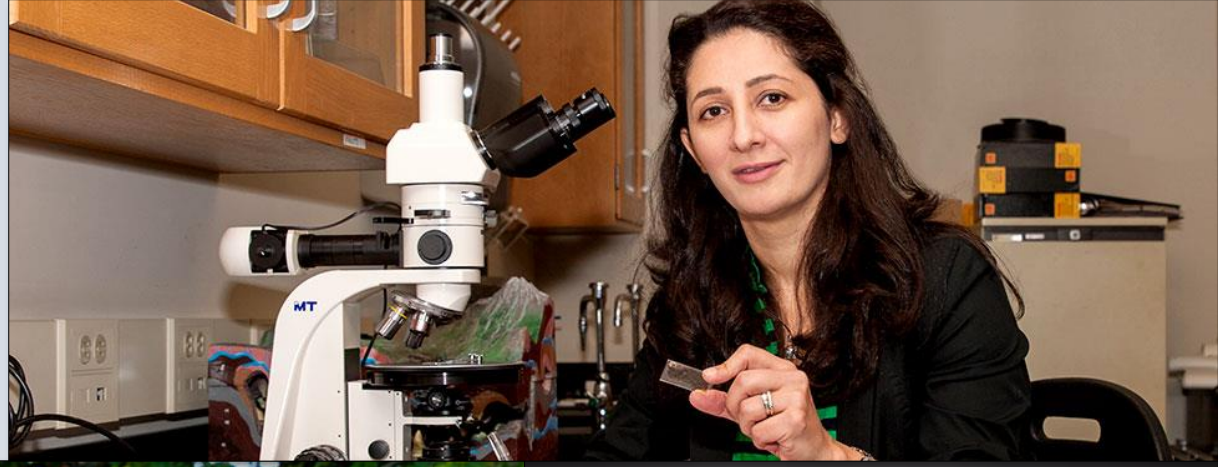
Geography/GIS classrooms and geospatial technologies provide opportunities for experiential active learning.

Teaching strategies which incorporate field-based inquiry, storytelling, retrieval practice, and metacognition can further enrichen classroom experiences and promote long-term learning.



Introduction to GIS Spring 2019
GPS Trail Data Collection

# CITED UNG IESA FACULTY



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