From Here to There…

The most promising words ever written on the maps of human knowledge are terra incognita – unknown territory

Boorstin, D. 1983

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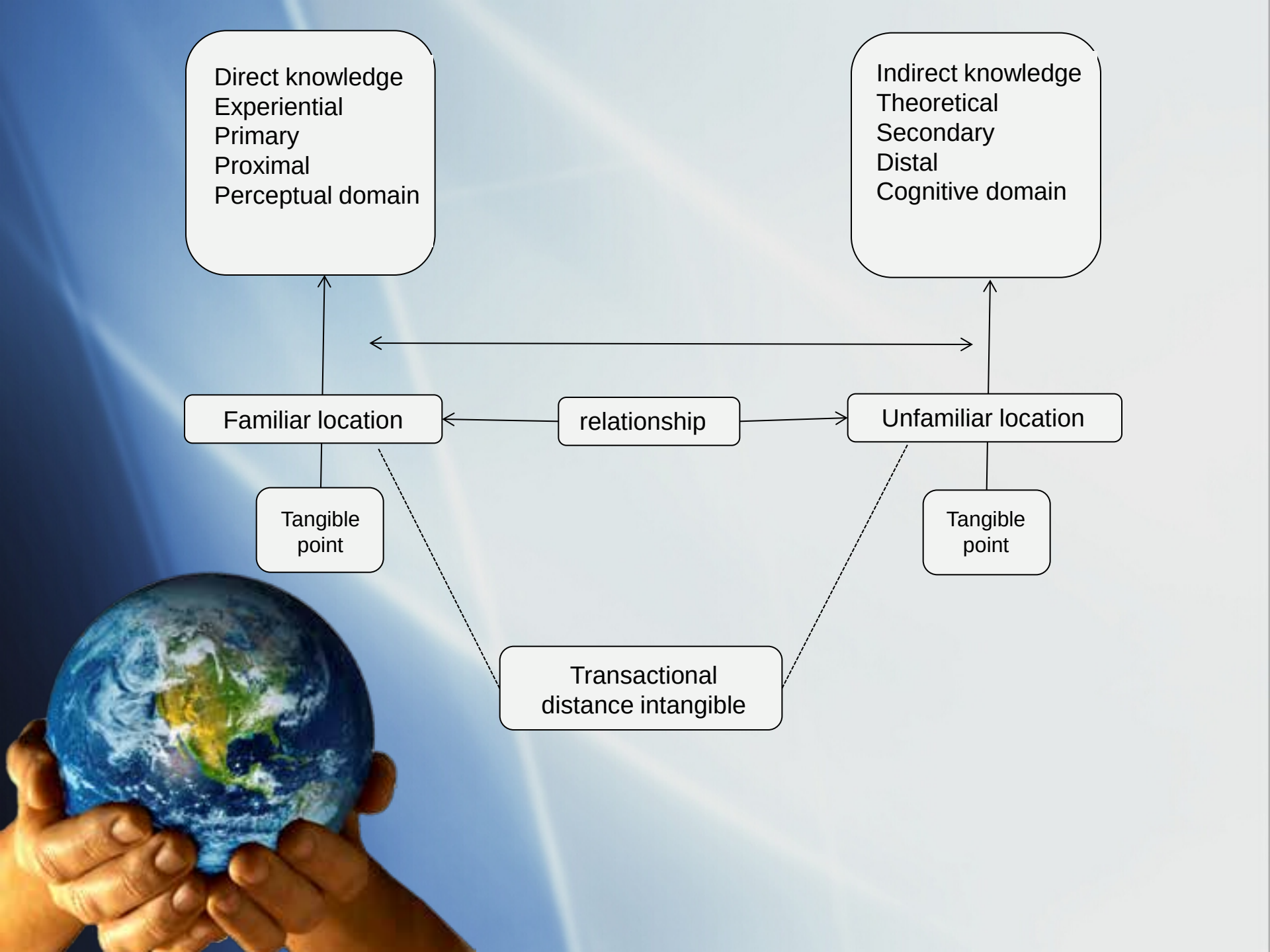
Abstract

Guiding students to become familiar with the 'unknown' is at the heart of education, and geotechnologies facilitate virtual accessibility to unknown places. Elementary students' knowledge, skills, motivations and dispositions employed in making meaning of an unfamiliar place were captured using video and think-aloud protocol. The data reveal how content knowledge affected strategies for navigation, dispositions influenced interpretation, and motivation was both

ontological and epistemological


Direct knowledge
Experiential
Primary
Proximal
Perceptual domain
Indirect knowledge
Theoretical
Secondary
Distal
Cognitive domain
Familiar location
relationship
Unfamiliar location
Tangible point
Tangible point
Transactional distance intangible

Background

- Constructionist inquiry STEM project
- Grade 5-6 students
- Project grounded in an unfamiliar place
  - Goal of understanding how geospatial literacy informed the students' inquiry
  - Unpack assumptions of image interpretation

Theoretical Framework: Learners

Dewey

Can’t separate the knower from the known

Child comes to learning with knowledge, experience,

Learning needs to be relevant to the learner’s individual context

Piaget

Learners can learn on their own, can construct knowledge, move toward the unknown – relationship considers the learner

Children think differently than adults

Move through different stages of cognitive development

Theoretical Framework: Learning

Vygotsky

Social influence and mediation of knowledge

Wrestling with activity

Papert

Constructing and building provided deeper knowledge than simply using

Eisner

Representations as cognitive tools

Theoretical Framework: Literacy

- Alberta Education
- Canadian Council on Learning
- PISA
  - Programme for International Student Assessment
- IALS/IALLS
  - International Adult Literacy Survey
  - International Adult Literacy Survey and Life Skills Survey

- Geospatial Literacy

  An amalgam of knowledge, skills, and dispositions required to collect, comprehend, critically assess, create, and communicate geospatial information.

Methods

- Qualitative case study
- 4 month onsite
- Multiple data sources
- Thinkaloud protocol with image interpretation
- Video
- Student reflections
- Observations
- Sketch maps

Knowledge

- Core, declarative knowledge
- Used as basis for interpretation
- Revealed through virtual globe navigation strategies
  - mirrored virtual reality navigation models
- New knowledge acquired through abductive reasoning

Skills/Procedural knowledge

- Taken for granted in image interpretation
- Challenges:
  - Orientation
    - dominant alignment effect
  - dimensional transformation

Dispositions

- "Constellation of attitudes, intellectual virtues, and habits of mind"
- geospatial thinking dispositions reflect critical thinking dispositions
  - Open-mindedness
  - Inquisitiveness
  - Analyticity
  - Systematicity
  - Craftmanship
  - Truth-seeking
  - Self-confident

(Facione, Facione, Sanchez, 1994)

Dispositions: Curiosity

- § Ontologic motivation
  - § Distrust in technology resulted in a different purpose and approach to using the technology
  - § Students expressed different “truths”
- § Epistemic motivation
  - § Extrinsic: non-specific closure - intolerant of uncertainty and ambiguity, seize and freeze
  - § Intrinsic: specific closure – a desire to reach a conclusion that makes sense and is personally acceptable, and a practice of investigating the evidence until satisfied of a valid conclusion

(Kruglanski & Webster, 1996)

Dispositions: Curiosity

- With increased epistemic motivation comes increased ability to deal with the discomfort of uncertainty and ambiguity

- Students were able to use epistemic motivation to go well beyond the limits of their skills and comfort and reach new levels of learning

(Kruglanski & Webster, 1996)

Dispositions: Interest

- engage with particular content, as demonstrated by increased attention, concentration and affect

- Individual interest
  - internal
- Situational Interest
  - external catalyst

- Students' questions formed the lens through which they viewed imagery

(Hidi, 2006)

Dispositions: Creativity

- “mini-c” creation, the intrapersonal construction of knowledge and insight development of which imagination is the foundation.
- Imagination
  - Used to both create and explicate knowledge
  - Reproductive
  - Combinatorial

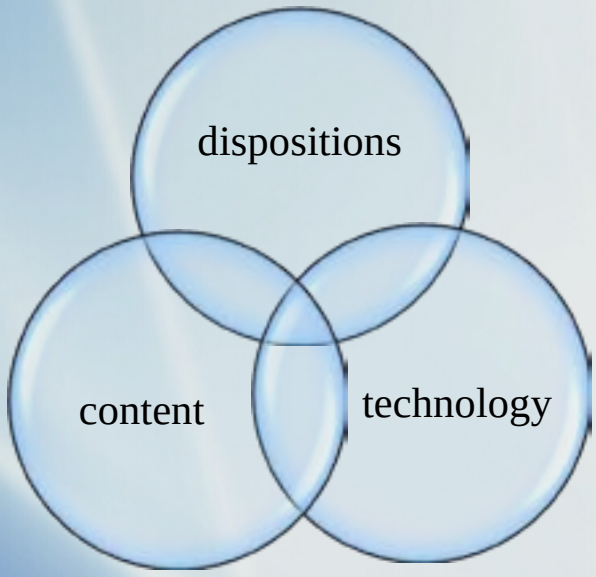
(Beghetto & Kaufman, 2007)

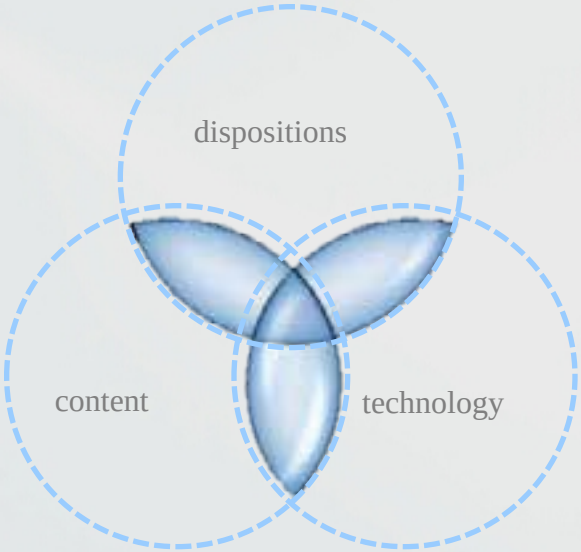
Conclusions

- Image interpretation can be used to both employ and reveal geospatial knowledge, skills, and dispositions.
- Dispositions for spatial thinking reflect critical thinking dispositions
  - Creativity and curiosity are triggered with image exploration through abductive reasoning
  - Challenges to interpretation are orientation and perspective

Conclusions

Model for learning with geospatial technology





Knowledge of content as well as technology (technical and procedural knowledge) work in tandem with geospatial thinking dispositions. Like TPACK, overlapping areas are critical.

(Mishra & Koehler, 2006)

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