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Defining Individuals' Learning Styles in a Technology- Enhanced Learning Environment

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Technology & Medical Education

- Impact of technology to medical education

" If there is a single area that represents the greatest change in the way physicians are preparing to enter practice in the 21st century, it is the application of computer technology to almost every aspect of their education. -- Anderson & Brownell, 2000"

Technology & Learning Styles

- "…effective computer-assisted instruction can correct for many teacher's inability to meet the needs of all learners." -- Schelechter, 1991
- "computer assisted instruction may not be the preferred mode of learning for all of the students" -- Ross, 1999

Previous Studies (1)

- Hoffman and Waters (1982) stated that CAI is suited best for individuals who “have the ability to quietly concentrate, are able to pay attention to details, have an affinity for memorizing facts, and can stay with a single track until completion.”
- Gregorc (1985) argued that sequential students prefer CAI because the computer is seen as an extension of the sequential person’s mind.

Previous Studies (2)

- Woods (1996) et al claimed that individuals who have a preference for CAI usually enjoy working alone.
- Ross & Schulz (1999) asserted that abstract-random (AR) learners may be at risk of doing poorly with certain forms of computer-aided instruction. They also argued that AR participants spent less time with program, used less video and made fewer interactions with the computer.

Objectives

- Understanding students' learning styles in the context of actual learning experiences.
- Providing both qualitative and quantitative data to interpret the association between individual's learning style and attributes of the learning environment.

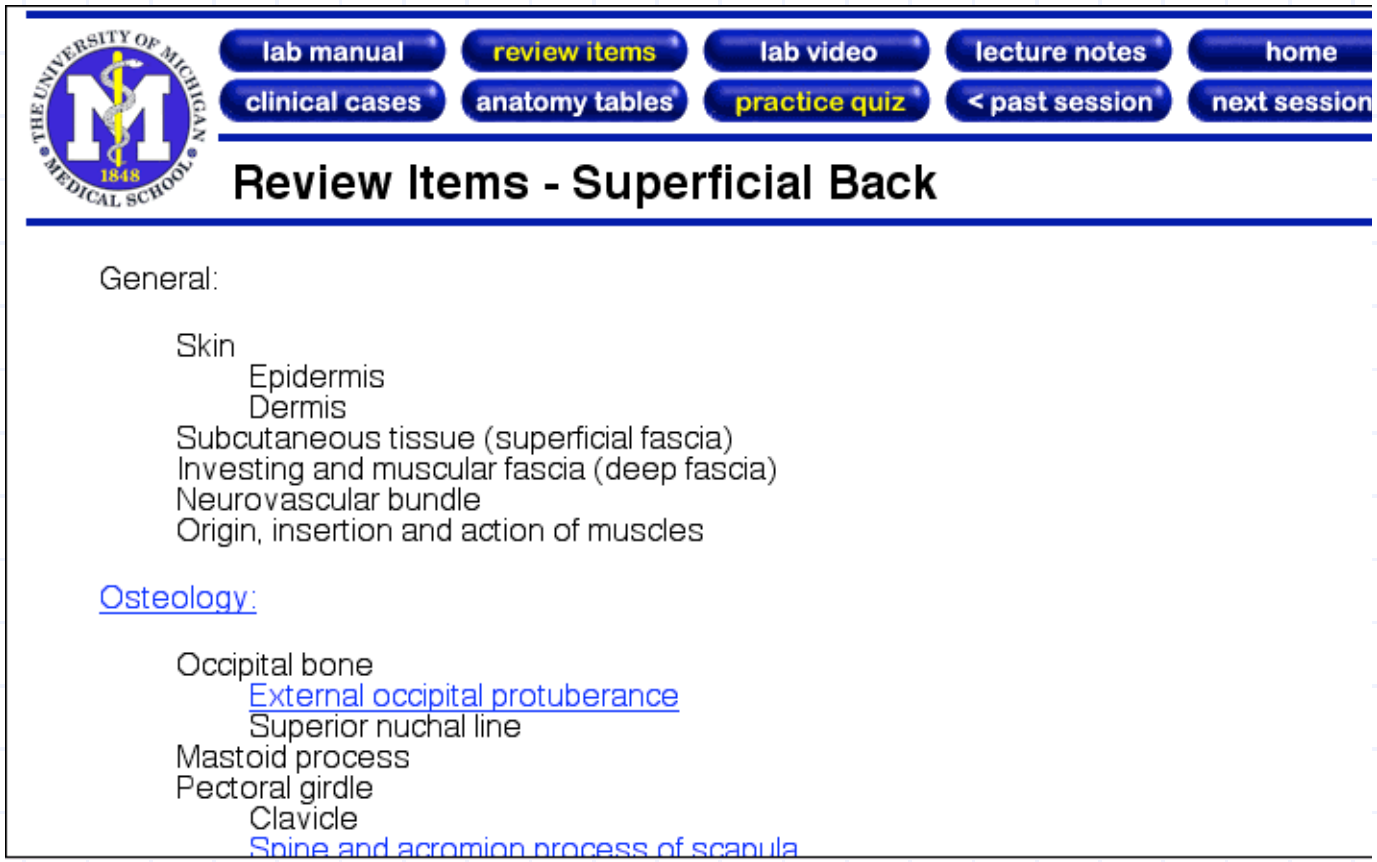
Guiding Questions

- How students with different learning styles perceived and interacted with computer-based learning materials?
- What is the association between different learning styles and characteristics of the technology-enhanced learning environment?

Educational Setting

- Available online materials:
  - Review Items
  - Anatomy Table
  - Dissector (Lab Manual)
  - Dissecting Movie
  - Online Quizzes
  - Clinical Cases
- ATLASPlus

Web Materials



lab manual | review items | lab video | lecture notes | home

clinical cases | anatomy tables | practice quiz | < past session | next session

Review Items - Superficial Back

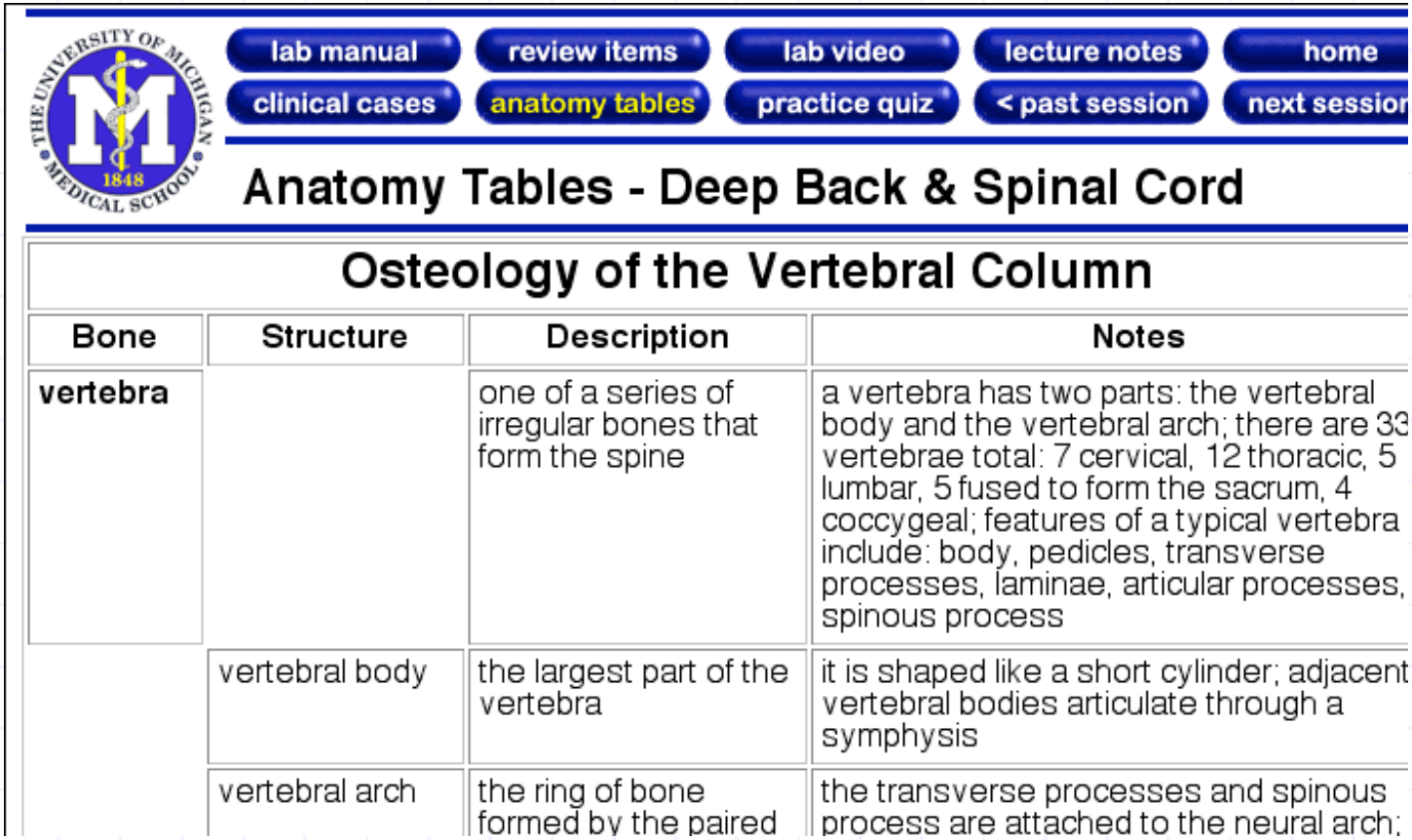
General:

- Skin
  - Epidermis
  - Dermis
- Subcutaneous tissue (superficial fascia)
- Investing and muscular fascia (deep fascia)
- Neurovascular bundle
- Origin, insertion and action of muscles

Osteology:

- Occipital bone
  - External occipital protuberance
  - Superior nuchal line
- Mastoid process
- Pectoral girdle
  - Clavicle
  - Spine and acromion process of scapula

Anatomy Table



lab manual | review items | lab video | lecture notes | home
clinical cases | anatomy tables | practice quiz | < past session | next session

Anatomy Tables - Deep Back & Spinal Cord

Osteology of the Vertebral Column

Bone	Structure	Description	Notes
vertebra		one of a series of irregular bones that form the spine	a vertebra has two parts: the vertebral body and the vertebral arch; there are 33 vertebrae total: 7 cervical, 12 thoracic, 5 lumbar, 5 fused to form the sacrum, 4 coccygeal; features of a typical vertebra include: body, pedicles, transverse processes, laminae, articular processes, spinous process
	vertebral body	the largest part of the vertebra	it is shaped like a short cylinder; adjacent vertebral bodies articulate through a symphysis
	vertebral arch	the ring of bone formed by the paired	the transverse processes and spinous process are attached to the neural arch;

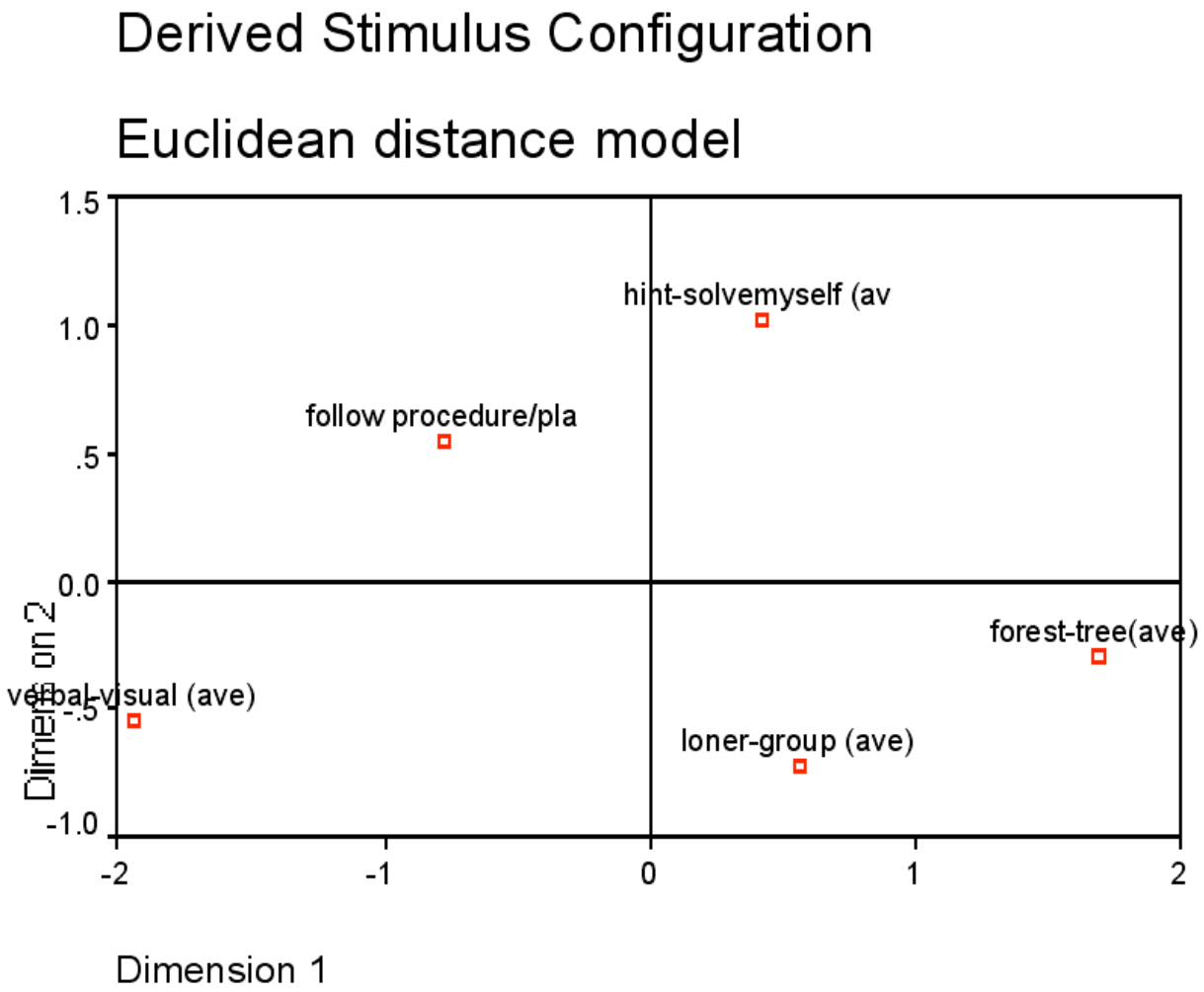
Method (1)

- Learning style survey
  - focus on big picture vs focus on details
  - prefer to follow procedure vs prefer to work at personal pace
  - need hints and help for problem solving vs prefer to solve problems by myself
  - prefer to learn verbally vs prefer to learn visually
  - prefer to work alone vs prefer to work in group

Method (2)

- Student Interview
- Instructor Interview

Results (1)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Euclidean distance model
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0.0
-.5
-1.0
-2
-1
0
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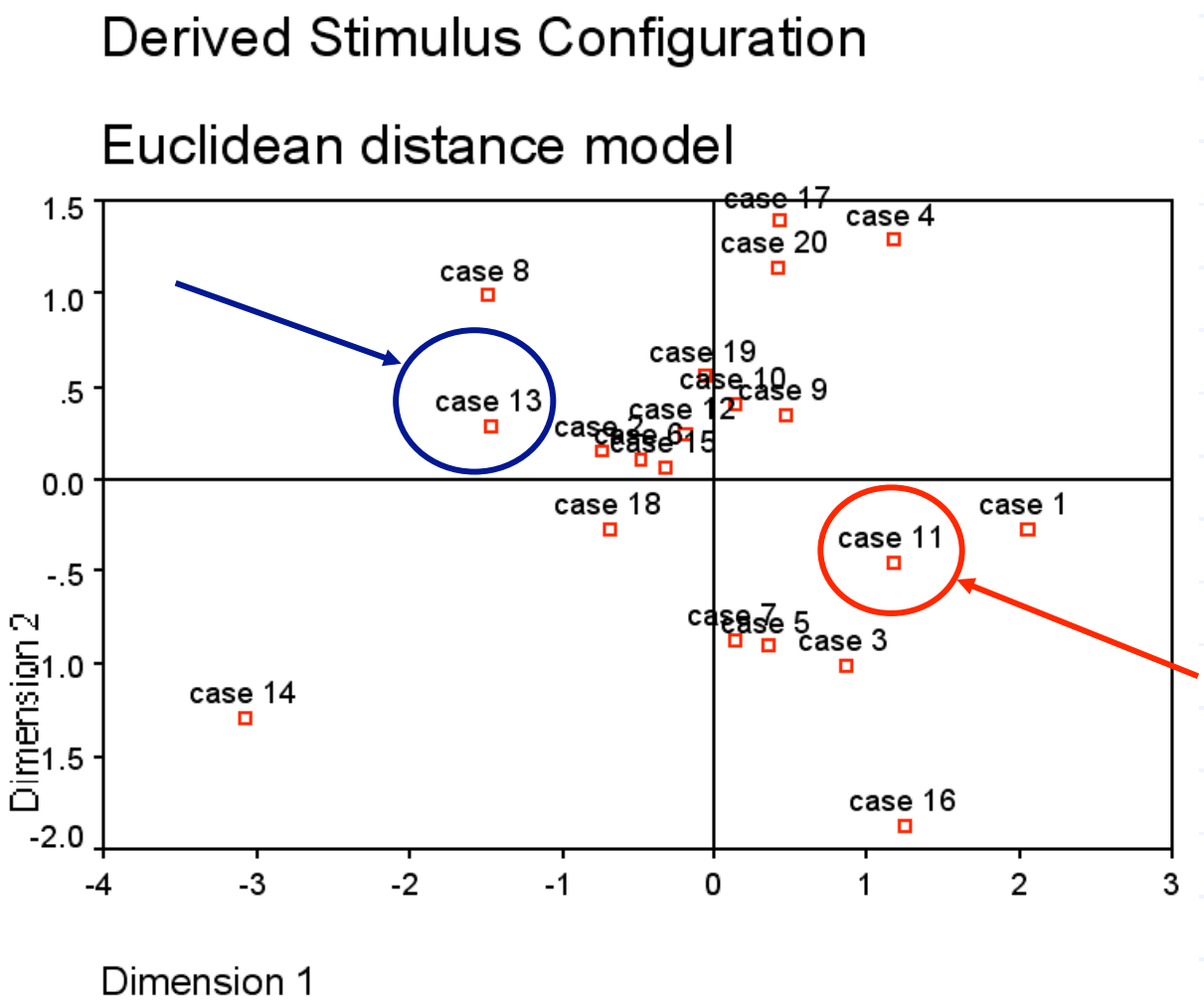
2
hint-solvemyself (av
follow procedure/pla
forest-tree(ave)
verbal-visual (ave)
loner-group (ave)
Dimension 2
Dimension 1

Results (2)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Euclidean distance model
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Dimension 2
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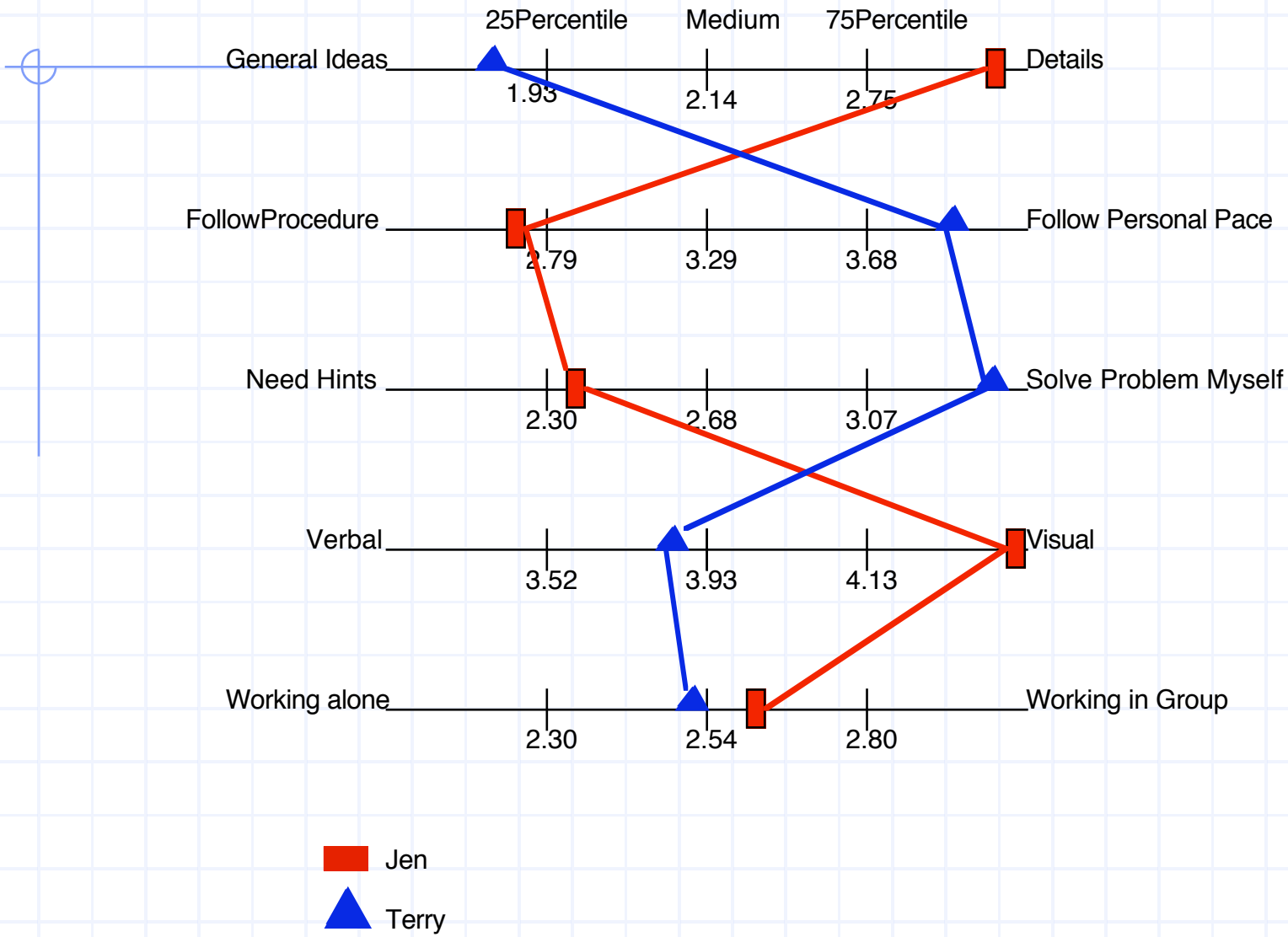
Learning Styles Scaling



Findings (1) Perception of Computer Use

Terry

- Situated-use of a computer
- Perceived *Anatomy Table* most useful
- Limited access to computer was a hurdle
- Computer problems were unbearable

Jen

- Thoroughly and systematically explored to all the materials
- Used *Anatomy Table* for review purposes
- Accommodated herself to the computer lab hours
- Persistent in trying computer applications

Findings (2): Learning Difficulties

Terry

- Reviewing information in multiple ways is confusing
- Linear Instruction

Jen

- Memorizing details

Findings (3): Suggestions to Online Materials

Terry

- Would like to see the *relationship* among information
- Computer orientation

Jen

- Need more thorough materials for each lab
- Materials should be matching the content of each lab session

Discussion (1) Revisit Previous Research

Terry

- Learning at his own pace, paying attention to the big picture
- Using computer “by chance”
- Butler -- random learner

Jen

- Following procedure, focuses on details and hints for learning
- Integrating computer materials systematically into learning
- Gregorc -- sequential learner
- Kolb -- assimilator

Discussion (2): "One Size Fits All?"

- Students who focuses on details of the learning materials may need more online information.
- Students who focuses on the big picture may feel confused by the variation of information
- Implementation of information organization

Discussion(3): Beyond the Learning Style

- Learning preference with computer can be inconsistent with one's learning style
- What should be taken into account for future research: computer access, level of comfort with computer, and experience with technology
- The importance of computer orientation

Conclusion

- Implications for the Visible Human Learning Environment Design

Acknowledgement

- National Library of Medicine
  - Grant N01-LM-0-3511, PI: Dr. Brian Athey
- Division of Anatomical Sciences, University of Michigan, Ann Arbor
  - Dr. Burkel, Dr. Thomas Gest, Geri Pelok

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