An Informatics Perspective on Computational Thinking

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1 July 2013

Topics

1. Informatics Thinking
2. The Course
3. The Activities
4. The People
5. Assessment
6. Conclusions and Future Work

College of Informatics

- Business Informatics (Information Systems, Health Informatics, Library Informatics)
- Communications (Comm Studies, Electronic Media, Journalism, Media Informatics)
- Computer Science (Computer Science, Information Technology)

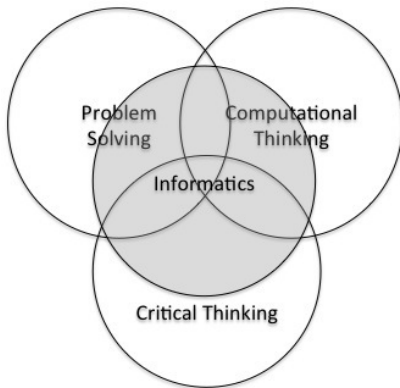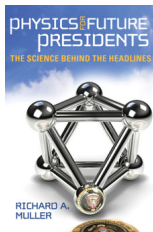# Computational and Critical Thinking

Figure: Intersection of Computational and Critical Thinking

Computational Thinking vs. Informatics Thinking

- Informatics for Future Presidents.
- Computer Literacy for 21st Century.
- Information focus.

- Programming focus.
- CS0 designed to lead to CS1.
- Computational Thinking focus too narrow.

`http://inf128.nku.edu/`

Student Learning Objectives

1. Define and identify terms, concepts, and current practice of informatics.
2. Find, interpret, and evaluate information.
3. Evaluate the capabilities of ICTs using principles of informatics.
4. Explain how the design of ICTs influence human behavior.
5. Understand how ICTs influence the creation of shared meaning.

Information Principles

1. Information can be measured using the Shannon definition.
2. Evolution is a process for selecting information.
3. Digital information consists of discrete binary units called bits.
4. Information can be encoded into bits in many ways.
5. Digital copies are easy to make and perfect, while analog copies degrade with each generation.
6. Metadata consists of bits describing other bits.
7. Bits can last forever, but you may not be able to decode them.

Computation Principles

1. Both data and code are just bits.
2. Universal computation.
3. Halting problem and Rice's theorem.
4. NP class algorithms appear to require exponential time to compute.
5. Amdahl's Law.

Modules

1. Information and Encoding
2. Analog and Digital
3. Atoms and Bits
4. Communication
5. Sensemaking
6. Journalism
7. Social Media
8. Information Retrieval
9. Algorithms

10. Limits of Computation
11. Information Visualization
12. Computation and Thinking
13. Pandora's Genome
14. Health Informatics
15. How the Internet Works
16. Who Controls Information
17. Privacy and Anonymity
18. The Nature of Trust

Turing Test Activity
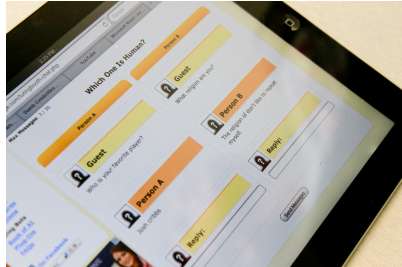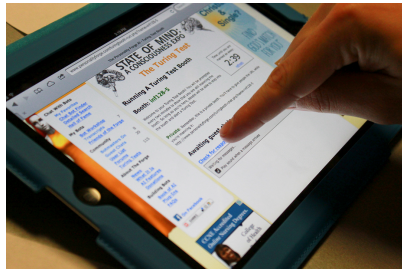
QR Code Activity

- Install Qrafter before class
- Decode QR codes during a lecture session
- Describe contents of QR codes

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Informaticists in Residence

English

Philosophy

Sound and Music in New Media
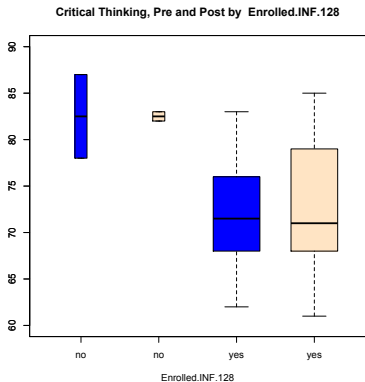
Health Informatics

Communication

Biology

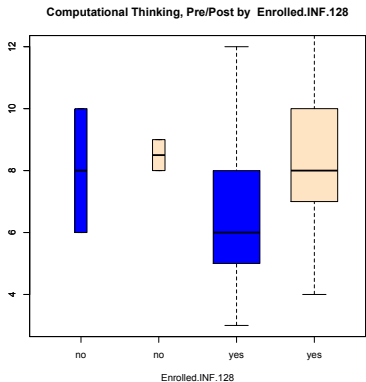History

Figure: Pre and Post Critical Thinking Results

Figure: Pre and Post Computational Thinking Scores

Conclusions

- Informatics for future presidents in the 21st century
- Broader focus than CS principles
- Computational Thinking has some overlap with Critical Thinking
- Informaticists in Residence gave breadth to the course

Future Work

1. Finalize as a Gen Ed
2. Teach at another institution
3. Publish course materials