Research

GeoGames REU Summer 2018

Why?

- Expand the body of knowledge
- Imagine an expanding bubble and vectors …
- We just don't know what we don't know and what will be important

What is Research?

- Examples: http://www.rit.edu/academicaffairs/facultyscholarship/index.php?year=2017

- Research, Scholarship, Creative Works
  - http://as.cornell.edu/research
  - https://www.rit.edu/academicaffairs/sites/rit.edu.academicaffairs/files/docs/2.24.14%20Thoughts%20on%20faculty%20scholarship%20at%20RIT%20FINAL.pdf
  - See II.B: http://www.rit.edu/academicaffairs/policiesmanual/e040

- What's in common?

Thrill Pillars

- Peer Review
- Dissemination
- Impact
- Goal: maximize all three!

Process in a Nutshell

- Find a new problem
- Solve the problem or determine if no solution
- Distribute the information and suggest new directions
- Repeat
- Simple, isn't it? ☺

Finding a Problem

- Hypothesis statement:
  - What are you trying to solve?
  - Perhaps you are trying to create something
  - Maybe you are trying to confirm a supposedly-established concept
  - Remember creative works and making
- Specificity:
  - Too broad? "Solve world hunger."
  - Too specific? "What is the average favorite number chosen by everyone wearing red pants in the Marketplace Mall every Thursday in June in 2019."
  - What's "just right?"

Background Work

- Start large, think big
- Find a field
- Talk with researchers and research students
- Learn about what's interesting
- Search for current research articles
- Read the abstracts, conclusions, and future work/recommendation sections
- Are there common threads/questions that arise? Is the problem something you have the resources to tackle?

Problem Scope

- Comb through multiple databases
- Half the battle/work/time is narrowing and refining the problem statement ... but moving fast enough before someone else solves it
- OK if you publish work simultaneously ... confirms solution
- Accept negative results
- Keep a list of tangents, other ideas, ... a career in research means continuing to answer these questions (called setting a "research agenda")

Conducting the Research

- Experimental Design
- Human Subjects
- Animal Subjects
- Creative Works
- Double Blind Tests
- Focus Groups

Work Backwards

- Papers and talks:
  - Introduction (go from broad to narrow in the area of study)
  - Hypothesis (problem to solve)
  - Background Research/Related Work (sometimes goes after Intro)
  - Experiments/Methodology/Derivation (show how you can/can't solve the problem)
  - Results (what happened?)
  - Conclusions (what did you learn?)
  - Future Work/Recommendations (what should you and/or another researcher do next?)
  - References/Bibliography (be as thorough as possible)
- See examples in databases

Creative Works

- Games!
- An aside: Tic Tac Toe
- Serious Games
- Another aside:
  - Academia and scholarship...
  - Publish both the creative works and paper(s) about the works

Serious Games

- Express concepts in a such a fashion to teach certain principles to the players
  - Many, many examples!
  - SerGIS: http://geoapps64.main.ad.rit.edu/sergis/games
  - IPAR: https://forensic-games.csec.rit.edu
- Many games out there:
  - Background search/market survey critical
  - Innovation is key
- What part/parts are the "research?"
  - Design
  - Implementation
  - Playtesting and results/observations
  - All interesting
- Speaking of "Serious…"

Ethics

- Plagiarism
- Libel
- Falsification
- Copyright/Fairuse/IP
- Example policy:
  https://www.rit.edu/academicaffairs/policiesmanual/c020

Citations

- http://pitt.libguides.com/citationhelp
- https://www.acm.org/publications/authors/reference-formatting
- https://endnote.com/

More Resources

- Famous Hamming talk for graduating PhDs and entering the academic world: http://www.cs.virginia.edu/~robins/YouAndYourResearch.html

- "Summon:" https://library.rit.edu/summon-tutorial

- Databases: https://library.rit.edu/dbfinder/

- Google Scholar: https://scholar.google.com/

- Publish or Perish: https://harzing.com/resources/publish-or-perish