Multi-Institutional

Multi-National

Parsons Problems Studies

Working Group 3

ITiCSE 2023

July 10, 2023

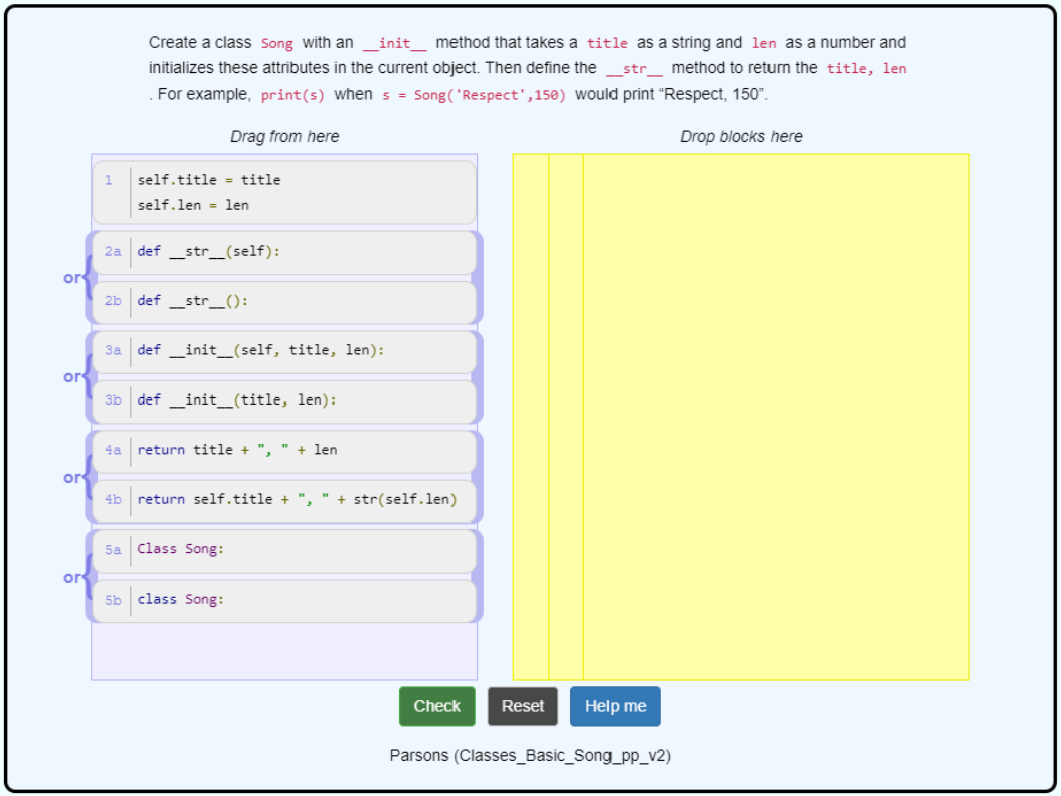
Turku, Finland

Working Group Members:

(L to R)
- Kostos Liaskos
- Jan Pearce
- Francisco Gutierrez
- Barbara Ericson
- Andrew Csizmadia
- Susan Rodger
- Jayakrishnan Warriem
- Rita Garcia
- Aadarsh Padiyath
- Angela Zavaleta Bernuy
- David Smith
- Michael Scott

Parsons Problems

- What are they?
  - Mixed-up code
  - Drag code over in order
  - Distractors?
  - Pick from choice?
  - Many variations
- Created 2006 by:
  - Dale Parsons
  - Patricia Haden



Last year… WG2022 - Parsons Problems Literature Review

- Found all papers on Parsons since 2006
  - Variations of: Parsons puzzles, Parsons programs, Parsons programming
  - Is it Parsons or Parson's? X
    - Interviewed Dale Parsons
  - Over 1000 papers!!
    - Narrowed to 141
- Do Studies
  - NO Time!

HOW TO DO Studies

This year - WG 3 - Three things

1) Expanded Parsons Literature Search from last year
2) Literature Search on Multi-Institutional Multi-National Studies in Computer Science Education
3) Parsons Problems Studies

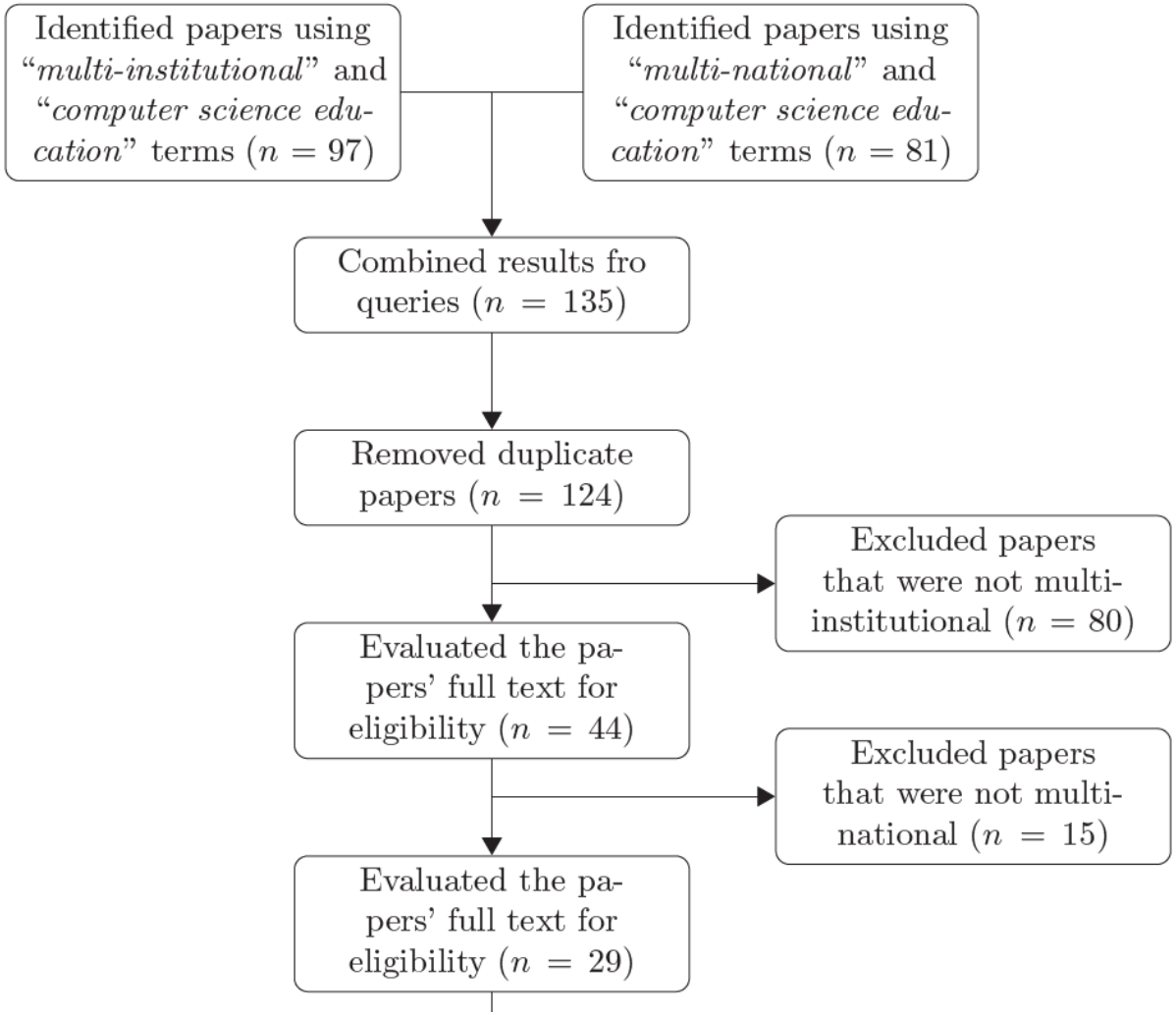
1) Expanded Literature Search

- Not as extensive search
- Since last year -> 15 papers
- Most of them Research on Parsons problems, and learning programming
- On newer types of Parsons Problems
  - Adaptive Parsons
  - Framed Parsons
  - Micro Parsons

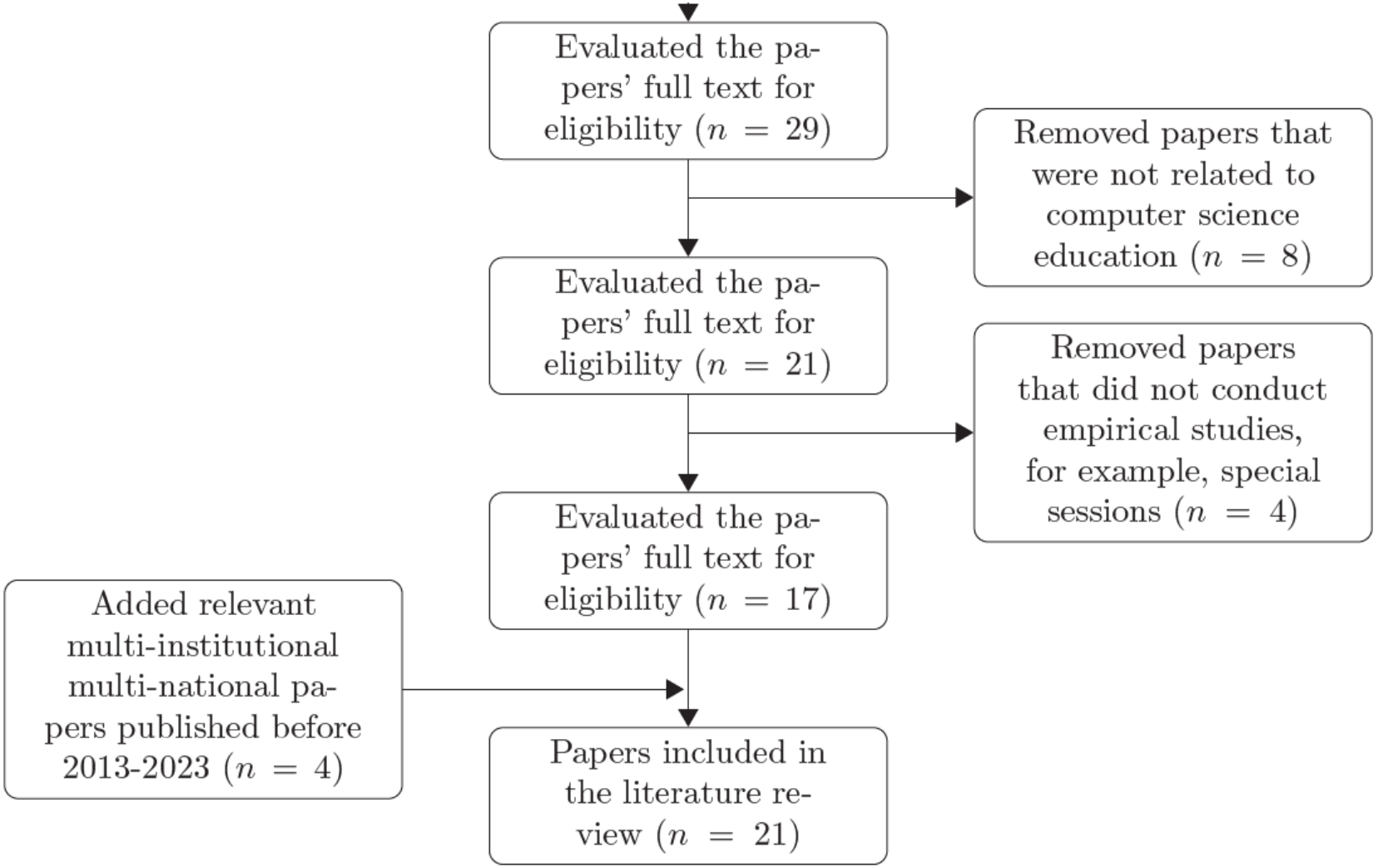
2) Literature Review: Multi-Institutional, Multi-National Studies in CSE

- 17 papers from the past 10 years
- 4 relevant papers from before that
- Difficult to do – so many considerations when comparing between different countries
  - Institutional Characteristics
  - IRBs
  - Languages, Translations

Choosing papers:



Choosing papers (cont):



As an MIMN Study

- Challenges:
  - Time constraints
  - Participants at different stages of learning
  - Globally distributed team
- Overcame with:
  - Team coordination
  - Onboarding package for faster ramp up, IRBs
- We could have used more time!

3) Parsons Problems Studies

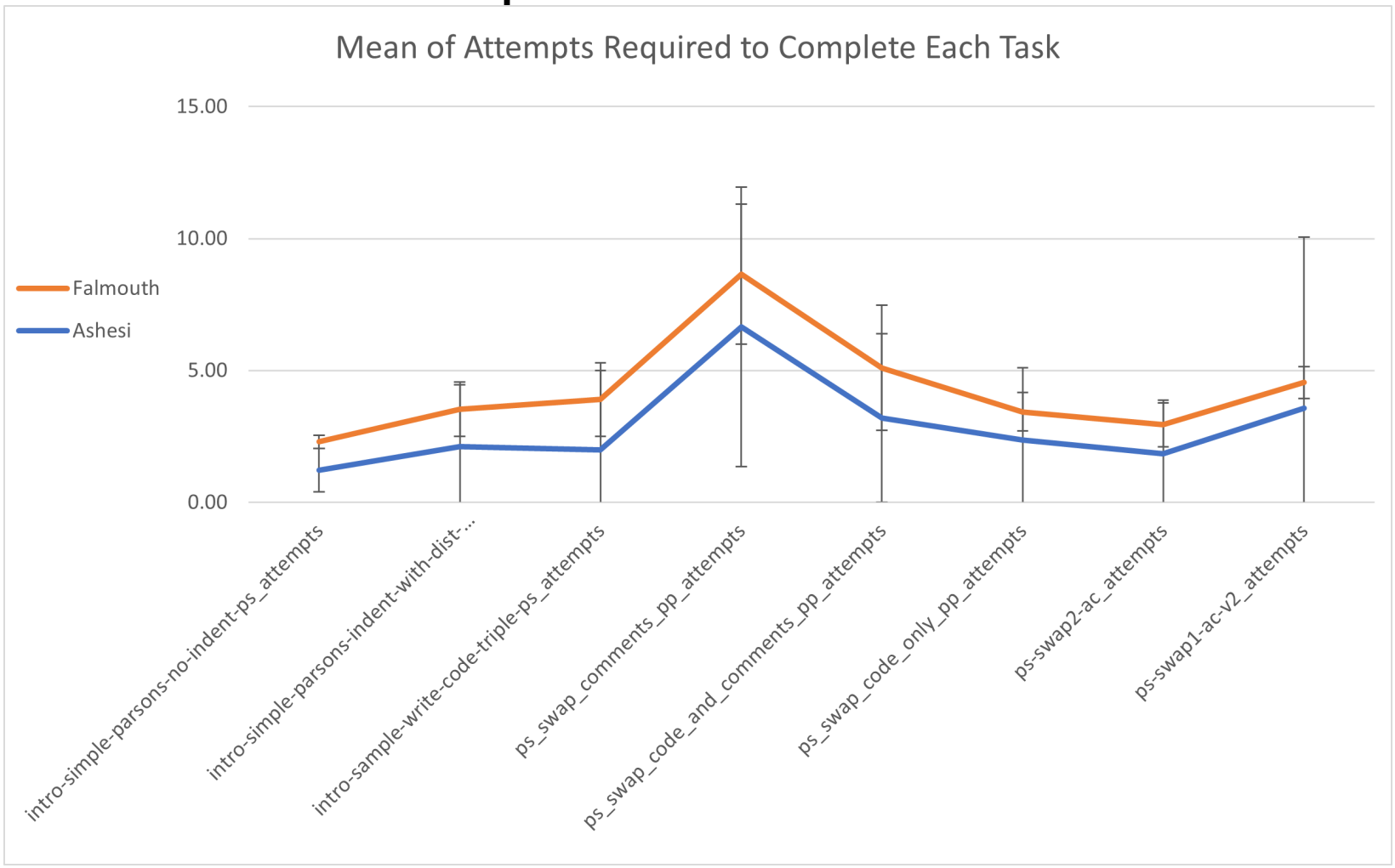
- Study in a box
- Many different studies between 14 institutions
  - Topics: Swap, Classes, etc.
  - Mostly Python
  - Runestone Academy online platform
  - Pre/Practice/Post
- Think Aloud Studies

Here are a few results from studies we did - More in the paper!!!

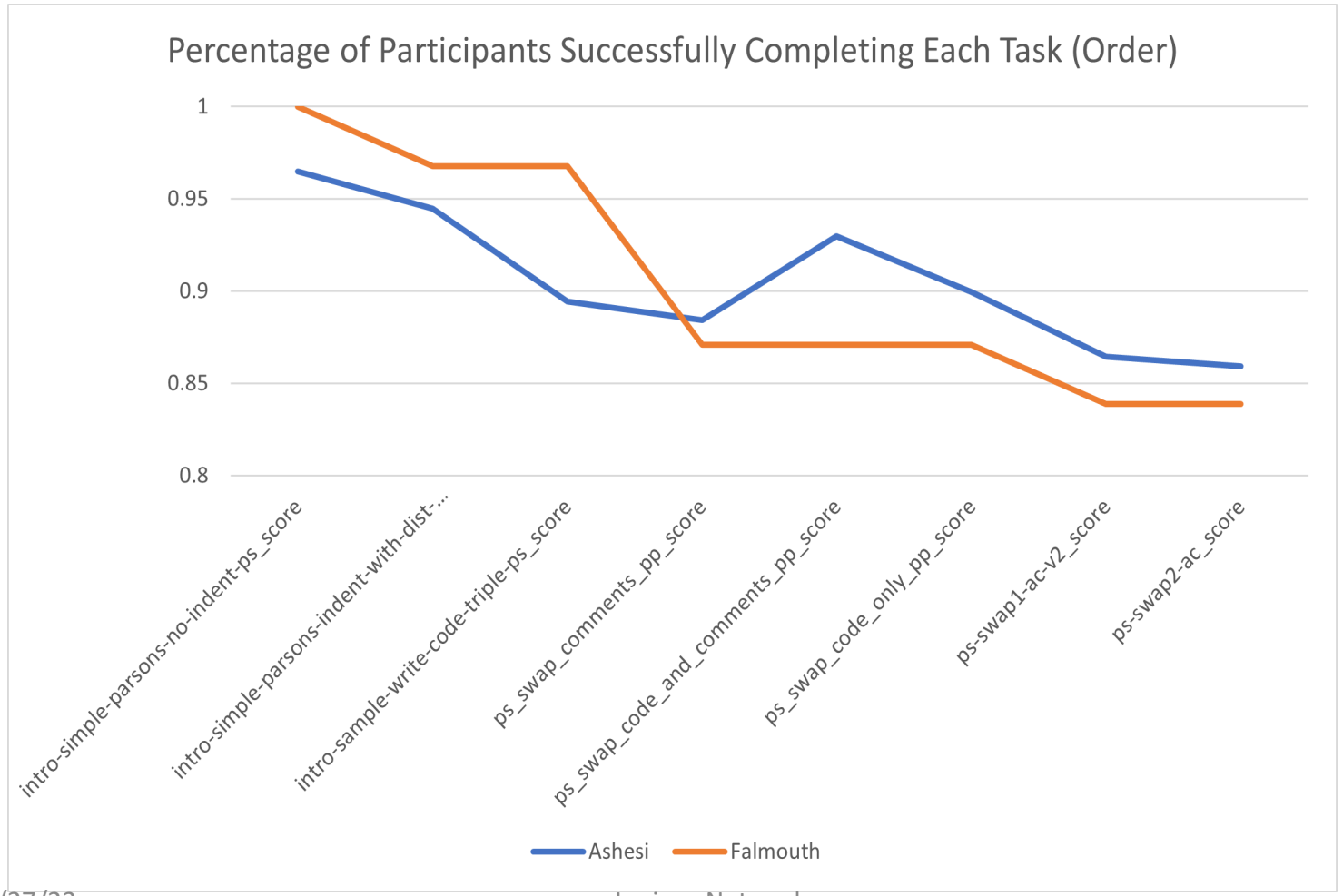
Results: Python-swap

- most students were able to write the code for swap after solving three Parsons problems:
  - text comments with algorithm steps, text comments and code, and code
- similar pattern of engagement across all participating institutions; many attempts and time-taken on comment-sorting exercise – 80% completion rate
- no correlation between prior familiarity and success on the final post-test task
- success on first training task, and time on the comment-sorting parsons exercise predicted success on the final post-test task; suggestive of scaffold

Mean of Attempts Required to Complete Each Task



Percentage of Participants Successfully Completing Each Task (Order)



Recommend - WGFS:

- SIGCSE encourage:
  - Working Groups For Studies (WGFS)
  - Large MIMN Studies
- Need an earlier deadline (Sept/Oct?)
  - Time for IRBs
  - Different countries are on different school schedules
  - Not many MIMN studies done!
- SIGCSE should consider this type of WG

Questions?
Want to do a study? Contact us!