Think-Pair-Share Activity: Sorting Algorithm Card Demonstrations

Duration: 80 minutes today + Presentations next class

Group Size: Teams of 3-4 students (5 teams total)

Learning Objectives

Students will master one specific sorting algorithm, create an engaging demonstration using playing cards, teach their algorithm effectively to peers, and compare different sorting approaches.

Materials Needed

5 decks of playing cards (one per team)

Access to Wikipedia pages for sorting algorithms

Paper for planning and documentation

Recording device (optional, for practice)

<https://en.wikipedia.org/wiki/Bubble_sort>

<https://en.wikipedia.org/wiki/Selection_sort>

<https://en.wikipedia.org/wiki/Insertion_sort>

<https://en.wikipedia.org/wiki/Quicksort>

<https://en.wikipedia.org/wiki/Merge_sort>

Team Assignments

Team 1 Bubble Sort

Team 2 Selection Sort

Team 3 Insertion Sort

Team 4 Quick Sort

Team 5 Merge Sort

Each team will work with cards numbered 2-10 from their deck (provided in the next class).

**Today's Activity Structure**

THINK Phase (30 minutes)

Individual team members will read the Wikipedia article for their team's algorithm, practice sorting 9 cards (2-10) using their algorithm, and document the step-by-step process, key decision points, common pitfalls, and best teaching approaches. Students should:

- Take detailed notes on their algorithm (15 minutes)

- Practice manipulating the cards [drawn or digital] (10 minutes)

- Document specific steps and transitions (10 minutes)

PAIR Phase (45 minutes)

Teams will share individual interpretations and develop their presentation:

First 15 minutes:

- Each member demonstrates their understanding

- Teams discuss any differences in interpretation

- Agree on the correct process

- Resolve any confusion about the algorithm

Next 30 minutes:

- Create and refine presentation script

- Assign and practice specific roles:

\* Main presenter

\* Card handler(s)

\* Step explainer

\* Q&A responder

- Practice the demonstration multiple times

- Identify and prepare for potential questions

- Film a practice run if time permits

Next Class: SHARE Phase

Each team will present their card sorting demonstration (10 minutes) plus Q&A (2-3 minutes)

Demonstration Requirements (For Next Class)

Initial Setup

Display unsorted cards (2-10)

Explain algorithm's basic principle

Step-by-Step Demonstration

Clear narration of each step

Physical movement of cards

Explanation of why each move is made

Special Features

Bubble Sort: Show how cards bubble up

Selection Sort: Show how minimum is selected

Insertion Sort: Show how cards are inserted into position

Quick Sort: Show pivot selection and partitioning

Merge Sort: Show splitting and merging phases

Interactive Element Suggestions

One volunteer from audience

Guided participation in one sort iteration

Q&A session (2-3 questions)

Tips for Effective Demonstrations:

Hold cards high and visible [Seewo camera]

Move cards slowly and deliberately

Use clear, consistent terminology

Have a backup person ready with cards

Practice with different starting arrangements

Prepare for common questions

Common Pitfalls to Avoid

Don't rush through complex steps

Avoid technical jargon without explanation

Don't block audience's view of cards

Ensure all team members understand every step

Don't skip over obvious steps

Practice Suggestions

Film practice runs

Time demonstrations (aim for 10 minutes)

Practice with different card arrangements

Prepare for interruptions/questions

Have backup plans if something goes wrong

Next Class Presentation Order

1. Bubble Sort Team

2. Selection Sort Team

3. Insertion Sort Team

4. Quick Sort Team

5. Merge Sort Team

Each team will have 10 minutes to present and 2-3 minutes for questions.

Grading Rubric for Sorting Algorithm Demonstrations:

Emerging

Description: Beginning to understand basic sorting concepts and algorithmic thinking, requiring significant guidance in both comprehension and demonstration.

Skills and Abilities:

- Basic algorithm recognition without systematic execution

- Limited team participation requiring constant support

- Inconsistent card manipulation and step sequencing

- Fundamental comprehension of algorithm steps with frequent confusion

- Minimal contribution to practice sessions

Developing

Description: Shows growing understanding of sorting algorithms and demonstration techniques, but needs support in connecting concepts and presenting clearly.

Skills and Abilities:

- Basic demonstration execution with occasional guidance

- Team participation with some prompting needed

- Systematic card handling with support on complex moves

- General algorithm explanation lacking edge case understanding

- Basic documentation and presentation skills needing refinement

Proficient

Description: Demonstrates solid comprehension of sorting algorithms, effective presentation skills, and strong teamwork, working independently with minimal support.

Skills and Abilities:

- Clear, independent demonstration execution

- Active team collaboration and practice participation

- Confident card manipulation with audience awareness

- Precise explanation of algorithm mechanics and decision points

- Comprehensive documentation and adaptable presentation style

Extending

Description: Shows advanced understanding of algorithmic concepts and exceptional presentation skills, exploring sorting concepts beyond basic requirements.

Skills and Abilities:

- Creative demonstration design enhancing comprehension

- Leadership in team organization and peer support

- Sophisticated analysis of algorithm efficiency

- Innovative documentation including performance insights

- Advanced presentation skills with real-world applications

Assessment Note: Each level builds upon the previous, emphasizing progression in both technical understanding and communication abilities. The focus remains on mastery of sorting concepts, demonstration effectiveness, and collaborative contribution.