Computational Fluid Dynamics (CFD) has emerged as a powerful tool for solving engineering fluid flow problems both in industry and in academia. It is essential for the graduating engineer to be equipped with the knowledge to use CFD simulations expertly in engineering design and solutions.

Goal: Evaluate the effect of various instructional tools designed to improve students’ learning of CFD and inform future instruction.

Data used for study
- Students self-reported on pre and post surveys
  - CFD concepts
  - Instructional tools
- Analysis of HW and exams

Survey participation
- Survey sample reflects overall class composition
- Large variation in students’ previous experience with CFD/FLUENT

Other interesting themes (in survey data):
- Many students appreciated the insight into ‘the black-box’ and some demonstrated awareness of the ‘expert approach’ to simulation
- Actual research projects were thought to be more useful in learning than courses (useful for future stand-alone CFD course design)
- Some students felt at a disadvantage not being in the hands-on session

Results: Instructional tools
- Online tutorials were rated to be most effective
- Out-of-class learning materials and hands-on sessions received high ratings [2]
- Lecture viewed as least effective but still important [1]
- Large variation in response to use of clickers, such as:
  - No grades no motivation
  - Questions too easy (wide range of expertise in class)
  - Nice, but need more questions

Notes for future
- Focus greater attention on developing improved out-of-class learning materials
- Improve use of clickers to promote active learning
  - More extensive use
  - Use questions that involve a wide range of difficulty catering to the wide range of student expertise
  - Possible allocation of a small % of grade
- Analyze learning outcomes in homework and exams to corroborate survey data

References

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