

Computer Lab Sessions for Undergraduate Math Courses: Is It a Waste of Time?

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Lab Sessions

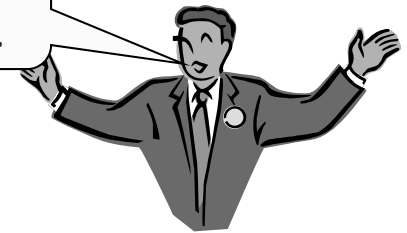
- ◆ Carried out in computer lab
- ◆ Scheduled timeslots
- ◆ Conducted by lab assistants
- ◆ Lab worksheets prepared by lecturers
- ◆ Lab quizzes
- ◆ Software: Maple, MATLAB, Derive

Background

- ◆ Started: 1998
- ◆ Courses: 1st year undergraduate Calculus and Linear Algebra
- ◆ Lab sessions as part of curriculum
- ◆ Mandatory
- ◆ Visualization and experimentation
- ◆ Expose to CAS

“Bad” News

Let's make lab sessions optional.



Implications

- ◆ Some course coordinators will op-out
- ◆ Students' pressure
- ◆ Peer pressure
- ◆ Most course coordinators will op-out
- ◆ Software licenses will not be renewed
- ◆ Lab sessions will become extinct

Administrator's perspective

- ◆ Not a believer of IT in teaching
- ◆ Difficult to find teaching staff for courses with lab sessions
- ◆ Expensive software
- ◆ Manpower and space allocation

Why are lecturers avoiding lab?

- ◆ Not IT savvy
- ◆ Do not want additional workload
- ◆ Not believers of IT in teaching
- ◆ Don't think students find them useful

Students' Feedback

- ◆ Conducted survey
- ◆ Target: certain math students
- ◆ Taken at least one module with lab sessions in the past two years
- ◆ Number responded: 323

Students' Feedback

Do you find lab sessions help in understanding concepts?

➤ Linear Algebra

Agree – 161 Neutral – 97 Disagree – 52

➤ Calculus

Agree – 127 Neutral – 123 Disagree – 48

➤ Advanced Calculus

Agree – 101 Neutral – 125 Disagree – 43

Students' Feedback

Do you think lab sessions is a waste of time?

- **Linear Algebra** useful – 161 Neutral – 97 useless – 52
Agree – 73 Neutral – 129 Disagree – 105
- **Calculus** useful – 127 Neutral – 123 useless – 48
Agree – 68 Neutral – 131 Disagree – 95
- **Advanced Calculus**
Agree – 57 ^{useful – 101} Neutral – 133 ^{useless – 43} Disagree – 72

Students' Feedback

Will you still attend the lab sessions
if they are not part of assessment?

Yes – 120 Maybe – 136 No – 59

Students' Feedback (positive)

- ◆ *With graphics it further explains to us certain abstract concept which are not easily seen through just words.*
- ◆ *The lab for linear algebra really allows me to understand matrix better.*
- ◆ *For MA1104, the lab sessions allow us to visualize 3 dimensional diagrams and figures.*
- ◆ *Allow us to solve complex sums using software commands rather than do the tedious computation which in some cases are not necessary for a certain concept.*

Students' Feedback (positive)

- ◆ *We have a chance to use the popular software to do math.*
- ◆ *Provide foundation to applications to real life modeling using MATLAB.*
- ◆ *They give us an insight on how the software can be used to build models to enhance our imagination on how the models may look like*

Students' Feedback (positive)

- ◆ *It illustrate the way the concepts are being used to solve problems.*
- ◆ *Illustrations can be helpful in understanding how some formulas work and can show clearly what happens when we change some variables.*
- ◆ *Good for independent learning & self-exploration of the subject matter.*

Students' Feedback (negative)

- ◆ *I think they are really not useful at all. We just go there because it's compulsory.*
- ◆ *We are not being introduced to the concepts behind the problems.. we are merely following instructions...*
- ◆ *Most of the students just copy from their friends*
- ◆ *It's like a typing session.*
- ◆ *The lab assistants do not know how to answer our queries at times.*
- ◆ *I go into the lab feeling "lost" for most of the time.*

Why students think lab sessions is a waste of time?

- ◆ Good students: can grasp the concepts with or without lab
- ◆ Weak students: cannot connect the concepts with the lab activities
- ◆ Not so helpful lab assistants
- ◆ Unclear objectives
- ◆ Badly designed lab activities

Some thoughts about the positive students' comments

- ◆ Viewing lab as (Graphing) calculators
- ◆ Few can see the usefulness of labs beyond visualization
- ◆ The administrator has a point!

Conclusion

Is Lab a waste of time?

- ◆ To lecturers

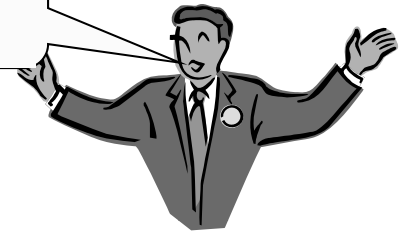
- No, provided ...
- they believe in it
- they make the students believe in it

- ◆ To students

- No, provided ...
- the lab activities are well-designed
- the lab assistants are well-trained

“Good” news

Lab sessions will remain mandatory for now.



What shall we do next?

- ◆ Address the current problems
- ◆ Educate the lectures
- ◆ Find alternative solutions

Online lab sessions

- ◆ Web-based activities
- ◆ Use Web tools instead of CAS
- ◆ Do away with lab assistants
- ◆ Illustration
- ◆ Project - Implement virtual labs to all calculus modules

Thank You