Refresh Teaching: Just one more question… – being there for your students

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- My experience with "Introduction to Programming" (Fall 2020)
  - Teach "programming" – design & implementation of correct programs
  - No prerequisites
- Students
  - About 600 enrolled
    - 150 Repeat customers (course part of Basic Exam)
    - 50 Other (including 3rd semester Interdisciplinary Sciences)
    - 400 B.S. Computer Science (1st semester)
      - Some know (part of) contents from other sources
  - About 250 – 350 engaged participants
- Your milage may vary

Teaching programming

- You don't learn programming with "frontal instruction"
  - Practice and individual feedback
  - No "Sage on the Stage"
  - But "Guide on the Side" ?
    - With 300 students?
- Another model
  - Instructor → demonstrator
    - Anatomy of a computer program

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Lecture → demonstration

- 250 … 350 online students
  - 240 ... 330 in Zoom meeting
  - 10 ... 20 in (ETH) LiveStream [ML D28]
    - Better audio
    - Screen magnification
    - Longer delay
    - No direct interaction
- Powerpoint slides + Wacom annotator

- Course infrastructure: recitation groups, homework, study center

Ingredients

Zoom

- Outreach via polls
  - 1-3 polls/90 min
  - Only 10 questions/poll, 20 polls per meeting
    - New Zoom link middle of semester
- Chat from students to me
  - Private (not seen by other students)
  - Immediate notification for problems

Annotator

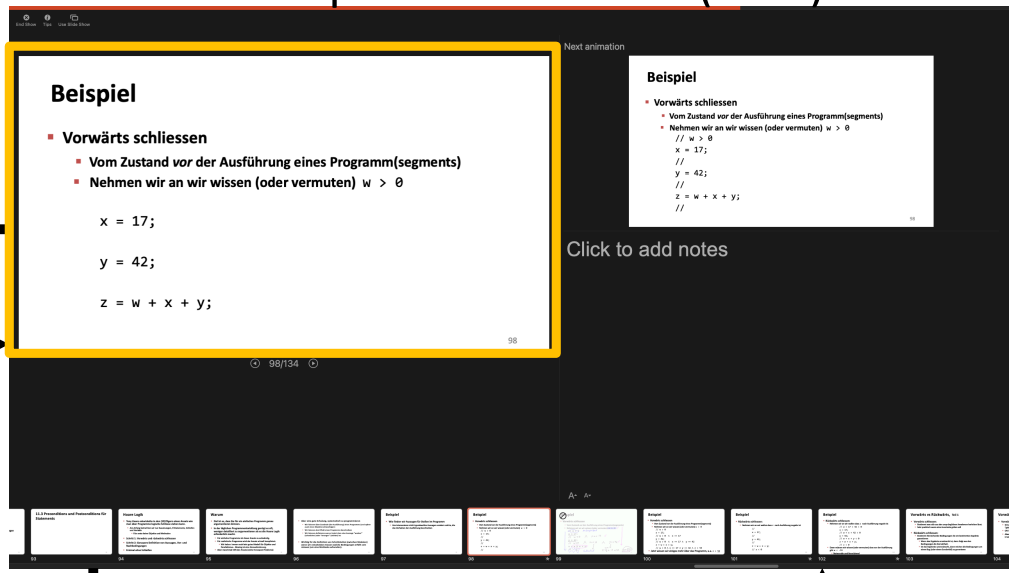
- PowerPoint "background"
  - Program segments, partial graphs
  - Animation when needed
  - Slides posted ahead of class
- Dynamic elements
- Blank sheet if needed
- Store page for later posting

LiveStream + Zoom

PowerPoint presenter mode (Mac)

Display adapter

Zoom share
external device



Beispiel

foo (int w)

- Vorwärts schliessen
  - Vom Zustand *vor* der Ausführung eines Programm(segments)
  - Nehmen wir an wir wissen (oder vermuten) `w > 0`

```
// w > 0
x = 17;
// w > 0 ∧ x == 17
y = 42;
// w > 0 ∧ x == 17 ∧ y == 42
z = w + x + y;
// w > 0 ∧ x == 17 ∧ y == 42 ∧ z > 59
```

Microphone 2: Zoom

Microphone 1: LiveStream/
Room

Wacom annotator

Two small problems

- OS integration of Zoom problematic
  - Arriving chat message may trip up PowerPoint presenter
- Can't look at Chat window when using PowerPoint presenter

- Solution: 2nd computer to my left
  - Participates in Zoom – with a different name ("trg2")
    - Co-host
    - I did not require sign-in ….
    - Could use any Zoom account, or get avatar from ID
  - Students send Chat messages via this channel

chat: trg2

252-0027

Einführung in die Programmierung

13.0 Finale

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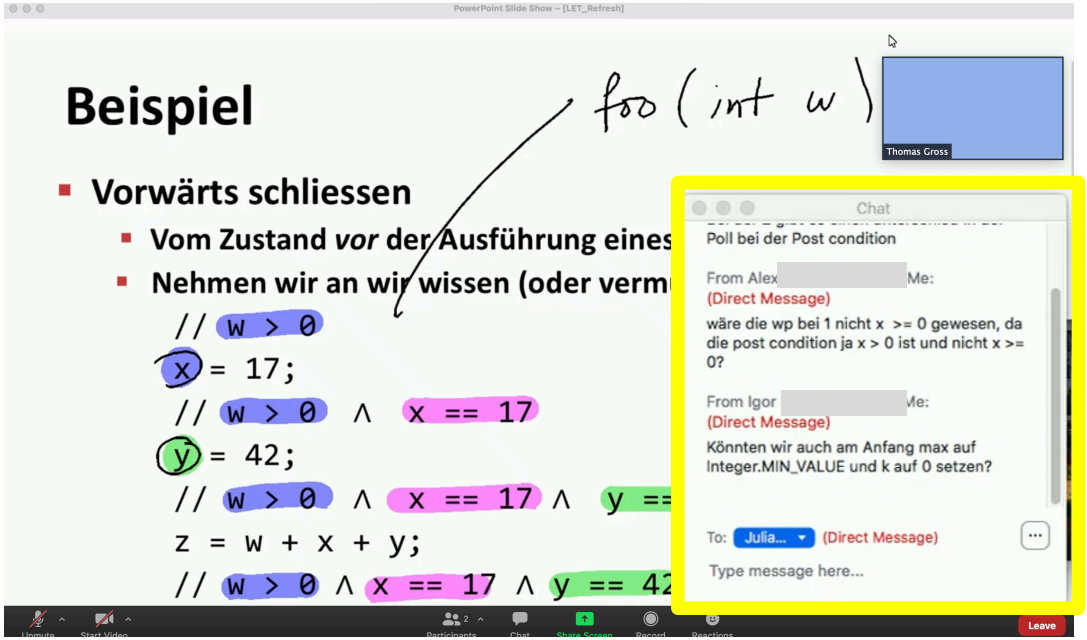
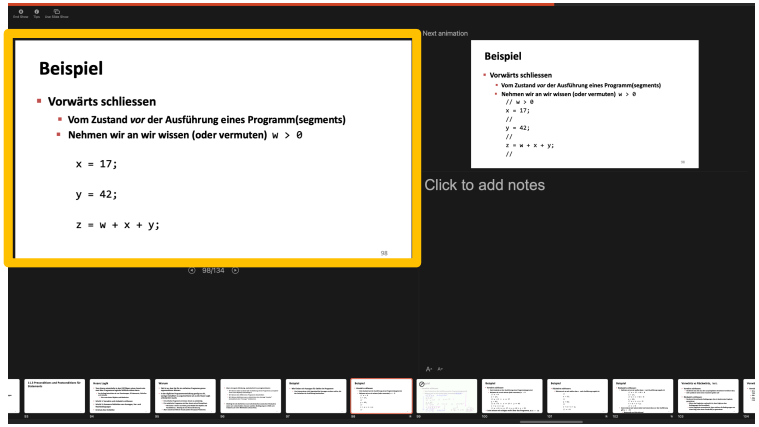
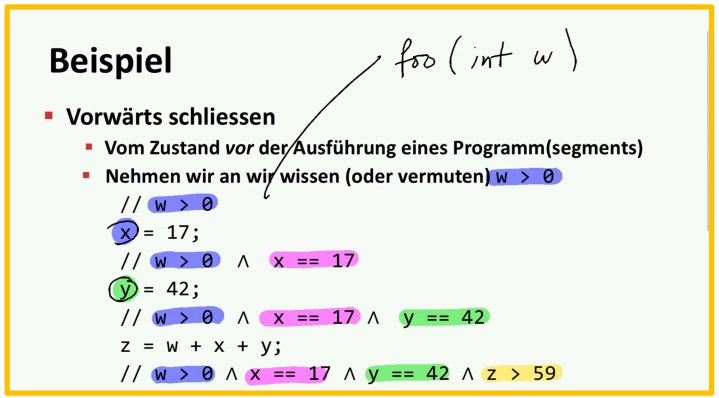
Mac 2:



Zoom – Chat enlarged/edited

Mac 1:





Wacom annotator

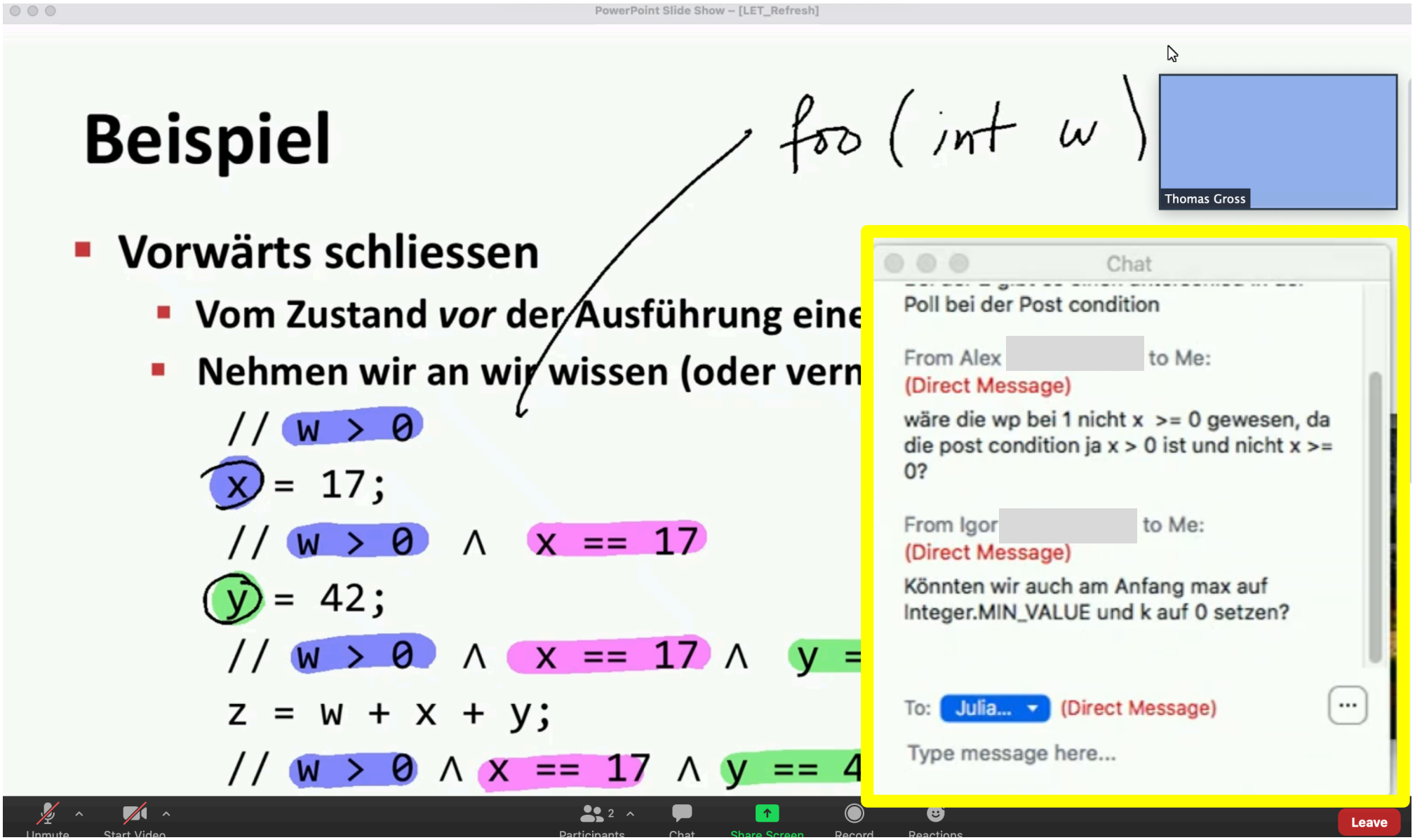
Observations

- Chat is anonymous
  - Many questions – up to 40 in 90 min
  - Students don't expose their name to their colleagues
- Chat is immediate
  - Something does not work: immediate feedback
    - One reason why I want to see the stream

08:16:13 From Jan [redacted] to trg2 (Direct Message) ##########################
Stream auf website läuft nicht.
08:16:55 From Nicolas [redacted] to trg2 (Direct Message) : **************************
der Stream ist aus
08:17:41 From Nicolas [redacted] to trg2 (Direct Message) : ok geht jetzt
08:18:08 From Peter [redacted] to trg2 (Direct Message) : Stream auf Videoportal funktioniert jetzt

Observations

- Chat is anonymous
  - Many questions – up to 40 in 90 min
  - Students don't expose their name to their colleagues
- Chat is immediate
  - Soemthing does not work: immediate feedback
    - One reason why I want to see the stream
- Chat allows context
  - Even two lines of code provide a lot of context
  - Students can prepare message


PowerPoint Slide Show – [LET_Refresh]
Beispiel
foo (int w)
Thomas Gross
Vorwärts schliessen
Vom Zustand vor der Ausführung eine
Nehmen wir an wir wissen (oder vern
// w > 0
x = 17;
// w > 0 ∧ x == 17
y = 42;
// w > 0 ∧ x == 17 ∧ y =
z = w + x + y;
// w > 0 ∧ x == 17 ∧ y == 4
Chat
Poll bei der Post condition
From Alex to Me:
(Direct Message)
wäre die wp bei 1 nicht x >= 0 gewesen, da die post condition ja x > 0 ist und nicht x >= 0?
From Igor to Me:
(Direct Message)
Könnten wir auch am Anfang max auf Integer.MIN_VALUE und k auf 0 setzen?
To: Julia... (Direct Message)
Type message here...
Unmute
Start Video
Participants
Chat
Share Screen
Record
Reactions
Leave

Answering questions

- Polls take time
  - At least 6 … 8 minutes– I usually stop when 75% have voted
  - Opportunity to answer simple questions
- Breaks
  - Shortened due to Covid but still took 5 .. 10 minutes
  - Students need breaks (satellite groups)
- Directly after class
  - Rarely as another class followed (students left Zoom)
- eMail follow-up
- Batch processing at start of next class

Antworten zu Fragen aus dem Chat

- Dann kann man mit catch(Exception ex) { } alle exceptions abfangen?
  - **Ja. Aber sie behandeln den Fehler nicht – und je nach Programmlogik kommt es schnell zu weiteren Exceptions**
- Frage zur vorherigen Folie: warum kann man I1 i schreiben wenn wir mit Interface kein Exemplar erstellen können?
  - **`I1 i;` erlaubt Verweise (Referenzen) auf Exemplare die `I1` implementieren**

Taxonomy of questions

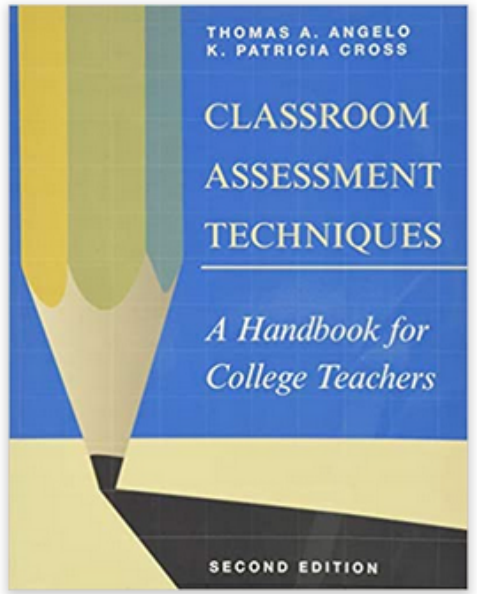
- Problem reports
  - Introduced special headers
- Related to current content
  - Go back a slide, rephrase, another example
    - That's why I need the annotator
  - Immediate, next poll or break
- Beyond current content
  - Sometimes in-class, eMail, refer to Study Center
  - Follow-up in future meeting

Notes

- Wacom Annotator not mandatory
  - Wacom tablets in several lecture halls
  - Needed for room/LiveStream support
  - Used iPad in other classes
    - Unstable with Zoom, Wacom more drawing options
  - *Important:* opportunity for fast and straighforward reaction
- Extra camera (for instructor's face) did not work
  - Students don't seem to care
- Breakout rooms w/ 4 students don't work for large classes

Notes

- Polls poor choice (simple queries, one or multiple answers)
- My wishlist: more 1-minute assessments
  - EduApp?



Thanks

- Armin Brunner and the team of ID MMS
  - Setup consulting
  - LiveStream operation
- Thomas Schmid of D-INFK
  - Hardware support

Questions welcome

- Direct now in Zoom
- Chat: trg2
- eMail: thomas.gross@inf.ethz.ch