Student Activation and Interaction through Tutorials and Adequate Scheduling

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student activation: what it’s not

HAS NOTHING TO DO WITH STUDENT LAZINESS

DUE TOMORROW

DO TOMORROW

MEMESLY.com
WHAT COULD BE A REASON FOR THESE STUDENTS TO BE SLEEPING DURING CLASS?
student activation: what it’s all about

“HAVING THE STUDENT ACTIVELY PROCESSING THE COURSE MATERIAL”
student activation should be focussed

DON’T OVERDO IT!

NO GIMMICKS.
“EVERY STUDENT HAS AN INDIVIDUAL WAY OF PROCESSING NEW THEORIES”
→ offer them a broad range of processing tools
small steps can results in big differences!
case study: “KMS” – some keywords

multi-dimensional distributions
sequential experimental design

residual analysis
multi variate regression analysis

bayesian estimation

contribution analysis
likelihood ratio

non-linear regression analysis
Global Fitting potential
maximum likelihood principle
case study: “KMS” – some content

\[ D_3(x) = \frac{\sum_{k=1}^{m-1} \sum_{l=k+1}^{m} \frac{1}{S_k S_l} |\hat{y}^{(k)}(x) - \hat{y}^{(l)}(x)|}{\sqrt{\text{Var}\left(\sum_{k=1}^{m-1} \sum_{l=k+1}^{m} \frac{1}{S_k S_l} |\hat{y}^{(k)}(x) - \hat{y}^{(l)}(x)|\right)}} \rightarrow \text{Max} \]

\[ E(\Delta S) = -\sum_{i=1}^{m} \pi_{i,n} \ln \pi_{i,n-1} + \int \left( \sum_{i=1}^{m} \pi_{i,n} \ln \pi_{i,n} \right) \sum_{i=1}^{m} \pi_{i,n} P_i dy_n \]

\[ (\mathbf{y} - \mathbf{\bar{y}}_R)^T (\mathbf{y} - \mathbf{\bar{y}}_R) = (X_2 \beta_2 + \mathbf{\varepsilon})^T (I - A_1)^T (I - A_1) (X_2 \beta_2 + \mathbf{\varepsilon}) = (X_2 \beta_2 + \mathbf{\varepsilon})^T (I - A_1) \beta_2 + \mathbf{\varepsilon}^T (I - A_1) \varepsilon \]

\[ = \beta_2^T X_2^T (I - A_1) X_2 \beta_2 + 2 \beta_2^T X_2 (I - A_1) \varepsilon + \varepsilon^T (I - A_1) \varepsilon \]

\[ (L_i)_{\text{max}} \]

\[ \frac{(L_i)_{\text{max}}}{(L_j)_{\text{max}}} = \left[ \frac{n - p_i}{n - p_j} \right] \frac{n}{2} \exp \left( \frac{p_i - p_j}{2} \right) \left[ \frac{e_j^T e_j}{e_i^T e_i} \right] \frac{n}{2} \]
previous evaluation

The theory is not very accessible

but

project sessions and exercises are highly appreciated

HOW TO MAKE THE COURSE MORE ACCESSIBLE?
(with minimal effort)
our observations

- during the theory sessions, **interaction was limited** due to the rather abstract content (and low, declining student attendance)
- students were **ill-prepared** for the exercise sessions
- **not all concepts were put in practice** through exercises and/or projects
- throughout the semester, the **workload was concentrated** at specific times during the semester
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A: statistical distributions
B: linear regression analysis
C: non-linear regression analysis
D: experimental design
E: multiresponse regression

LARGE SPREAD IN TIME OF THE COURSE TOPICS (theory, exercises, projects)

OVERLAP OF EXERCISE SESSIONS WITH THEORY ON DIFFERENT TOPICS
our observations and solutions

• during the theory sessions, interaction was limited due to the rather abstract content (and low, declining student attendance)
• students were ill-prepared for the exercise sessions
• not all concepts were put in practice through exercises and/or projects
• throughout the semester, the workload was concentrated at specific times during the semester

• split up the theory sessions: from 3 hours to 1.5 per session
• have a tutorial session after each theory sessions
• concentrate the different topics in clusters throughout the semester
• introduce a minimum of blended learning principles
• project session as closure of a topic
### our new schedule

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A: statistical distributions  
B: linear regression analysis  
C: non-linear regression analysis  
D: experimental design  
E: multiresponse regression  
F: contribution and reaction pathway analysis  
G: ‘reading and analyzing a scientific publication’ in regression analysis: **FLIPPED**

**NO OVERLAP OF EXERCISE SESSIONS WITH THEORY ON THE COURSE TOPICS**

**MINIMUM SPREAD IN TIME**
feedback and grading

6 tutorial sessions: one assistant per 6 to 7 students

→ every student has a close interaction with an experienced assistant

after every project, each student has personal feedback

not only on their hard skills (project content)

but also on their soft skills (writing, visualizing and summarizing)

common feedback session at end of semester: students ↔ teacher/assistants

final grade is composed of two parts:

½: projects

⅔: viva voce ⇒ theoretical question + case study or a scientific publication analysis

credit acquisition: combined score ≥ 50% (≥ 40% on both components individually)
### before reorganization | after reorganization
--- | ---
theory | 24 | 22.5 (,std)
| 8 | 14 (,std)
exercises/tutorials | 9 | 9 (=)
| 3 | 6 (,std)
PhD examples | 4.5 | 6 (,std)
| 2 | 4 (,std)
total | 37.5 | 37.5 (=)
| 13 | 24 (,std)

😊 equal amount of contact hours

😊 less theory hours (and more content is covered)!

😊 more practical examples on kinetic modelling

😊 more sessions (theory, exercises) $\rightarrow$ more spread out

☹ requires a more flexible schedule of the teacher and assistants
conclusions on rescheduling

1. the student/teacher/assistant interaction has significantly increased

2. resulted in a significantly augmented student attendance

3. immediate follow-up of theoretical by the corresponding tutorial sessions:
   • allows for a more direct learning process of the students
   • remediating their previous ill-preparedness for the exercises.

4. the workload has been spread out more evenly over the semester.

5. the amount of time spent by the teacher and assistants during the course stays equal, but it requires more flexibility
THANK YOU FOR YOUR KIND ATTENTION!

and

ANY QUESTIONS, COMMENTS OR CONCERNS?