Dealing with students' requests for a more transparent process of education

Kazakevich V.
Saint-Peterburg Electrotechnical University "LETI", Saint-Petersburg

COMPUTER ASSISTED MATHEMATICS
15-17 July 2025

Initial impulse

Students want to UNDERSTAND

- what
- how
- why

is happening

Students are willing to ASK about this

Universality of these questions

Why is it GOOD?

- Making problem setting clear
- Analytico-synthetic approach
- Mutual respect
- Understanding

Problem statement

- Provisional classification of requests
- Answers in a language understandably by student

Provisional classification of requests

- Contextual
- Structural (architectural)
- Grading-related

Contextual: request

- Why do we study it?
- What for do we study it?

Contextual: response

- Immersing students in their professional context
- Learning is a part of their future profession
- Real life is now

Contextual: examples

- Example 1: why do I need to study group theory? It has no applications!
- Example 2: why do I need to study calculus, if I want to be software engineer?

Structural: request

All questions pertaining to course’s architecture

- Proportion of lectures and seminar sessions
- Different problems at seminars and in tests
- Theory discussed at seminars
- Line between “theory” and “practice”

etc

Structural: response

- Don’t sweep these questions aside
- No understanding outside of personal experience!
- Machine learning and human learning: dual (complementary) modelling

Structural: examples

- Answer for a problem as a hash function
- Learning dataset ≠ testing dataset and overfitting problem
- Generalization capability as one of learnedness criteria

Grading-related: request

- Understanding the grading criteria.
- What to do to get a high grade? (for test … for course)

Grading-related: explanatory example

Extract from course program of “Discrete mathematics: graph theory” (HSE, fall 2022):

«Homework 1. 5 problems of 5 subproblems each. Maximal grade for each subproblem is 4 points.

Grading criteria: Each subproblem is graded independently, from 0 points to 4 points.

4: if a complete solution and a complete correct answer are presented.

3: insignificant flaws in solution.

2: significant flaws in solution.

1: severe errors in solution.

0: absence of solution regardless of correctness of the answer.»

Grading-related: review versus grading

- **Review.** Result: statement on the quality of work done, convertible both to grade and feedback.
- **Grading.** Result: grade.

Attention should be switched from grading to review!

Provisional classification of grading criteria

Formal

- often easily measured (margin size, number of correct answers, correctness of answer);
- can be checked by non-specialist.

Grading is automatable.

Expertise-based

- often hard to measure (completeness and correctness of solution, coherence of presentation);
- cannot be applied without expertise (and often incomprehensible to a non-specialist).

Grading is unautomatable in principle (at current level of technology).

Conclusions

- Will to understand is productive
- Balance of completeness, precision and understandability of the answer
- Provisional classification of requests is presented
- Methods of handling such requests are presented

Plans

Is it time to move from observations to a full-fledged experiment?

Question of architecture of experiment.

Thanks for your attention!!!

Contact:

sokratt@gmail.com

Grading-related: problem

- Unability to appraise the quality of one’s own text on any criteria except formal.

- “Magical” approach.

Grading-related: answer versus solution

Concept

- Not “I believe” but “I understand”.
- Form follows substance.
- Shaping the concept of expertise and its value

Specifics

- Any substantial work with text.
- Cross-review with discussion.
- Immersing students into their professional context and building on it.