False assumptions about students' knowledge in numeracy/mathematics

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Plan

- Background.
- Activity 1. Easiest vs hardest questions.
- Activity 2. True or false.
- Activity 3. Your observations.
- Activity 4. What can/ought we do?

Background

- 'House rules'
  - Please interrupt if you have a question
  - Include details if you want to stay in touch
    - Send summary of workshop and ask for feedback
    - Further discussions/collaborations
  - Non-judgemental. Judging ideas/maths, not character
  - You are not obliged to stay if you don't find this useful

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- My (relevant) teaching experiences
  - Maths drop-in
  - Private tuition
  - 2.5 years on STEM FY
    - 70% did A-Level maths
    - 15% did A-Level physics or chemistry, and no maths
    - 15% did not do A-Levels

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- I don't have answers. But I do have strong opinions...

Activity 1. Easiest vs. hardest questions

- Diagnostic Test is being distributed
  - Given to students on 1st day of teaching
  - 25 minutes
  - Non-calculator
  - 1-mark each question
  - Only marked final answer, not explanation
- Which questions were easiest and which were hardest?
  - Easiest = highest percentage of correct answers
  - Individually or in groups
  - Write your guesses on bits of paper distributed
  - :) Happy smiley for easiest questions
  - :(Sad smiley for hardest questions

Activity 1. Easiest vs. hardest questions

Question	% Correct	% Incorrect	% Blank
1	86	8	6
5	84	12	4
3	80	15	6
9	73	22	5
2	71	26	3
6	60	35	6
4	52	46	2
7	43	46	11
8	40	44	16

Activity 2. True or false

- I have provided a list of statements which I thought were true of students on a STEM FY. Some I still think are true but others I now know are false.
  - As individuals or in groups, decide which are true or false
  - All statements are anecdotal
    - My experience or colleague's experience
    - Based on STEM FY experience
    - 70% A-Level maths, 15% other A-Level, 15% other
  - I will discuss the truth of statements in few minutes
    - Probably not enough time to go through all of it
    - Ask if you want to know about any statement in particular

Activity 3. Your observations

- Discuss amongst yourselves any insightful observations or changes of opinion you have had.
- In few minutes, I will ask for a sample to be shared with everyone.

Activity 4. What can/ought we do?

Some of my thoughts/ideas.

Our habits/attitudes/behaviours

- Know what you assume of your students
  - Be as explicit as possible. Familiarity vs mastery.
  - Inform students of assumptions?
- Careful using your own habits as an example
  - Disregard if it is 'good' habit
  - Do regard if it is 'bad' habit
  - Think about something you struggle with e.g. gym
- Careful how you help students
  - Don't just do question and ask if student understands
  - Ask student to do something
    - Find and explain similar example from notes/textbook
    - Attempt a simpler example/simpler skill

Activity 4. What can/ought we do?

How to diagnose

- Diagnostic test at start of year/module
- Encourage self-diagnosis?
  - My lectures start with ‘warm-up’ questions
  - My assessments include questions from earlier weeks
  - Produce checklist of skills for students?
- When helping a student

Activity 4. What can/ought we do?

Prescription. How to help diagnosed students

- I am overall pessimistic
  - Mathematically weak students often have other weaknesses
    - Weak study habits, e.g. lack of organisation
    - Weak mental skills, e.g. memory, pattern recognition
    - Inability to learn from most resources
    - Under-utilising support sessions
    - Lack of experience of success?
    - Being human...
  - I believe properly overcoming these weaknesses requires
    - 1-1 sessions
    - Several hours a week
    - Excellent instead of 'just good' teachers
  - Personally I find 'just passing' an unsatisfactory goal

Activity 4. What can/ought we do?

Pre-university

- Entrance test?
- (Compulsory?) pre-registration training/course/day?

Other

- Non-calculator exams and tests
  - Otherwise students will always use their calculator
  - Allows you to ask questions that uncover weaknesses
  - Calculator questions included throughout the course

Activity 4. What can/ought we do?

- Discuss your own ideas or practices
- I will ask people to share in few minutes.
- Try to categorise
  - Our habits/attitudes/behaviours
  - How to diagnose
  - How to help diagnosed students
  - Pre-university
  - Other