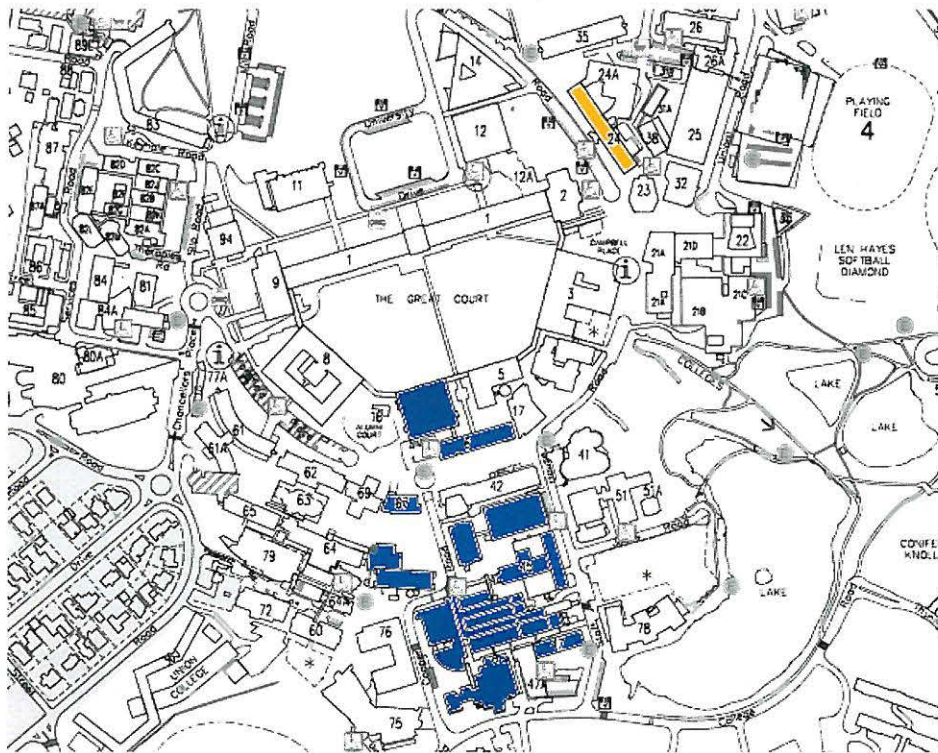


## Who are education theorists and should they be running the mathematical sciences?



A typical University: mathematical disciplines (blue), Education (orange)

### Results

1. tables of paragraphs instead of marks
2. written essays in maths
3. social moderation is unfair
4. ballooning educ-red tape
5. teachers upset (81% submiss., 85% all teachers, 95% regular teachers)
6. Educ experts disconnected: "no problems at all" - !?!
7. syllabus: 2/7 is maths (see page 2)
8. anti-knowledge (since 1972, drift away from knowledge)
9. students performing badly
10. maths teaching quals for registration: ed. essential, but maths optional

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"In his 1918 article, "Project Method", Kilpatrick argued that **knowledge is changing so fast that no specific subject matter should be required in the curriculum.** He also claimed that following the project method would develop "critical thinking skills".

## Educationalists have a different version of maths

<u>Mathematics ...</u>	<u>Education-maths ...</u>
- has sufficient clarity to distinguish right from wrong.	- favours vague questions which have many interpretations.
- is mastered through much practice "there is no royal road to geometry".	- discourages repetition.
- uses standard procedures such as long multiplication, long division.	- prefers children invent their own methods, or use a calculator.
- requires memorizing some basic facts, such as the times-tables.	- discourages memorization of facts, even of the times tables.
- teachers can add up a student's marks to get a percentage.	- teachers consult tables of criteria paragraphs, written by education specialists, to grade students' work.
- includes algebra as a main part.	- discourages the manipulation of symbols.
The defining characteristic of mathematics is proof.	- omits proof.
- uses mathematics' own succinct international notation.	- students collect data and write essays.
- uses textbooks.	- prefers not to use textbooks.
- is done with pencil and paper.	- pencil and paper work is de-emphasized.
- is examined by tests.	- prefers open-ended, take-home, word-processed assignments.
- develops skills and methods unique to the discipline (of mathematics).	- is merely another setting for students to learn the 'higher order skills' and 'attitudes' of education.
- students learn abstract concepts whose truth is independent of, but may be applied to, specific contexts.	- students must always consider problems in some concrete context.
- students' mastery of the subject is independent of machines.	- students rely on calculators throughout primary school, and learn which buttons to press on a graphics calculator in high school.
- is difficult, requires concentration and often silence.	- can be done chatting as a group sitting cross-legged on the carpet.
- topics have a logical sequence.	- topics are covered in a spiral sequence.
- prefers to cover fewer topics well.	- skips through many topics.
- concerns timeless truths.	- constantly rewrites itself.

- see <http://www.wgquirk.com/TruthK12.html>

## Conclusion

QSA & education experts are like the crazy counterfeiters who round corners off 50c pieces to make them into 20c pieces. They are the wrong people to run the mathematical sciences.

## **How inquiry -based learning is bad for maths students**

Inquiry based learning is wrong for (school) maths, because mathematics builds upon itself. You've got to have a solid foundation in order to be able to proceed to the next level, the next topic. Building this solid foundation requires guided practice and homework (**repetition**). Getting maths into long term memory requires practice and memorisation (study for exams). Assignments do not offer this repetition or skill development, and they prevent students from doing homework and study.

Advocates of inquiry-based learning frown on repetition, calling it 'lower order', or 'too mechanical'. The effect on maths is disastrous.

For boutique topics e.g. 'The Pyramids of Egypt' assignments can be fun and appropriate, because you don't need to build on that knowledge. Assignments do not memorise the times-table for you.

### **9. What I see in the students arriving at Uni**

They have been exposed to the relevant maths topics, but they can't do any of them confidently. (This is demoralizing for them - compare with "I can do it" )

The list of maths topics in Maths B, C is pretty good, but the students have generally not been required to practice, or study sufficiently to become competent in them. Why? because the inquiry-based assessment asks for written assignments instead of homework, criteria sheets do not ask for repetition, and moderated exams are often a sham (not requiring study).

I see students learning the new topics we teach them, but failing in first year exams questions because they cannot do the inherent school maths.

It would be better in school to cover a shorter list of topics thoroughly - Better for student morale and for their future learning/life.