THEN LET THEM WRITE THEIR OWN TEXTBOOK…

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OVERVIEW

- Overview
- Background
- What did I do?
- What did I find?
- What did I do since then?
- What are the takeaways?

OVERVIEW

My research questions:

- What is the evidence for the students' development of Key Competencies when collaborating in a technology-rich environment on producing an online textbook?
- How do students evaluate such a pedagogical approach?

BACKGROUND

CHRIST'S COLLEGE
CANTERBURY

My school is well resourced. Students tend to be willing learners, but they are very busy. Some students are very focused on their academic results.

BACKGROUND

One of my starting points was the question how to measure value added when academic results tend to be very good anyway.

I decided to focus on the development of Key Competencies.

BACKGROUND

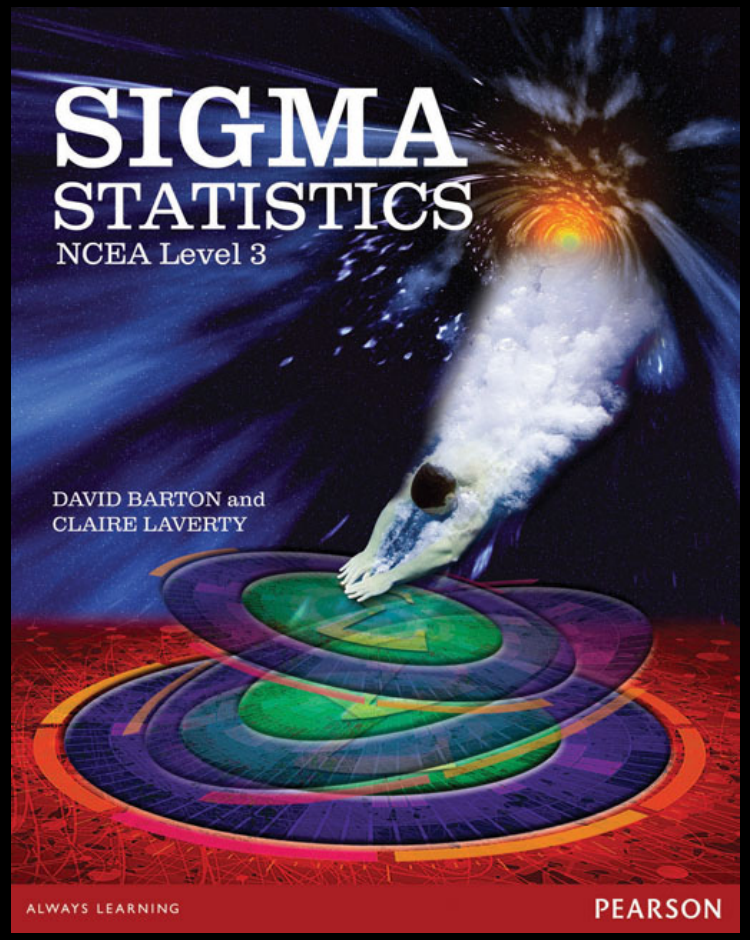
The Key Competencies in the NZ Curriculum

- Thinking
- Relating to others
- Using language, symbols, and texts
- Managing self
- Participating and contributing

BACKGROUND

The project was carried out with an accelerated Y12 class studying L3 Statistics. I had taught the class in the year before and there was good rapport and trust.

BACKGROUND



Another starting point was the lack of a good textbook for the course. The idea was that student would produce an online textbook that other students could use. This would include questions with answers and an instructional video.

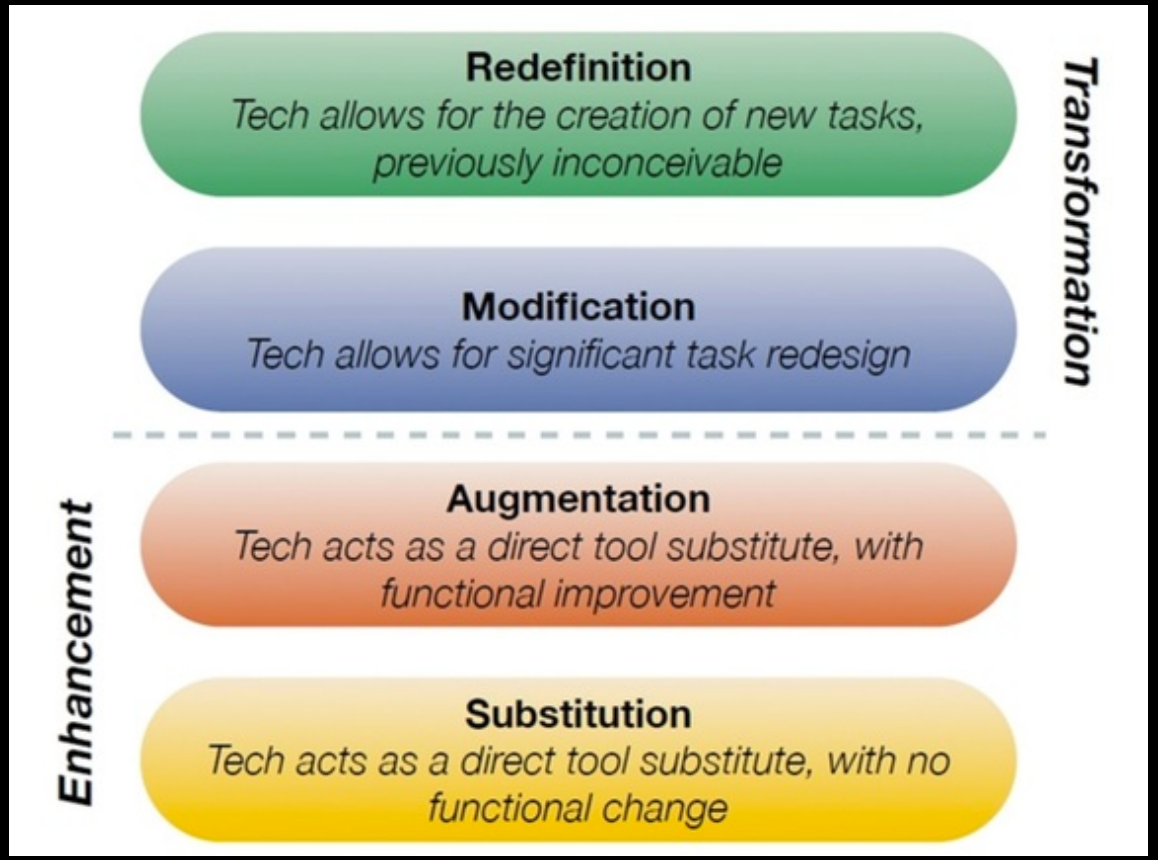
BACKGROUND

The project happened in the second year of a new BYOD policy . All students had their own laptop and were familiar with working in Google Docs.

BACKGROUND

I had some experience in producing short instructional videos. I had done this for some time for Scholarship Statistics. I use an iPad stand and record with an iPad. I print out a question and work through it while I talk about my thinking, typical misconceptions, etc.

BACKGROUND



I was interested in how technology in the classroom could redefine teaching and learning rather than just do something in a slightly different way (SAMR model).

BACKGROUND

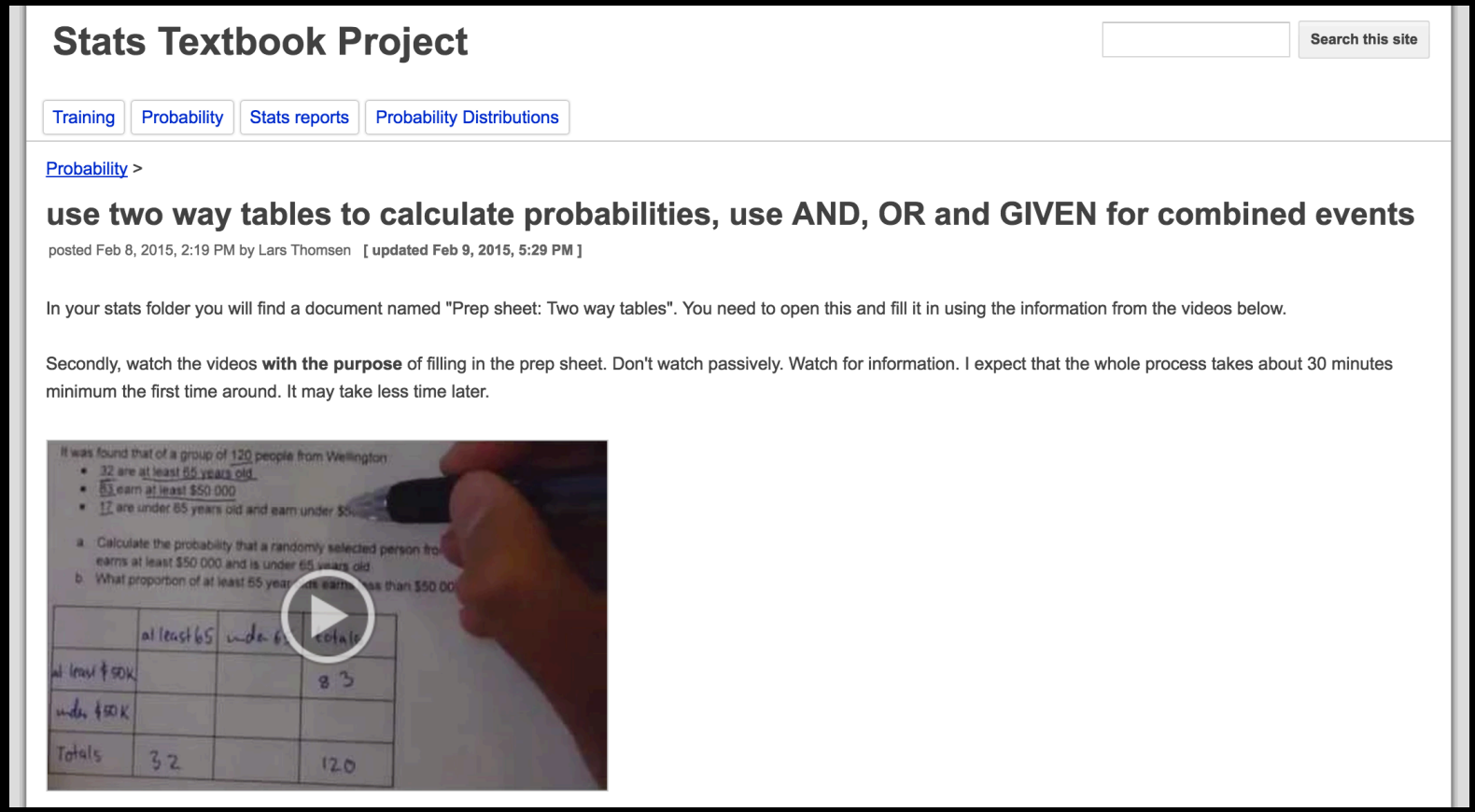
Finally, I had to write a Master's dissertation.

WHAT DID I DO?

Scope:

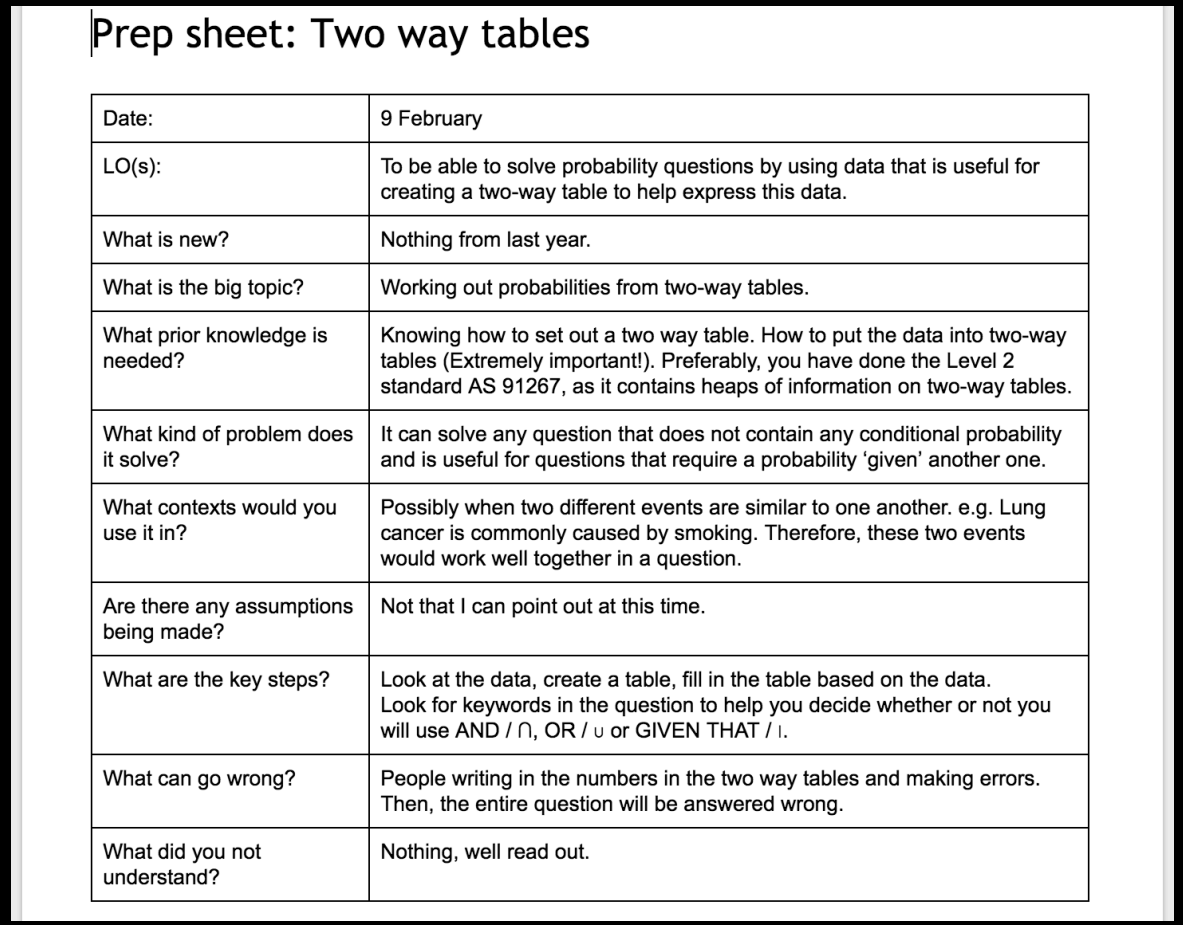
- One class of students (14)
- Twelve weeks spread over the year
- Three external standards

WHAT DID I DO?



I created a Google site as a starting point for students. In preparation to each class, students had to watch a video…

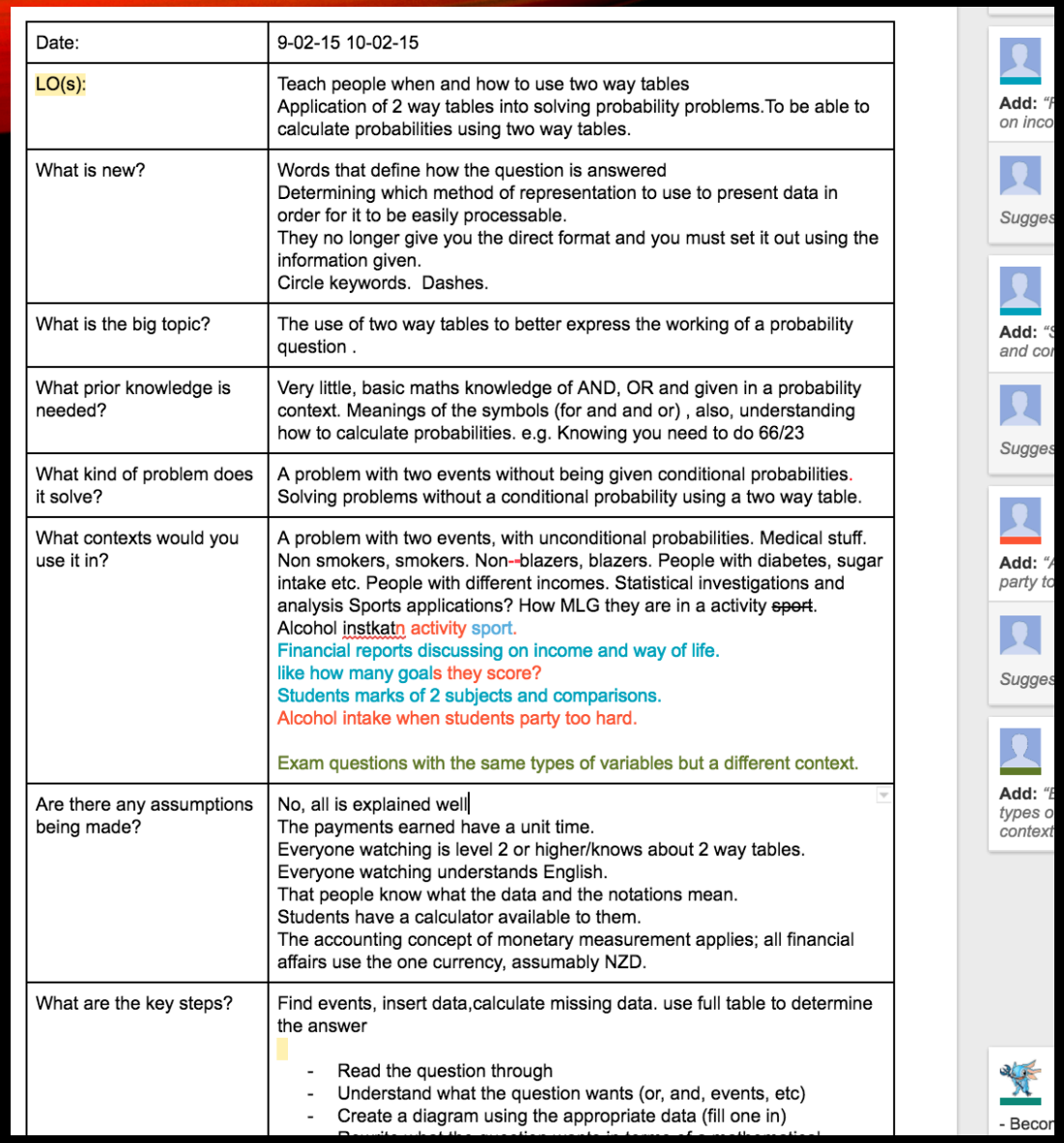
WHAT DID I DO?



Prep sheet: Two way tables

Date:	9 February
LO(s):	To be able to solve probability questions by using data that is useful for creating a two-way table to help express this data.
What is new?	Nothing from last year.
What is the big topic?	Working out probabilities from two-way tables.
What prior knowledge is needed?	Knowing how to set out a two way table. How to put the data into two-way tables (Extremely important!). Preferably, you have done the Level 2 standard AS 91267, as it contains heaps of information on two-way tables.
What kind of problem does it solve?	It can solve any question that does not contain any conditional probability and is useful for questions that require a probability 'given' another one.
What contexts would you use it in?	Possibly when two different events are similar to one another. e.g. Lung cancer is commonly caused by smoking. Therefore, these two events would work well together in a question.
Are there any assumptions being made?	Not that I can point out at this time.
What are the key steps?	Look at the data, create a table, fill in the table based on the data. Look for keywords in the question to help you decide whether or not you will use AND / ∩, OR / ∪ or GIVEN THAT / |.
What can go wrong?	People writing in the numbers in the two way tables and making errors. Then, the entire question will be answered wrong.
What did you not understand?	Nothing, well read out.

… and fill in a 'prep sheet'. This was designed to give them focus on relevant aspects and encourage them to watch actively.

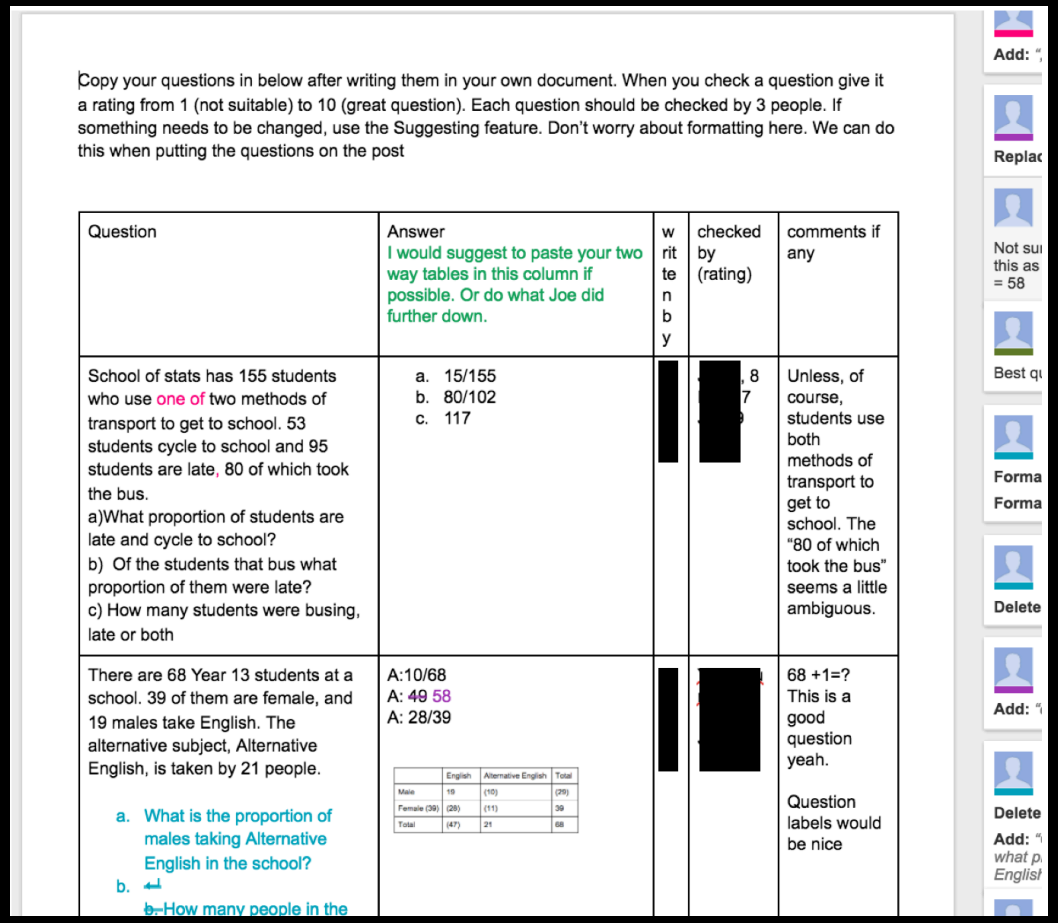


Date:	9-02-15 10-02-15
LO(s):	Teach people when and how to use two way tables Application of 2 way tables into solving probability problems.To be able to calculate probabilities using two way tables.
What is new?	Words that define how the question is answered Determining which method of representation to use to present data in order for it to be easily processable. They no longer give you the direct format and you must set it out using the information given. Circle keywords. Dashes.
What is the big topic?	The use of two way tables to better express the working of a probability question .
What prior knowledge is needed?	Very little, basic maths knowledge of AND, OR and given in a probability context. Meanings of the symbols (for and and or) , also, understanding how to calculate probabilities. e.g. Knowing you need to do 66/23
What kind of problem does it solve?	A problem with two events without being given conditional probabilities. Solving problems without a conditional probability using a two way table.
What contexts would you use it in?	A problem with two events, with unconditional probabilities. Medical stuff. Non smokers, smokers. Non--blazers, blazers. People with diabetes, sugar intake etc. People with different incomes. Statistical investigations and analysis Sports applications? How MLG they are in a activity ~~sport~~. Alcohol instkatn activity sport. Financial reports discussing on income and way of life. like how many goals they score? Students marks of 2 subjects and comparisons. Alcohol intake when students party too hard. Exam questions with the same types of variables but a different context.
Are there any assumptions being made?	No, all is explained well The payments earned have a unit time. Everyone watching is level 2 or higher/knows about 2 way tables. Everyone watching understands English. That people know what the data and the notations mean. Students have a calculator available to them. The accounting concept of monetary measurement applies; all financial affairs use the one currency, assumably NZD.
What are the key steps?	Find events, insert data,calculate missing data. use full table to determine the answer - Read the question through - Understand what the question wants (or, and, events, etc) - Create a diagram using the appropriate data (fill one in)

WHAT DID I DO?

At the start of each class students shared their findings from the individual prep sheets. This was the time to share ideas for questions and clarify what people didn't understand. Constructive comments were encouraged.

WHAT DID I DO?



Copy your questions in below after writing them in your own document. When you check a question give it a rating from 1 (not suitable) to 10 (great question). Each question should be checked by 3 people. If something needs to be changed, use the Suggesting feature. Don't worry about formatting here. We can do this when putting the questions on the post

Question	Answer I would suggest to paste your two way tables in this column if possible. Or do what Joe did further down.	written by	checked by (rating)	comments if any
School of stats has 155 students who use one of two methods of transport to get to school. 53 students cycle to school and 95 students are late, 80 of which took the bus. a)What proportion of students are late and cycle to school? b) Of the students that bus what proportion of them were late? c) How many students were busing, late or both	a. 15/155 b. 80/102 c. 117	[redacted]	[redacted], 8 [redacted] 7 [redacted]	Unless, of course, students use both methods of transport to get to school. The "80 of which took the bus" seems a little ambiguous.
There are 68 Year 13 students at a school. 39 of them are female, and 19 males take English. The alternative subject, Alternative English, is taken by 21 people. a. What is the proportion of males taking Alternative English in the school? b. ↵ ~~b.~~ How many people in the	A:10/68 A: ~~49~~ 58 A: 28/39 [table]	[redacted]	[redacted]	68 +1=? This is a good question yeah. Question labels would be nice

	English	Alternative English	Total
Male	19	(10)	(29)
Female (39)	(28)	(11)	39
Total	(47)	21	68

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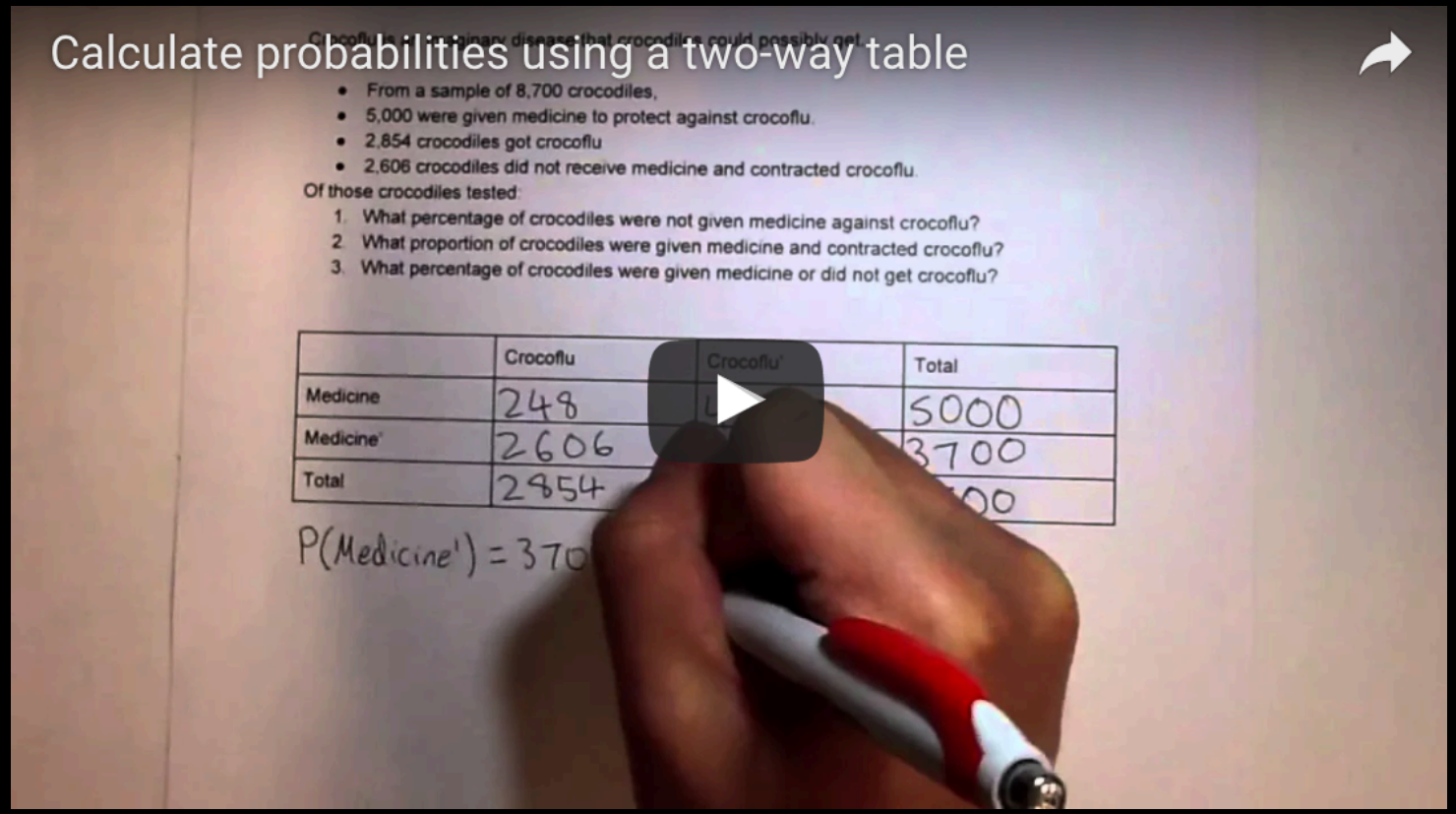
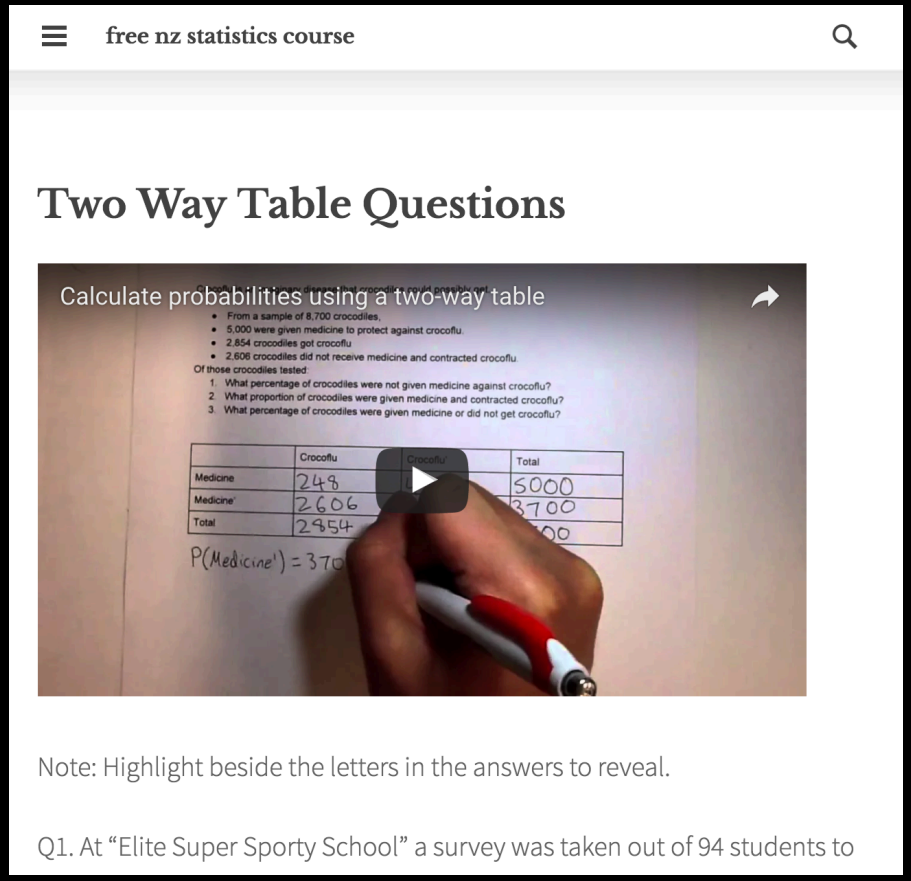
The main part of each class consisted of students writing questions (with answers) and checking each others questions.

WHAT DID I DO?



For each topic two students selected one of these questions to produce an instructional video.

WHAT DID I DO?

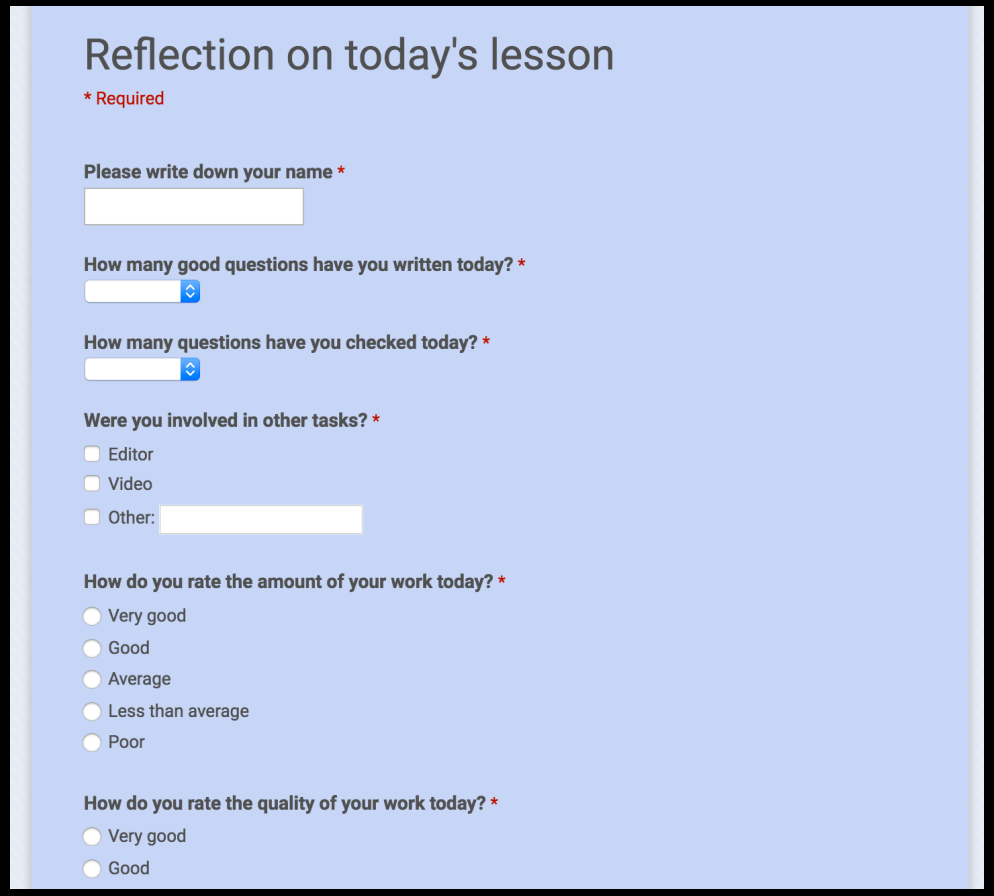


Two other students were the editors who selected questions and put everything on the website.

The material can be found at nzstats.edublogs.org . It is somewhat incomplete as some work was not finished. I may re-visit and improve on this with another class in the future.

The Edublogs platform is based on Wordpress but has some additional educational features.

WHAT DID I DO?



Reflection on today's lesson

* Required

Please write down your name *

How many good questions have you written today? *

How many questions have you checked today? *

Were you involved in other tasks? *

- [ ] Editor
- [ ] Video
- [ ] Other:

How do you rate the amount of your work today? *

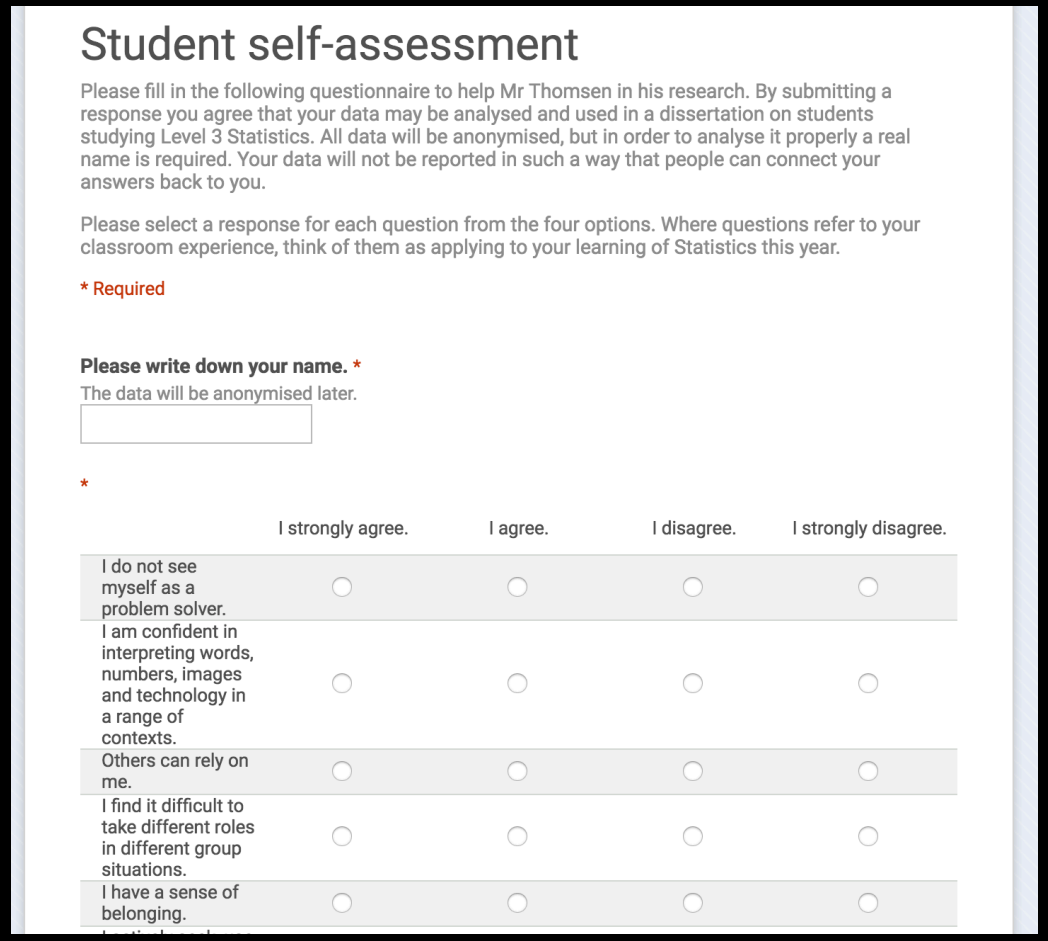
- ( ) Very good
- ( ) Good
- ( ) Average
- ( ) Less than average
- ( ) Poor

How do you rate the quality of your work today? *

- ( ) Very good
- ( ) Good

After each lesson, students were asked to fill in a Google Form with a reflection.

WHAT DID I DO?



Student self-assessment

Please fill in the following questionnaire to help Mr Thomsen in his research. By submitting a response you agree that your data may be analysed and used in a dissertation on students studying Level 3 Statistics. All data will be anonymised, but in order to analyse it properly a real name is required. Your data will not be reported in such a way that people can connect your answers back to you.

Please select a response for each question from the four options. Where questions refer to your classroom experience, think of them as applying to your learning of Statistics this year.

* Required

Please write down your name. *

The data will be anonymised later.

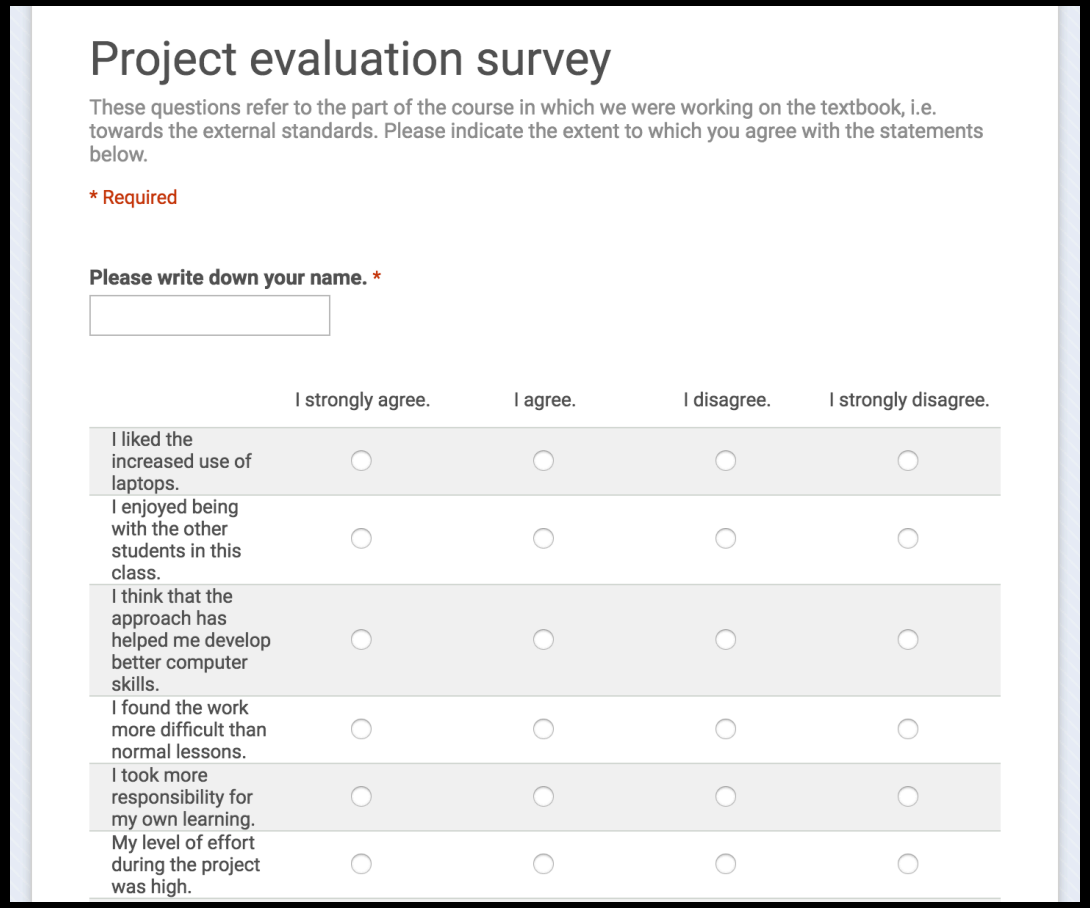
*

	I strongly agree.	I agree.	I disagree.	I strongly disagree.
I do not see myself as a problem solver.				
I am confident in interpreting words, numbers, images and technology in a range of contexts.				
Others can rely on me.				
I find it difficult to take different roles in different group situations.				
I have a sense of belonging.				

I developed a Key Competencies Instrument based on statements about the KCs in the NZ Curriculum.

Students rated themselves against these statements at the start and towards the end of the year in order to allow some measurement of their perceived development of the different KCs.

WHAT DID I DO?



Project evaluation survey

These questions refer to the part of the course in which we were working on the textbook, i.e. towards the external standards. Please indicate the extent to which you agree with the statements below.

* Required

Please write down your name. *

	I strongly agree.	I agree.	I disagree.	I strongly disagree.
I liked the increased use of laptops.				
I enjoyed being with the other students in this class.				
I think that the approach has helped me develop better computer skills.				
I found the work more difficult than normal lessons.				
I took more responsibility for my own learning.				
My level of effort during the project was high.				

Students were also asked to fill in an evaluation survey…

WHAT DID I DO?

- How would you describe yourself as a learner? How do you learn?
- How was learning different for you in this project?

- What does higher level thinking mean to you?
- How do you think you develop higher level thinking in maths or stats?
- Do you think you developed higher level thinking during the project? How?

- What skills or characteristics do you think are needed to be a successful student at university in comparison to the ones needed in school?
- Do you think you developed any of these skills or characteristics during this project? Which ones? How did you develop them?

- In the process of learning maths or stats in general, what do you think are the responsibilities of the teacher and the student?
- Was this different in the project? Did you find this problematic?
- There was a moment early on in the project when some students did not want to continue. How did you experience this?

… and took part in individual semi-structured interviews.

WHAT DID I FIND?

Development of Key Competencies

- Thinking
- Using language, symbols, and texts
- Relating to others
- Managing self
- Participating and contributing

Students did not think that they had developed *Thinking* or *Using Language, Symbols and Texts*. One could argue that the academic results may be used to evaluate this as well.

WHAT DID I FIND?

Development of Key Competencies

- Thinking
- Using language, symbols, and texts
- Relating to others
- Managing self
- Participating and contributing

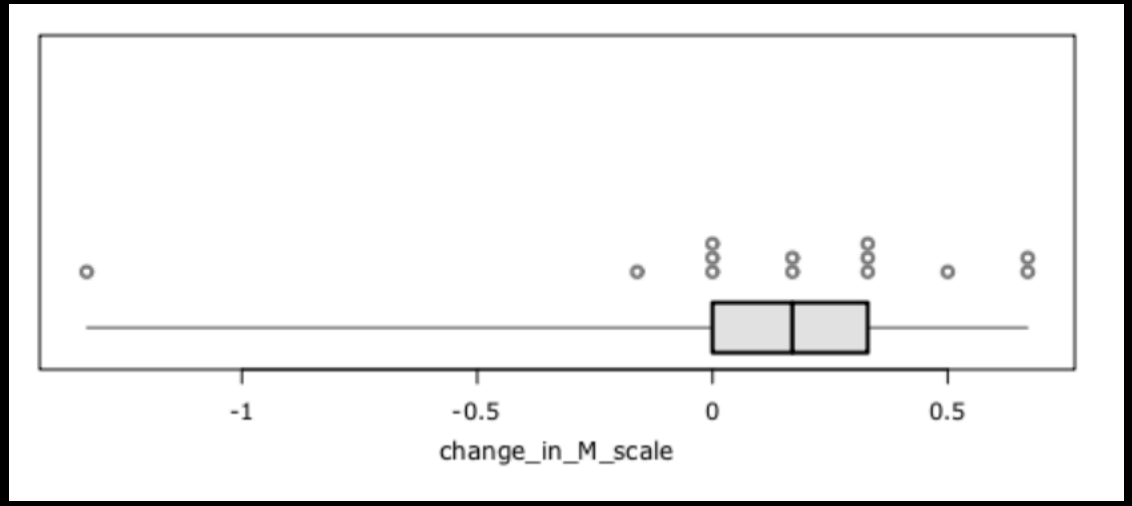
Students also did not think that they had developed *Relating to others*, although they had collaborated extensively during the project.

WHAT DID I FIND?

Development of Key Competencies

- Thinking
- Using language, symbols, and texts
- Relating to others
- Managing self
- Participating and contributing

Most students thought that they had developed *Managing self* to an extent, but one student thought he had failed to do this.

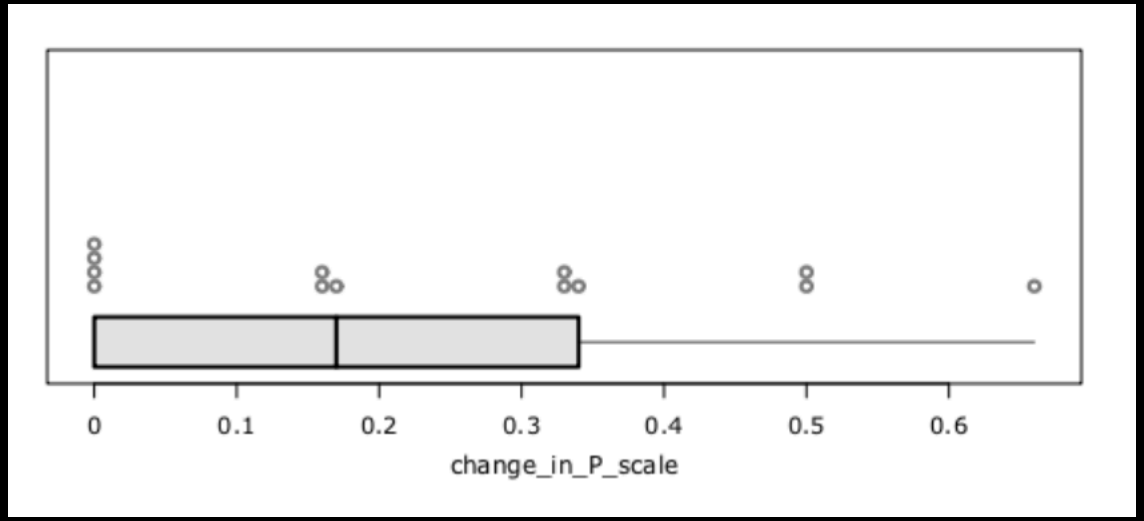


WHAT DID I FIND?

Development of Key Competencies

- Thinking
- Using language, symbols, and texts
- Relating to others
- Managing self
- Participating and contributing

The strongest, yet still weak, evidence can be found in *Participating and contributing*. Students saw their work as 'service' to others.



WHAT DID I FIND?

Academic outcomes

Between the 14 students :

- 3 Achieved grades,
- 23 Merit grades and
- 16 Excellence grades in the external exams

- 6 Merit and 8 Excellence subject endorsements

- 8 Scholarships

The academic results were outstanding and very different to other, similar classes that I have taught.

WHAT DID I FIND?

Student views

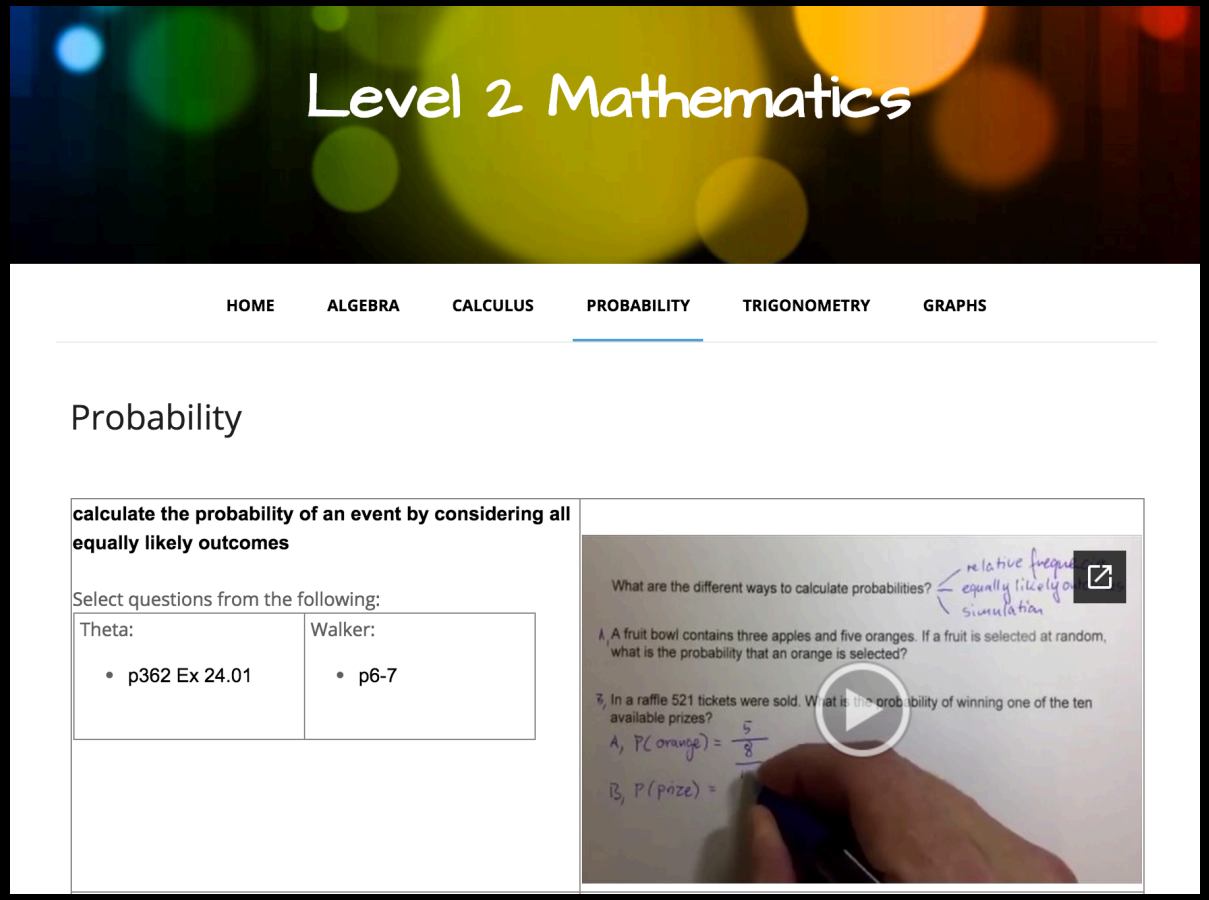
- More work and slower progression than normal lessons
- More enjoyable and more creative than normal lessons
- Liked videos
- Found distractions and procrastination challenging
- Enjoyed collaboration but struggled with free-rider effect
- Thought that by writing questions they had developed higher-level thinking
- Felt that through increased responsibility they had developed their ability to learn independently and valued this

WHAT DID I DO SINCE THEN?

Key ideas that stuck with me

- Teach students how to learn more independently
- Be explicit about the value of more independent learning
- Be explicit about how to use technology in learning
- Create communities of learners

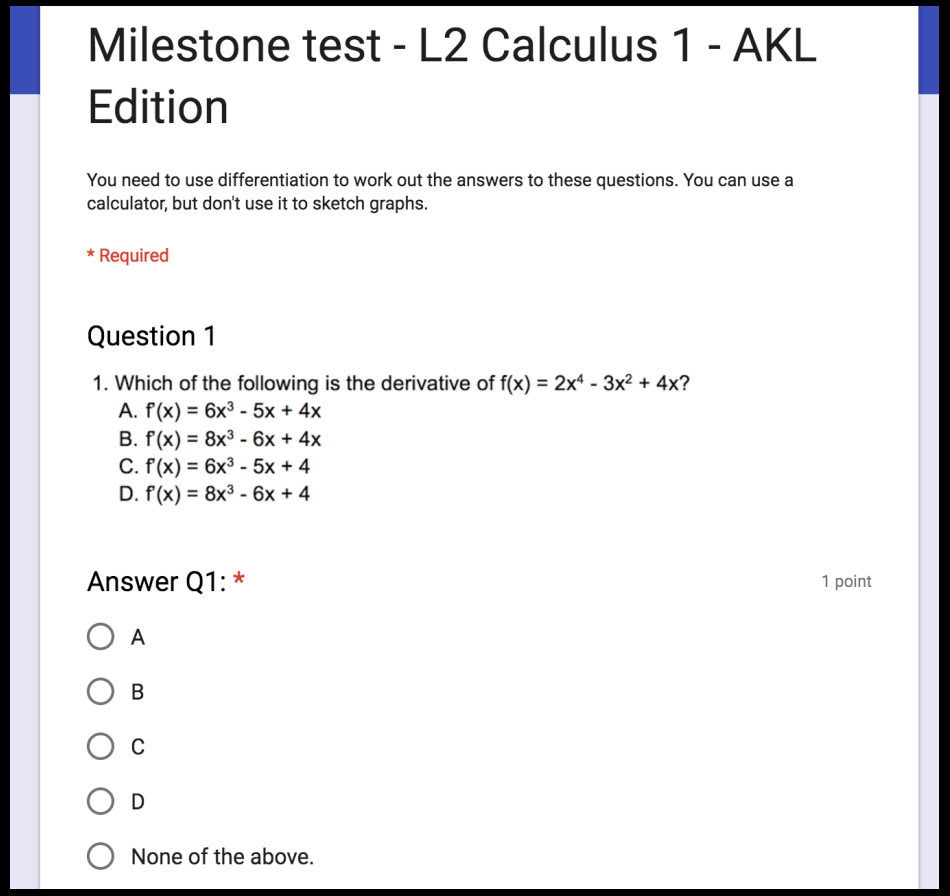
WHAT DID I DO SINCE THEN?



This year I had my Y12 maths class work from a website with videos all year long. I was merely a tutor in class, helping students were they needed it.

Students progressed with different speeds, although I indicated milestones that I wanted them to achieve at certain points in time.

WHAT DID I DO SINCE THEN?



Milestone test - L2 Calculus 1 - AKL Edition

You need to use differentiation to work out the answers to these questions. You can use a calculator, but don't use it to sketch graphs.

* Required

Question 1

1. Which of the following is the derivative of $f(x) = 2x^4 - 3x^2 + 4x$?
   A. $f'(x) = 6x^3 - 5x + 4x$
   B. $f'(x) = 8x^3 - 6x + 4x$
   C. $f'(x) = 6x^3 - 5x + 4$
   D. $f'(x) = 8x^3 - 6x + 4$

Answer Q1: * 1 point

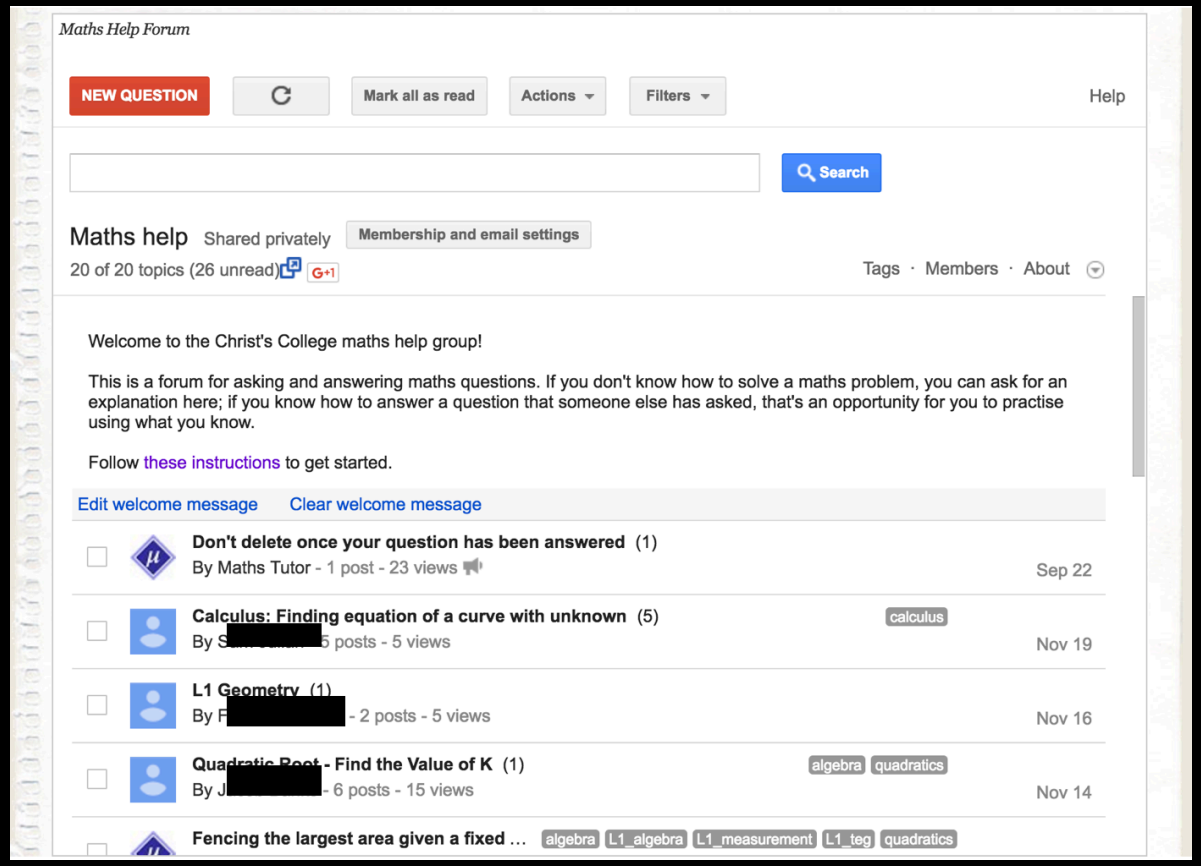
- A
- B
- C
- D
- None of the above.

Parts of the website were self-marking milestone tests based on Google Forms.

These also indicate how technology is emerging and makes things easier. While the CHC version is based on the Autocrat plugin and requires some spreadsheet work, the AKL version is now possible with the new built–in Quizzes feature in Google Forms.

tinyurl.com/AKLstatsday
tinyurl.com/CHCstatsday

WHAT DID I DO SINCE THEN?



We are further developing the idea of a community of learners. In some courses students will produce online learning materials for others.

A Google group has been established as a forum in which students can post questions and others can answer them. As this is based on email technology, students can just take snapshots of questions and/or answers and attach them.

WHAT ARE THE TAKEAWAYS?

- Technology CAN transform teaching and learning.
- The technical side gets easier all the time.
- Don't try to get it 100% right.
- Use technology based on educational principles:
  - "What are you trying to achieve?" rather than
  - "What does the technology allow us to do?"