

HOW TO PUT CHILDREN OFF STUDYING COMPUTING

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Outline

I recently spent a considerable amount of tax payer's money in an attempt to encourage more early high school pupils to study computing. **It did not succeed.** This talk is a post mortem of the project.

- What did I do to put pupils off?
- What evidence do I have that I put them off?
- Did I put girls off more than boys?
- What do teachers make of it?
- *Why* were they put off?

You are invited to scrub up, seize a scalpel and join the post mortem.



Disclaimer

I'm being flippant, of course. The team (Cathrin and Andy) worked hugely hard on this project, and the teachers put in great personal effort. This is a genuine effort to learn from a project rather than a blame game.

Making Games in Schools Training

What I did to put kids off

Why game making?

- Our previous research indicated kids were learning a lot of successful learning and literacy skills and were highly motivated by game making (Robertson and Howells 2008)
- A recent study found positive results for similar software (albeit with smaller sample size) (Carbonaro, Szafron, Cutumisu, & Schaeffer, 2010)
- Game making is increasingly common in CSE education literature as a way to motivate CS learners
 - ▣ E.g. Scratch (game making software from MIT) has a user community of 80 000 kids world wide.

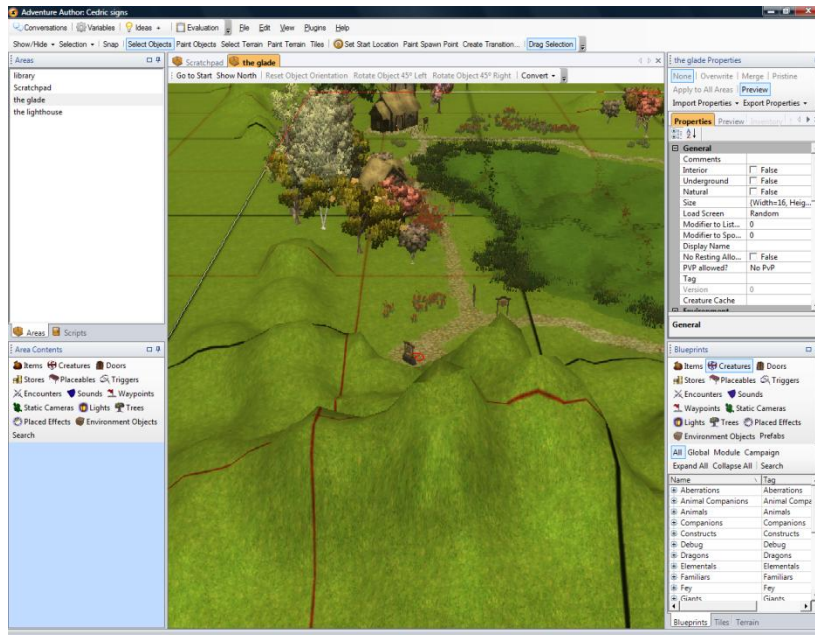
What's the deal with girls and computing?

- Very low rates of participation in computing from mid high school onwards
- Girls are less confident in their skills
- Bright girls seem to choose not to take it
- There is curious “we can, but I can’t attitude”

The project

- EPSRC funded 18 months public engagement work for the Adventure Author project
- Training teachers to run game making projects in their classes using the Adventure Author software.
- We wanted to encourage pupils (aged 11-14) to become interested in computing and to investigate gender issues.
- We trained 31 teachers in 19 schools in 4 cohorts. 2.5 days residential training each, plus ongoing technical and educational classroom support.

Training model

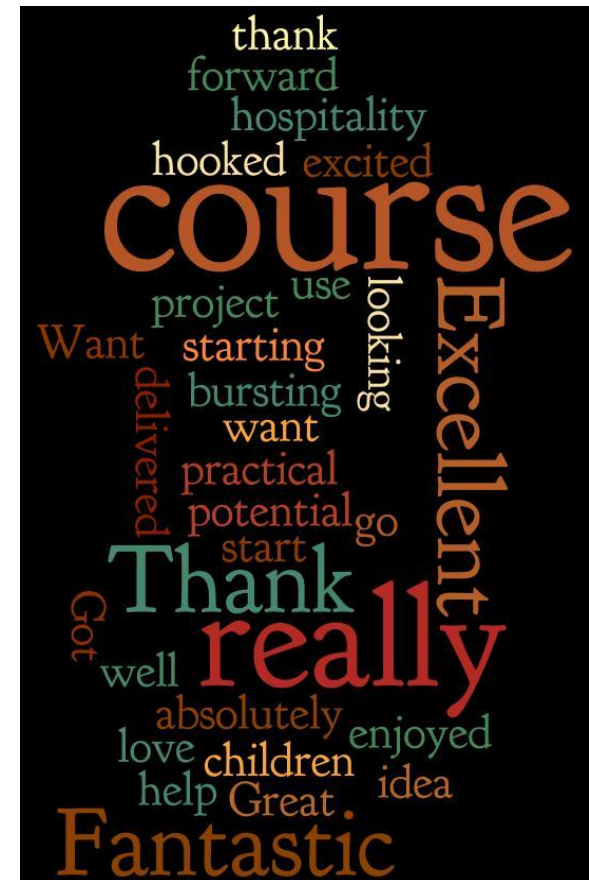


- Hands-on active learning for teachers
- Reflective discussion
- Modelling pedagogical techniques which teachers could use in the classroom
- Reporting research results
- Note: part of the aim is for teachers to integrate this in their practice. Therefore each school project was different.

Evaluation of training model

- Excellent feedback from participants on training and style of teaching
- Positive evaluation from experienced EPSRC mentor who took part in one workshop:

“a professional atmosphere in which the teachers felt they were ‘valued’ and being offered a high quality training experience. The course was well structured and the content was very comprehensive. The course combined plenty of practical training on use of the Adventure Author software with training on the use of story planning and evaluation software, how making games in schools can be integrated across the curriculum, and career development opportunities.”



Reaching pupils

- By Nov 2010, we got data back from 13 schools:
 - 992 pupils had taken part
 - 15772 total learning hours on the project
 - Mean number of pupils per school = 70
 - Mean hours per week = 2
 - Mean project duration = 9 weeks
- Huge variation in project models by school
- Children completed pre and post attitude tests
- Teachers completed exit surveys
- Very poor response rate to post test (23%).
- Projects continue in most of the schools, and we've had 2 additional schools sign up since the project finished

Attitude questionnaire

- Computers are fun
- Programming is hard
- Computer jobs are boring
- I am good at computing
- I like computing
- I know more than my friends about computing
- My family encourages me to use computers
- My friends like using computers
- I like the challenge of computing
- I can become good at computing
- I want to find out more about computing
- This project was fun
- This project made me more interested in computers
- I would recommend this project to a friend
- The best thing about this project was...
- Can you suggest any improvements to this project?
- Is there anything else you would like to tell us?

Adapted from (Ericson & Mcklin, 2005)

Results

How I know I put them off

Research questions

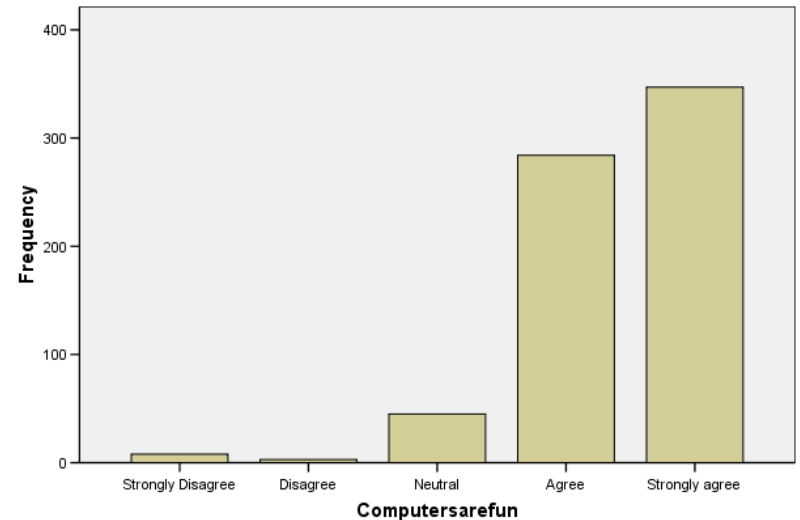
- *Attitude benchmarking*: What are pupils' opinions of computing, working with computing in the future, and what are the perceived attitudes of friends and family?
- *Impact of the game making project*: Did the pupils enjoy taking part in the project, and did it change their attitude to computing?
- *Gender differences*: Are there gender differences in the pupils' attitudes to computing? Are there gender differences in the pupils' changes in attitude after taking part in the project?
- *Teachers' perceptions*: What is the educational impact of the project as perceived by the teachers who took part?

Analysis method

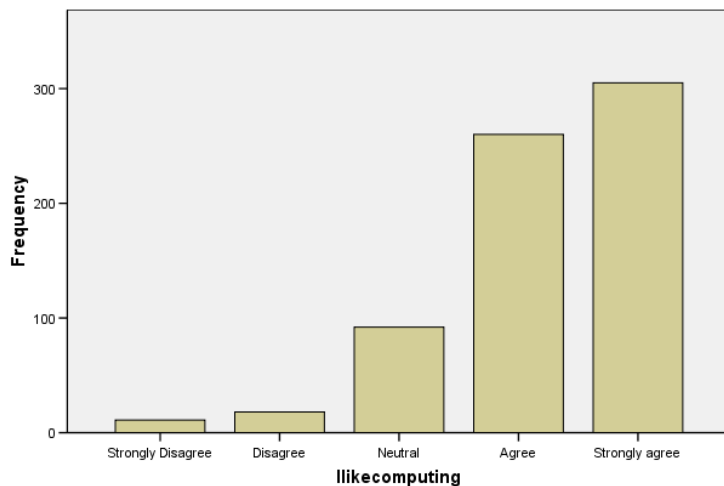
- Used anova-type statistic for 2x2 mixed factorial design with likert data (Kaptein, Nass, & Markopoulos, 2010).
- Mann-Whitney-U test for gender analysis of project impact questions
- Thematic qualitative analysis of brief comments of “how would you improve this project?”
- Note: analysis based on 225 participants due to poor post-test completion rates

What are pupils' opinions of computing? (pre-test)

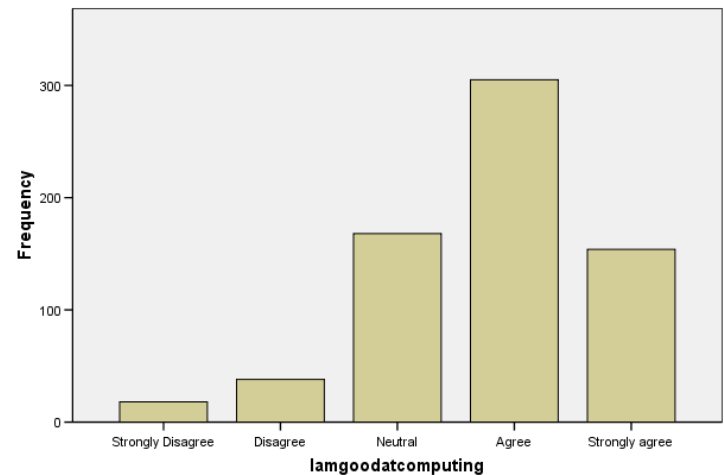
- Positive: they agree that computing is fun, they like it and think they are good at it.



I like computing



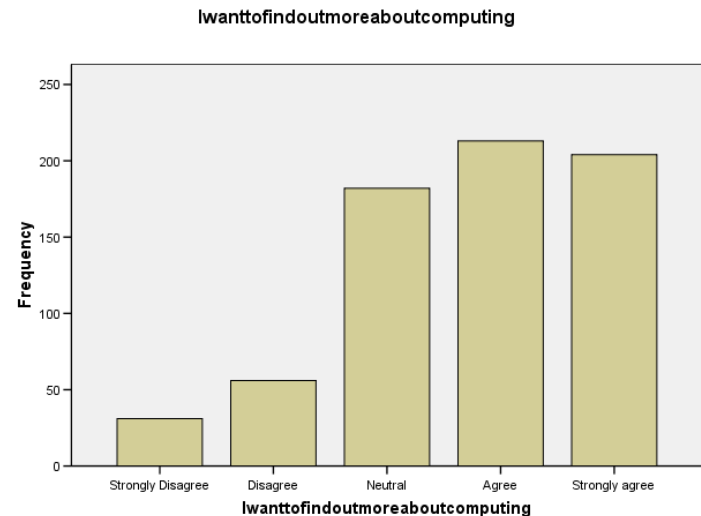
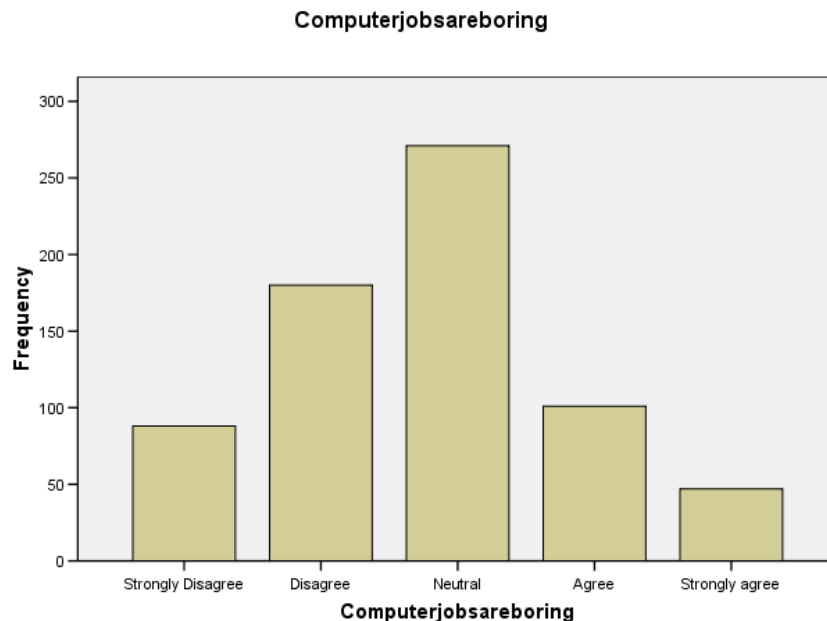
I am good at computing



Working with computing in future

What are pupils' opinions of working with computing in the future?

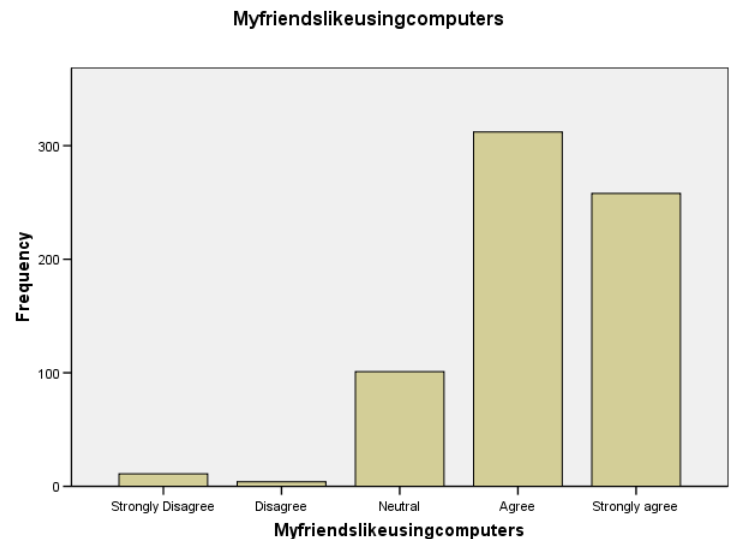
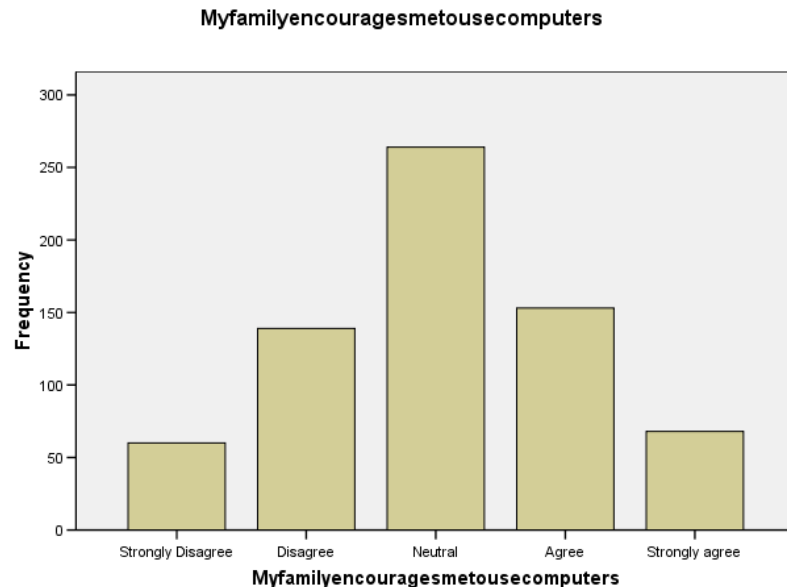
- Positive: they would like to find out more about computing, but are neutral about whether computer jobs are boring.



Attitudes of friends and family

What are the perceived attitudes of friends and family?

- Pupils believe that friends like computing and are neutral about whether family encourage them.



Impact of the game making project

Did the pupils enjoy taking part in the project?

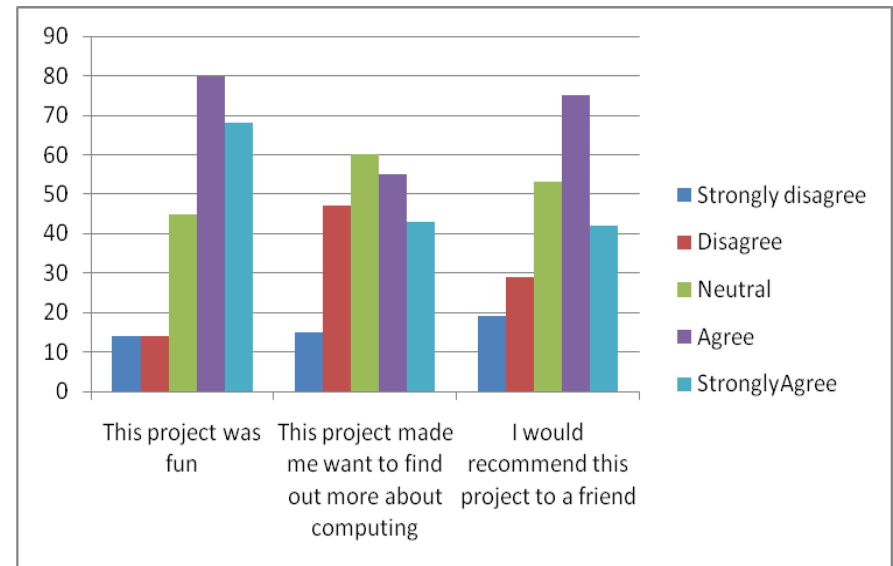
- Yes, they thought it was fun and would recommend it to a friend.

Did it make them more interested in computers?

- No, there was a neutral response

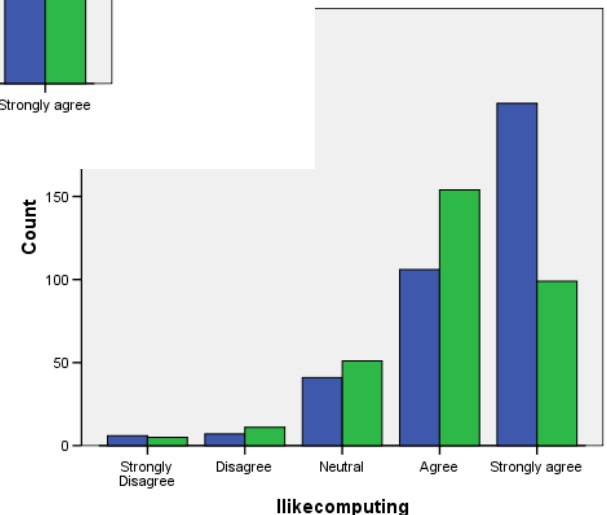
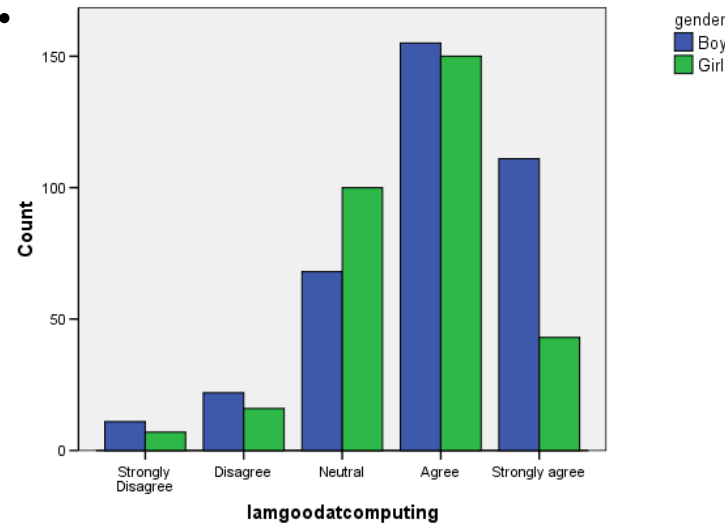
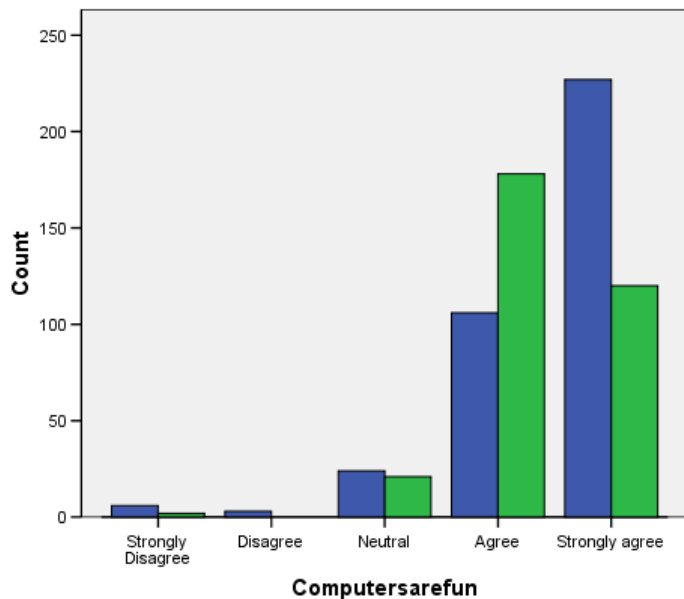
Did it change their attitudes to computing?

- Yes. Pupils are *less* likely to like computing ($F = 13.65, p < .001$) or to want to find out more about computing ($24.3, p < .001$) after taking part



Gender differences

Girls are positive towards computing but slightly less positive than boys.



Boys blue, girls green

Gender differences

- Computer jobs are boring ($F = 6.3, p < .001$) (Girls more likely to think it boring)
- I like computing ($F = 18.17, p < .001$) (Girls less likely to like it)
- I want to find out more about computing ($F = 16.06, p < .001$) (Girls less likely to want to find out more)

Difference in attitude changes

Is there a difference by gender in changes to computing attitudes after taking part in the project?

- No. (No gender X time interaction effect in factorial analysis on any d.v.)

Teachers' perceptions

What is the educational impact of the project as perceived by the teachers took part?

- Highly positive.
 - ▣ “The project has created a buzz in the school and the classes are at full capacity.”
- Pupils highly engaged across ability spectrum.
- Pupils with special needs benefited.
- Impact on teaching approaches in school
 - ▣ “I was challenged on a daily basis to think outside the box in an area where I was sometimes out of my depth of knowledge. But I loved this! The children enjoyed seeing me as a learner too!”
- Girls were interested but perhaps their interest was of shorter duration.
 - ▣ “I think after five or six weeks the girls have had enough”



Why?

Why, oh why, oh why?

Suggested improvements to the project

Qualitative analysis of 200 answers to “Can you suggest any improvements to the project”

- No improvements (53)
- Teaching/ learning related (50)
- Technical limitations (43)
- Content related (35)
- Fun related (10)

Lingering questions

- Why do the teachers have a different view from the kids?
- How come girls like computing and think they're good at it, when previous studies have indicated the opposite?
- If the project was fun, why do kids not want to study computing more afterwards?
- What do kids understand by the term “computing” anyway?
- What would be a sensible target for “converting” kids to want to study computing? How many minds can you really expect to change?

What's next?

- We will continue to loan laptops to schools who want to take part – there are currently 3 sets on loan to local schools.
- Cathrin is interviewing 20 pupils at 2 schools involved in a current project to get a deeper understanding of the underlying issues.
- We need to keep working with these schools to track the pupils' eventual career choices.

Thanks for listening

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