Teachers' Interview Findings and Results

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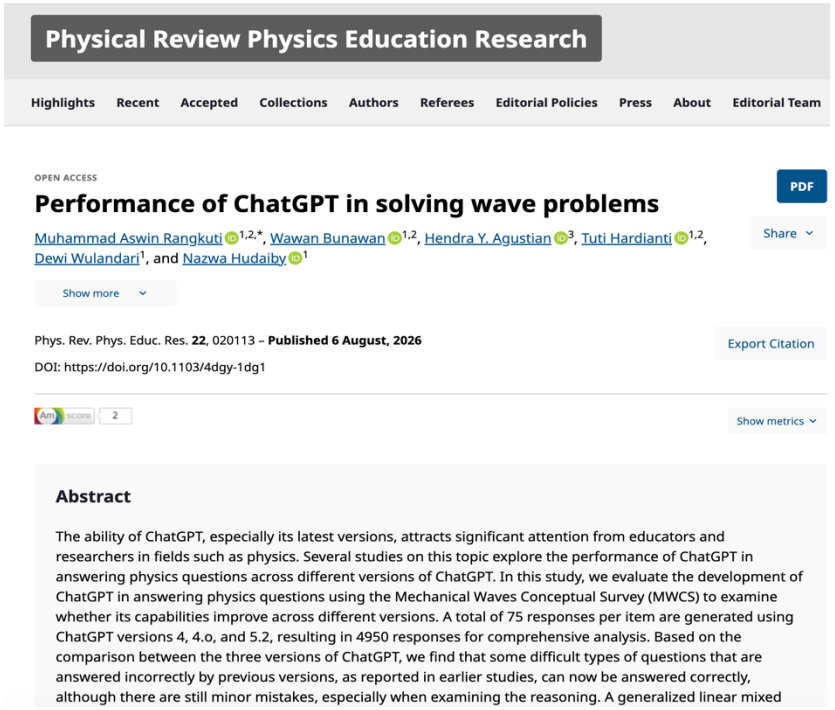
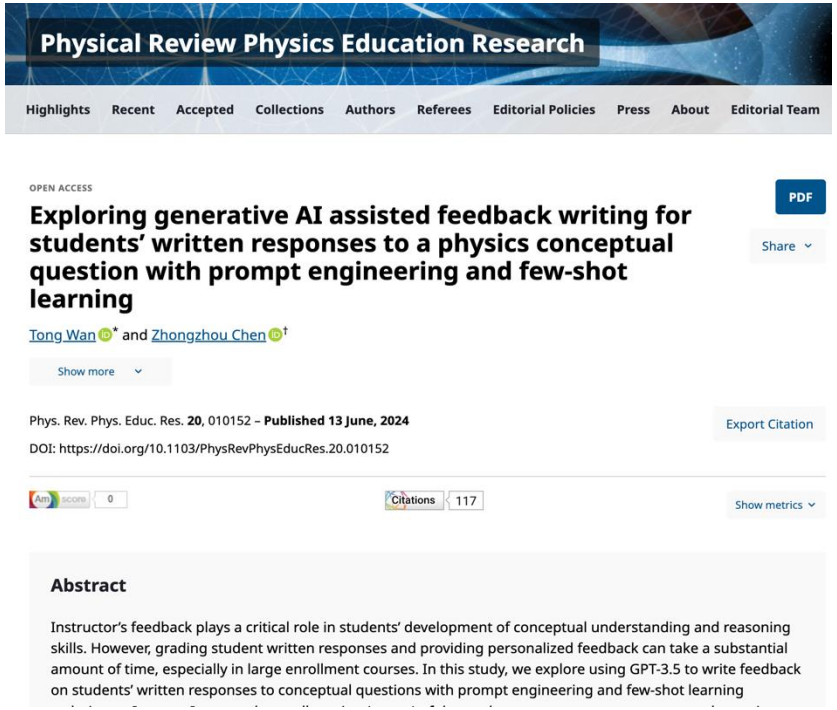
Background and Research Questions

Research on GAI in physics education ask what the technology can do.



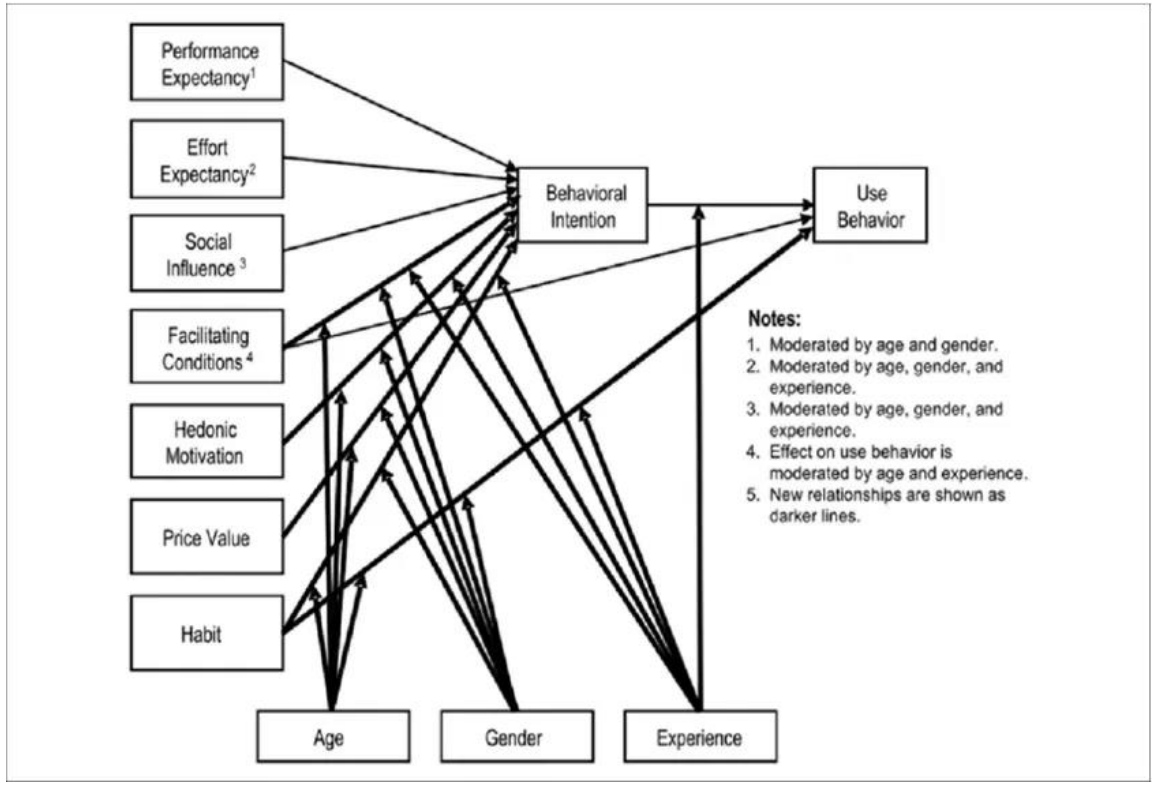


Far less is known about how teachers actually use and experience it

What we wanted to find out

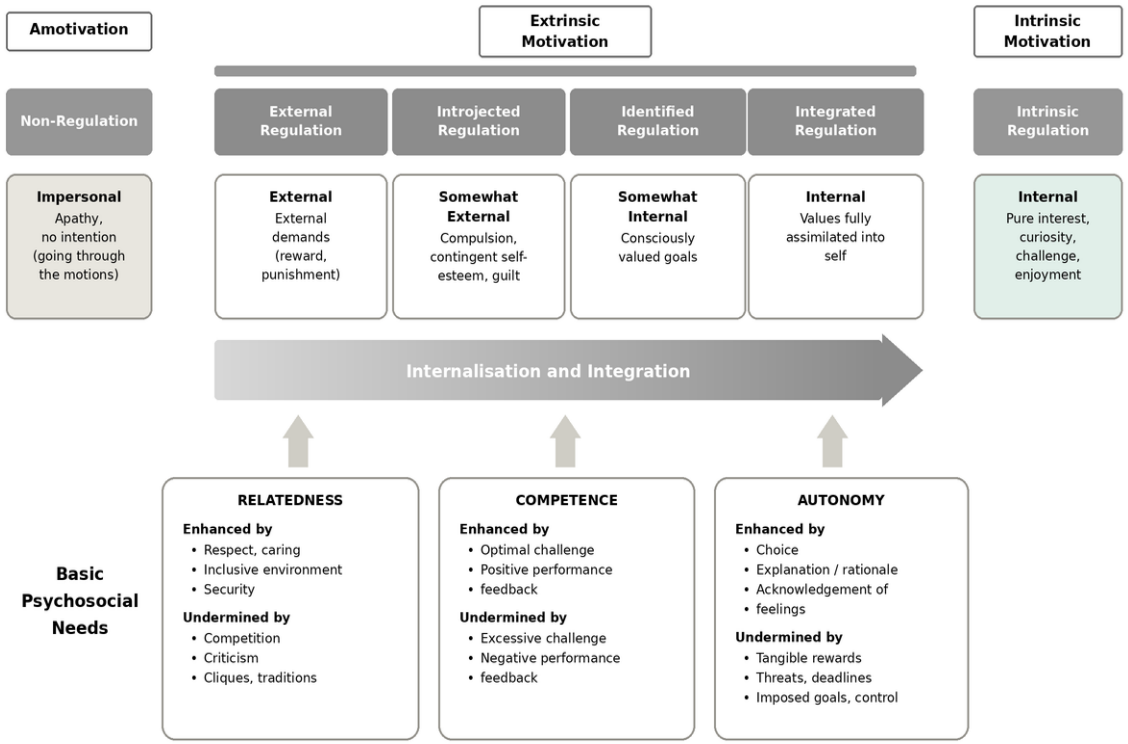
- How do teachers adopt and use GAI in their teaching?
- What are their concerns?
- How does it affect them as teachers?

Methods (Framework to develop the questions)



The Unified Theory of Acceptance and Use of Technology (UTAUT2) (Vakantesh,et. Al, 2012)

- Performance expectancy: Can GAI improve teaching?
- Effort expectancy: How much effort effort required to learn and operate GAI?
- Social influence: For example, pressure to GAI.
- Facilitating conditions: Do teachers get help in using GAI?
- Hedonic motivation: Do teachers enjoy using GAI?
- Price value: Trade-off between benefits and financial costs.
- Habit: Do teachers use GAI routinely?



Self Determination Theory (SDT) (cook & Artiono Jr, 2016)

- Autonomy: Is use of GAI is a self-endorsed choice that fits their own values and judgement or is it more imposed on them.
- Competence: Do teachers feel more or less capable in their work as physics teachers with GAI?
- Relatedness: GAI's influence on teachers' relationships with their students and colleagues.

Participants

Teacher	School	Gender	Experience Using GAI	Type of GAI
Teacher 1	School 1	Male	Frequent	ChatGPT, Claude
Teacher 2	School 2	Male	Moderate	ChatGPT
Teacher 3	School 2	Male	Light	Copilot
Teacher 4	School 3	Female	Moderate	Copilot
Teacher 5	School 3	Male	Light	ChatGPT, Copilot
Teacher 6	School 4	Female	Light	Copilot
Teacher 7	School 4	Male	Moderate	Copilot
Teacher 8	School 5	Female	Light	Copilot, ChatGPT
Teacher 9	School 6	Female	Light	Gemini
Teacher 10	School 7	Female	Light	Copilot
Teacher 11	School 7	Male	Moderate	Copilot

Stages of thematic network analysis

1 — Code the material

Interview segments arranged in a workbook with assigned codes; each segment mapped first to the seven UTAUT2 constructs, then the four SDT constructs.

386
coded segments (298 UTAUT2 + 117 SDT)

↓

2 — Distil the basic themes

Initial codes compared, consolidated, and explicitly defined to remove overlap and redundancy, leaving a stable set of basic themes.

59
final codes = basic themes

↓

3 — Group into organizing themes

Basic themes clustered into broader organizing themes — e.g. uses of GAI, effects on students, assessment, the teacher's position, conditions and context.

8
organizing themes

↓

4 — Construct the thematic network

Built in Gephi: nodes are codes, links are code co-occurrence within a segment. Only the strongest links kept by extracting the backbone, then clustered.

10
modules from the backbone network

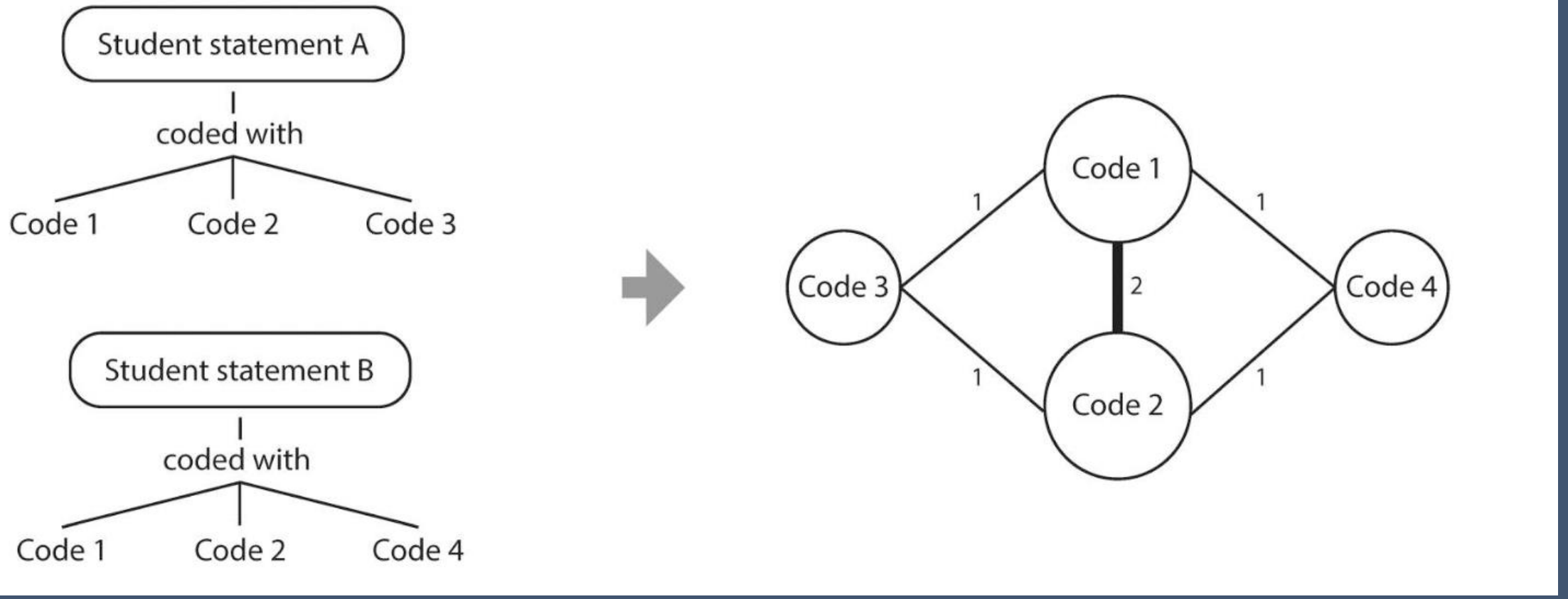
↓

5 — Select and interpret

Five modules chosen for detailed reading — those revealing cross-teacher connections the parallel qualitative analysis did not surface on its own.

5
modules interpreted in depth

How to read



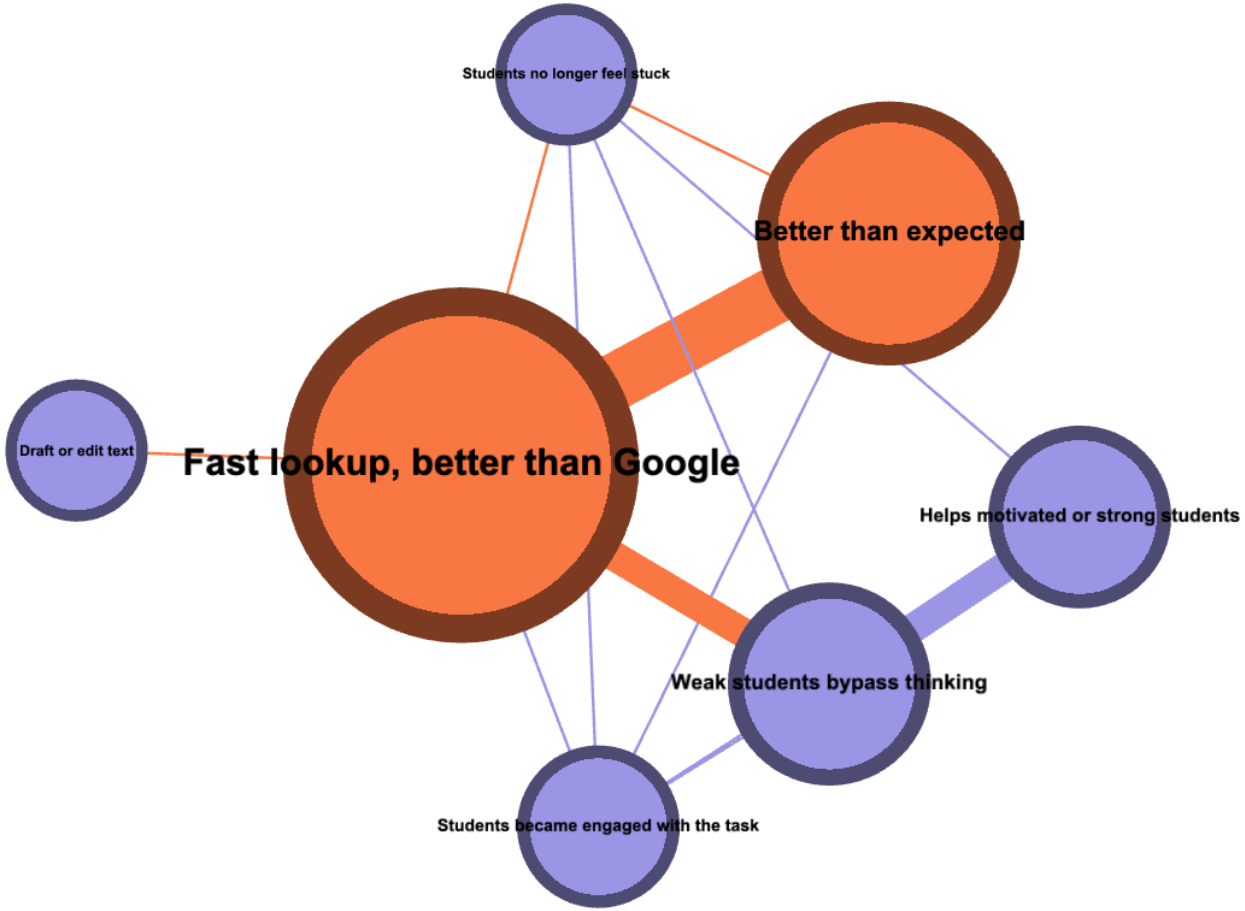
Marshall, et. al (2026)

Results

The strong-weak divide

- Motivated/strong students use GAI to go further, while weaker students use it to avoid the thinking.

> *Academically strong students most often come from academically strong homes — a mum or dad who's an academic, help over dinner. The students who don't have that opportunity are left missing it. That's what I'd realised when these AIs came.*

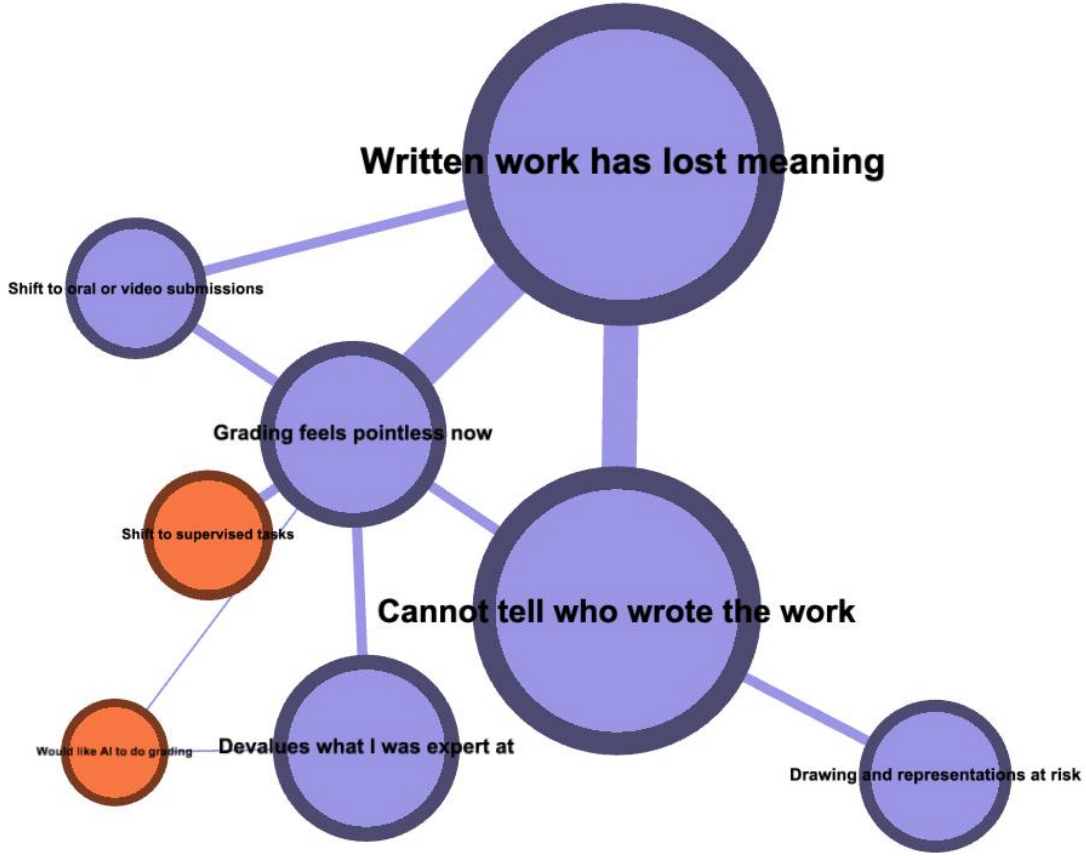


Assessment and trust crisis

- The strongest feeling in the whole dataset because it reaches past the tools and into the relationship between teacher and student.

> *I feel ridiculous as a teacher if I have to sit and read a task they didn't write themselves... we have to rethink the exam forms and the way we grade.*

> *Some produce surprisingly detailed answers with technical terms they wouldn't normally use — seemingly to appear knowledgeable rather than to understand.*

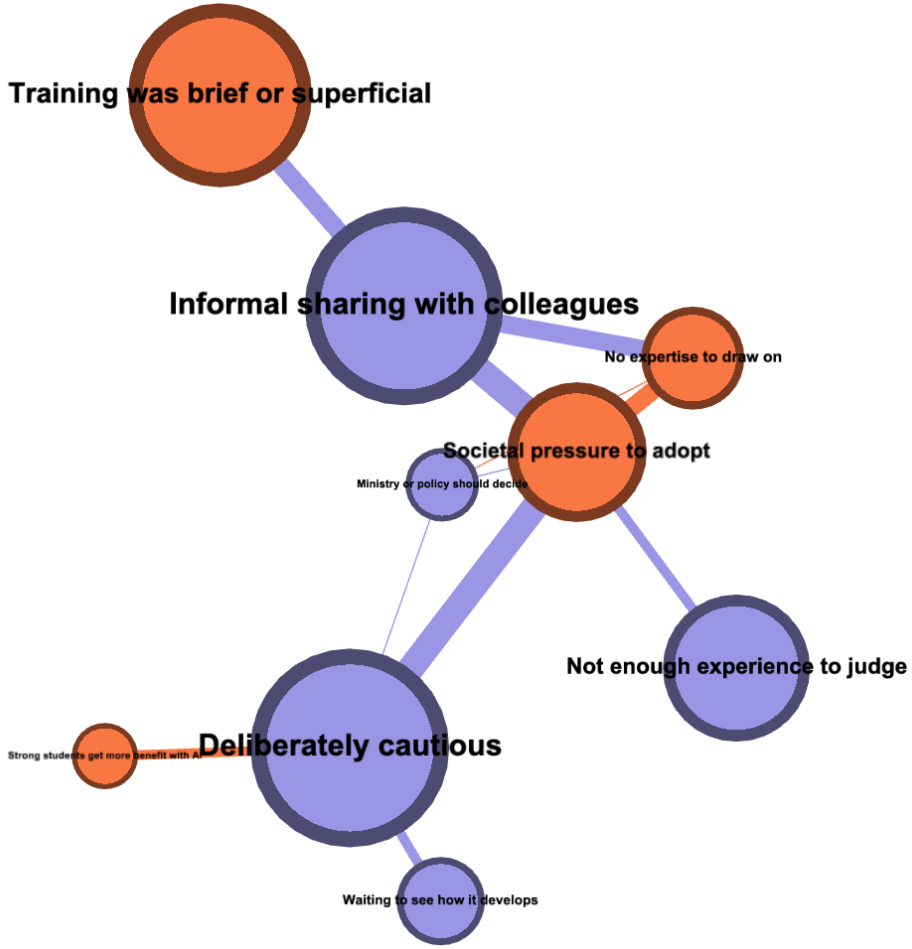


A crossroads with no framework

- Teachers' unease was not about GAI itself, but about being left to work it out alone.

> *I feel there's a societal pressure. No one has told me I have to use it. But I can feel it... like it's come past as a wind. And if I'm to help my students as well as possible, then I also have to.*

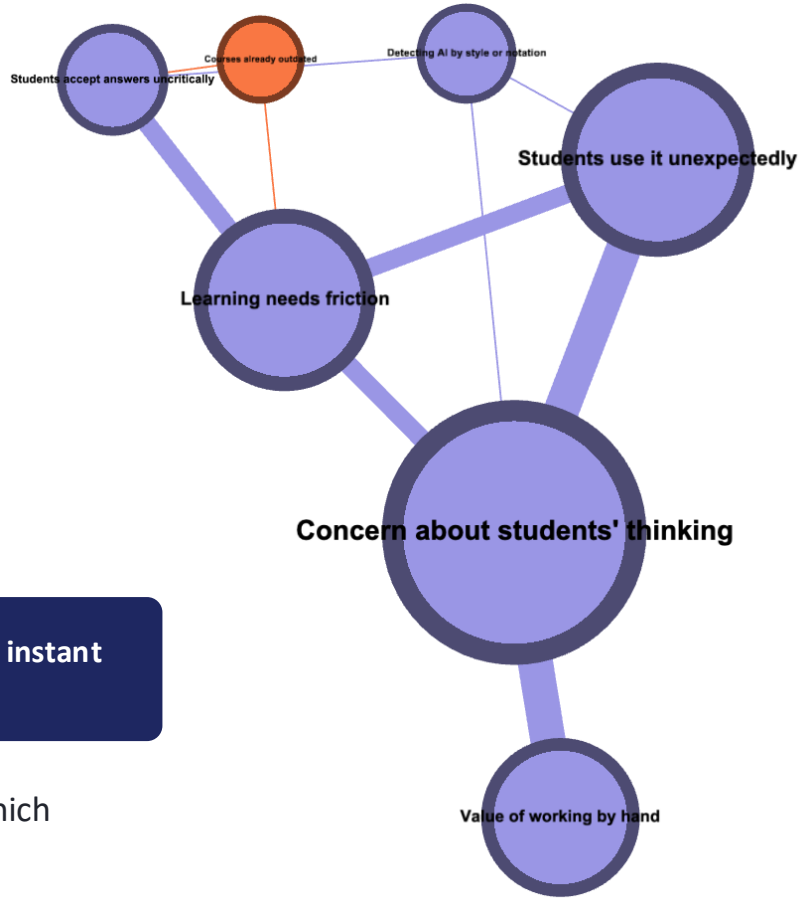
> *You do get breathed down the neck. But who's coming to save us?... There must be someone who sets frames for our teaching and exams. But there just isn't. So we stand at a crossroads now.*



Learning physics still needs friction

- Understanding develops through struggle and GAI may remove from this the learning process.

> *It simply can't provide the friction that learning requires. And if it tries to, there's resistance from the students. They'd rather have resistance through my teaching than through the machine.*



WHERE FRICTION LIVES IN PHYSICS

Drawing diagrams	**Deriving relationships**	**Problems with no instant answer**

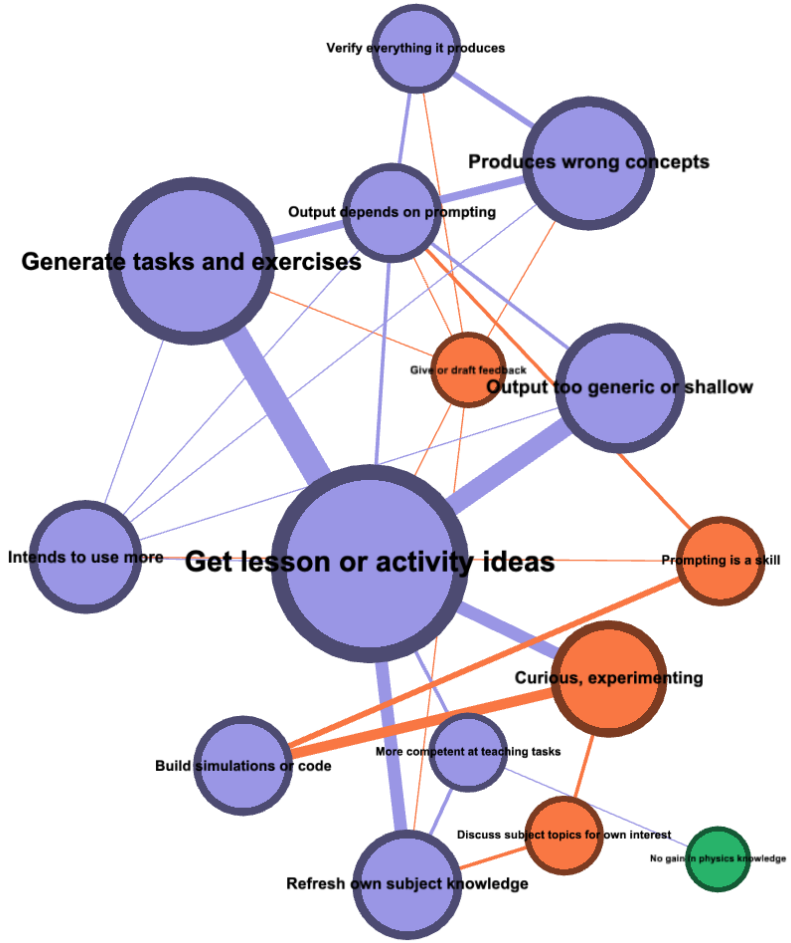
A tool that supplies the answer directly may remove exactly the struggle through which understanding is built and consolidated.

A machine without mind

- When asked what would make the teachers rely on GAI more, they didn't want a more powerful tool but they wanted a more trustworthy one.

> *I have a problem with that thing where it can't distinguish whether it's understood something or not. It doesn't have a concept itself. It just generates.*

> *I used this AI to say: what if we have some radium, what does it decay to? Even though it claimed it could, it always went wrong. So it fell apart.*



Conditional Autonomy

- On the surface, teachers made the pedagogical calls. On closer look, that control had limits.

Teachers choose:

- whether to use the tool
- what to use it for
- how to respond — reviewing, correcting, or rejecting outputs

> *I was about to say it was me. I think I set it in motion, but where it ends up, that I can't control. Of course, if I get it prompted well enough, then it's probably me who controls it.*

Do teachers pick up the tool?

- The choice was largely made for them. Most used Copilot because leaders recommended it on data-protection grounds.
- Only three teachers had ever used more than one GAI system.

Divided Views on Competence

- Moderate users felt more capable at planning their teaching but no more knowledgeable in the subject itself.

> *I also feel more competent in that you can use it to develop your teaching. I don't think you become physics-subject smarter.*

PEDAGOGICAL COMPETENCE ↑

- Faster access to teaching ideas
- Alternative ways to explain concepts
- Recall of content not taught for a while
- Less time on grading & admin

SUBJECT EXPERTISE → UNCHANGED

- Content felt shallow and unreliable
- Some tried it for physics, then stopped
- Supplies material, doesn't deepen understanding
- Teachers kept the two carefully apart

- A few teachers worried GAI devalued competence they had valued and grey lines they used to hold firm.

> *I don't think it's very exciting to grade their tasks, especially not when I know they've gotten help from the chat. So, I'd like it if AI could solve that task for me…* ***when does it become okay that I use AI to grade the students' tasks?***

- Some human roles cannot be replaced by AI.

> *The part called teaching, what should we [work with], and how should you work with it, is not threatened. But that more roaming reference work is more threatened.*

THREATENED

Being the trusted source of disciplinary knowledge.

DISTINCTLY HUMAN

The relational core of teaching

- Presence
- Attentive listening
- Motivating and responding to individual students

Suspicion and the loss of bond

- Relatedness was the SDT need teachers felt as most vulnerable where GAI strained their trust in students.

> *I'm clearly more skeptical toward what they say. There's become a shorter path for them to say something that sounds right, but which they haven't thought about themselves... I'm more reserved toward whether they thought their way to it.*

WHAT TEACHERS NOW WATCH FOR

- **Facial expressions**
- **Questioning unexpected answers**
- **Signs understanding actually occurred**

Rather than accepting contributions at face value, teachers now look for evidence of genuine thinking.

Teaching depends fundamentally on interaction.

- Knowledge develops through the reciprocal relationship between cognition and social interaction.
- When students can produce plausible answers without understanding them, that relational foundation starts to erode.

Conclusion

THROUGH UTAUT2

- Main concern: negative effects on students, who use GAI in unproductive ways
- Used mainly for low-stakes tasks: refreshing knowledge, teaching ideas, curiosity
- Little freedom to explore tools: schools directed them to Copilot for data protection
- Poor impression of output quality, while acknowledging it depends on the prompt

THROUGH SDT

- Shallow use: autonomy largely preserved; no sense of becoming a stronger physics teacher
- Teacher–student relation disturbed by loss of trust
- A distance gradually opening between teacher and students