

Welcome_

Ashton | Frédéric | Jailia | Seamus

Our Team_



Ashton | CS



Frédéric | Econ



Jailia | CS



Seamus | PubPol

- **Problem domain:** Teachers in academic education with students aged 12 and up:
 - Teachers possess the expertise, but face obstacles and stress, we hope to hear more and potentially enhance their work life through technology
 - Empowering teachers benefits students because students thrive when teachers are supported

Needfinding Methodology_

Our 4 Interviewees:

- **Participants:** Three current teachers, one PhD student (expert) with deep prior TA experience
 - Networks, cold-emailing
- **Location:** One Zoom interview, three in-person interviews
 - **Apparatus:** Zoom recording, audio & video recoding
- **Extreme user:** Teacher who instructs in program with students from exceptionally diverse backgrounds
 - Uncommon teaching scenario
 - Broader perspective and unique challenges
- **Questions:** General question bank
 - Participant-specific questions based on background and experience
- **Roles:** Two team members present during interview — one interviewer, one note-taker

Needfinding Methodology_

Our 4 Interviewees:

- **T**, a STEM teacher in her 50ies at Parade, a special program focused on teaching students in Oregon with just 1 day of face time a week (extreme user)
- **J**, a PhD researcher in education technology in her 20ies and former long-time CS TA at U.C. San Diego (expert)
- **M**, a recent Stanford graduate and teacher in her 20ies at Palo Alto High School who is the youngest on her team
- **P**, a STEM teacher in his 50ies at Harper School, a prestigious private school in the Bay Area



Interview Results

Interview Results_

Interesting Quotes:

- "I don't like using others' lecture materials, I like to make my own, and boil the material down to the essentials." – P
- "I don't think GPT has changed anything about what it means to teach." – P

Unit 3: Energy and the Cell (Cellular Respiration and Photosynthesis) Chapters 6 & 7

17

P Honors Biology

Enduring Understandings: (what you should still remember in 10 years)

- Living organisms must constantly expend energy to maintain internal order, respond to their environment, and reproduce (always battling that darned 2nd Law of Thermodynamics...).
- Through photosynthesis, autotrophs capture light energy and store it in chemical form.
- Cellular respiration converts the chemical energy in large energy-storage molecules into a more versatile form (ATP) that is used by cells for a diverse array of reactions.
- Nearly all life on earth depends on the interplay of the above processes – energy capture, transfer, and release - to power necessary life functions.

Unit Outcomes: (What you should know or be able to do by the end of the unit/for the semester final) Chapter 6

- Describe the first and second laws of thermodynamics and relate these laws to everything else that goes on in this unit (e.g. why we need ATP, exergonic/endergonic reactions, etc.)
- Define, and distinguish between, endergonic and exergonic reactions.
- Describe the relationship between cellular respiration and photosynthesis in living organisms.
- Explain what Calories (kcal) measure and list the types of molecules that "have calories" – in other words that can be used to produce ATP.
- Define redox reactions and describe what happens in/identify oxidation and reduction reactions.
- Explain the role of NAD⁺ and FAD in electron/energy transfer.
- State the three stages of cellular respiration and explain (at the level of detail given in class) what happens in each stage.
- Describe the structure of the mitochondria and relate this structure to how it functions.
- Explain oxidative phosphorylation in detail, especially its use of redox reactions, electron transport, and chemiosmosis to produce ATP molecules.
- Explain the importance of oxygen in cellular respiration and compare and contrast aerobic and anaerobic respiration. Explain why fermentation is necessary to the continuation of glycolysis in the absence of oxygen. State the end products of fermentation for different types of cells.
- Explain the effects of metabolic toxins as discussed in class i.e. how these toxins interfere with specific pieces of cellular respiration. (Do not need to memorize the names, just be able to explain their effects when presented with a description of their mechanism of action.)
- Describe (briefly) how other food molecules (and which food molecules) can be used in the formation of ATP.
- Understand (in general) that the metabolic pathways described in this unit can also be used to synthesize large molecules like fats and proteins (biosynthesis).
- Describe, and list evidence for, the endosymbiont theory.

Chapter 7

- Define autotroph/heterotroph and describe the importance of producers to the biosphere.
- Describe the carbon cycle and relate it to biomass and climate change as shown in class.
- Explain what happens to the glucose produced in photosynthesis (what can plants and animals do with it!)

Interview Results_

Interesting Quotes:

- "At UC San Diego, we had this tool called autograder. It's all in one platform, really advanced, I loved that." – J
- "School's provided technology can be really difficult." – M
- "Almost everything is done on (Microsoft) teams, but I find it much better to grade and provide feedback by hand. [...] I also can't get myself to grade things before grades are due."
– T



Empathy Map for T_

SAYS

- (1) Have to teach multiple subjects and grade levels
- (2) Enjoy seeing students get excited about learning
- (3) Utilize a teaching style similar to "flipped classroom"
- (4) Takes multiple hours a night to grade and give feedback
- (5) Prefer providing feedback on written assignments by hand
- (6) Technology can be too distracting for students in class
- (7) School district tries to unsuccessfully introduce new technologies
- (8) Chat-GPT is helpful and the work is often better than what would've originally been produced
- (9) Teaches a diverse range of students
- (10) Almost everything is done on Teams

THINKS

- (1) It's difficult to make so many lesson plans and curriculum
- (2) Learning should be fun and enjoyable
- (3) Teaching style is optimal for balancing hybrid learning
- (4) Impossible to grade before grades are actually due.
- (5) Easier and more satisfying to handwrite with pen/pencil/stylus
- (6) Students will not be engaged and use other sites in class
- (7) School district doesn't have a thought-out plan
- (8) Chat-GPT is powerful but takes away students' learning
- (9) District provides adequate resources specific to teaching diverse students
- (10) Features need to be updated/improved to support teaching

DOES

- (1) Uses Facebook groups with other teachers to share
- (2) Incorporate different methods and learning styles
- (3) Have students complete hands-on, participatory group work when in-person
- (4) Grades every class once a week based on a schedule
- (5) Stays updated on new features to help make providing feedback easier
- (6) Only uses technology for designated activities during designated times
- (7) Learns to use their own technologies and resources they know are available
- (8) Creates assignments that are non-Googleable, non-fact based, requires subjective answers
- (9) Makes accommodations and modifies expectations
- (10) Agrees to try new technologies as suggested by district

FEELS

- (1) Appreciative of other teachers who share their resources
- (2) Teaching is a rewarding job because they get to see students learn
- (3) Conflicted because it is difficult to balance the use/role of technology in hybrid learning
- (4) Mentally challenged trying to remember what and when grades are due
- (5) Annoyed/frustrated that there is no single platform to perform all related tasks
- (6) Little control over what students do during class time when they are at home
- (7) Invisible and misunderstood because district doesn't consider the impact on teachers or ask for their thoughts
- (8) Uncertain and afraid of the future/impact of AI
- (9) Exhausted being the one trying to find other mediums and resources to support diverse students
- (10) Ignored and unsupported because Platforms appear unaware/inconsiderate of teachers using them

Key Themes_

Agreement

Grading (and bureaucracy!) is time-consuming and not what I should be spending my time on
– P, J, T

School-affiliated or provided technology platforms are not customer friendly and customizable enough
– M, J, T

Teaching is difficult to balance with personal circumstances
– M, J, T

Technology is great for communication: with students that are out (e.g. sick, not in school), with parents
– M, P, T

Disagreement

Lesson Plans: some find it difficult to make their own and would like more sharing (there's FB groups and more), some prefer DIY

"Technology Not a Distraction" vs. "Technology a Distraction": screens (and esp. AI) lowering learning and risk to academic integrity

Summary_

It would be better to...

- ...have a more nuanced idea who we're building for.
- ...narrow down the scope of our questions.

Summary_

Still, we already learned that...

- teachers find it tough to balance work and private life
- teachers are ambivalent when it comes to tech in classroom
- teachers mostly don't like the technology schools pick for them
- teachers don't like spending a lot of their time grading

Q&A_



T

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M

SAYS

1. There is a lot of stress in highschool
- (2) It is important to teach students about internet safety and privacy
3. Technology is not a distraction to students
4. Her teaching style is due to her younger age
5. Students are constantly studying and dealing with imposter syndrome
6. School affiliated technology can be "difficult"
7. Teaching can be difficult to balance with personal circumstances
8. School and competition causes stress and anxiety
9. AI is useful but must be used with caution
10. Has to budget her own salary

THINKS

1. Traditional lectures and homework affects learning
- (2) Students are not being taught about internet safety and privacy at home
3. Technology can help students stay engaged
4. Older teachers can be taught how to use technology
5. Going to high school in Silicon Valley by Stanford is very competitive
6. Technology Platforms used are not customizable/ user friendly
7. Teachers need mental health/ wellness support as well
8. School work needs to be less competitive to relieve student's of stress
9. Students can easily be misled due to Chat-GPT's falsity
10. Teachers are underpaid and overworked

DOES

1. Teaches students in collaborative tactile project based learning
- (2) Creates lesson plan to teach students about internet safety and privacy
3. Incorporates Chromebooks/ phones during class activities
4. Helps older teachers utilize tech in classroom
5. Strives to make more meaningful connections and serve as a resource/outlet
6. Emails her student instead of using schoology
7. Meets with the school's in-house therapist for teachers
8. Lets Students complete project that conform to their own personal learning style
9. Encourages hands-on, critical thinking, and subjective assignments while discouraging the belief in Chat-GPT's answers
10. Purchases classroom materials with the school department's budgeted money

FEELS

1. Teaching is better understood when it is memorable
- (2) Alone and liable because few other teachers are involved in teaching about internet safety
3. Her age influences her open attitude toward technology compared to other faculty
4. Her younger age better helps her integrate colleagues into using tech
5. Students need more resources like online chatlines and additional school counselors/ therapists
6. Communication is important with teachers and students/parents
7. The teaching community is overlooked because most schools don't provide resources/ support
8. Learning styles have been "debunked" and every students has a specific mixture of all learning styles.
9. Knowledgeable and up-to-date with AI news due to proximity and connections in Silicon Valley
10. Conflicted because she feels privileged that her school helps purchase classroom materials, but she also feels undervalued due to her little salary

J

SAYS

1. OMG - you want me to be a TA?
2. I taught mainly because of the TA community
3. I love teaching
3. Very satisfying to see students grow over time
5. I love working on something so important!
6. There's a lot of stress on you as an instructor, we're underpaid and overworked
7. Key thing that drains my energy: dealing with the school bureaucracy, and grading
8. Everyone loves feedback, but everyone also hates grading
9. Learning is multi-faceted and very personal, that's why introducing a tech tool is always tricky
10. You want to create personal boundaries, you want to be there for your students but you also are a human and need space outside of work
11. There's too little training, often no guidance and you are scared you'll mess up

THINKS

1. Teachers are not in it for the money
2. Thinks that in college settings, TAs are often "on their own"
3. An important aspect of every job are the peers around you and the community
4. That technology is needed in classrooms but that it's hard as it is not as flexible
5. That a key to better education is instructors having more time to focus on the individual student
6. That teachers themselves need more support, like the students do, as having a lot of things on their mind hurts their teaching
7. That teaching is a calling, and sth she'd like to do for life
8. That it is tough to facilitate a healthy classroom dynamic
9. That money is not what motivates most teachers
10. That burn-out is a real problem for new teachers

DOES

1. Spends whole weekends in labs helping students with coding problems
2. See teaching as a community of people with similar interests and good hearts who will help her get ahead
3. Uses a tool called "auto-grader" to manage assignment submissions
4. Currently do a lot of research on how tech is used to better train teachers
5. Uses "auto-grader" to also manage a queue of people who want help
6. Has no way of contacting her students
7. Encourages students to be more confident and ask for help
8. Focus on creating good classroom dynamics where nobody feels left out
9. Work on helping TAs become more effective
10. sports and other things so as not to drain her energy too much

FEELS

1. Technology is often overkill for teaching (like the slice the bread with a sword-meme)
2. She needs to be a role model for girls and other minorities
3. Technology can strengthen in-person learning, but feels unequipped to answer how
4. That the more she knows, the less competent she feels
5. That students need easy access to TAs and instructors
6. Often a bit overwhelmed (both in her time as a TA and now as a PhD)
7. The community of TAs is very smart but that doesn't mean they should just be left to figure everything out for themselves
8. That learning styles differ and that most technology tools are too descriptive
9. AI is a big problem for academic integrity, but an even greater opportunity
10. AI can help with taking some of the load off of teachers and grading and feedback and help with training and is thus mostly a relief and not a threat