Online Solutions for Deaf and Hard of Hearing STEM Learners

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For Your Consideration

Do you have students who are:

- **Underprepared for STEM coursework?**
- Underrepresented and isolated (STEM-wise)?

Overview

- Who we are
- Rationale for the project
- Describe the online community infrastructure
- **Tutoring activities**
- Q & A

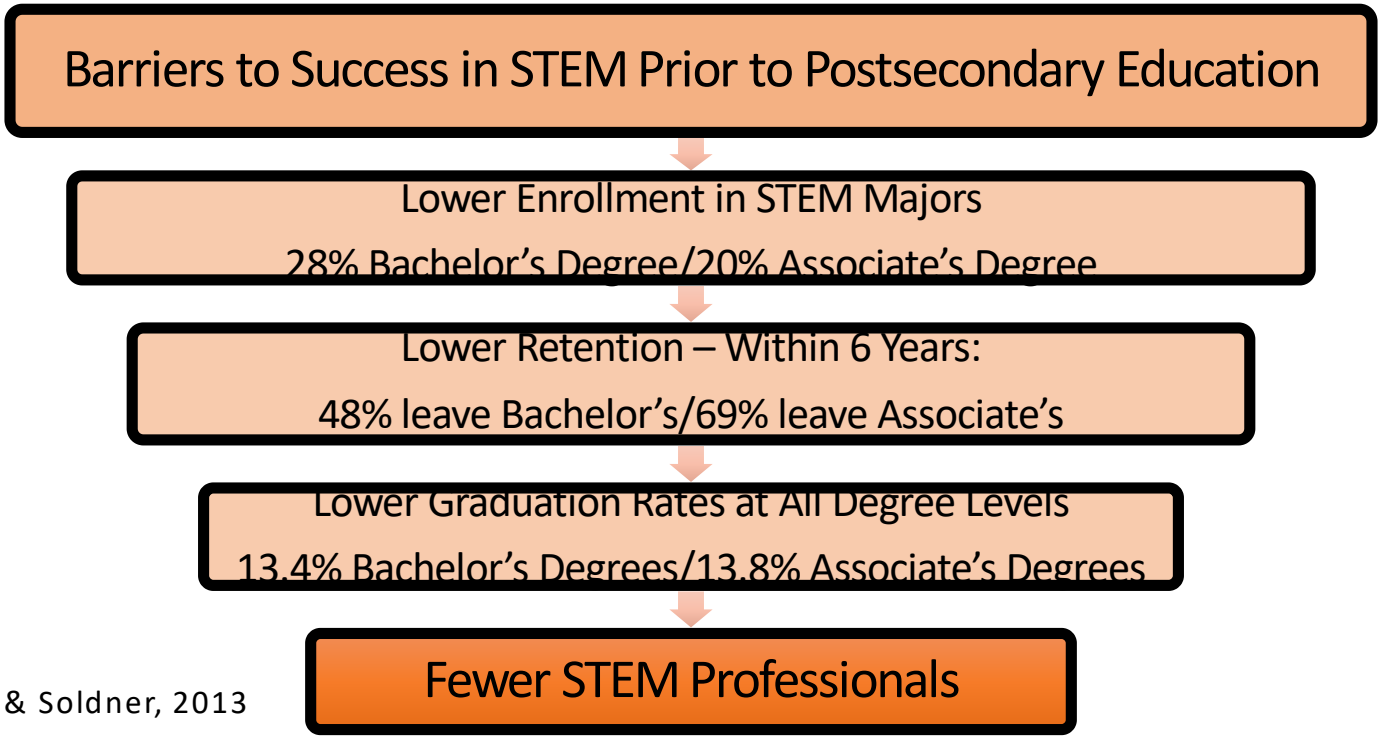
Who We Are

- Deaf STEM Community Alliance
  - Only Alliance specifically for D/HH students
- Supported by the National Science Foundation, HRD #1127955
- Ongoing project (started Sept 2011)
  - Now in our 7th year

Campus Partners

RIT is the lead institution for this project, with Camden County College and Cornell University as partners.

The Narrow STEM Pipeline for Students with Disabilities



Chen & Soldner, 2013

Goal and Objectives

- Goal:

  Create a *model* virtual academic community (VAC) to increase the graduation rates of postsecondary D/HH STEM majors in the long term

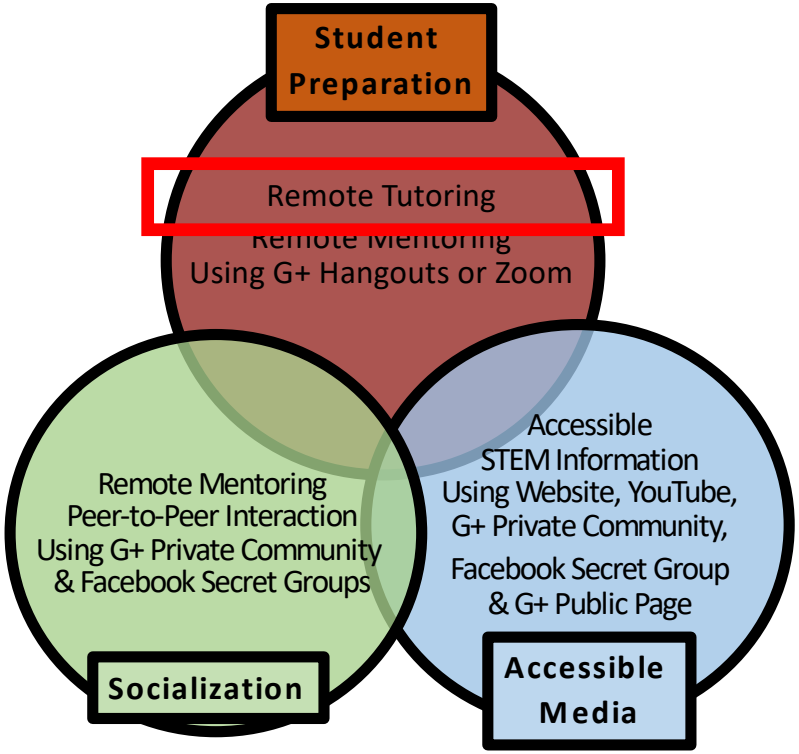
  - Iterative and incremental (Cockburn, 2008)
    - Empirically determining what works and what doesn't
    - Model construction is occurring in stages instead of all at once

- Objectives

  1) Document and disseminate this process for replication

  2) Increase the GPAs and retention rates of D/HH students in STEM majors

DHHVAC Model Barriers & Strategies



Online Synchronous Tutoring

- Defined:
  - The tutor and student are simultaneously present during the session.

- Platforms used:
  - Google Hangouts or Zoom

Sessions-to-date	Students involved	Tutors involved	Average session length	Average GPA achieved
>160	43	16	60 min	2.60

Online Synchronous Tutoring: Themes

- Qualitative analysis of synchronous tutoring sessions:

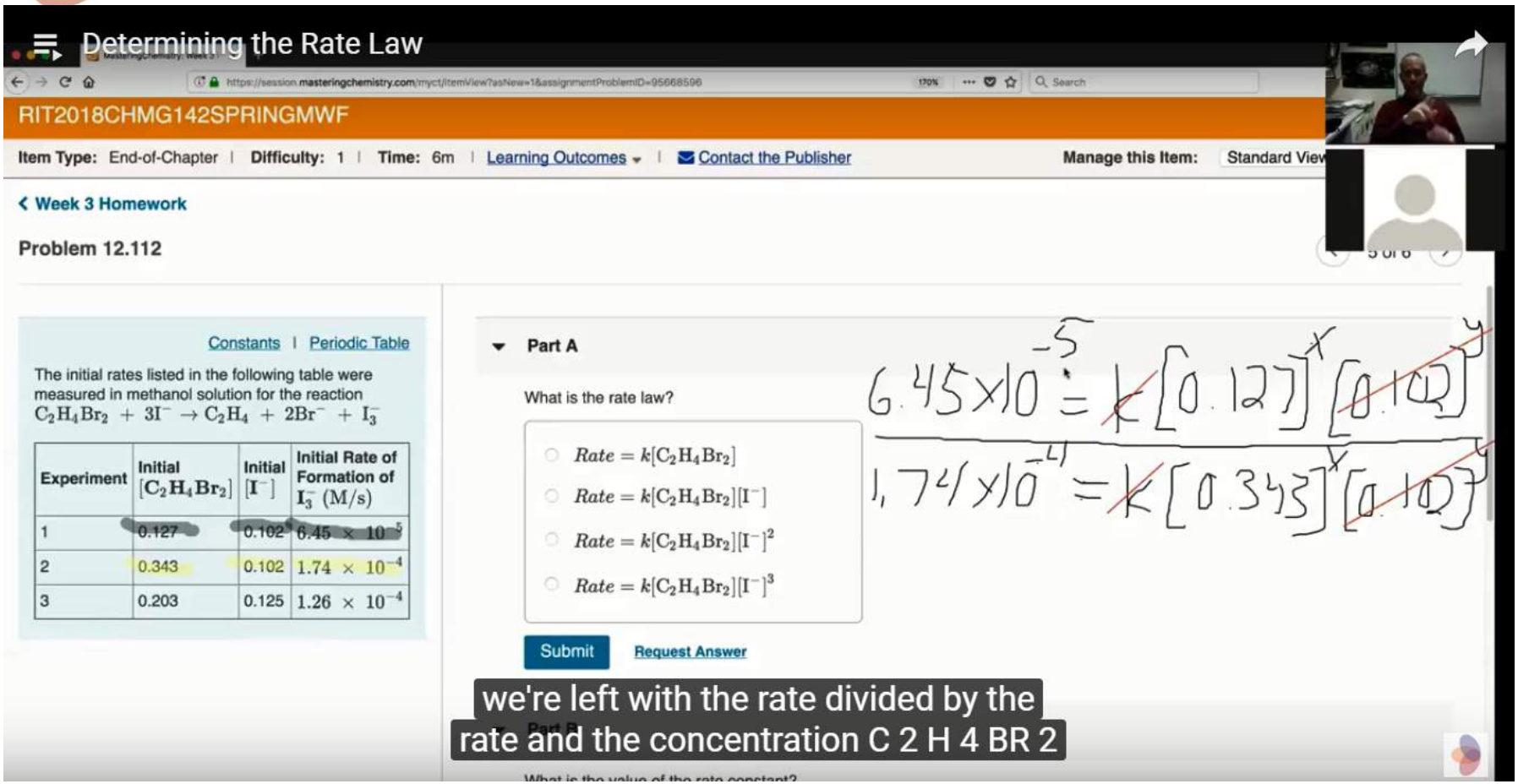
Feature	Observation
Session length range (> 160 sessions):	15 minutes to 3 hours (avg. 63 min)
Sessions analyzed:	12 videos
Content of sessions analyzed:	Physics, Mathematics, Biochemistry
Conversation focus:	Providing content, expressing understanding
Communication used:	Students: ASL; Tutors: simultaneous communication and spoken language
Materials used:	Hardcopy homework documents; text-based chat
Technology issues:	Video feed freezes

Asynchronous Tutoring

- Defined:
  - The tutor records instructional lessons that are made available to students through private YouTube channel.

Tutor	Course	Videos recorded	Avg. length	Platform/Dissemination	Dissemination
A	Trigonometry	45	3:45	NTID Sprint Relay Lab Editing: Camtasia or Adobe PremierePro	Private YouTube Channel managed by DHHVAC
	Foundations of Algebra	142	2:57		
	Explorations of Algebra	81	2:13		
	Integrated Algebra and Applications of Algebra	193	2:35		
B	General & Analytical Chemistry	13	13:00	Zoom	

Asynchronous Tutoring



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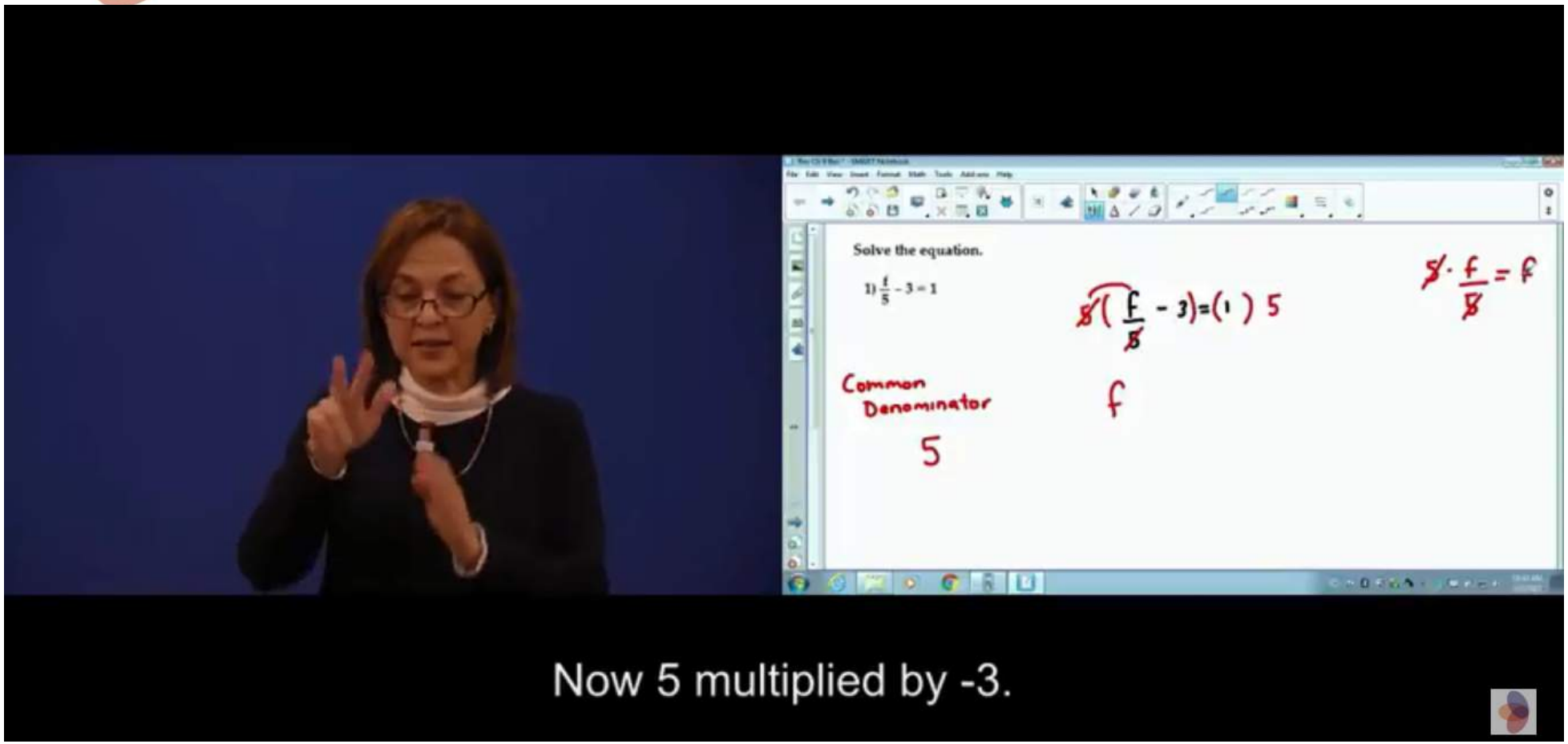
Asynchronous Tutoring



Asynchronous Tutoring: Usage

Tutor	Course	Videos recorded	Views	Avg. length
A	Trigonometry	45	55	3:45
	Foundations of Algebra	142	1609	2:57
	Explorations of Algebra	81	528	2:13
	Integrated Algebra and Applications of Algebra	193	5901	2:35
B	General & Analytical Chemistry	13	137	13:00

Asynchronous Tutoring: Themes

- **Independent learning**
  - "A way to go back and learn something on my time"
  - "I can rewind to figure out rather than ask again and again."

- **Test preparation**
  - "Built my confidence for the final test"

- **Scheduling**
  - "It is nice to have video because we are always busy and also I live off campus. It is good benefits (sic) for me to use video instead of drive all the way to campus. If I do not understand after I watched video, I will ask the teach to clarify."

- **Understanding**
  - "Better understanding, more knowledge, much better grades if I watched the video a lot before tests or quizzes."
  - The whiteboard shown plenty of information (sic)…Helps a lot for me since I am visual learner."

Tutoring Benefits and Challenges

Tutoring model	Benefits	Challenges
Synchronous	More accommodating for student schedules	Student commitment (DHH students have in-person tutoring regularly available)
	Easy to share documents	Tutor recruitment (time needed to develop technical skills while still managing tutoring workload)
	Good for classes with significant online component	Robust internet connection
Asynchronous	Most flexible option for student schedules	Tutor recruitment (time needed to develop technical skills while still managing tutoring workload)
	Obvious potential to impact much greater numbers of DHH students	
	Resources remain available for future student access	

Student Successes

- 69 students enrolled in project-to-date
  - Associates, bachelors, masters, doctoral
- 37 graduated-to-date
  - Associates (10)
  - Bachelors (24)
  - Masters (3)
- Remainder still pursuing various STEM degrees
- 7 left college prior to graduation

Hearing students at public colleges

- *29% graduation rate at 2-yr schools with AS degree*[1]
- *59% graduation rate at 4-yr schools with BS degree*[1]

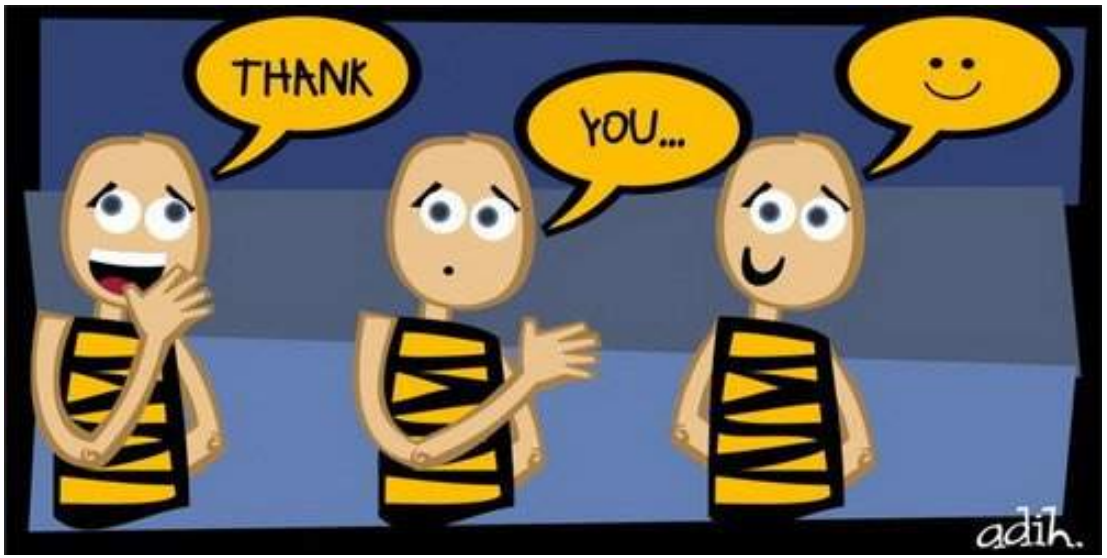
[1] http://www.ntid.rit.edu/media/annual-report

Conclusions

- The DHHVAC tutoring model attempts to implement a solution to address:
  - Personal objectives (student access to content, tutor professional development)
  - Institutional objectives (student success, effective management of workload)

- Intergenerational cooperation and support (student AND tutor buy-in) are essential

> "Nothing is too difficult to learn, especially for people who make their careers out of educating others. The best way to learn how to teach with a synchronous tool is to learn with one."
>
> J. Finkelstein, *Learning in Real Time: Synchronous Teaching and Learning Online, pp. 138-139.*


THANK
YOU...
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Contact Information

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Select References

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