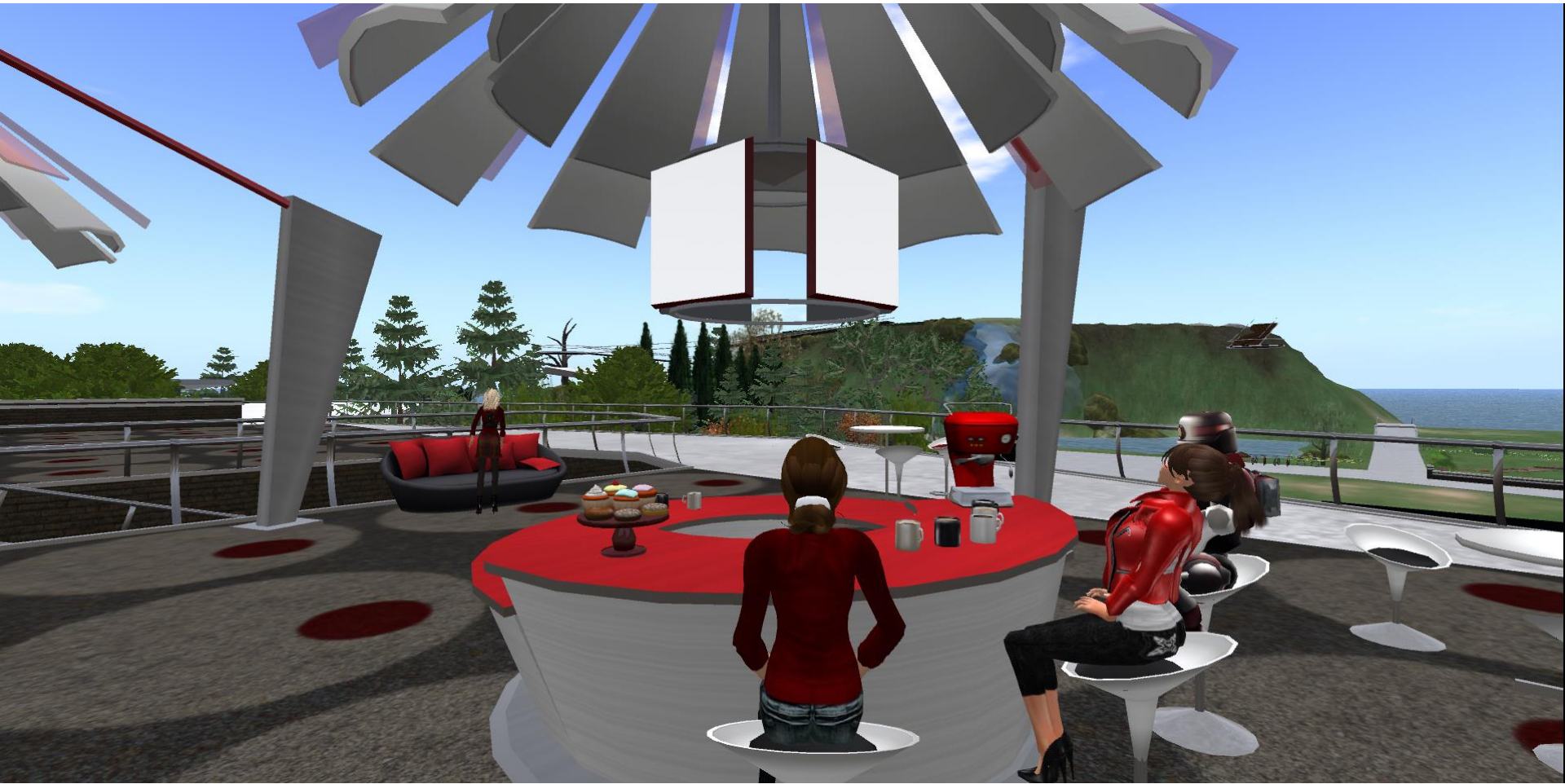


BreakThru: Findings & Lessons in using Virtual Worlds to Broaden Participation of Students with Disabilities in STEM



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Your Hosts Today

- Robert L. Todd
- Nathan W. Moon
- Maureen A. Linden

Georgia Institute of Technology



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What is the Georgia STEM Accessibility Alliance (GSAA)?



Funded by a grant from the National Science Foundation (NSF), Research in Disabilities Education (RDE), Grant Nos. 1027635 and 1027655.

BreakThru is a collaboration between the Georgia Institute of Technology and the University of Georgia.

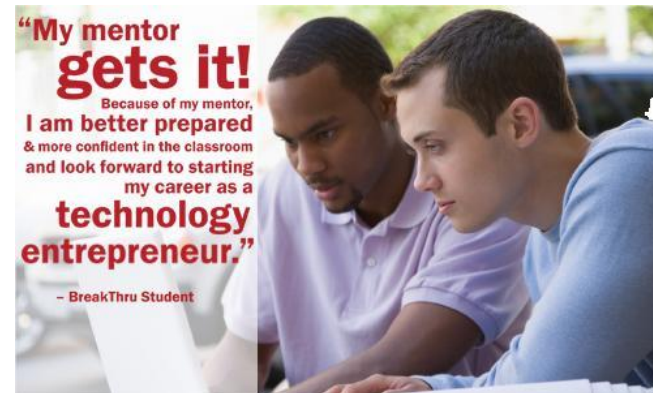


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What is BreakThru?

- Online learning and mentoring community
- Connects **students and mentors** virtually
- Promotes accessibility and achievement in **Science, Technology, Engineering, and Math (STEM)** courses



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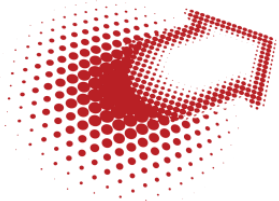
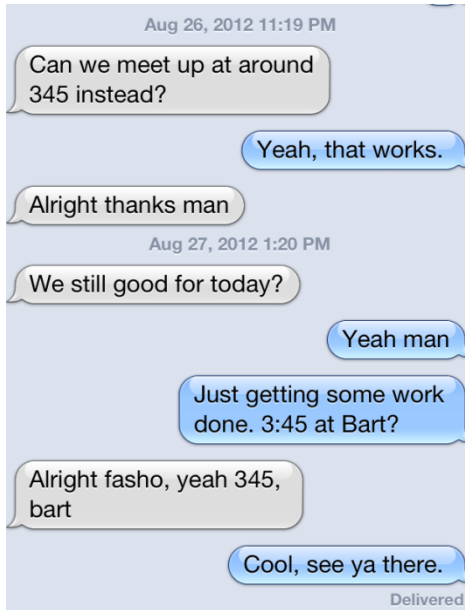
What is BreakThru?



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What *Else* is BreakThru?



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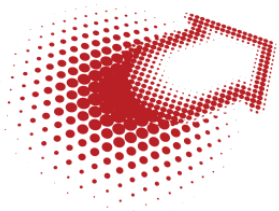
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Project Goals

The project serves as a pipeline providing mentorship for students with disabilities through critical transitions:

high school > two-year college > four-year college > graduate school / STEM employment

The overall project goals are to increase the retention of students with disabilities who are enrolled in STEM classes and majors and the number of students participating in BreakThru mentoring activities.



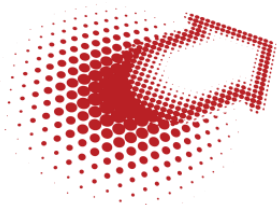
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Broader Impacts

BreakThru has been created to provide broad impact through:

- applicability to students and faculty who are separated geographically, and
- potential to gather a national/international network of STEM stakeholders
- Foci on **universal design for learning** and inclusion of accessible materials



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Access for All Students

Accessibility means that people with disabilities can perceive, understand, navigate, and interact with the virtual world, and that they can contribute to it.

“Disability” in this context can be defined as any functional limitation (physical, sensory, cognitive) that impedes a student’s ability to fully engage in the educational process, as compared to similar-age norms.



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Enhancing the STEM Workforce

Considerable attention has been given to the need for educating a diverse STEM workforce.

National Science Foundation stresses the critical importance of strengthening efforts to recruit and retain students chronically underrepresented in STEM fields.



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Virtual Worlds – The Good

Virtual worlds and other forms of online engagement can offer important benefits:

- Immersion
- Active engagement
- Creating
- Making real-world disabilities - disappear



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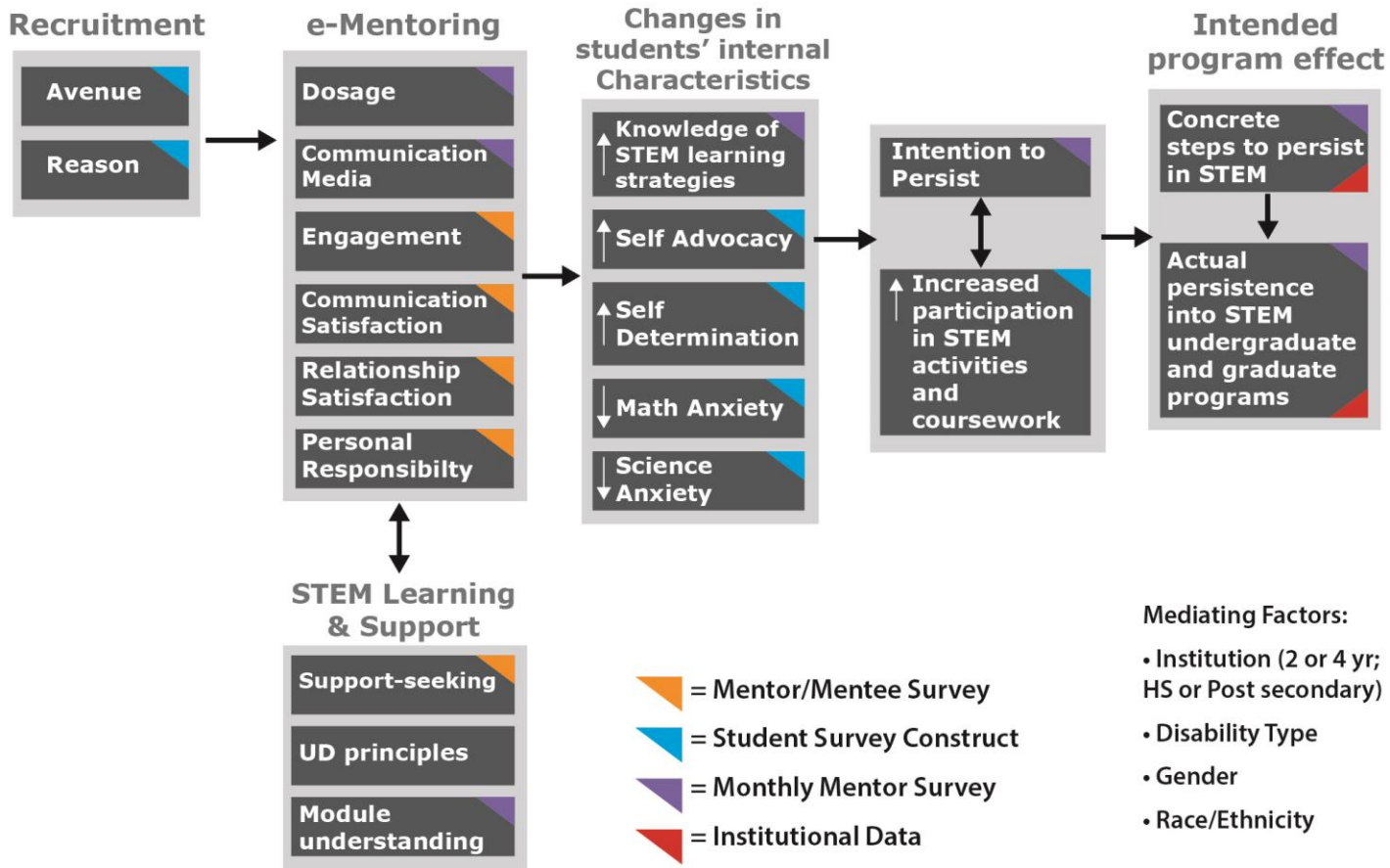
Virtual Worlds – The Bad

But virtual avatars and other online tools can create significant barriers:

- Complexity of access and use
- Student and teacher reluctance to accept as educational tools
- Privacy, security, distraction



Theory of Change – In Brief

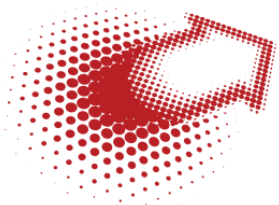


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Benefits of Virtual Mentoring

- Individualization
- Collaborative Learning
- Control over Personal Representation
- Access to Mentors

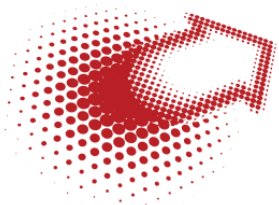


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Virtual World Platform: Why Second Life?

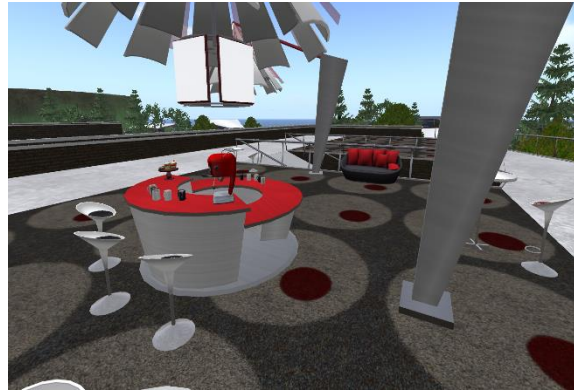
- Well-documented, active support community
- Extremely rapid prototyping
- Significant third-party development
- Extensive user customization
- Marketplace



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Features of BreakThru



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Gamification

The intent was to encourage more users in the Breakthru Islands through the use of interactive elements.



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Virtual Mentorship in BreakThru

- **Purpose:** Fostering a relationship in which experienced persons share knowledge and perspective to achieve personal and educational growth of students.
- **Key components:**
 - Online learning and training practices based on principles of UDL for STEM.
 - Access to virtual and social media tools to promote connections and community.
 - Linking to local STEM resources to continue support of STEM ambitions.



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Virtual Mentoring

- 25 Mentoring Modules
 - 4 Critical Modules: Introduction to STEM, Self-Determination, Classroom Accommodations, Time Management
 - Other Key Modules: Math/Science/Test Anxiety, Forming Study Groups, Taking Notes, STEM Study Skills
- E-Mentoring Sessions
 - Meetings at Least Monthly
 - Surveys of Mentors/Mentees
- Emphasis on Student Support for Persistence



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CONNECT, LEARN, BREAKTHRU

E-mentoring for success in science, math, technology and engineering

Home | For Students | For Mentors | About Us | Contact Us | Log In | FAQs

Assistive Technology Accommodations

Assistive Technology Accommodations

Assistive technology is technology used by individuals with disabilities in order to perform functions that might otherwise be difficult or impossible. Assistive technology can include mobility devices such as walkers and wheelchairs, as well as hardware and software that assist people with disabilities in accessing computers and other information technologies. For example, people with limited hand function may use a keyboard with large keys or a special mouse to operate a computer, people who are blind may use software that reads text on the screen in a computer-generated voice, people with low vision may use software that enlarges screen content, people who are deaf may use a TTY (text telephone), or people with speech impairments may use a device that speaks out loud as they enter text via a keyboard ([University of Washington Do-It Program](#)).

What Accommodations do I Need?

To determine what accommodations you need, it is important to clearly understand your disability (strengths and weaknesses), find accommodation solutions that match to your weak areas, and explore technology and other accommodation solutions that may boost your weak areas. Use the Accommodation Worksheet as a guide to identifying your accommodations. Activity #1: Complete the Accommodation Worksheet to identify current and potential accommodations.

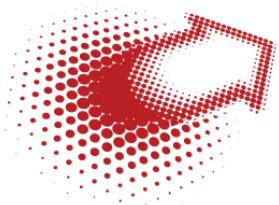
- **Areas of Strengths & Weaknesses** - Your strengths and weaknesses have already been identified in your evaluation report and/or your Individualized Assessment Plan. You also gained a better understanding of your disability and how it affects you in the classroom during the Self-Determination learning module. Use the information you already learned to list your areas of weakness on the Accommodation Worksheet. Example: slow reader, don't understand what I read, difficulty doing math calculations, can't turn the pages of my books, etc.
- **Current Accommodations** - Check the box next to the accommodations you are currently receiving. Try to understand the connection between a listed weakness and a specific accommodation. For example, a slow reader might have extended time on tests and books in digital or audio format.
- **Assistive Technology Accommodations** - Mark the assistive technology accommodations you are already using. Many students are unaware of the technology that can help you accomplish learning. For example: if you have problems with writing, a speech-to-text program such as **Dragon** would allow you to say aloud into a microphone what you want written. A user will translate your words into print.
- **New Potential Accommodations** - Write in the space provided the accommodations you believe you need. Remember to match your accommodation to a listed weakness. Try to have books in an audio or digital format but if you do not have a disability related to reading, this accommodation, do not list it on your worksheet. Also include assistive technologies you need. You may also want to complete the BreakThru Assistive Technology Accommodation Worksheet. You may also want to request accommodations on your own or with your mentor to learn more about technology accommodations.

< Classroom Accommodations Examples of the Accommodation Process >

unded by a grant from the National Science Foundation Research in Disabilities Education Program Grant #1027655. BreakThru is a collaboration between Georgia Institute of Technology and the University of Washington. Media and Marketing collaboration with AT Georgia. Show mobile version

Changing Focus of BreakThru

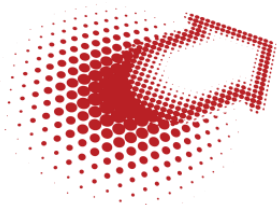
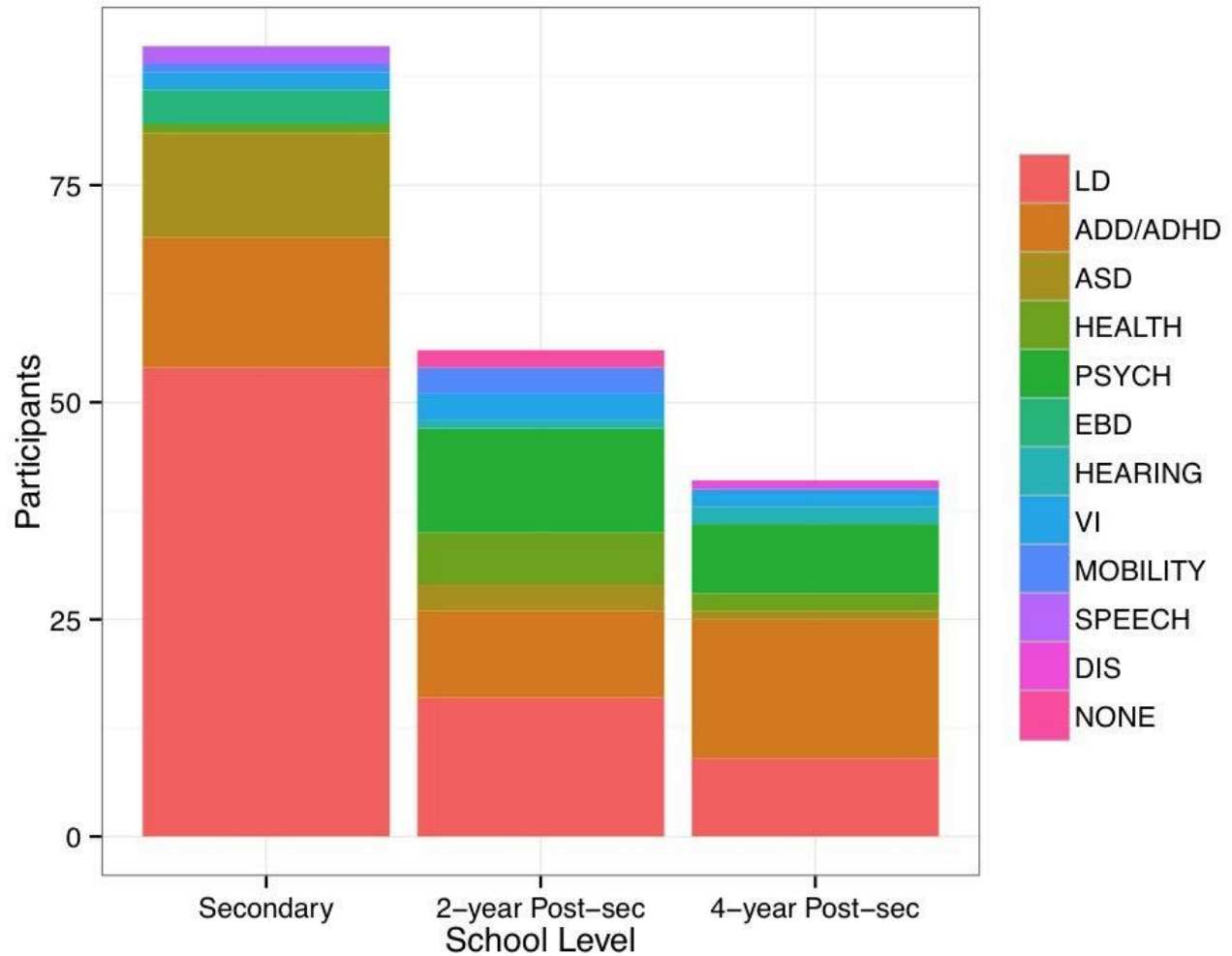
- Deeper research on efficacy of e-mentoring
- Increased focus on duration and modes of communication and quality of mentoring relationship
- Wider range of communications technologies, especially mobile technologies
- Focus on understanding qualitative factors rather than just increasing enrollment, retention, and graduation



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GSAA Participation by Disability

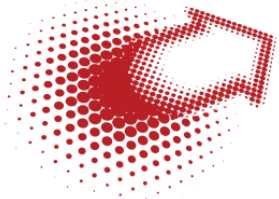


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Communication Methods

Communications Methods Utilized Across 5 Reporting Periods

Survey Responses	<u>Text</u>			<u>Voice</u>			In Person
	Email	Facebook	SMS	Second Life	Skype	Phone	
Secondary Mentees Total (n=36)	81%	8%	75%	47%	11%	69%	61%
Post-Secondary Mentees Total (n=61)	97%	31%	57%	52%	20%	69%	15%
Secondary Mentors Total (n=43)	84%	5%	67%	44%	16%	70%	44%
Post-Secondary Mentors Total (n=61)	97%	31%	57%	32%	20%	69%	15%



Mentorship Findings

- Confidence levels related to success in STEM Courses. ($p < 0.01$)
- Interest levels in STEM ($p < 0.01$)
- Self-advocacy to acquire necessary resources and supports for their education ($p < 0.01$)

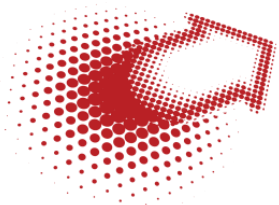


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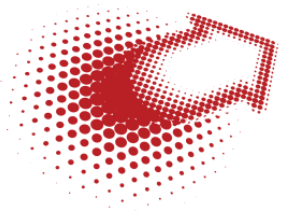
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Findings

- The student retention rate (60% over five years) suggests that the **BreakThru** model was effective in recruiting and retaining students at both the secondary and postsecondary levels.
- Text-based tools were often the most frequently used mentoring tools.



Accessibility and Usability



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Accessibility and Usability Challenges

Conceptual Challenges

- Need to Explain Benefits of Second Life to New Users
- “Culture” of Virtual Worlds: Group Communication, Removal of Geographic Boundaries

Technical Challenges

- Computer and Internet speed requirements
- Security requirements for school/employer
- Need for ongoing tech support
- Lack of mobile platforms and weak iPhone, iPad clients



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Sensory Disabilities: Vision Impairment

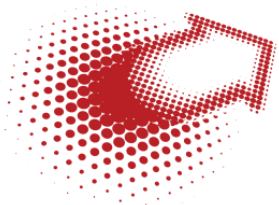
- Second Life is an image-intensive environment
- Second Life browser generally incompatible with screen readers
- Lack of metadata in the world to label objects
- Undefined objects and features means a lack of control and perceptibility



Accessibility for Blind Users

Alternate browsers, paired with voice-output screen readers

- TextSL with JAWS
- Metabolt with JAWS
- Radegast with speech plugin or NVDA (non-visual desktop access) reader
- Virtual Guidedog with Max Voice Plus
- IBM AbilityLab Virtual Worlds Accessible User Interface



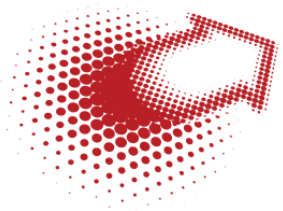
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Deaf and Hard of Hearing

Text Chat features made Second Life relatively useful to students who were deaf or hard of hearing

- No access to voice-only interactions
- Need to self-identify as deaf
- Second Life built-in voice recording can be problem for events
- American Sign Language not supported

Virtual World Adoption Survey

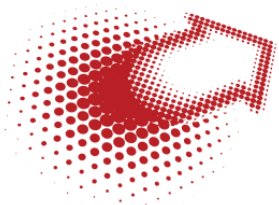


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Virtual World Adoption Survey

- Recruitment: 22 mentors, 25 mentees contacted for participation; 10 mentors, 16 mentees agreed to take part
- Participant Classification (N=26) into Four Categories
 - Adopters: Used SL twice during last two semesters
 - Abandoners: Used SL at least once; discontinued use
 - Non-Adopters: Trained in SL; never used it for mentoring
 - Rejectors: Never trained in SL and never used SL



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Data Collection and Analysis

- Telephone administration of selected interview protocols following decision tree sorting the participant into categories
- Interviews were transcribed and coded using content analysis software



Study Participation Overview

Category	Secondary		Postsecondary		TOTAL
	<i>Mentor</i>	<i>Mentee</i>	<i>Mentor</i>	<i>Mentee</i>	
SL+	1	--	1	3	5
SL-	1	1	1	7	10
SL+/-	2	--	3	3	8
SL-/-	--	--	1	2	3
TOTAL	4	1	6	15	26

Respondents represented 33 distinct mentor-mentee relationships



Adopters: Bonding over Gaming

Good fit for mentors and mentees with natural interest in technology:

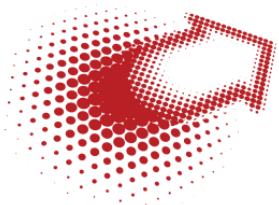
“I like computer games. [My mentee] did, too. ... So, it was a really good experience, something different. **Because we were both computer gamers....Being able to do that virtually facilitated that relationship to take place deeper and faster because of the fact that it was virtual.**”



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Adopters: Comfortable Environment

“I also liked how we would talk to each other through our avatars...talking about if I had to approach my **teachers about my disability** when I’m trying to get testing accommodations and being more clear about what I need from them.”

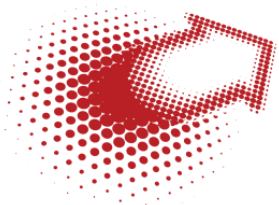


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Adopters: Benefits for Disability

Second Life specifically for students with ADHD:

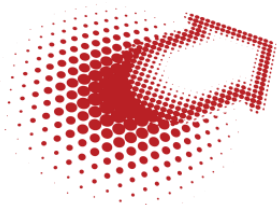
“I’m the type of person who gets distracted very easily. So, being able to use Second Life definitely helps me focus, especially when I’m trying to talk to somebody else about lessons that concern me or help me do better....I use Second Life because it helps me. It helps train me into wanting to do better in school like every week.”



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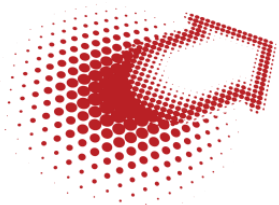
Adopters: Summary

- Tech-savvy mentors encourage mentees to use Second Life
- Most participants use Second Life for at least one hour per week
- Participants communicate about disability-related issues
- The Virtual World environment might be particularly useful for participants with ADHD
- Some believe Second Life is only for gamers or individuals with social anxiety
- Obtaining reliable and current hardware was an obstacle
- Incorporating an app version would increase usage



Abandoners: Technology Problems

“I have used it [with my mentor], I think twice, but we usually just use Skype because I can’t use Second Life at home....**Our computer is not high enough quality.** If I have Second Life on the computer, it slows down to the point where it’s not efficient use.”

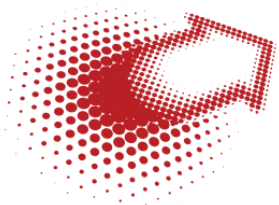


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Abandoners: Preference for In-Person

“I did meet [my mentee] in Second Life on two occasions at the very beginning of the semester. But when he discovered that I was on campus, **he preferred to meet in person. So, the majority of our mentorship took place in person, face-to-face.**”
[Mentor]

“But a couple of times we met on there. Again, I just kind of told her, **“Hey, we can keep doing this, but I’d rather just meet you in person or just call you.”** [Mentee]



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Abandoners: Scheduling Conflicts

“We couldn’t seem to get the times together when she was going to be there and when I was going to be there.” [Mentee]

“But sometimes we can’t get on Second Life. But if he sent me an e-mail, I can get it anytime....I think because of individual schedules, we just chose to talk via e-mail.” [Mentee]



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Abandoners: Positive Feedback

Benefits of Sharing Information Visually

“I think it is very helpful to be able to have you and your mentee review the same information at the same time, and know that you’re looking at the same thing...you’ve got it up on a screen and you’re viewing it through the same interface. So, **you know for sure you’re talking about the same thing at the same time.**”



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Abandoners: Key Findings

Second Life was seen to provide an added benefit to the mentoring relationship, however...

- Some participants prefer to meet in person
- Technical issues, such as slow computer speeds and microphone malfunctions, were barriers
- Mentors and mentees rarely had overlapping availability
- Some believe Second Life is only for gamers or individuals with social anxiety



Non-Adopters: Lack of Access

Concern about mentee's at-home access:

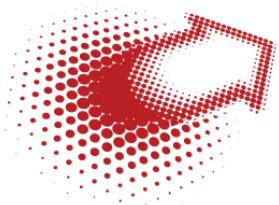
- **“Some of my kids are challenged financially. If they have a phone to text, you're fortunate. Some of them don't have access to a library. That was a challenge, them actually being able to get a medium to get onto Second Life.”**



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Non-Adopters: “Hassle Factor”

- “[My mentee] wasn’t familiar with Second Life. So, in the end, **we chose the path that she was most comfortable with communicating [Skype].**
- “It seemed like **it wasn’t worth the time to become more familiar with it and use it.** It just seemed easier to do other forms of communication.”



Non-Adopters: Preconceptions

Second Life was *only* for social anxiety :

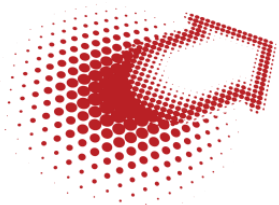
- “I can maybe see if someone had **general communication difficulty**, and they did well in gaming just because they are comfortable in that environment, then they could communicate more effectively in a virtual world than in a one-on-one sense.”



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Non-Adopters: Key Findings

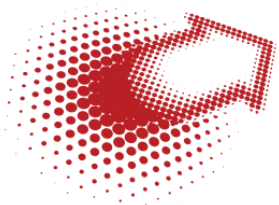
- Computer and Internet access at work and home are barriers for secondary mentors and mentees
- Mentors and mentees rarely have overlapping availability
- Second Life is not integrated into daily life and is therefore not easy to use
- Some believe Second Life is only for gamers or individuals with social anxiety
- Mentees find Second Life to be out-of-date
- Incorporating an app version will increase usage



Rejectors: Inaccessibility

Inaccessibility of Second Life and incompatibility with screen readers prevented even basic training:

“It’s impossible for me to use Second Life. **I can’t navigate the software because it’s not compatible with my screen reader.** So, I didn’t take the Second Life training...if there was some kind of way to implement some other software to make Second Life more usable, I may have considered it because I love that kind of environment.... I’m totally into that kind of stuff. **But if there was a way for me to use it on my screen reader, I probably would. I want to anyway, but I can’t.**”



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Rejectors: Key Findings

- A screen reader compatible environment would increase usage
- Computer and Internet access at work and home are barriers for secondary participants
- Mentors and mentees rarely have overlapping availability
- Second Life is not integrated into daily life and is therefore not easy to use



LESSONS



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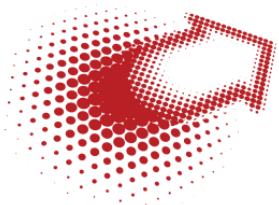
Overarching Lessons

- The Virtual World was not intuitive; training is essential
- Synchronous nature may work against its use for mentoring
- Second Life requires processing power and fast Internet speed; out-of-touch in increasingly mobile world
- Accessibility issues, especially for those with sensory limitations
- For committed users, however, it can deliver a positive experience



Final Thoughts

- Platforms evolve faster than research projects
- Hardware requirements sometimes cause a barrier
- Participants increasingly rely on mobile technology
- Most readily available platform is typically chosen for mentorship
- Technology may increase accessibility for some groups, but shut out others...



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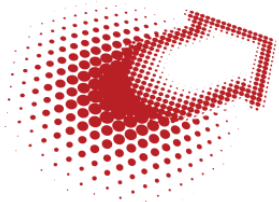
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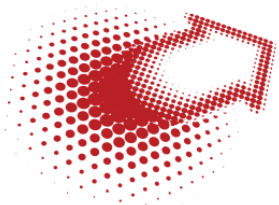


The University of Georgia



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Graduate Symposium
BreakThru Launch Party



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