

# ***Students with Disabilities & Accessible Instructional Materials: Experiences from the Field***



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# Disabilities, Opportunities, Internetworking, & Technology



**DO·IT**

- *1992, grant from U.S. National Science Foundation*
- *Now DO-IT Scholars program funded by State of Washington*
- *Other grants fund special projects*

## DO-IT Goal

*To increase the success of individuals with disabilities in Postsecondary education & careers, using technology as an empowering tool*



## Disabilities related to:

- *Hearing*
- *Seeing*
- *Learning*
- *Attention*
- *Health*
- *Speech*
- *Mobility, physical skills*
- *Communication, ...*



# Challenges for students:

- *Diminished support systems after high school*
- *Little access to successful role models*
- *Lack of access to technology that can increase independence, productivity, & participation*
- *Inadequate self-advocacy skills*
- *Inadequate accommodations, including obtaining materials in accessible formats*
- *Low expectations & other negative attitudes on the part of people with whom they interact*

# Sources of Evidence for Project Interventions

- *Literature review*
- *Outcomes of prior projects*



- *Suggestions from practitioners*
- *Input from students with disabilities*



Alliances to increase degree attainment of students with disabilities



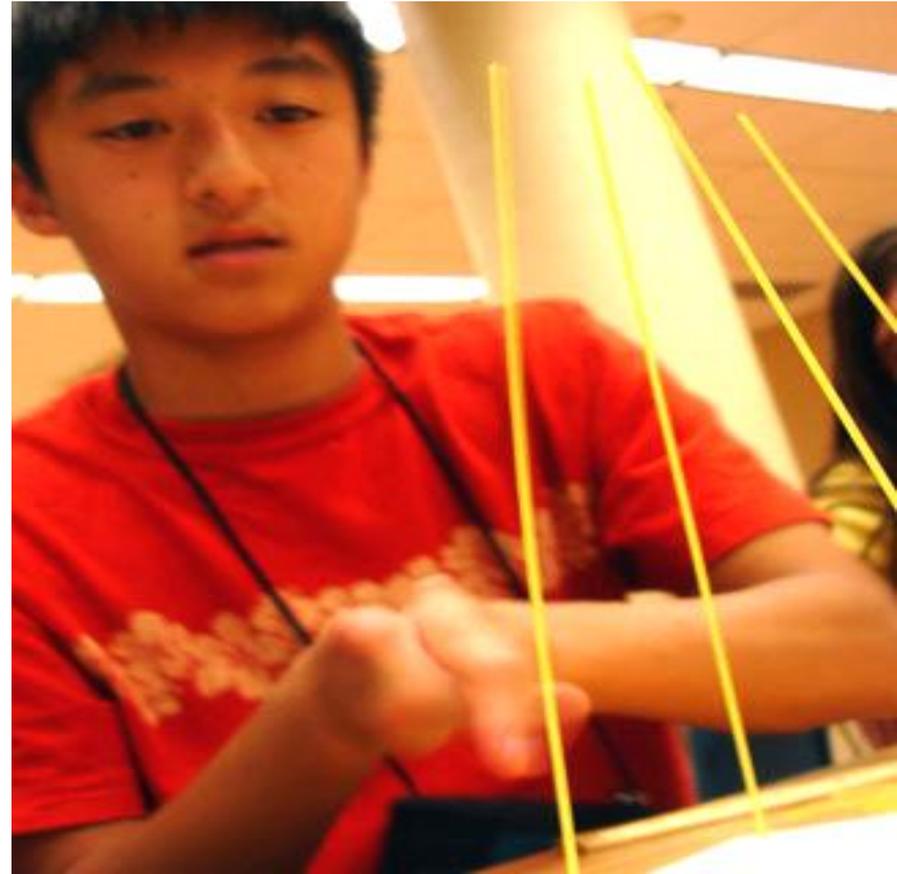
in science, technology, engineering & mathematics (STEM)



in computing fields

# Ultimate Impact

- *Make academic & career opportunities available to more citizens.*
- *Enhance fields of study/employment with the talents & perspectives of people with disabilities.*



# Alliance activities promote:

1. *Student success*
2. *Institutional change*
3. *Knowledge dissemination*

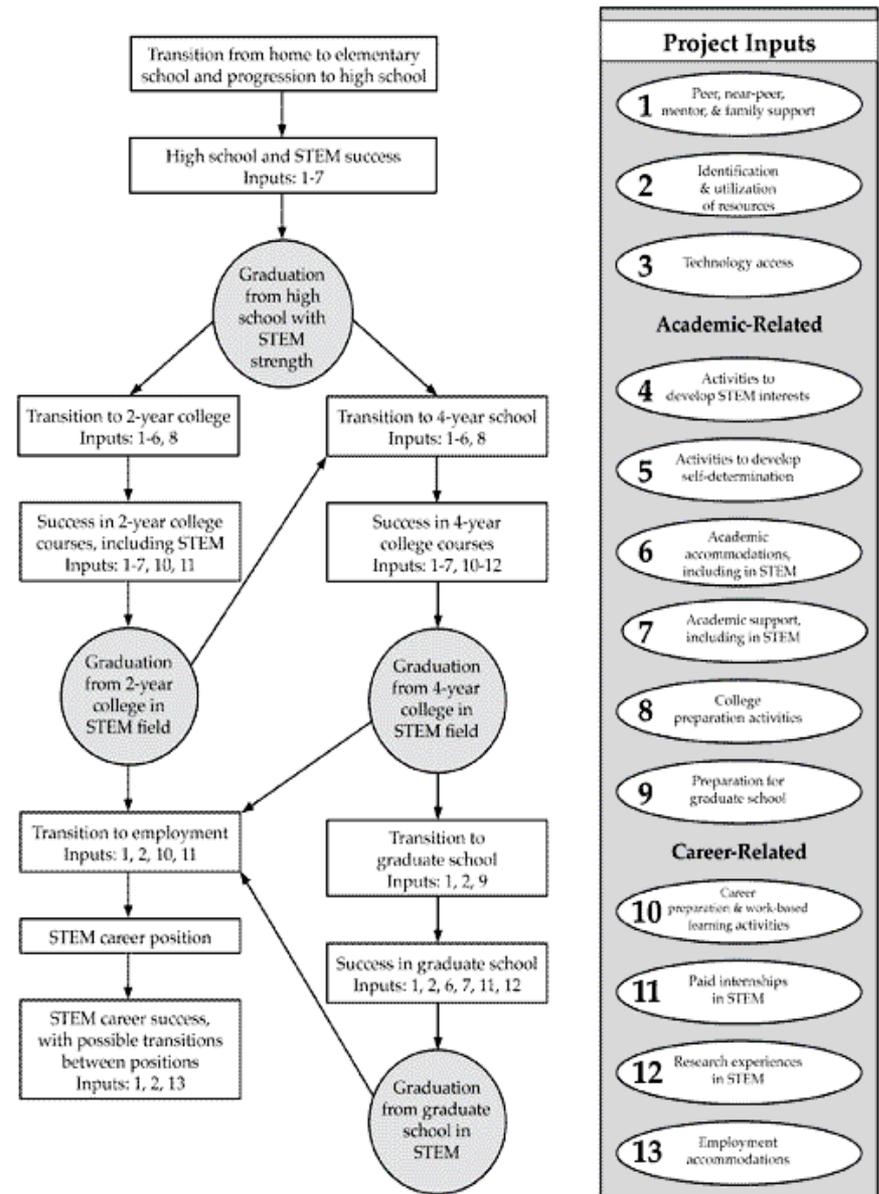


# 1. Student Engagement

- *Computer, science transition lectures, workshops*
- *Field trips*
- *College & career prep*
- *Tutoring*
- *Networking*
- *Internships*
- *E-mentoring*
- *Self-determination, leadership opps*



# Critical Junctures



# International Exchanges Between DO-IT U.S. & DO-IT Japan





- *Two U.S. DO-IT Scholars to Japan to share experiences & tips for success with Japan Scholars.*

- *Japan & U.S. Scholars communicate in electronic video conferences & Second Life.*



# Perspectives of Students Regarding Accessible Materials

- **Publishers** don't provide books in accessible format at all or in timely manner.
- **Instructors** don't choose materials early enough to get produced in accessible format; post materials online in inaccessible formats
- The **institution** takes too long to produce materials in accessible formats

## 2. Working with Institutions

*We promote  
universal design &  
effective  
accommodations*



# Accommodation =

*Alternate format,  
service, &/or  
adjustment for a  
specific  
individual*





**“Coffeepot for Masochists”,**  
Catalog of Unfindable Objects by Jacques Carelman;  
in Donald Norman’s *The Psychology of Everyday Things*, 1988

# Universal Design =

*“the design of products & environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.”*

The Center for Universal Design  
[www.design.ncsu.edu/cud](http://www.design.ncsu.edu/cud)

# In Postsecondary Institutions, UD Can be Applied to:

- *Instruction/Learning Environments & Instructional Materials*
- *Student Services*
- *Information Technology*
- *Physical Spaces*





## We Promote UD as:

- An **attitude** that values diversity, equity, & inclusion
- A **goal**
- A **process**
- **Practices** that make learning materials & environments **welcoming, accessible, & usable** for everyone

# Examples of UD Practices

- Arrange seating so that everyone has a clear line of sight
- Use large, bold fonts on uncluttered overhead displays & speak aloud all content presented
- Provide multiple ways to gain & demonstrate knowledge
- Avoid unnecessary jargon; define terms
- Provide scaffolding tools (e.g., outline)

# Examples of UD, continued

- *Buy lab products that can be used by individuals with wide range of abilities*
- *Address safety procedures for students with wide range of abilities*
- *Address a variety of reading levels & language skills*
- *Provide materials in accessible electronic formats, including symbols & figures*

# Conclusion, We need:

- ***Universal design***  
(proactive for everyone) & ***accommodations***  
(reactive for individuals)
- ***Policies & procedures***  
that address ***both***



# 3. Searchable Knowledge Base

[www.uw.edu/doiit](http://www.uw.edu/doiit)

- **Q&A:** *Where can I find electronic text versions of books for students who have visual impairments or other print disabilities?*
- **CASE STUDY:** *Earth Science: A Case Study on Teaching Concepts to a Student with a Visual Impairment*
- **PROMISING PRACTICE:** *Accessibility Reviews: A Promising Practice to Improve the Accessibility of Local Science Education Programs*

# Accessibility at UW

- *Work with developers for accessible web sites and apps*
- *Networked screenreader available for testing*
- *Site template, Catalyst, other tools*

*(image of online form for Braille submission removed.)*

- *Find at:*

<http://www.washington.edu/itconnect/accessibility/atl/braille.html>

***(image of UW ATC entrance removed)***

***(image of alternate keyboards at UW ATC removed)***

# AIM at U of Washington

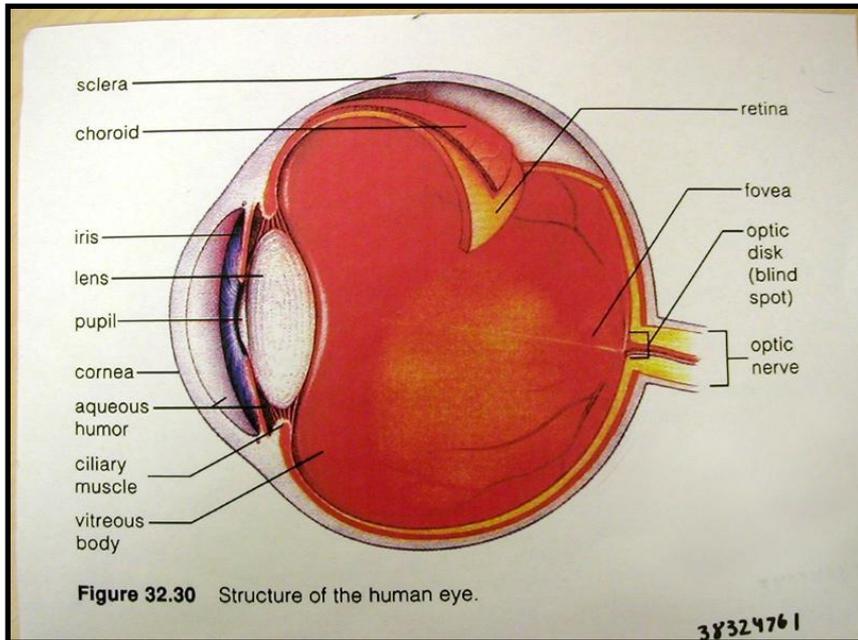
- *High speed scanning, Braille, tactile graphics*
- *Disability Resources for Students: publisher contacts*
  - *MS Word, PDF format*
- *Facilities & training for independent PDF conversion*
- *Ubiquitous AT for reading*

***(image of students in computer lab removed)***

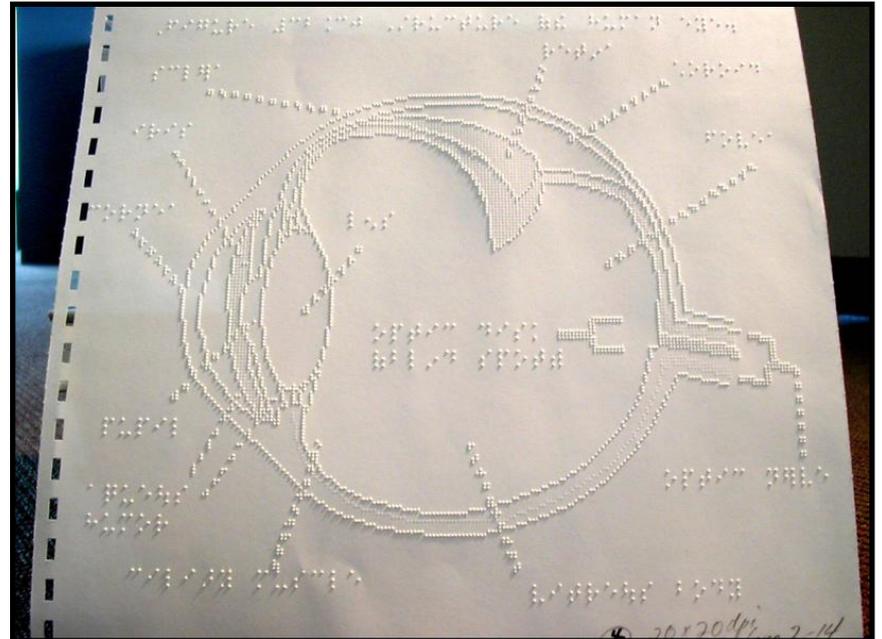
# Research

- *Android accessibility – CSE Capstone*
- *AIM Research Group – iSchool*
- *Tactile Graphics – CSE and ATC*

# Tactile Graphics

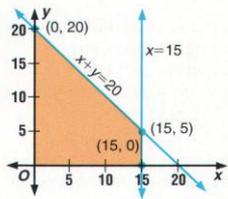


**Diagram of human eye  
from textbook**



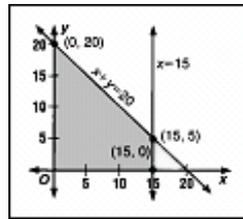
**Computer-embossed  
tactile diagram with  
Braille labels**

# Graphic Translation



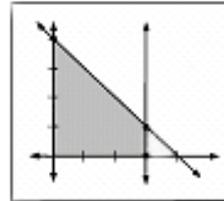
original scanned image

preprocess



clean image

text extract



pure graphic

text image

location file

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  <ScaleY>1.953125</ScaleY>
  -
  <Label>
    <x1>121</x1>
    <y1>45</y1>
    <x2>140</x2>
    <y2>69</y2>
  <Alignment>0</Alignment>
  <Angle>3.141593</Angle>
</Label>
    
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y
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x= 15
15
10
5
0
x
5
10
15
20
20

x+ y=20

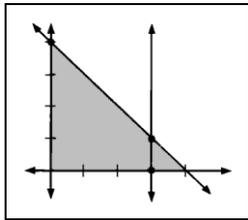
(15, 0)
(15, 5)
    
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text

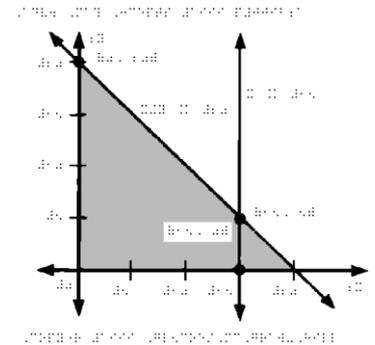
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15
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0
x
5
10
15
20
20
x+y=20
(15, 0)
(15, 5)
  
```

Braille

```

y
(#0,#20)
x.k#15
#15
#10
#5
0
x
#5
#10
#15
#20
#20
x+y.k#20
(#15,#0)
(#15,#5)
  
```



**Questions**

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**Comments**

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**Discussion**

**Tactile Graphics:**

**[tactilegraphics.cs.washington.edu](http://tactilegraphics.cs.washington.edu)**

**DO-IT:**

**[www.uw.edu/doi/](http://www.uw.edu/doi/)**