

MOBILITY & ASSISTIVE TECHNOLOGIES: AIDS FOR PARTICIPATION & QUALITY OF LIFE

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Where am I coming from?

- 40 years as an Occupational Therapist
- Using assistive technology as an intervention for 25+ years
- Worked with clients and families in “special centers”, parent centers, neighborhood schools, private practice, AT coordinator in school districts, university professor, researcher and presenters, and in clinic practice here at the U of L
- A person with an amputation as result of bone cancer
- A person who learned to see people’s strengths before I saw their limitations— a contradiction for most “medical model” intervention

Where am I coming from?

- Its likely no accident that I arrived at my viewpoint
 - Using an artificial limb confirmed the idea that a “prosthesis” or a helper device is a very *positive* thing
 - Occupational Therapy (OT) confirmed the idea that “doing things a different way” was especially effective if a goal is really important
 - My work as an OT has been to discover what the meaningful ambitions, roles or goals were for a specific individual

Each of you could probably tell me a story about a person with a disability who blossomed using this approach

As well as others who got stuck for lack of expectations, a vision ... or an encourager!

For me....This is a Transition Year

- In my 40 years as an OT, I have...
 - Provided direct services to many individuals
 - Done clinical research and work in Knowledge Translation
 - Transportation for people who ride seated in their wheelchair
 - The contribution of Assistive Technology (AT) to recovery and adaptation in Spinal Cord Injury
 - Development of an Assistive Technology (AT) program at Frazier Rehab and subsequently at the U of L Physician Clinic for PM&R
- So pleased to be asked to present today to you
 - A topic of great interest to me

Learning Objectives

At the end of I hope you will have a different perspective on:

1. The value of mobility in a self-directed life:
Identity is tied to what you do
2. The contribution of other assistive technologies:
Devices, posture and positioning
3. What is possible and how to get started

Numbers?

- Disability definitions vary depending on whose is trying to define disability. A common definition comes from the ADA....
 - A person who has a physical or mental impairment that substantially limits one or more major life activities
- Approximately 6.5 million people in US have intellectual disability
- Assistive Tech can make a critical impact on the possibilities for this underserved group of men, women and children



The Value of Mobility

- Walking is typical for humans
- Without it human babies find other means...
- Enabling mobility is worth the effort and it is motivating
- It can be encourages
 - Social environment and attitudes
 - Surroundings
 - Inner drive
- As attendees today, I assume you agree so I want to share some thoughts...
 - Disability as difference
 - Attitudes about wheeled mobility
 - Mobility can change over the life span
 - Approaches to mobility
 - Info about devices

The Value of Mobility

- Moving is learned through and motivated by MOVING!
- Moving creates feelings that are deep in our
 - Brain's vestibular system
 - The body's joints and muscles as a result of acceleration or g-forces
 - As extreme examples...
 - Consider the roller coaster experience
 - Toddler thrill when tossed in the air and caught by parents



The Value of Mobility

follow
your
curiosity

- Moving is a *really* basic form of communication!
 - Mobility allows us to see a person in a new way
- Early intervention
 - Curiosity is based in cognition
 - Use primitive postural reflexes
 - Log rolling
 - Scooter boards & crawlers
 - Lekotek – toy lending libraries
 - Multisensory toys and single switch toys
 - Teach parents how to play and stimulate their children

Early intervention... Go, Baby, Go

- A fabulous example
- Dr. Cole Galloway, a PT professor at the U of Delaware
- Uses simple power ride on toys plus control mods to create inexpensive powered wheels for ~\$200
- Powerful cause & effect experiences



<https://www.youtube.com/watch?v=U-NE7B0RTdA>

Early intervention... Go, Baby, Go

- Learn more on their Facebook page
- Download free construction and wiring instructions with a search on Google



On their way to powered mobility



Creates the foundation for:

- perception,
- spatial awareness,
- curiosity,
- Learning,
- problem solving,
- social connection,
- self determination,
- more

Other Wheeled Mobility Devices...

- Wheeled technologies can be a huge helpers in skill development!
- Going to share info about a some product categories that hold promise
 - Some prompt/build interest in mobility
 - Help build the physiological foundation for mobility
 - Some place clients in functional postures
 - Some teach functional skills
 - Think... Create “just the right challenge” for client’s developmental level



RAZ Shower Chair

Standing Devices

Standing helps with...

- Keeping calcium in long bones
- Maintaining joint range of motion
- Weight bearing reduces spasticity
- Creates opportunity for different functional activities
- Food preparation, group participation



EasyStand Evolv

<https://www.youtube.com/watch?v=4yfLJBTPzI8>

Mobility Devices

- Transfers are often the first challenge
- Hoyer lift but use a split or divided leg sling
- Advantages:
 - Avoid sliding & loss of positioning support
 - Allows toileting
 - Reduced heat
 - Reduced bulk so avoids skin irritation/breakdown



<https://www.youtube.com/watch?v=Wzgr60QnmWI>

Multipurpose Devices

- What about a multipurpose device?
- Transfer device
- Stander
- Gait Trainer



Rifton Tram

<http://www.rifton.com/resources/videos/2013/rifton-tram-video-2-sit-to-stand-lift-gait-training>

Locomotor Training

- Being used at Frazier to treat Spinal Cord Injury
- Early research is showing that this technique can re-train walking for individuals with SCI
- Re-stimulates central pattern generators
- Overhead body support with a variable % of body weight and treadmill speed



Locomotor Training

- Happening in 7 centers around the US
- Will it generalize to other neurological diagnoses?
 - Stroke
 - Cerebral Palsy



Overhead suspension

- Used with a ceiling mounted track
- Wireless control of hoist
- Increases ease
- Increases safety for staff and client
- Easy to incorporate into functional activities



Choosing a Wheelchair...

When someone has the desire but not the ability to move...

- Enable this desire with the right equipment
- Use care to prevent repetitive strain or overuse injuries
- Consider configurable versus standard wheelchairs
- Use W/C components that are:
 - Strong
 - Contoured
 - Durable
 - Lightweight
 - Grow-able or adjustable
- Seek out a therapist with Seating and Mobility Certification

Mobility Devices

- There is a science and art to mobility devices
 - All therapists learn something about mobility but... Some therapists make it their specialty by thinking outside the box. They...
 - Develop an expertise in the human technology interface
 - Know the client or the “human”
 - Recognize and use abilities and strengths
 - Compensate or work around limitations
 - Use the technology inside the programming of the controller
 - Recognize that growth and lifespan changes things
 - Keep an eye on technology innovation and product development
- Rehab Engineering has been a strong interest of mine
 - Have certification as RESNA ATP and SMS

Manual Mobility



Manual recliner with elevating leg rests

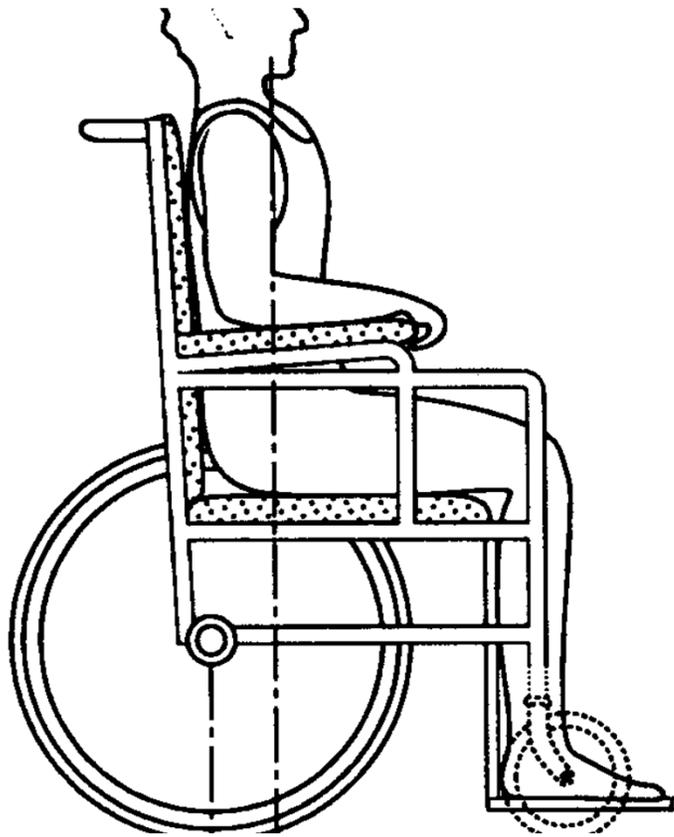
- Huge range of options
 - Most supportive but also most restrictive
 - Most versatile but least supportive
 - Weight is mistaken for durability
 - This design prevents mobility
 - Temporary or selective use

A Standard Wheelchair...



Compare Axle Position

Standard



Customized



On their way to powered mobility



- Start with simple controls, e.g. forward and right turn
- Head array, switches, midline joystick
- Add attendant control for adults
- Programmability: change torque, acceleration, turning speed, remove some options
- Use independent powered mobility in specific settings or specific times
- Think: driving is a developmental skill
- Make it fun, functional and successful

Powered Mobility

- Huge range
 - Technology compensates for motor impairment
 - Features can compensate for intellectual impairment
 - Programming
 - Educational approach
 - Most versatile
 - Weight is always a factor
 - Independent mobility may become a most important asset



With Wheelchairs...

- Important to prevent secondary disability or impairment...
 - This is outcome when there is...
 - Lack of specialized knowledge... don't know what you don't know!
 - Failure to acquire the right equipment
 - Using generic equipment when specialized equipment is needed
 - Poor device selection
 - Working within a "scarcity" model
 - The consequences for clients
 - Pressure ulcers
 - Contractures, deformity and postural collapse
 - Cost, effort or ability to participate becomes too great

AT and Seating & Mobility Specialist...

- RESNA is the Rehabilitation Engineering and Assistive Technology Society of North America (<http://resna.org>)
 - Assistive Technology Professional or ATP (basic)
 - Seating and Mobility Specialist or SMS (specialist)
- Find/contact a certified professional: OT, PT, SLP, Ed
- Requirements for
 - Experience
 - Continuing Education in the area of AT
 - Ethical behavior & practice... Do no harm!



AT and Seating & Mobility Specialist...

- The International Seating Symposium
- Sponsored by the University of Pittsburgh
- Located in Nashville KY at the Gaylord Opryland
- March 2-4, 2017
- Find out more information at <http://www.iss.pitt.edu>

ISS 2017



About the ISS
Location
Registration
Program
Previous International Seating Symposium
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2017 International Seating Symposium

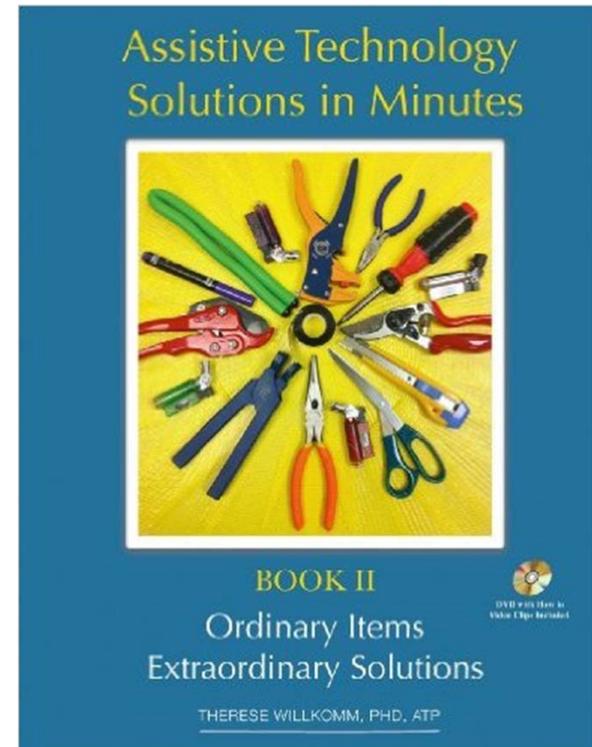
March 2 – 4, 2017



Hosted by the University of Pittsburgh

What is Assistive Technology?

- Harnessing technology as a tool for function
- Function? An activity or a purpose!
- How do you determine what “function” to focus on?
- This is the art of the “treatment plan”
- Get the big picture... then “reverse chaining”
 - Working backward from the goal
 - Develop the sub-skills needed to accomplish a goal

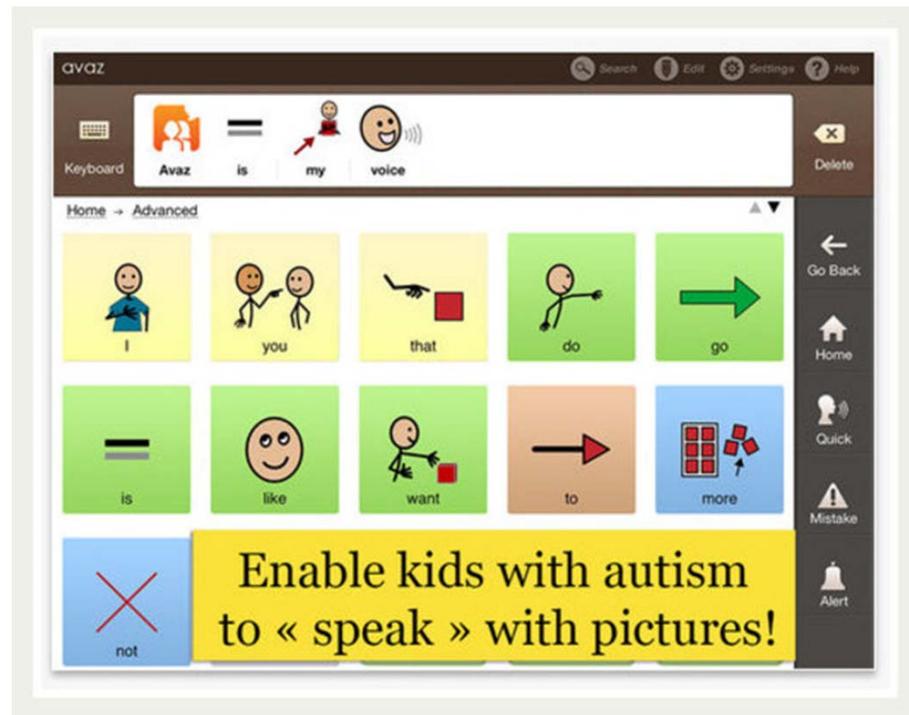


Theresa Willkomm, PhD, ATP

<http://www.unh.edu/universityevents/speakersbureau/speakerdetails.cfm?sid=276>

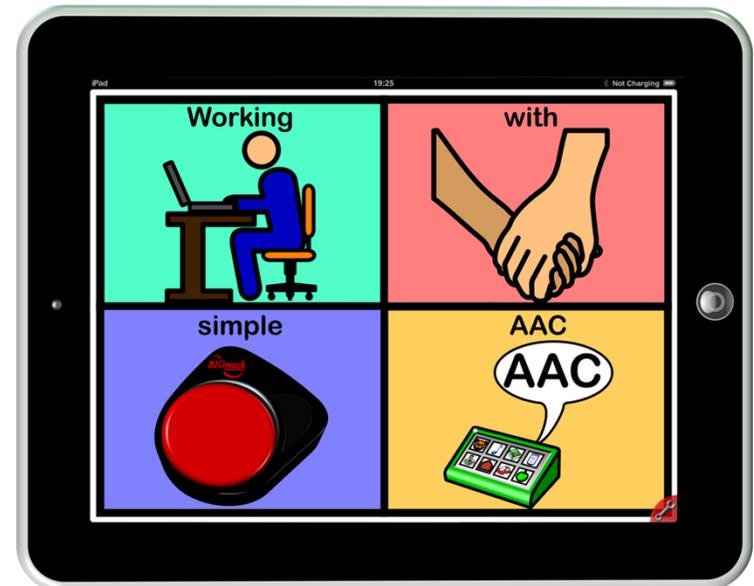
Other Types of Assistive Technology

- Augmentative Communication
- Adaptations to user interface
- Hand held devices: Wi-Fi phones & tablets
- Software and Apps



Augmentative Com

- Requires a vision for the future
- Families develop novel communication
 - Routines
 - Daily needs
 - Gestures and non-verbal communication
- Teach the concept and then progress to more capable devices
- Communicate with non familiar partners

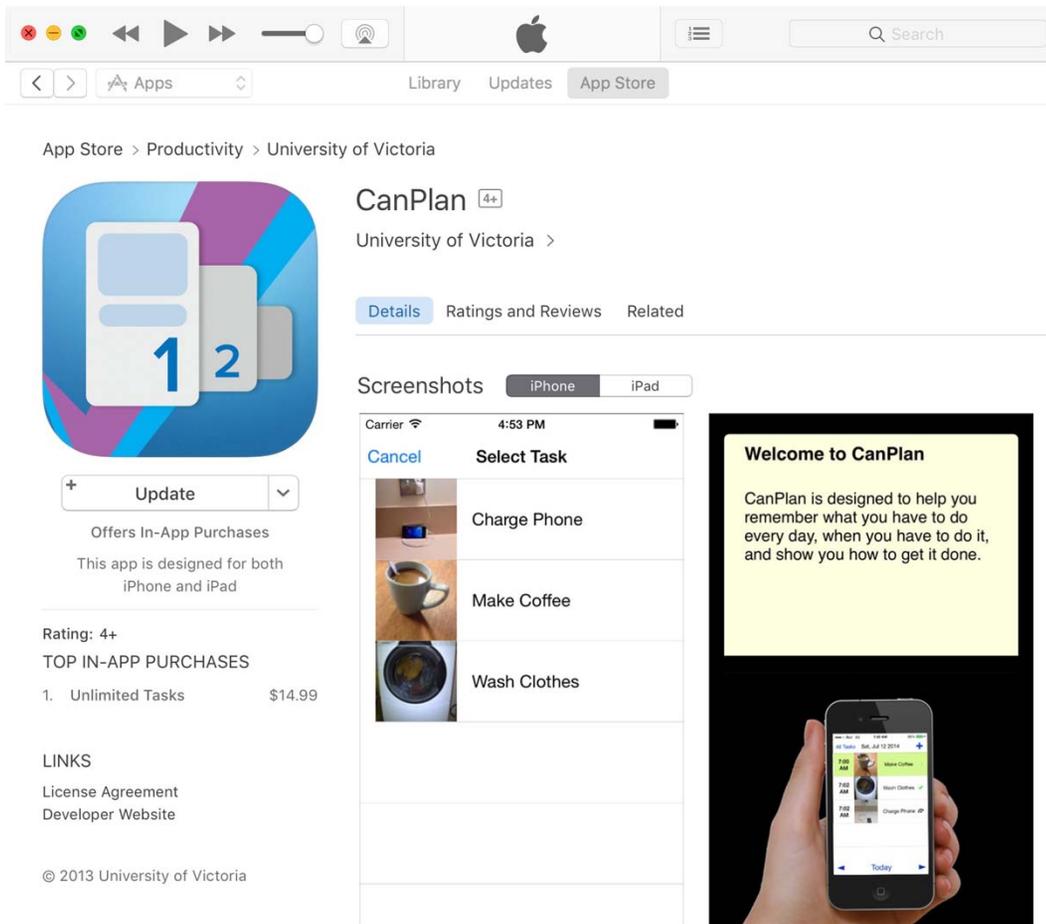


Wi-Fi and Handheld Devices

- A mainstream device
 - Adaptable user interface
 - Versatility
 - Accessibility options
 - Cost
 - Photographs
 - Text to speech
 - Recorded speech
 - Rugged cases
 - Variety of mounts
 - “Digital Natives”



Specialized Apps: CanPlan



The screenshot shows the App Store interface for the CanPlan app. The app is developed by the University of Victoria and has a 4+ rating. It is available for iPhone and iPad. The app's icon features a blue and purple background with a white document icon and the numbers 1 and 2. The app description includes a link to the developer's website and a copyright notice for 2013 University of Victoria. The app is categorized under Productivity and is available for purchase at \$14.99.

App Store > Productivity > University of Victoria

CanPlan 4+
University of Victoria >

Details Ratings and Reviews Related

Screenshots iPhone iPad

Carrier 4:53 PM

Cancel Select Task

- Charge Phone
- Make Coffee
- Wash Clothes

Welcome to CanPlan

CanPlan is designed to help you remember what you have to do every day, when you have to do it, and show you how to get it done.

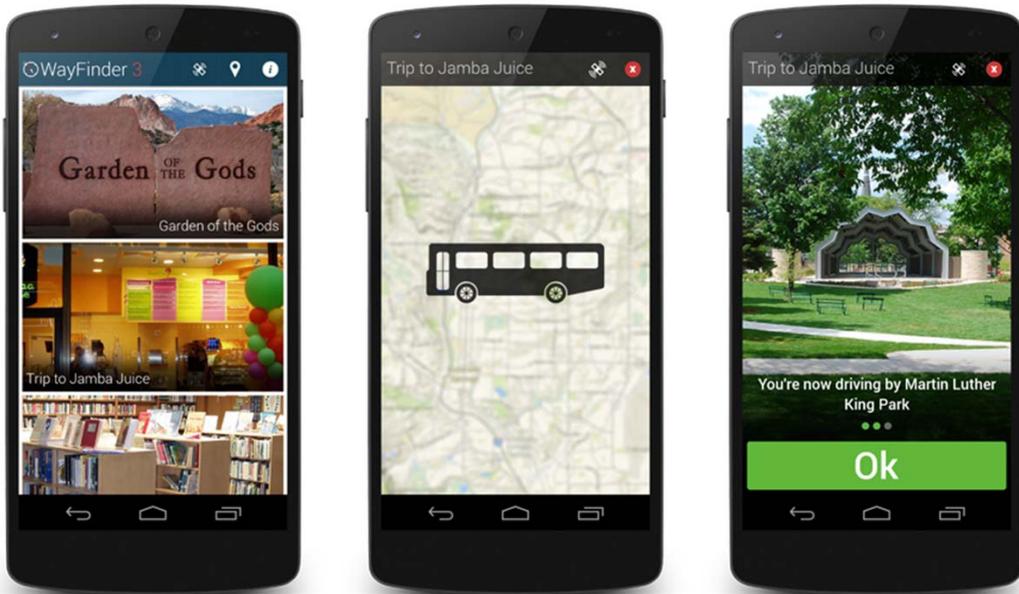
Rating: 4+
TOP IN-APP PURCHASES
1. Unlimited Tasks \$14.99

LINKS
License Agreement
Developer Website

© 2013 University of Victoria

- A Canadian Resource Can Assist
- An app: Can Plan:
- <https://www.youtube.com/watch?v=gGCx8yCywyY>

Specialized Apps: AbleLink Technologies



<https://www.youtube.com/watch?v=iNYfFpzjqyU>

- Dan Davies
- Colorado Springs
- A family of apps:
<http://www.ablelinktech.com>
- RERC Advancement of Cognitive Technologies: virtual job coach

Being on the Cutting Edge...

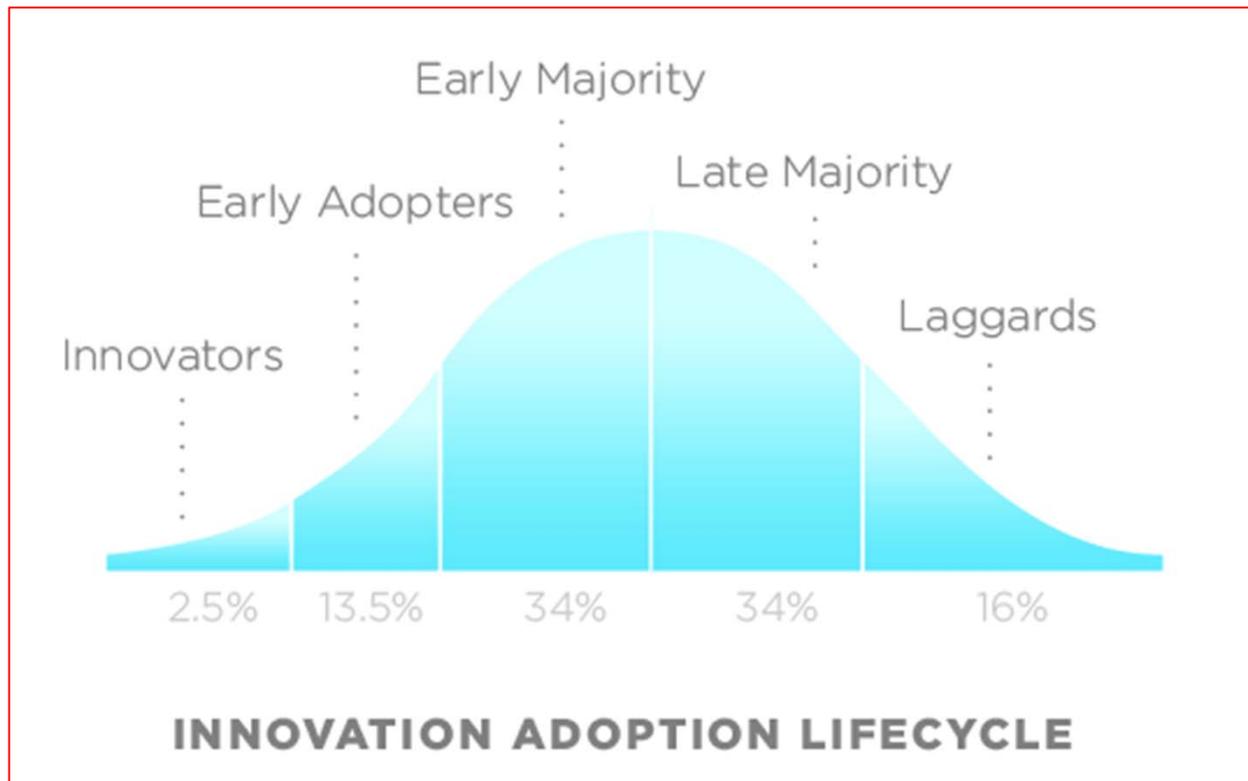
Innovation brings excitement as well as frustration!

- Transition from the idea or concept to the marketplace
 - Knowledge of how to implement
 - Knowledge on how to apply
 - Treatment versus Compensation
 - Payment or affordability
- This transition to recognition of the contribution of AT is reaching a critical mass.
- Due to a concept known as: Diffusion of Innovation

Everett Rodgers, 1962

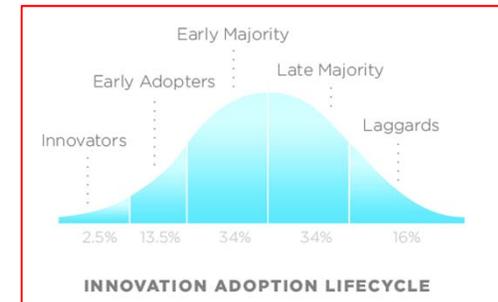
The Cutting Edge?

Adoption of Innovation can be characterized



Everett Rodgers, 1962

Diffusion of Innovation



This theory comes from many disciplines

Rogers: 4 key elements influence the spread of new ideas:

- The innovation itself
- Communication channels
- Time
- A social system

Technology Adoption relies heavily on human capital

- The knowledge, talents, skills, abilities, experience, intelligence, training, judgment, and wisdom possessed individually and collectively by individuals in a population. Leadership!
- Consider how hard it is to change hand washing behavior

The bottom line? Technology rocks

- Assistive Technologies have finally come of age and are now part of 21st Century rehabilitation care for...
 - Diagnosis and Treatment
 - Preventing secondary disability such as:
 - pressure ulcers,
 - prevention of postural collapse and deformity,
 - repetitive strain injuries, and
 - depression secondary to loss of life roles and decreased quality of life.
 - Essential for return to school, work, community living, home management, transportation, etc.
 - Increasing safety in the home
 - Reducing the cost of healthcare

A Recent Supplement in USA Today

- “Gadgets for Good: the Demand for Assistive Technology in 2015” at:
 - <http://www.futureofpersonalhealth.com/education-and-research/gadgets-for-good-the-demand-for-assistive-technology-in-2015-infographic>
- AT devices are items, pieces of equipment or product systems that increase, maintain or improve functional capabilities of individuals with disabilities improving outcomes in
 - Education
 - Employment
 - IT & Telecommunication
 - Community Living

Locally, Where are We on this Path?

- **Statewide AT Programs or Tech Act Projects**

- Started as part of “Technology Related Assistance Act” in 1988.

- Now offer:

- Guidance for funding, education, demonstration, finding experts, low interest loans, equipment recycling, etc.

- Our regional resources:

- Kentucky – KATS Network – www.KATSnet.org

- enTECH at Spalding University’s OT Department

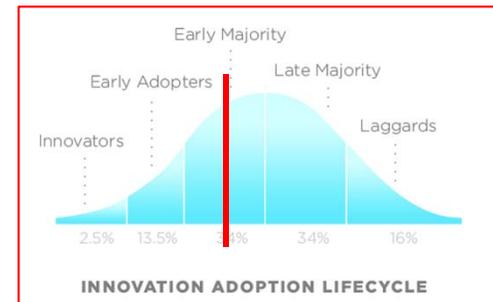
- Indiana – www.InDATA.org at Cross Roads Easter Seals, Indianapolis

- Find other Projects?

- Search: Association of Tech Act Projects (ATAP)

Where are we on this Path now?

- **Curiosity + the Internet and WWW resources = a wealth of information**
- Resource organizations
 - Center for Parent Information & Resources
<http://www.parentcenterhub.org/>
 - The ARC – <http://www.thearc.org/>
 - YouTube videos... an example:
<https://www.youtube.com/watch?v=ZlyR6o2QqZg>
 - Product developers and consumer education resources that educate about AT Devices and Services
- These are all are examples of Human Capital
- Are we being agents for change?



Where are we on this curve?

Where are AT Services being delivered?

- **Educational Services:** in Public School Districts and outpatient centers like The Kid's Center, Mattingly Center, the UofL's Resources for Student's with Disabilities
- **Employment Services:** Kentucky and Indiana Offices of Vocational Rehabilitation
 - "Rehab Techs" assist Rehab Counselors with advice about AT solutions and training, vehicle modification, etc.
- **Outpatient Clinical Services:** situation is on hold
- Exposure during rehab care with referrals generated by PM&R physicians, or members of the rehab team

The Maker Movement & Maker Spaces



An Example: The Community Model

- AT&T and NYU: The ConnectAbility Challenge
- Prizes for developing assistive technologies
- Acknowledges the “Maker Movement” and Maker Spaces
- New civic infrastructure
 - https://www.youtube.com/watch?v=ll6d4A_LSts



The Medical vs. Community Models

- In community models, the use of AT is imbedded in the occupations of the clients: daily living, work, child rearing, homemaking, education, learning in preschool, etc.
- In medical models, AT is imbedded in “medical” necessity and so requires a physician order or referral.
 - When health insurance is the payer...
 - Is a wheelchair medically necessary?
 - Is speech recognition software medically necessary?
 - Is an iPad medically necessary?
 - May not pay for AT devices but usually pays for evaluation & training... then patient or family has information and direction

The Medical Model at Frazier / UofL

My efforts to promote AT here in Louisville have been largely focused within the medical model

AT eval & service delivery is logical in academic medicine:

- We develop new knowledge as a teaching hospital and we are a natural setting for research and technology transfer
- Education of young health care professionals, residents & physicians
- Takes advantage of synergies and opportunities for R&D within health care professions, medical research and engineering
- AT affects rehab outcomes, readiness for adaptation/return to daily living, and reduction in perceived disability
- Sets the expectation for life changes and adaptation

The Current State at Frazier / UofL

- Acquisition by Catholic Health Initiatives and transition to Kentucky One has led to increased emphasis on productivity and billable hours
- This is not always compatible in a specialty treatment area that requires:
 - Customized solutions
 - Team coordination
 - Innovation
 - Education

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- https://www.cookchildrens.org/SiteCollectionDocuments/Education/Mobility/MichelleLange_PediatricPowerMobility-presentation.pdf

Resources

- Google search on:
 - Resources Intellectual and Developmental Disability
 - Apps for adults with intellectual disabilities
- KATS Network: <http://www.katsnet.org>
- Indata Project: <http://www.eastersealstech.com>
- AbleLink: <http://www.ablelinktech.com>
- CanAssist: <http://www.canassist.ca>
- Center for Parent Info & Resources:
<http://www.parentcenterhub.org/resources/>
- RESNA: <http://resna.org/>
- Wheelchair drive controls:
<https://mobilitybasics.ca/wheelchairs/drivecontrols.php>

Questions?



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