Tracking Assistive Technology needs, solutions, and intervention outcomes for students with disabilities in Higher Education

November, 2015

Accessing Higher Ground 2015
Westminster, Colorado
Marla C. Roll, MS, OTR /L
Director – Assistive Technology Resource Center
Assistant Professor, Department of Occupational Therapy

Matthew P Malcolm, Ph.D., OTR
Associate Professor, Department of Occupational Therapy

- Land grant institution
- Carnegie Research University
- Comprised of 8 colleges
- 30,000 students
- 1700 faculty
- 4500 employees

- Located in northern Colorado in Fort Collins, CO
- Population size is 150,000

- GO RAMS!
Agenda

- Review learning objectives
- Background of AT in post secondary
- Rationale for data collection/ outcome measures in higher ed
- Review of existing outcome measures in AT
- Overview of ATRC outcomes measures
- Methodology and results
- Lessons learned
- Discussion
Learning Outcomes:

1. Participants will identify the assistive technology (AT) needs of and interventions for higher education students.
2. Participants will be able to identify ways to generalize use of the Canadian Occupational Performance Measure (COPM) in other AT settings/applications.
3. Participants will be able to compare and contrast the COPM to other established or emerging outcome measures.
4. Participants will contribute to the development of best-practice for assessing AT-related outcomes in higher education students.
Legal Mandates for AT in Higher Education

- Institutions of higher education are required to provide appropriate accommodations, including assistive technology (AT), for students with disabilities. Ideally, the provision of AT ensures that students are better-able to successfully perform and participate in key academic activities.

- Section 504 of the Rehabilitation Act
- ADA – Title II
  - Non-discrimination
  - Require equivalent access to learning opportunities and content

- AT provision - commonly
  - Disability Support office
  - IT/ Central Computing

- Colorado State University’s AT provision
  - Located in a graduate OT program - Assistive Technology Resource Center
Assistive Technology Resource Center

**ATRC Mission:**
- The ATRC ensures equal access to technology and electronic information for CSU students and employees with disabilities.

**Service Overview:**
- Services include assistive technology assessments, accommodations and training, as well as consultation and education regarding accessibility and universal design of mainstream and instructional technologies.
- OT graduate education regarding assistive technology.
Total Post-secondary Enrollment in the U.S. (1947-2012 and projected)
(National Center for Education Statistics, 2014)
Importance of the college student role:

• Despite influx of students with disabilities attending higher education, rates of persistence, retention and graduation remain low (Belch, 2004: Kochar-Bryant)

• Failure to complete a college education is correlated with reduced quality of life, underemployment, and unemployment (Mamiseishvili, 2010).
Disabilities in Higher Education


• At Colorado State University (Schelly, Davies, & Spooner, 2013).
  • 8%–11% report a disability
  • Non-apparent disabilities are the largest proportion and growing
Types of Disabilities

Apparent
- Mobility Impairments
- Visual Impairments / Blindness
- Hearing Impairments / Deafness

Non-apparent
- Learning Disabilities
- Attention Deficit Disorder (ADD/ADHD)
- Autism Spectrum Disorder
- Traumatic Brain Injury (TBI)/other neuro
- Mental Illness (depression, PTSD, etc)
- Other cognitive / perceptual disorder
- Pain
Commonly Used AT in Higher Education:
Mobile apps, software & hardware that assists with:
reading, writing, studying, note-taking, examinations.

- **Literacy Support:**
  - Text-to-Speech Software (Listening to text)
  - Voice Recognition Software (Dictation)
  - Software for Study skills, highlighting, dictionaries, etc.
  - Screen magnification & screen reading software
Commonly Used AT in Higher Education (con’t)

• **Ergonomics/ Alternative Access:**
  - Alternative keyboards (one-handed, chorded, etc.)
  - Alternative pointing devices (head pointing, eye gaze, trackballs, touchpads, switches, etc.)

• **Organization/ Time Management:**
  - Mind mapping software, productivity & time management apps, calendaring, etc.
Why are outcomes measures necessary?

- We need to build evidence for AT interventions:
  - Number of college students with a disability is rising
  - Services are mandated, but outcomes on effectiveness are scant
  - Effectiveness has largely been anecdotal – needs to be more quantifiable
  - Stakeholders want to know extent to which AT interventions impact academic performance
  - Institutions of higher education must better understand the characteristics of the AT user
Outcomes are necessary but lacking:

- Outcome measures do not exist specific to AT effectiveness in higher education/post secondary.

- Existing outcome measures — based in rehabilitation
  - Functional Independence Measure (FIM)
  - Psychosocial Impact of Assistive Devices (PIADS)
    • (Day and Jutai, 1996)
  - Quebec User Evaluation of Satisfaction Scale (QUEST)
    • (Demers et al., 1999).

- Existing outcome measures — based on K-12
  - School Function Assessment Assistive Technology Supplement (SFA-AT)
    • (Silverman et al., 2003)
  - Quality Indicators for Assistive Technology (QIAT)
    • (Zabala, J.S. et al., 2005)
Existing outcomes are not a good fit!

- **Rehab Measures:**
  - Focus is too broad
  - Time intensive

- **K-12 Measures:**
  - Different service delivery
  - College students are more autonomous

- **Necessary Criteria for Higher Ed:**
  - Quick, user perspective, related to academic success
ATRC data collection/ outcome measure process:

- Colorado State University Assistive Technology Resource Center (ATRC) Survey (Roll et al., 2007)
- Canadian Occupational Performance Measure (COPM; Law et al., 1990)
What is the COPM?

- Commonly used assessment in occupational therapy.
- Semi-structured interview at initiation of services, can be used after intervention for outcome measure.
- Prioritizes occupations by importance to the client; includes areas of self-care, productivity and leisure.
- [The COPM in Use](http://www.thecopm.ca/use/)
COPM Psychometrics:

- Measures perceived performance and satisfaction on 1-10 rating scale.
- Extensively measured for reliability and validity.
- Has been used to assess assistive technology. (Carswell, et al., 2004)
- Several studies have modified the COPM by narrowing the areas of occupation addressed in order to measure specific outcomes.
  - Studies deemed the outcomes after using a modified version of the COPM (mCOPM) clinically significant. (Di Rezze et al., 2008; Roberts et al., 2014)
**ATRC use of mCOPM**

- Focuses areas of occupation on academic skills in postsecondary education
  - Reading
  - Writing
  - Note-taking
  - Test-taking
  - Study Skills
  - Other (may include researching, computing, math, etc.)
ATRC administration of mCOPM

• Measures importance, performance, and satisfaction in given areas on 1-10 scale (1 low, 10 high).
• Performance and satisfaction areas are averaged.
• Conducted at initial intake and again after OT deems that intervention has taken effect to show change in occupational performance specific to academics.
1. Rate the importance of each activity below on a scale from 1-10 (1-not important at all, 10-extremely important)

2. Rate each problem on current performance and satisfaction on a scale from 1-10 (Performance: 1-not able to do it, 10-able to do it extremely well/ Satisfaction: 1-not satisfied, 10-extremely satisfied)

i.e. How well do you think you are performing in each area and how satisfied are you with this performance?

Example 1: I would rate my performance in the area of reading a 4 but I am not happy with this level so I would rate my satisfaction a 5 (meaning I would like to improve my performance).

Example 2: I would rate my performance in basketball a 6 but am happy with this level so I would rate my satisfaction a 10 (meaning I have no interest in improving my performance right now).

### School-related Performance Problems:

<table>
<thead>
<tr>
<th></th>
<th>Initial Assessment</th>
<th>Reassessment</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Importance</td>
<td>Performance</td>
</tr>
<tr>
<td>1. Reading</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>2. Writing</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>3. Note-taking</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>4. Test-taking</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>5. Study Skills</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>6. Other_____________</td>
<td></td>
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</tr>
</tbody>
</table>

(researching, computing, math, science, Ramweb, RamCT, etc.)

For Internal Use Only:

### Scoring:

- **Performance Score 1**: 3.2
- **Satisfaction Score 1**: 2.4
- **Performance Score 2**: 7.4
- **Satisfaction Score 2**: 7.8

**Change in Performance =** 7.4 - 3.2 = 4.2

**Change in Satisfaction =** 7.8 - 2.4 = 5.4

Completed by ATRC staff.
Methodology

• **Subjects**: college students seen as clients in the CSU ATRC between 2011-2015
  • n=428
  • All client identifiers were removed from the data at point of analysis
  • Methods approved by CSU IRB

• **Intervention**: AT support to evaluate and train
  • AT evaluation
  • AT hardware
  • AT software
  • “General population” AT (e.g., smart phone apps)

• Exploratory and retrospective

• **Measurement**:
  • Intake questionnaire: attributes
  • End-of-semester ATRC survey: service provision, AT use, AT impact
  • Pre- and post-AT intervention (semester) mCOPM: importance, performance, satisfaction
Statistics

- Descriptive statistics
  - Attribute
  - ATRC survey data

- Correlation
  - ATRC survey and mCOPM-Spearman’s Rank
  - mCOPM performance change vs. satisfaction change-Pearson r

- One-way ANOVA & Independent samples t-test
  - Attribute and mCOPM

- Paired samples t-test (Bonferroni-corrected, $\alpha = .004$)
  - pre vs. post mCOPM importance, performance, and satisfaction scores
RESULTS
Client attribute data
Students Served by the ATRC: Frequency by Year in College 2011-2015

- Unidentified: 83
- Freshman: 105
- Sophomore: 71
- Junior: 78
- Senior: 74
- Graduate: 44
Students Served by the ATRC: Frequency by Gender 2011-2015

- Female: 228
- Male: 193
- Missing: 7
Students Served by the ATRC:
Primary Diagnosis or Condition
2011-2015

- LD 39%
- Mental illness 11%
- Mobility 6%
- Vision 9%
- CNS damage 8%
- COG-PERC 7%
- ADD/ADHD 7%
- ASD 3%
- Other 6%
- Pain 4%
Students Served by the ATRC: Primary Diagnosis or Condition, Apparent vs. Non-Apparent
2011-2015

- Non-apparent, 316, 77%
- Apparent, 97, 23%
Satisfaction with ATRC service provision
1. The ATRC identified my needs (Spring 2015)

- Strongly Agree - 68.9%
- Agree - 24.4%
- Strongly Disagree - 6.7%
2. The AT accommodation was made in a reasonable time-frame (Spring 2015)

- Strongly Agree - 71.1%
- Agree - 24.4%
- Strongly Disagree - 4.4%
3. What training approach works best for you?

- I teach myself using manual or tutorial: 22.2%
- Demonstration by ATRC staff: 64.4%
- Practice with ATRC assistance: 48.9%
- Independent practice: 37.8%
Use of AT
9. I use AT for:

(Spring 2015)

- **Reading**: 78.6%
- **Writing**: 54.8%
- **Note-taking**: 59.5%
- **Test-taking**: 23.8%
- **Studying**: 76.2%
- **Other**: 59.6%
13. I use AT here:

(Spring 2015)

- Home/dorm: 60.0%
- Library AT rooms: 37.5%
- Testing support: 25.0%
- Adult Learning & Veteran Svcs.: 17.5%
- College Lab: 10.0%
14. How frequently do you use AT?

(Spring 2015)

- Rarely or Not at all: 9.3%
- A few times per Month: 9.3%
- A few times per Week: 37.2%
- Daily: 44.2%
WHY DID YOU STOP USING AT?

- Availability: 11%
- Cost: 16%
- Location: 10%
- Comfort: 6%
- Tech_hard: 8%
- Tech_dys: 11%
- Didn’t: 20%
- Other: 18%
Impact of AT
6. I am independently using recommended AT to meet my needs

(Spring 2015)

- Strongly Agree - 52.3%
- Agree - 36.4%
- Neutral - 9.1%
- Disagree - 2.3%
8. I am comfortable requesting course materials that work w/AT or learning needs (Spring 2015)

- Strongly Agree - 29.5%
- Agree - 38.6%
- Not Sure - 22.7%
- Disagree - 9.1%
15. AT helped me to remain in my courses
(Spring 2015)
16. AT positively impacted grades
(Spring 2015)

- Strongly Agree: 52.4%
- Agree: 31.0%
- Not Sure: 14.3%
- Strongly Disagree: 2.4%
23. Likelihood you will use AT post-grad
(Spring 2015)

- Very Likely: 53.5%
- Somewhat Likely: 18.6%
- Not Sure: 25.6%
- Very Unlikely: 2.3%
mCOPM Data
Performance-COPM

COPM Score

READ 1 | READ 2 | WRITE 1 | WRITE 2 | NOTES 1 | NOTES 2 | TESTS 1 | TESTS 2 | STUDYING 1 | STUDYING 2 | OVERALL 1 | OVERALL 2
---|---|---|---|---|---|---|---|---|---|---|---
5.66 | 6.99 | 6.70 | 7.47 | 7.42 | 7.31 | 7.35 | 7.29

*p < .001
Satisfaction-COPM

COPM Score

READ 1: 4.90
READ 2: 6.83
WRITE 1: 6.35
WRITE 2: 7.29
NOTES 1: 6.16
NOTES 2: 7.40
TESTS 1: 5.66
TESTS 2: 6.99
STUDYING 1: 5.86
STUDYING 2: 7.08
OVERALL 1: 5.76
OVERALL 2: 7.10
Relationships between measures
Diagnosis and performance change-post hoc test (LSD)

\[ F_{8,191} = 1.78, \ p = .08 \]

*p ≤ .01
Diagnosis and performance change post hoc test (LSD)

*p = .04
Diagnosis and satisfaction change-post hoc test (LSD)

\[ F_{8,190} = 1.85, \ p = 0.07 \]

\[ *p < 0.01 \]
Diagnosis and satisfaction change — post hoc test (LSD)

*p < .01
Diagnosis and satisfaction change-post hoc test (LSD)

*p = .02
Summary of Main Findings

- Non-apparent diagnoses & conditions dominate (>75%)
- Demonstration and practice w/staff support important in training
- High frequency of use suggests students are very reliant on AT
- Portability of AT to where students live and study is critical
- Impact of AT: independent use, positive impact on grades and staying in school
- Continue to use post-grad (>50%)
- Academic task performance and satisfaction significantly increase with AT interventions
- Attributes DID NOT predict change on mCOPM
Take Home Points from the Data

• Evaluate for non-apparent dx or condition→ tremendous need for which good AT solutions exist

• Training with AT for this population benefits from consistent support and practice w/AT staff

• Timeliness of intervention critical: quickly allow student to improve performance in ways that shape the course of her/his education
Lessons learned

• Survey was intended as a means for program evaluation but is working as an outcome measure too.
• Consider timing for post measure with the COPM
• Need for a customized database becomes essential!
• Raises questions of administration procedures e.g. can we do all of it on-line?
• Collect other forms of important data
• In prep to launch outcome measurement/data collection, thoroughly plan the process: IRB, anonymous data, questions you intend to answer, and how you intend to analyze data
Outcome measures used by others:

• Discussion:
  • What are other campuses using for outcome measurement?
  • What is working?
  • What are the challenges?
Thank You!

Questions:

Research collaborators?

Slide show will be available on the ATRC Website (http://atrc.colostate.edu/presentations.aspx)

Contact Info:

• Marla.Roll@colostate.edu
• Matt.Malcolm@colostate.edu