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# ENHANCING ASSISTIVE TECHNOLOGY ACCESS THROUGH THE 3DADAPT APP: A USER- CENTERED APPROACH

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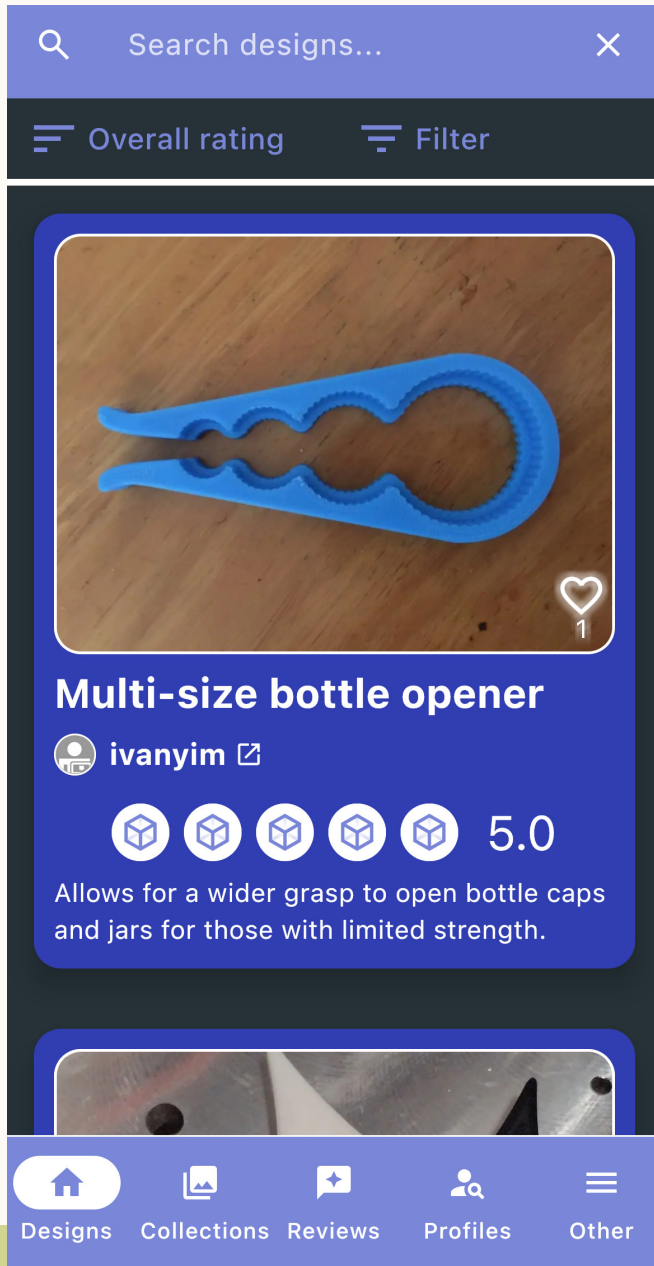
Development of this application was partly supported by the App Factory to Support Health and Function of People with Disabilities funded by a grant from the National Institute on Disability, Independent Living and Rehabilitation Research (NIDILRR) in the U.S. Department of Health and Human Services to the Shepherd Center (Grant # 90DPHF0004).

# THE ACCESS PROBLEM

- Assistive technology (AT) supports independence, but access remains limited
  - Cost, availability, awareness<sup>1</sup>
  - Mismatch → abandonment
- **Open-source 3D printing** offers low-cost, customizable AT
- **Persistent gap:** Connecting persons with disabilities (**PWD**) needs ↔ designs ↔ **clinicians** ↔ makers



Images retrieved from [amazon.com](https://www.amazon.com) and [myminifactory.com](https://www.myminifactory.com)



# WHAT IS 3DADAPT?

- Smartphone app connecting: PWD, clinicians, and students<sup>2</sup>
  - Open-source 3D-printable AT
  - Core features:
    - Search and filter
    - Save collections
    - Order devices
    - Review devices
    - Collaborative decision-making through sharing

# RESEARCH AND DEVELOPMENT OVERVIEW

Iterative, participatory design approach to evaluate the the content, usability, and efficacy<sup>3</sup>

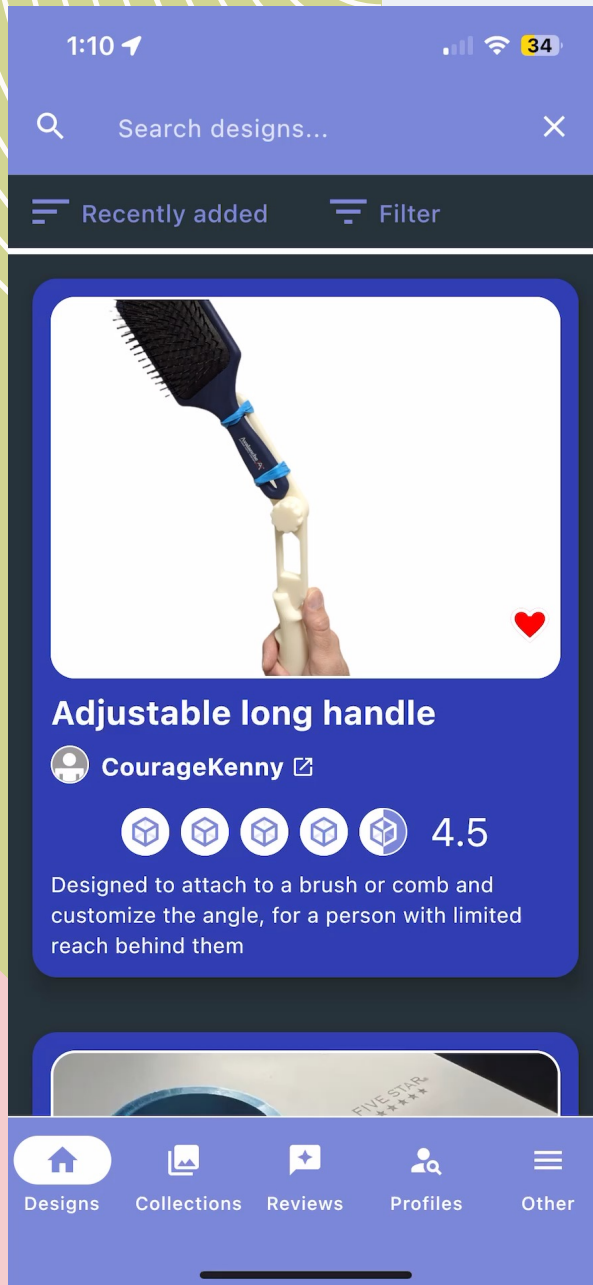
*Phase 1:* Expert feedback on initial usability and app modifications

*Phase 2:* Usability testing with care partners, PWD, and rehabilitation students

- Assess the feasibility of the 3DAdapt app, including acceptability among end-users.

*Phase 3:* Efficacy testing with PWD

- Testing conditions included participants completing a search and order of a 3D device to print, receiving and using the device, and then providing feedback within the app.



## ***PHASE 2: USABILITY TESTING***

- **Mixed-methods usability testing**
  - 11 OT Students, 10 PWD (autoimmune disorders, amputation, ABI, progressive neuro conditions), four (4) Care Partners
- **Qualitative:**
  - **Focus groups** concurrent “think-aloud” with standardized tasks of beta app downloaded on an Android device
- **Quantitative:**
  - **System Usability Scale (SUS):** Range 0–100;  $\geq 70$  indicates acceptable usability)<sup>4</sup>
  - **Acceptability Questionnaire:** Range 1-5 Likert-type agreement based on the Technology Acceptance Measure (TAM)<sup>5</sup>

# USABILITY TESTING RESULTS

	Rehabilitation Students n=11 M (SD)	PWD n=10 M (SD)	Care Partners of PWD n=4 M (SD)
System Usability Scale (SUS)	65.00 (14.05)	55.00 (19.36)	58.75 (35.68)
<b>Acceptability (1-5)</b>			
Usefulness	4.67 (0.37)	4.26 (0.52)	3.92 (1.34)
Ease of use	3.70 (0.44)	3.50 (0.24)	3.44 (1.33)
Attitude	4.77 (0.41)	4.20 (0.53)	4.50 (0.58)
Intention to use	4.23 (0.41)	3.9 (0.50)	4.00 (2.00)
Satisfaction	3.73 (0.79)	4.1 (0.88)	4.00 (2.00)

**Revisions:** Open-text search, clearer navigation, help content, remove unfamiliar terms (i.e., "Printset")

## Themes<sup>6</sup>

"Looks familiar"

Follows low-vision  
principles

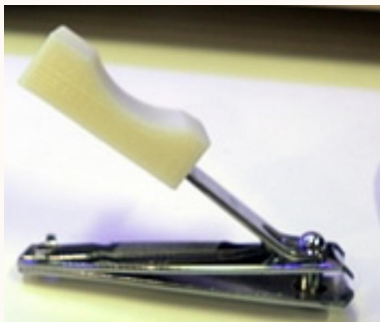
Easy-to-use  
connection

Help students understand  
what AT is

Devices are universally  
designed

# ***PHASE 3: EFFICACY (N-OF-1 OUTCOMES)***

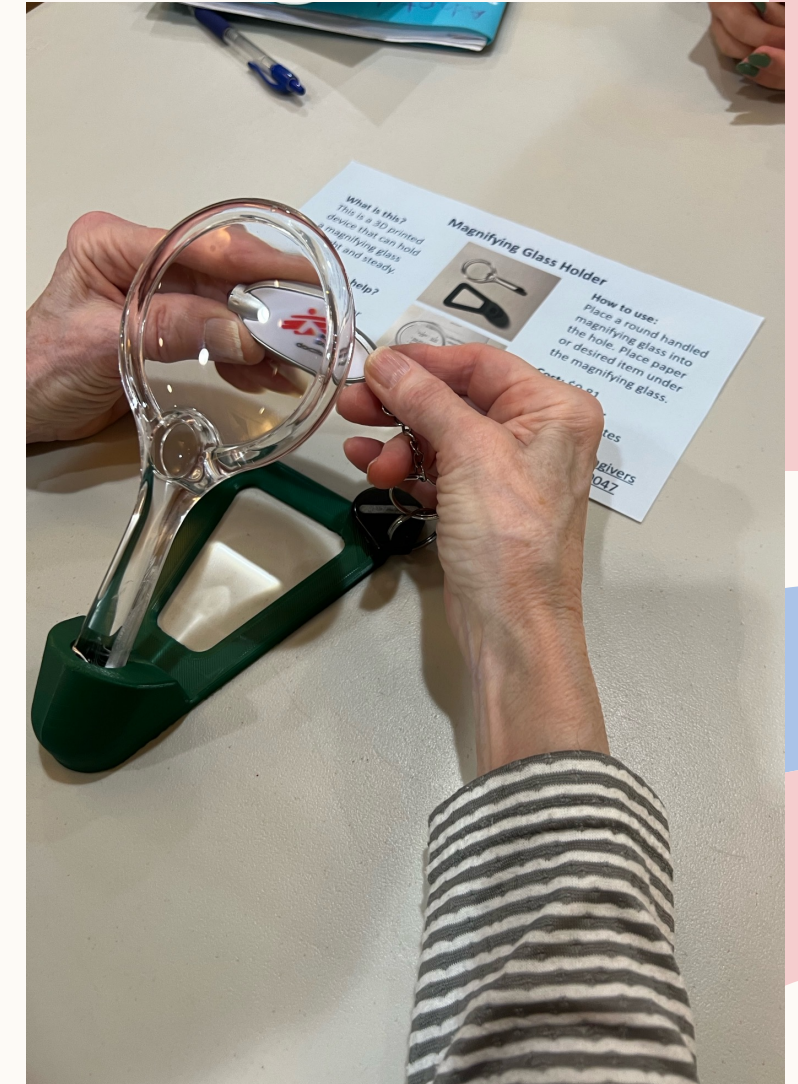
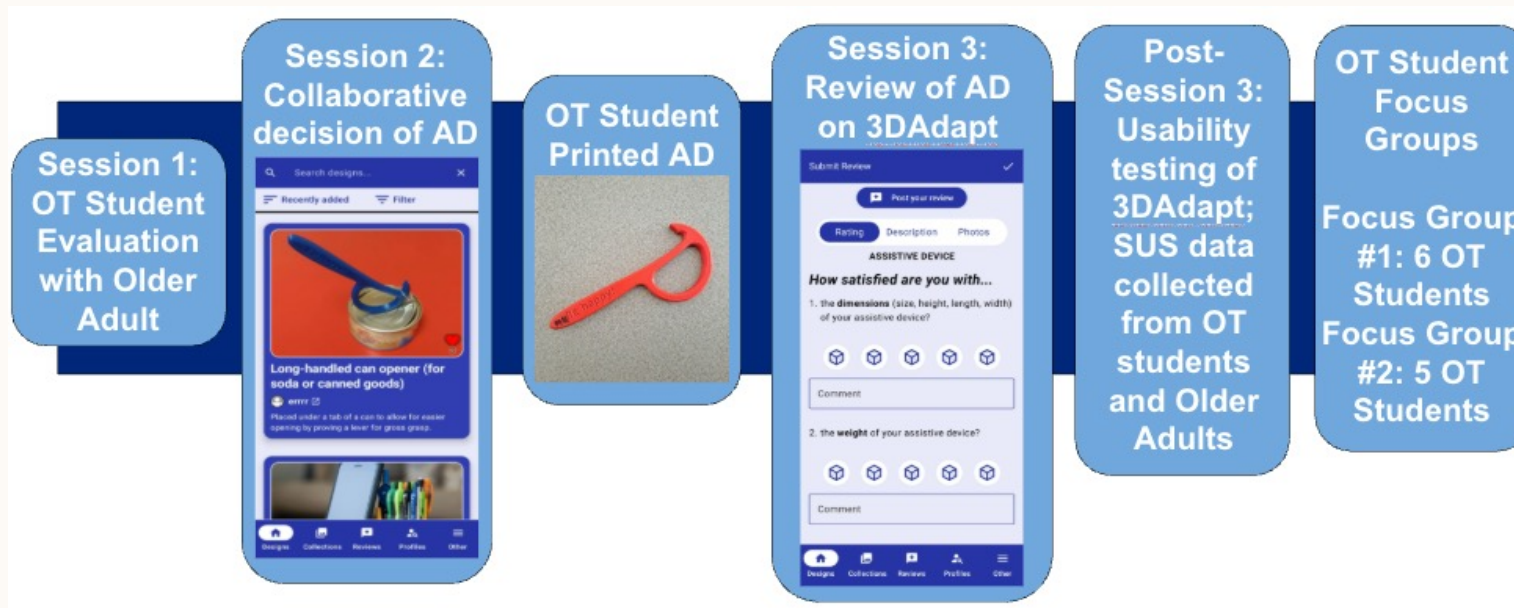
- **n=5 PWD** with diverse needs returned to review the finalized app
- **SUS reports of 3DAdapt:** Improved from M=52 to M=69 usability
- **Acceptability Questionnaire:** All categories improved (~ 4 = agree)
- All five PWD successfully ordered AT
  - **QUEST satisfaction<sup>7</sup> of AT = 4.48** (range of 1-5)
  - **100% reported functional needs met**



Images retrieved from “3DAdapt,” 2024, <https://apps.apple.com/us/app/3dadapt/id6661019600>

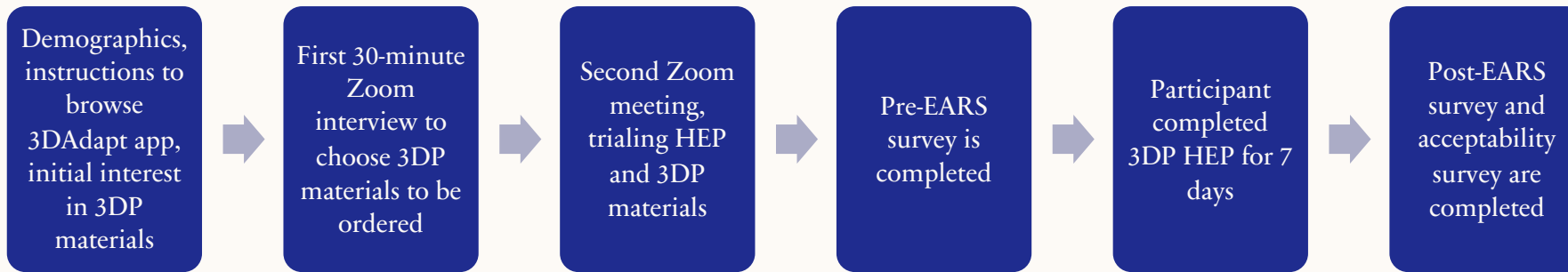
# FOLLOW-UP STUDY IN OT EDUCATION

- Entry-level OT adaptations course
- **OT students** (n=30) and client collaboration (**older adults**, n=14)
- 3-session workflow: Assess need → Match device → Print and review
- **Measures: SUS** (student M = 80.42, older adult M = 64.64) and focus groups with 11 students

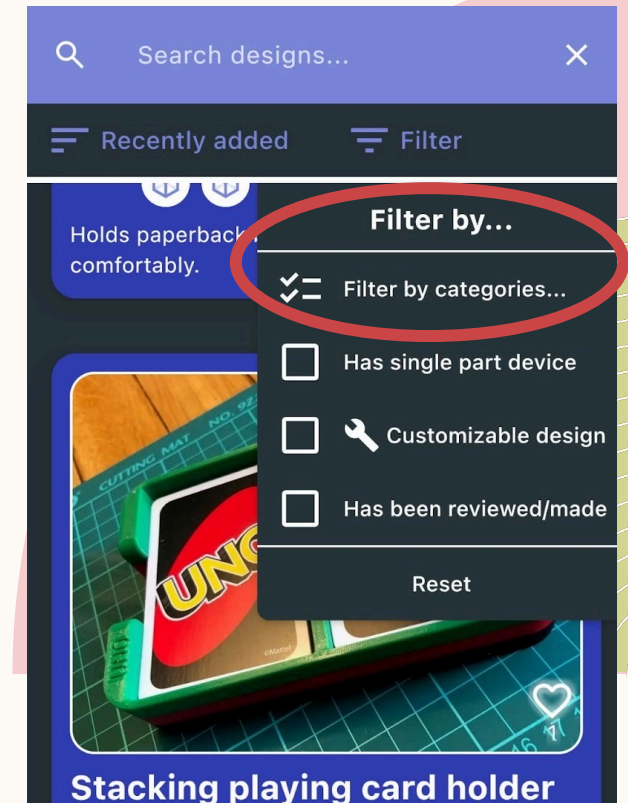
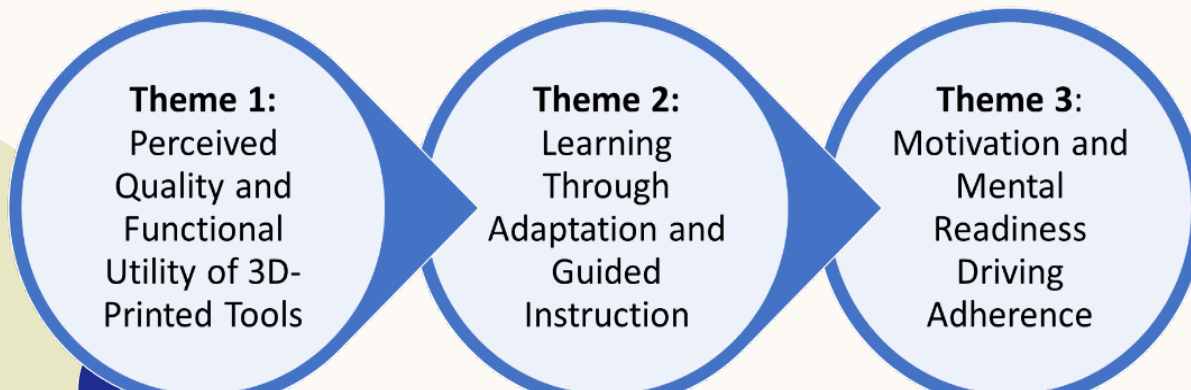


# FOLLOW-UP STUDY FOR HOME EXERCISE PROGRAMS (HEP)

- n=6 in-home clients with unilateral UE motor challenges
- Examining feasibility of 3DP HEP materials



- Adherence (EARS)<sup>8</sup> maintained, 80.56% agreement with acceptance, implementation factor themes:



Images retrieved from "3DAdapt," 2024, <https://apps.apple.com/us/app/3dadapt/id6661019600>

# IMPLICATIONS FOR OT PRACTICE AND EDUCATION

- Iterative design improves usability and satisfaction
- Usability differs by role: Technology trainings
- Apps as clinical tools and educational scaffolds
  - **Practice:** AT awareness, customization, shared decision-making
  - **Education:** mHealth + 3D printing builds confidence and reasoning



# REFERENCES AND CONTACT

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