



Make the makers' voices count: combining universal and participatory ergonomics to create accessible makerspaces for individuals with (physical) disabilities



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voices count.  
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# 1 WHO MIGHT THE MAKERS BE?

“Making is fundamental to what it means to be human. We must make, create, and express ourselves to feel whole” (Hatch, 2013), and since “everyone is a Maker, and our world is what we make it” (Maker Media, 2013).







# 2 MAKERSPACES

## FACILITATING MAKING

- ❑ In 2006, the first Maker Faire was in San Mateo, California.
- ❑ The maker or Do-It-Yourself (DIY) movement, which facilitates maker-learning within makerspaces, has been flourishing globally in public, academic and school libraries.
- ❑ Encourage students to tinker, design, and invent collaboratively with actual tools, technologies and materials in makerspaces (Kurtti, Kurtti & Fleming, 2014; Waters, 2016 ).

*Makerspaces have been established to provide healthcare professionals (i.e. physicians, nurses and caregivers) with a creative, innovative and design space for healthcare innovation.*

- Example: MakerNurse lab was established last year in the United States.

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# MakerNurse lab

# MakerNURSE Create

A community for health making



FEATURED NOW DIRECT PATIENT CARE

Custom Inflatable Support Pillow



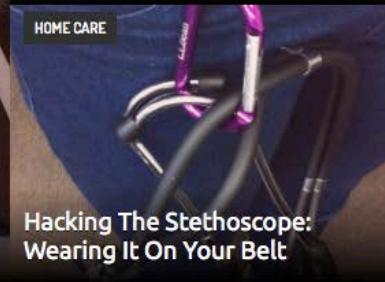
HOME CARE

DIY Finger LED



HOME CARE

Hacking The Stethoscope: Sugru Earpiece Replacement



HOME CARE

Hacking The Stethoscope: Wearing It On Your Belt



DIRECT PATIENT CARE

Hacking The Stethoscope: Tubing Deterioration Protection



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# 3 PURPOSE...

- ❑ Generally, the makers' 'voices' are not taken into account when designing blend-able spaces.
- ❑ Needs of individuals with disabilities (sometimes referred to as individuals with special needs) when designing and facilitating makerspaces.
- ❑ As a result, the prospective benefits to individuals are significant, but it is vital that the spaces, tools, services and facilities must be inclusive to deliver these benefits equally to everyone. Makerspaces may seem inaccessible and uninviting for individuals with disabilities.
- ❑ So there is a need...

**A need for a blend-able makerspaces**

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# 4 PRAGMATIC ANALYSIS

Can *universal design* and *participatory ergonomic principles* enable a blend-able makerspace environment where individuals with (as well as without) physical disabilities can participate in the design of makerspaces?



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# 4 PRAGMATIC ANALYSIS

- ❑ **Focus:** Design a blend-able and accessible makerspace through aligning the principles of universal design and participatory ergonomics with the main makerspace components.
- ❑ **Context:** Healthcare. Specifically, students in an academic medical library.
- ❑ **Key concepts:** Universal design, participatory ergonomics and the involvement of people with and without disabilities.
- ❑ **Scope:**
  - Clarification of concepts.
  - Practical guidelines.
  - Role of health librarians.

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# 5 WHAT IS...

## DISABILITIES

“Disability can be defined as ‘any restriction or lack (resulting from an impairment) of ability to perform an activity in the manner or within the range considered normal for a human being” (WHO, 1980).

## PARTICIPATORY ERGONOMICS

“In participatory design (or co-design), users are also part of the design team, helping to come up with the requirements and features of the design” (University of Washington, 2015).

## UNIVERSAL DESIGN

“Universal design encourages the design of space, products, and processes not just for the average user, but for people with a broad range of abilities, ages, reading levels, learning styles, languages, cultures, and other characteristics” (University of Washington, 2015).

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# 6 MAIN MAKERSPACE COMPONENTS

## PHYSICAL SPACE

Must be open and inviting, and catering for the needs of people with disabilities.

### Universal design principles:

- Examples: Pathways, ramps and entrances should be wheelchair-accessible.
- All heights and levels must be accessible.
- Walkways should be wide and clear of obstacles.
- Work surfaces and power cords must be movable.
- Meeting space must be spacious.

### Participatory ergonomics:

- Individuals with disabilities should be invited to assist in modifying the space. For example: Explanation of the type of tasks and social situations. Improve their commitment.

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# 6 MAIN MAKERSPACE COMPONENTS

## EQUIPMENT

Must be the perfect fit between the students and their 'stuff'.

- ❑ Universal design principles:
  - Examples: Positioning whiteboards and other tools for easy reachability from a seated position.
  - Equipping tables, seating and equipment with a push-button for easy adjustability to set the perfect height.
  - Enough space under all work surfaces.
  - Movable furniture.
  - Providing storage facilities.
  
- ❑ Participatory ergonomics:
  - Address psychosocial factors in workplace or learning environment . For example: Assist in the modification of their equipment such as being adjustable, detachable and movable.

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# 6 MAIN MAKERSPACE COMPONENTS

## TOOLS, TECHNOLOGIES AND MATERIALS

Must need to be inclusive for use by students with various abilities and disabilities.

### ❑ Universal design principles:

- Examples: Health mobile applications.
- Hand tools for example need to have raised, large and clear labels.
- Safety gear should be promoted, described and labelled .
- Computers with specific assistive technologies.
- Provide alternative keyboards and mouses, screen readers, speech-to-text software, trackballs and note taking software.

### ❑ Participatory ergonomics:

- For example: Co-design and partake in the selection of the tools, technologies and materials.

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# 6 MAIN MAKERSPACE COMPONENTS

## INTEGRATION OF LIBRARY AND INFORMATION STAFF, RESOURCES AND SERVICES

Assist in producing an interconnected space for information and other resources .

- ❑ Universal design principles:
  - Examples: Assist in obtaining the maker's needs .
  - Assist in arranging for a specific expertise.
  - Training students in utilising various hardware and software.
  
- ❑ Participatory ergonomics:
  - Assist in an audit of information needs analysis. For example, by having individuals with disabilities partake in surveys, interviews or group discussions to assist designers in the modification of makerspaces.

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# 6 MAIN MAKERSPACE COMPONENTS

## SAFETY PRACTICES AND TRAINING

Training materials, guidelines and instructions to ensure safe practices.

- ❑ Universal design principles:
  - Examples: Provide various formats appropriate for users with disabilities.
  - Safety labels and signs must be in high-contrast, large print and in braille.
  - All safety equipment should be accessible.
  - Visual and audio pointers should be provided for equipment and safety warnings.
  
- ❑ Participatory ergonomics:
  - Assist in forming 'safety' teams. For example: Such a team should include a wide spectrum of individuals.

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# 7 Role of health librarians

- ❑ Embrace the makerspace movement and the value it holds for academic (medical/healthcare) libraries.
- ❑ Regarding support for 'makers' with physical disabilities health librarians can:
  - Systematically review.
  - Promote acknowledgement.
  - Promote the importance.



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# 8 Conclusion

- ❑ Principles of universal design and participatory ergonomics can offer value to health librarians.
  - Address makers' needs.
  - Support to co-learn, co-create and co-design innovative applications.
  - Make the maker's voices count.



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# THANK YOU

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