Universal Design in Multi-Unit Housing

Presented by: Tracy Needles M.S.
My Background

- Work @ Google as Assistant Facilities Manager in NYC

- Masters @ Cornell focused on Human Environmental Relations
  - Focus on end user
  - Focus on environment from a whole systems view

- Master's Thesis Research Project:
  - Universal Design in Multi Unit Housing
Research Question

How does the use of Universal Design in Multi-Unit Housing impact Quality of Life?
"People with disabilities have little in common with each other. The mere fact that two people have a similar feature does not signify any relationship. People with muscular dystrophy are no more likely to have something in common with one another than are people with auburn hair."
(Wilkoff & Abed, 1994, p. 30)

Why UD & Multi Unit Housing
The Connection

- Diverse Residents
- Affordable
- Frequent Turnover
- Private + Public Spaces

Multi-Unit Housing

- Designing for All
- Cost Effective
- Flexible
- 7 Guiding Principles

Universal Design

Communal Bonds + Quality of Life
Concept Map: Relating it all

UNIVERSAL DESIGN (UD)
Design concept seeking to create environments that can be utilized by everyone, to their highest and best use.

Where can this be used most effectively?

APARTMENTS
Mechanism to “bottle” UD so it can effectively reach people.

Who will benefit from this apartment design?

APARTMENTS
Using apartments, UD can help certain groups of people that are often disadvantaged, while still providing amenities for everyone.

How Does UD make this impact?

UD can make an impact due to theoretical ideas such as Maslow’s Hierarchy of Needs. As well as theories on quality of life and the environment’s impact on it. These show how UD’s use positively affect users.

These theories explain how UD can “satisfy the user’s thirst”.

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Research Impact

- Educational Tool
- Rationalization for future use of UD
- Case study of UD in multi-unit housing
Experimental Design
Experimental Design

Instruments:
- Structured Questionnaire
- Systematic Observation
- Focused Interview

2010-11 Research Timeline

- Surveys sent to all tenants in August
- Survey responses received in September
- Observation completed in October
- Interviews conducted with managers in November
- Report completed in December
- Presentation in January
Methods

Questionnaire:
--Seven sections from previously validated instruments.

<table>
<thead>
<tr>
<th>Adequacy of space</th>
<th>EX</th>
<th>G</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
<td></td>
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<tr>
<td>Acoustics</td>
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<td>Temperature</td>
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<tr>
<td>Odor</td>
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<tr>
<td>Aesthetic Appeal</td>
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<tr>
<td>Security</td>
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<tr>
<td>Flexibility in Use</td>
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<tr>
<td>Ease of Entry/Exit</td>
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<td></td>
</tr>
</tbody>
</table>

Noise Distractions:

1: TOO DISTRACTING
2: 3: 4: COMFORTABLE

Background Noise Level:

1: TOO MUCH NOISE
2: 3: 4: 5:

Furniture Comfort:

1: UNCOMFORTABLE
2: 3: 4: 5:

Interviews:
--Intended via telephone
--Philadelphia was a mailed survey due to privacy reasons

Observation:
--Behavior Coding
--Node to node tracking
--Strategic measurements

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The Apartments

StL - 6 North

Both:
--near college
--walkable community
--just outside city center

Philadelphia

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Results and Analysis
## Results and Analysis

Findings from Questionnaire Data

<table>
<thead>
<tr>
<th>Category</th>
<th>Rated based on...</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
<td>Age of Residents</td>
<td>Older people in STL</td>
</tr>
<tr>
<td>Overall Qualities</td>
<td>Quality of individual areas and overall satisfaction of building</td>
<td>Greater satisfaction in STL</td>
</tr>
<tr>
<td>Aesthetics of Environment</td>
<td>Interiors and environmental qualities such as temp, lighting etc.</td>
<td>Higher rating in STL</td>
</tr>
<tr>
<td>Security</td>
<td>Private residence security, aesthetic exterior, overall maintenance of the building</td>
<td>Higher rating in STL</td>
</tr>
<tr>
<td>Accessibility/UD rating</td>
<td>Time takes to use/operate the washer and dryer; accessibility and layout of building</td>
<td>Higher rating in STL</td>
</tr>
</tbody>
</table>

6 North:
Response Rate: 17%

Philadelphia:
Response Rate: 15%

Grouped into categories but analyzed on an individual level
SPSS Independent T-Test used

Location used as a grouping variable
95% confidence at .05 significance level

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Results and Analysis
Observation - Quantitative

Outside the guidelines in Philadelphia:
- Strength to open doors-- *STL had auto doors*
- Clearance of tables -- *STL had adjustable tables*

Lobby
- Philadelphia- *Circulation problematic- one main path via stairs*
- St. Louis- *Open floor plate=more low traffic patterns*

Parking
- Philadelphia has architectural barriers (ramp vs. stairs)
### Results and Analysis

#### Interview Data

<table>
<thead>
<tr>
<th></th>
<th>6 North</th>
<th>Philadelphia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge-UD</td>
<td>High</td>
<td>None</td>
</tr>
<tr>
<td>Accessibility</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Cost</td>
<td>$100</td>
<td>$200-500</td>
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</table>
## Results and Analysis

<table>
<thead>
<tr>
<th></th>
<th>Equitable Use</th>
<th>Flexibility In Use</th>
<th>Simple &amp; Intuitive</th>
<th>Perceptible Information</th>
<th>Tolerance for error</th>
<th>Low Physical Effort</th>
<th>Size and Space for Approach</th>
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</thead>
<tbody>
<tr>
<td>Doors</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Shelves</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Adjustable &amp; Heights</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✗</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Parking</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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# Results and Analysis

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<th>Tolerance for error</th>
<th>Low Physical Effort</th>
<th>Size and Space for Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benches</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Floor plan</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>(hall width)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathroom</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Light Wells</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
</tr>
</tbody>
</table>
Discussion
Discussion of Results
Affordances of Apartments

- **Diverse Audience**
  - When physical barriers do not prevent them from living there
    - 6 North diversity vs. Philadelphia

- **Physical Structure**
  - Can create communal atmosphere necessary for societal impact
    - UD can be used in all aspects

- **Cost Benefits**
  - Frequent turnover
  - Operational benefit inherent in this design
Discussion of Results

Barriers to Use

- **Knowledge:** Interview Results
  - “Trickle-down knowledge”

- **Misperception:**
  - Cost
    - Monetary
      - Does NOT cost more to build with UD
    - Aesthetic Cost
      - Do NOT have to sacrifice Aesthetics to build Universally
  - Disabilities
    - Medical AND Architectural Disabilities

- **Politics:** Interview results show there needs to be political change for this to be as successful as possible
**Discussion of Results**

**Impact to Quality of Life**

**Universal Building = Environmental Support**

An Environment can...
- improve independence
- improve access to elements that influence quality of life

**Hierarchy of Needs**

6 North satisfies the basic lower level needs for residents w/ disabilities

Due to the UD design residents who would otherwise struggle at the bottom of the pyramid can reach the upper levels

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Observation - Qualitative & Quantitative=lless barriers for all

Questionnaire - Accessibility rated higher at 6 North

Observation - Qualitative-accessible design/layout → community & inclusion

Questionnaire - Safety rated higher at 6 North

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"Trickle down knowledge" as seen here leads to more UD environments being created

People spend more time in UD environments

Stigmas a/b disability disappear over time w/ architectural changes

Values embedded in UD become part of larger cultural values (equitable use etc)
Conclusions
Conclusion

Limitations of Study

- Resources - 6 North was only known UD apartment building (81 Units)
- Apartment building design - comparison between 6 North and Philadelphia not perfect (apartments with steps; parking lot; concierge)
- Time - Master’s thesis

Photo taken from Philadelphia building’s website
Conclusion

Take-Aways

- Universal Design creates more accessible apartment buildings
- Accessible design does not mean ugly design
- Universal Design can impact more than just the structure of the building
Thank You!

QUESTIONS?
Extra Slides

Handouts
Data Treatment

Instruments treated:

- **Questionnaire**
  - SPSS Independent T-Test used
  - Location used as a grouping variable
  - 95% confidence at .05 significance level

- **Observation**
  - Qualitative observation: *notes compiled into one cohesive document → common elements pulled out and compared (entry/circulation etc)*
  - Measurements: *inputted into excel charts and compared to known baseline for anthropometric limits/strength*
  - Node-Node: *took coded movements and analyzed traffic patterns → displayed patterns (low vs. med vs. high) on schematic drawings*

- **Interview:**
  - *Question and Answer format created to allow for easy comparison between locations*
### Experimental Design

#### Variables

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Dependent Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Apartment building use of Universal design</strong></td>
<td><strong>Quality of Life</strong></td>
</tr>
<tr>
<td>Two Levels:</td>
<td>Aggregate of:</td>
</tr>
<tr>
<td>● “yes (6 North)”</td>
<td>● circulation patterns</td>
</tr>
<tr>
<td>● “no (Apartment in Philadelphia)”</td>
<td>● ratings of space adequacy, accessibility and environmental quality</td>
</tr>
<tr>
<td></td>
<td>● interview data</td>
</tr>
</tbody>
</table>
Questionnaire Data

Demographics of Respondents

**Age by Location:**

<table>
<thead>
<tr>
<th>Location</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philadelphia</td>
<td>28</td>
<td>21</td>
<td>65</td>
<td>30.61</td>
<td>9.92</td>
</tr>
<tr>
<td>6 North</td>
<td>15</td>
<td>22</td>
<td>74</td>
<td>43.47</td>
<td>16.29</td>
</tr>
</tbody>
</table>

**Gender by Location:**

<table>
<thead>
<tr>
<th>Location</th>
<th>Males</th>
<th>Females</th>
<th>M-%</th>
<th>F-%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philadelphia</td>
<td>13</td>
<td>14</td>
<td>46.4</td>
<td>50</td>
</tr>
<tr>
<td>6 North</td>
<td>2</td>
<td>13</td>
<td>13.3</td>
<td>86.7</td>
</tr>
</tbody>
</table>
Observation Data

Schematics- Lobby

**Philadelphia Lobby**
High (solid)=20-30 ppl Med (dashed)= 11-19 Low (squares)=1-10 ppl

**St. Louis Lobby**
High (solid)=9-12 ppl; Med (squares)= 5-8 ppl; Low (dashed)=1-4 ppl
Observation Data

Schematics- Community Room

**Philadelphia Community Room**
High (solid)=2 ppl  Med (square)= N/A  Low (dashed)=1 person

**St. Louis Community Room**
High (solid)=N/A  Med (square)= N/A  Low (dashed)=1 person
Observation Data

Schematics- Parking Lot

Philadelphia Parking Lot
High (solid)=5-6 ppl Med (square)= N/A Low (dashed)=1-2 ppl

St. Louis Parking Lot
High (solid)=2 ppl Med (square)= N/A Low (dashed)=1 person