SPACE PLANNING IN RESIDENTIAL DESIGN

Jean A. Memken, Connie Garber-Dyar, and Sue Crull

Abstract

Almost every introductory housing course involves a unit on space planning. The concepts related to planning the interior spaces of the home have changed substantially over the years, given the change in family lifestyles, the aging population, and the interest in universal design. The process of space planning, however, has remained relatively static, although the outcomes of that process need to reflect a more modern idea of housing and how spaces are used within it. This paper includes the learning objectives, a conceptual framework, a review of space planning concepts, and a reference list related to teaching space planning. It also includes learning activities that a housing educator can use to teach space planning in the housing classroom.

Introduction

Space planning is a crucial aspect of the housing design process. Historically, space planning has been seen as one of the more important housing topics to be taught to future professionals who will work with families and their housing. In their book, The House, Agan and Luchsinger (1965) emphasized the importance of space planning in housing with the following statement:

The house, whether it is designed to be built or chosen after having been built, should be arranged so as to facilitate these essential activities, foster harmonious family life, and minister to the privacy of the individuals living in it. It should fit the scale of living of the occupants. The criterion for judging the adequacy of the house is that the organization and provisions of space be such

Jean A. Memken is an associate professor and Connie Garber-Dyar is an assistant professor of interior and environmental design in the Department of Family and Consumer Sciences at Illinois State University. Sue Crull is an assistant professor in the Department of Human Development and Family Studies at Iowa State University.

Correspondence relating to this article should be addressed to Jean A. Memken, 5060 FCS Department, Illinois State University, Normal, IL 61790-5060.
as to serve the functions of family life and the needs of each individual within the home (p. 75-76).

Housing that is well designed in terms of space planning and room arrangement does enhance the quality of life of its occupants. However, even though the philosophy of space planning has changed very little in the past four decades, considering the dramatic differences in family life and lifestyles that have come about in the last twenty years, the outcome of space planning must change. From this paper, the student will learn how spaces within the housing unit accommodate the needs of a variety of household types and life styles. They also will learn how to apply space planning concepts to create housing that provides an efficient living space as well as a supportive environment to contribute to the overall quality of life.

**Learning Objectives**

After completing this learning module, the student will be able to:
1. use space concepts to create an efficient floor plan.
2. organize rooms into appropriate zones for living.
3. create an easy-to-use circulation path for a floor plan.
4. recognize the relationship between the rooms of a home.
5. situate rooms in a floor plan in an appropriate public-private configuration.
6. apply universal design concepts to the development of a floor plan.

**Conceptual Framework**

The conceptual framework used in this paper comes from White’s (1986) work on space adjacency analysis and Rapoport’s (1987) ideas on the support of activities as a means of determining environmental quality. White (1986) perceives any design problem as an equation, and states that the designer needs to examine the two sides of the space equation before creating a floor plan. One side is an analysis by which the problem, the needs, the floor plan, and the opportunities to be capitalized upon are defined and discovered. It is this side of the equation on which the designer must work to understand the conditions to which the house or floor plan must respond. On the other side of the equation is synthesis, on which, with the decisions made about design, the designer attempts to solve the problems, meet the needs, and capitalize upon the opportunities presented by the house and the individuals who will be living in it. Figure 1 illustrates how this framework might be used in the presentation of concepts related to space planning in a housing curriculum.

Housing is considered a process (Morris & Winter, 1978) and not something that is static, so the equation is never really balanced or actually solved. A floor plan that meets the needs of a young couple just starting their lives together may not accommodate an elderly couple who need accessible housing. However, a well-designed floor plan could satisfy some households for many years, perhaps even throughout an entire lifetime.
As people change, so do their space requirements. Designers need to realize that a floor plan created for a household at the present time will need to change as the household changes. Therefore, floor plans that are flexible and easily adapted to changing needs work best. In addition, a floor plan design rarely is able to address every requirement of an individual household. According to White (1986), "analysis never really defines all the project requirements, and design synthesis never really solves all the problems or meets all the needs" (p. 10). In any floor plan or design, there are always design issues or requirements that are ignored or compromised for the sake of other issues and requirements deemed more important. Consequently, the true conceptual framework upon which a unit in the design of a floor plan is based is not really a linear equation, but, rather, a cyclic one, as presented in Figure 2.

Amos Rapoport (1987) speculates that housing is a "system of settings in which particular systems of activities occur" (p. 14). Based on this definition, he theorizes that housing quality can be described by a set of attributes called an environmental quality profile. Among these attributes would be the number and kinds of rooms and

![The Problem (Requirements) vs. The Solution (Design)](image)

The problem includes the needs, issues, requirements, constraints and opportunities of the individual for whom the floor plan is being designed.

To understand and define the problem, we use our analysis tools (our minds, matrix diagrams, floor planning concepts, knowledge of client, information sources)

The solution is the actual plan which responds to the needs, issues, requirements, constraints, and opportunities of the individuals residing in the home.

To respond to the problem with a floor plan, we use our synthesis tools (design skills, creativity, planning, insightfulness)

Figure 1. White's (1986) Design Equation as a theoretical basis for a space planning curriculum.
the configuration of those rooms. Because housing is culture-specific, one cannot assume that everyone will use spaces in the same way. This idea is especially important for designers in the United States, which has citizens with a multitude of ethnic backgrounds. Rapoport (1986) believes that housing needs must be discovered and not assumed, and that this discovery takes place as the designer considers activity systems, lifestyles, and values of the household that will occupy the dwelling. User-needs analysis and client interviews become critical aspects of the entire space planning process.

**Space Planning Concepts**

Although there are many factors to consider when selecting appropriate housing, the floor plan — that is, the way the rooms are arranged and the spaces within the house are used — is critical to the overall satisfaction of the residents. Floor plans can be evaluated in a number of ways. The following are some of the most important issues to consider when evaluating the spaces within a home. These criteria apply to all structural types, whether the residence is a mobile home, townhouse, apartment, or single-family dwelling (Wedin, 1979).

**Zoning**

There are three basic areas or zones within the home. They include:

1. The public zone, composed of spaces where non-family members are generally allowed.
2. The work zone, composed of areas where work activities that support the lifestyle of the household take place.
3. The private zone, composed of rooms used exclusively by the household members for private activities.

Such areas as the foyer, the living room and dining room, and a powder room in larger homes are considered part of the public zone. The public zone might also include the family room, the deck or enclosed porch and the kitchen, depending on the lifestyle.

![Diagram](image)

Figure 2. The cyclic relationship between the housing needs of the individual and the space planning solution that is implemented to address those needs (White, 1986).
of the household and the size and configuration of the rooms within the floor plan. If
the household operates a home-based business that requires clients to come into the
home for goods and/or services, those rooms that house the business are part of the
public zone.

The work zone includes the kitchen where food is prepared and the laundry area
where the household’s clothing is cared for. It might also include work spaces in the
garage or other rooms in the home. A home office or computer center might also be
considered part of the work zone, depending on how that space is used.

Finally, the private zone of the house includes bedrooms and bathrooms. A den or
family room might also be considered part of the private zone if the room is used
exclusively by the family members (House Planning Handbook, 1987).

The concept of zoning is based on three basic rules for a good floor plan. They are:

1. **All three zones (public, work, and private) should be present in a floor plan.**
   In the United States, a shelter would be considered substandard if one or more of
   the zones was not included in the floor plan.

2. **Zones should not be split.** Locating one bedroom on one side of the home
   while placing the rest of the bedrooms in the private zone on the other side of
   the home could maximize privacy in the one isolated bedroom, but it could also
   create a very confusing circulation pattern that would be deemed unsuitable for
   many households. Cluster work rooms together in one section of the house,
   public rooms and areas in another, and bedrooms and bathrooms in a third. Rooms
   that might be considered part of more than one zone should be located between
   the two zones with which they are identified. For example, if a kitchen area is
   used not only for work, but also for entertaining, it should be located between
   the work and public zones. Likewise, a home office, which is used for work as
   well as meeting clients from the public, should border both the work and public
   zones. There are exceptions to this rule, such as in multi-generational families
   where two separate private areas may be warranted.

3. **Household members should not have to cross through the middle of one
   zone to get to another.** Rooms need to be arranged so that one can move from
   the work zone to the private zone without going directly through the middle of
   the public zone.

The floor plan in Figure 3 shows an example of good zoning within the home. The
home has been effectively divided into the three separate zones: public, work, and
private. By clustering all the similar use rooms together, the space within the home is
used efficiently and allows for a circulation pattern that flows logically from one zone
to the next without crossing the third. Because of the good zoning practices used in the
design of this home, very little space in the floor plan is used for circulation, which is
another aspect to consider when evaluating floor plans.

**Circulation**

Circulation paths within the housing unit should be as short and direct as possible
(Kicklighter & Kicklighter, 1986). A circulation pattern through the home that is effi-
cient and that utilizes minimal floor space should be the goal of the residential des-
signer. Long hallways and circulation paths that snake around, and sometimes through,
rooms add significantly to the cost of the home without providing good usable spaces.
A central entryway and hallway often assist in the creation of a good circulation pattern
in the home.

Zoning and circulation complement each other in house design. Usually, a floor
plan that exhibits good zoning also will have excellent circulation, and vice versa.
Figure 3 illustrates a floor plan with good circulation. The central entryway leads to a
hallway that opens to each zone in the home. The space devoted to this circulation path
through the home is only about five percent of the total square footage — an excellent
circulation-to-usable-space ratio. Moreover, it allows circulation from one zone to
another without violating the third zone.

In addition to hallway placement, the designer must also think about the circulation
within rooms. With the openness of homes of the 90s, rooms within the home must also

Figure 3. Floor plan with good zoning and circulation pattern (Plan No. J-86155).
Used with permission from Homestyle.com.)
accommodate circulation throughout the home. A traffic pattern that cuts directly through a living room or family room is extremely undesirable. Entrances to rooms should be located so that traffic going through those rooms can move along one wall. The placement of furniture can help direct traffic flow in an open floor plan (Kilmer & Kilmer, 1992). Likewise, the designer must be sure to place bedroom closets near the entryway to the bedroom, thus avoiding a circulation path that cuts through the middle of the bedroom.

**Organization of Space and Relevant Structural Components**

For maximum efficiency in a floor plan, the following rules should be considered when putting together space in the home.

**Orientation.** Orientation refers to the way a housing unit is situated on the lot. Often the orientation of the home will affect the entire space plan. Figure 4 shows a single family home with desirable orientation (Brotherson, Hill, Jedele, Spie, Van Proyen

![Diagram](image)

**Figure 4.** Site plan with desirable orientation for a housing unit. (Reprinted by permission of the University of Illinois School of Architecture/Building Research Council from its copyrighted publication, *Home Energy Savings*. Other publications in this series on home building are available at a nominal fee. For more information and a list of publications visit [www.arch.uiuc.edu/brc](http://www.arch.uiuc.edu/brc), call 1-800-336-0616, or write to the Building Research Council, One East St. Mary’s Road, Champaign, IL 61820.)
& Weaver, 1982). Some aspects of orientation that should be considered when designing housing include:

1. An east-west orientation is preferable to a north-south orientation in most locations in this country. With an east-west orientation, which has the longer sides of the home facing north and south, windows can be placed on the south side of the home to take advantage of the sun’s position (low on the southern horizon) during the winter. These windows allow for passive solar heating during the winter months as well as natural lighting during the day. By putting few or no windows on the east and west sides of the home, intense morning heat and light from the sun as it rises in the east and sets in the west can be avoided.

2. Windows can be positioned so as to take advantage of cross breezes. Placing doors and windows so that prevailing summer winds can travel from one side of the home to another allows for natural cooling and ventilation.

3. Landscaping should be installed to act as a buffer to winter winds and as shade during the summer. Planting deciduous trees on the south side of the home will provide shade for the south facing windows in the summer, but will allow sunlight to penetrate through the windows during the winter. Coniferous trees planted on the north and west sides of the home can serve as a buffer for prevailing winter winds that come from the northwest in most parts of this country. In addition, the floor plan can be arranged so that the garage and utility areas are on the northwest corner of the home, further insulating the living spaces from cold winter winds (Kicklighter & Kicklighter, 1986).

Entryways. How one enters and exits the home will have a direct impact on how the spaces are arranged in the housing unit. Entryways should be easily accessible for household members and their guests, but they should be secure and serve as a buffer between the exterior and the rest of the house. The following are some useful ideas in the design of entrances to the home:

1. The front entry should be somewhat separated from the rest of the living areas in the home. An entry closet needs to be close to the front door to accommodate guests’ coats (Wedin, 1979). Figure 5 shows that even a smaller town house apartment can have a separate entry way with storage for guests’ and household members’ coats (NAHB Research Foundation, 1984). In addition, a powder room for guests should be close to the front entry and other public areas in the home. However, it should not be situated so that it is the first room a guest sees upon entering the home. Figure 6 shows an excellent configuration for a public entryway into the home.

2. The service entry is an additional entry to the home, oftentimes through an attached garage or on the side of the house closest to a detached garage. In many cases, it is the entrance most often used by the household and others who provide services to maintain the home. The service entry should be convenient to the kitchen, so that household members can easily move groceries into their proper storage areas, as well as to the basement and garage for service calls.
(Kicklighter & Kicklighter, 1986). In Figure 6, the garage opens into a mud room that is directly adjacent to the kitchen.

3. The entryway to and from the back yard should be through the public zone. Having the only back door of the housing unit located in a master bedroom or kitchen can be disruptive to those family members seeking privacy in the bedroom or trying to work in the kitchen.

**Work Areas.** The kitchen is the primary work area in the home. In recent years, the design of kitchens has changed a great deal to accommodate two or more cooks, an

---

Figure 5. A townhouse with separate entryway (NAHB Research Foundation, 1984). Used with permission.
Figure 6. A central entryway and hallway provide a good circulation throughout the home. This service entry from the garage is convenient to the kitchen — a desirable feature for most households (Plan No. AX-3305-B). Used with permission from Homestyles.com.
array of new household appliances, and a variety of activities that take place in this room in addition to meal preparation (Building Research Council, 1993). There are four basic steps to planning an efficient kitchen:

1. Plan the kitchen location and arrangement so that it is a convenient work space and is easily accessible from the other zones in the home, as well as from the service entry.
2. Decide on a kitchen configuration, that will minimize traffic flow through the work area. There are four basic kitchen shapes. Figure 7 shows these four kitchen configurations (House Planning Handbook, 1988):
   A) U-shaped
   B) L-shaped
   C) Corridor or two-wall
   D) Broken U-shaped
3. Choose suitable space standards. Allow for adequate counter space and storage near major appliances and by the sink. Determine the unique needs of the individuals using the kitchen space and plan the work areas in the kitchen accordingly.

![Figure 7. The four basic kitchen configurations (House Planning Handbook, 1988). Used with permission.](image_url)
4. Plan for efficient operation. Locate the appliances, storage, and counters in the space allocated for the kitchen. Evaluate the configuration in terms of efficiency and ease of maintenance (Building Research Council, 1993). The efficiency of kitchen spaces is often evaluated by means of the work triangle, the circulation path that leads from the refrigerator to the sink and then to the range. Ideally, the work triangle perimeter should be no greater than 26 feet and no less than 12 feet (Cheever, 1996). A work triangle that is too large could indicate an inefficient workspace with too much space between the different work centers. A work triangle that is very small is an indication of inadequate counter and storage space.

Although the work triangle joins the three primary work centers in the kitchen — the food storage, food preparation and cooking/baking areas — two other centers have emerged in recent years that add to the overall efficiency of this work center. The mixing center is a length of countertop at least 36 inches in length that can be used for a variety of cooking/baking activities (Cheever, 1996). Ideally the mixing center should be located between the refrigerator and the sink, although it can be located anywhere in the kitchen that is convenient for the users. The planning center is a more recent addition to the kitchen work area. It includes a desk or writing surface where meals can be planned, bills paid, and correspondence written. Often, a computer and filing space is located in the planning center as well (House Planning Handbook, 1988).

The laundry area is the one part of the home that has probably seen the greatest number of changes since the turn of the century. What until recently has been delegated to a corner in the basement (if, indeed, the home actually had laundry equipment), is now a focal point in the work zone of the home. A good placement of the laundry equipment is near the kitchen without actually being in the food preparation area. This configuration allows for maximum work efficiency and the dovetailing of tasks without the risk of contaminating food preparation surfaces with the harmful chemicals associated with laundry detergents, bleaches, and fabric softeners. The laundry equipment could be placed in a small room between the service entry and the kitchen (a mud room as shown in Figure 6) or it could be located in a deep closet within the kitchen that is not too close to the actual food preparation area.

A recent trend in housing is to locate the laundry area near the bedrooms where clean clothes are stored and dirty clothing is most generally deposited after being worn, as shown in Figure 8. Having this work center in the private zone does pose some advantages and is suitable for some lifestyles. A laundry room near the bedrooms eliminates the need to carry baskets of clothing from the work zone to the private zone. Households that tend to do a load of laundry every day rather than just once or twice a week find this arrangement especially convenient. However, a disadvantage is the noise associated with the use of laundry equipment that could be considered disruptive in a private area. A good option would be to locate the laundry area between the kitchen and bedrooms, if possible, so that it borders both the work and private areas.

Wherever the laundry area is located in the home, the most important consideration is that it be convenient for the user during normal routines. Today, the laundry room is
not only the place where clothing is laundered, but might also serve a variety of other activities such as ironing or sewing (Kilmer & Kilmer, 1992).

**Storage.** Storage space is an integral part of today's housing and should be found in every room. As mentioned before, bedroom closets should be located near the bedroom entrance. Walk-in closets are popular features in modern floor plans; however, a large standard two-feet-deep wall closet can hold almost as many articles of clothing as a walk-in closet, and is considered a much more efficient use of space. Standard wall closets can also be situated to serve as buffers between the private zone and the other zones in the home. Notice how the closets have been arranged between the public and private zones in Figure 9. This arrangement could serve to filter noise away from and distractions that might come from the public and work areas of the home so that household members trying to sleep or study in the private zone will not be bothered.

Figure 8. A housing unit with the laundry located in the private zone of the home (Plan No. L-1772). Used with permission from Homestyle.com.
Figure 9. Here bedroom closets serve as buffers between the private and public zones of the home (Plan No. J-9320). Used with permission from Homestyle.com.
**Plumbing.** In a multi-level home plumbing should be concentrated by situting kitchens, laundry areas, and bathrooms next to each other or stacked on top of one another. In addition, these rooms need to be in close proximity to the water heater. Clustering the rooms that contain plumbing requires less piping and transport of water throughout the housing unit, thus reducing energy costs and overall building costs. The mobile home in Figure 10 shows concentrated plumbing, a common characteristic of modular housing.

**Privacy.** In spite of today’s more open floor plans, privacy is still a highly valued aspect of housing in this country. According to noted anthropologist Margaret Meade, privacy is the most variable of all human needs (Meade, 1979). In this country, our emphasis on the importance of the individual, as well as the need for autonomy, contributes to the desire for privacy. In addition, cultural mores still uphold the need for private spaces in the home to carry out certain activities. Almost all new construction includes a private bath for the household head(s). A private den or study is much more prevalent in today’s homes than in those built even twenty years ago. The great room concept where living, family, and dining room are combined into one space might have opened up the public areas of the home, but the private zone is still a desirable and important design element. The private zone needs to be secluded and not in direct sight of the public area. Guests in the home should not be able to readily enter the private zone or even look in to it. Often, the private zone includes a hallway that leads to each household member’s bedroom and to the bathrooms. The entrance to a private bathroom or bedroom should not be situated at the end of that hallway, as seen in Figure 11. Because the hall is like a vista, the eye is automatically drawn to the end, and anyone visiting the home will quite likely gaze down to the end of the hallway. Therefore, it is a good idea to locate doors to private rooms off the sides of the halls so guests do not have a clear view of the interiors of those rooms.

A checklist, as shown in Figure 12, can be used in the evaluation of floor plans. As mentioned before, most floor plans do not meet all the criteria discussed in this paper.

![Diagram of a mobile home with concentrated plumbing configuration](image)

**Figure 10.** A mobile home with concentrated plumbing configuration. Used with permission from Holly Park Homes, Inc.
However, a floor plan that includes most of these characteristics and accommodates the individual needs of the household should prove to be a functional plan that will provide a desirable living environment for the residents of the housing unit.

**Space Planning Concepts for Universal Design**

All human beings have physical and mental differences. A good design of space can create an environment that is accessible by all, no matter their ability level. Creating a home to be functional and beautiful for diverse populations is called universal design. Cynthia Leibrock (1993) uses this simple definition to describe universal design: “helpful to most people” (p. xvi). However, she does point out that creating a usable design for many can create design conflicts. What may be a good design solution for an individual with a mobility disability may be a hindrance for someone with limited vision. Therefore, it should not be assumed that if a space is wheelchair accessible, it meets the criteria for universal design. All of the occupants and their mental and physical differences need to be taken into consideration (Leibrock, 1993).

Figure 11. The bathroom in this home is in full view from the public zone (Plan No. FB-5575-MERI). Used with permission by Homestyles.com.
### Floor Plan Evaluation Checklist

<table>
<thead>
<tr>
<th>Category</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Zoning</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All zones present</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zones are split without reason</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can move between zones without crossing a third zone</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Circulation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position of front entry centralized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short circulation paths</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dining room convenient to kitchen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kitchen near garage or service entry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No room serving as a hallway</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Organization of Space</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front entryway set off from living area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entry closet present</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concentrated plumbing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimal hallway space</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laundry positioned conveniently</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closets positioned near bedroom doors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage space in each room</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kitchen work triangle undisturbed by traffic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All kitchen work centers present</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Room sizes adequate for activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Privacy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bath or bedroom not visible from public areas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of buffers in bedrooms</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How well does this plan fit the household for which it was designed?
1. Poor
2. Acceptable
3. Fair
4. Good
5. Excellent

**Total Score**  
(1 point for each yes plus the number of the overall ranking)  

---

Figure 12. Checklist for the evaluation of floor plans.
Universal design in space planning can be beneficial not only to those with limited abilities, but to other individuals as well. Children and elderly generally find a well-designed space that applies universal design techniques much more friendly and easier to function in than one that is not universally designed. Even individuals who are considered fully functional with no physical limitations enjoy the accessibility provided by universal design in space planning.

Some universal design considerations for space planners designing homes for individuals with various levels of ability follow. Keep in mind that even though these guidelines are meant to make spaces more accessible for people with physical limitations, they are good design practices that could be helpful for many people.

**Wheelchair Access**

Appropriate space planning is critical for an individual who uses a wheelchair. Access to a door, through a door, and closing a door all require specific placement and dimensions. Once the individual is through the door, he must be able to use the fixtures and equipment within the space just entered. This design concept is particularly important in bathrooms and kitchens. Raschko (1982) has developed specific information on space planning for the disabled, with a list of necessary dimensions and usable equipment for individuals with mobility difficulties. She does, however, recognize the need for sight observation rather than relying solely on minimum dimensions. The designer who becomes involved with designing for people of varying physical abilities must use careful observation of the user in task performance (Raschko, 1982).

**Hearing**

For individuals with moderate to severe hearing loss background noise is a hindrance to their ability to listen and accurately hear (Leibrock, 1993). Room configuration, arrangement, zoning, and soundproofing are important criteria to consider when evaluating or designing a floor plan for an occupant with a hearing disability. Vaulted ceilings should be avoided because sound reverberates in numerous directions in an environment with very high ceilings. Open floor plans which are very functional for those with visual and mobility disabilities, are a barrier for someone who has difficulty hearing over the background noise from another space. Individual, enclosed rooms are better for these individuals, particularly if sound-proofing techniques are used in the construction of interior walls and in the selections of interior finishes (Ballast, 1994).

**Vision**

For an occupant who has limited vision or is legally blind, space planning is crucial in helping him maneuver easily through the home. Open floor plans with limited hallways are best. Elevated protruding objects should be avoided because any object that is mounted over 2'-3' above a finished floor cannot be detected with a cane (Leibrock, 1993). Use one or two levels in the planning of spaces for the visually impaired, and
staircases that are straight and easily negotiated. Design built-in shelving rather than protruding shelves and avoid raised hearths or protruding hooks and towel bars.

**Aging in Place**

By the year 2030, approximately 25% of the overall population will be 65 years of age or older (Noel, 1994). Research has shown that most elders want to remain in their own home, aging in place, or near a family member (American Association of Retired Persons, 1987; Borsch-Supan, 1990; Gunn, 1988). Adult children may be required to help care for an aging parent. If so, the single family home could be expanded to house not only the immediate family, but an older parent as well (Lind, 1993). This type of accommodation can take one of several forms:

1. The accessory unit is a separate living area within the existing home for the elderly parent. It is like an apartment within a single family home. The living space could include a sleeping area, bathroom, and kitchenette. Although accessory apartments are becoming more common in this country, local zoning codes prohibit them in many neighborhoods.

2. Elder cottages and granny flats provide the same type of spaces, but they are typically larger and include a living area as well and are either an addition built onto an existing house or a separate unit constructed on the same lot of land. Although these units are not prevalent in the United States, they can be found in several European countries, as well as Australia. Typically, these are modular units that are placed nearby in a back or side yard, and then can be sold and moved when the unit is no longer needed.

3. A separate bedroom and bathroom away from the rest of the private area of the home is another alternative for a three-generation household.

Whatever form the housing designed for the elderly takes, the purpose is to ease anxiety without compromising privacy and independence.

**Learning Activities**

**Case Studies**

1. Below are four case studies that describe households with specific space planning needs. Choose one and then do one of the following:
   A. Design a suitable home to accommodate the household.
   B. Visit real estate open houses in the community and find a housing unit that would provide a suitable living environment for one of these households.
   C. Consider a housing unit that you are familiar with (your own home or student apartment). How could this unit be modified to accommodate the household you have chosen?

   **Chuck and Lisa.** Chuck and Lisa were high school sweethearts. Chuck was enrolled in the vocational training program in school and Lisa trained as a beautician. Both dreamed of owning their own business some day. Chuck’s
father owned his own carpenter shop, and Chuck thought it would be ideal to be his own boss like his Dad. Lisa agreed.

After graduation, Chuck got a job at a local car dealership as a mechanic for a salary of $22,000 a year. Lisa works as a stylist at a small beauty salon and earns about $900 each month.

Chuck enjoys working on cars and owns a 1993 Cutlass Supreme that is in excellent condition. Lisa enjoys sewing and needlework.

Six months after graduation, Chuck and Lisa became engaged. A year later they were married. Both had lived with their parents until their wedding day, and worked hard to save as much money as possible. Their savings, along with wedding gifts of money they received, totaled $12,000.

What would be an appropriate housing alternative for this couple?

**Ted and Kathy.** Ted and Kathy Chambers are in their late forties, and have just seen their third child leave for college. Their oldest daughter, now 22, lives on the West Coast, is married, and works for a computer company. Their middle child, a daughter, is a junior at a nearby university and will graduate in a year, and their son has just enrolled at the local community college.

Ted has worked for 27 years at a large insurance company in their actuarial department. Kathy went back to college after all her children were in school and earned a degree in interior design. She now works as a free-lance interior designer. She has a complete design studio in her basement. Their combined income is $65,000; however, they give $5,000 to their son each year for college expenses.

Ted and Kathy were fortunate to be able to buy a lovely 3-bedroom split-level home 25 years ago. Their current home is valued at $100,000 and is completely paid for. Now that all the children are gone (even their son lives in an apartment), they are considering a change. Ted will probably retire within 15 years, and then they hope to do a great deal of traveling. In the meantime, they are not sure they want a smaller house, but they do want a home where they can feel comfortable as they grow older. They still want some room for their children when they come home to visit, and Kathy needs her studio, but they would like to devote more housing space to themselves, including a master suite with a private bath. They would also like some outdoor space where they can entertain and enjoy the good weather during the summer. Although Ted is also interested in maintaining a small flower garden, he does not want a large yard that would require a great deal of care.

The Chambers own two cars, which are both paid for and in good condition. They need garage space for both vehicles.

What is a suitable housing alternative for this household?

**The West-Slater Family.** When Elaine West married Al Slater, it was not just a union of two people. Elaine had been widowed for three years with two
children, a boy age 10 and a girl age 8. Al is divorced and has joint custody of his two daughters, ages 14 and 12, who come to live with the family every other week, and for a month in the summer. Their current problem is finding suitable housing for their blended family of six.

Al has a management position at a local appliance manufacturing company and makes approximately $48,000 a year. Elaine is an instructor at the local university and earns approximately $32,000 a year. She is on a 9-month appointment and has the summers off to spend at home with her family.

Currently, the entire family lives in Elaine’s 3-bedroom ranch home. It accommodates the family very well except on the weeks when Al’s girls reside there. In addition, Al would like to have a more prestigious home since he holds a relatively high position at his business. He has a model railroad set in storage that he would like to set up in a basement workroom. Also, Elaine loves to garden during the summer and would like more outdoor space.

After Al and Elaine married, Al sold his two-bedroom condominium for $55,000. Elaine has put her house on the market and hopes to get at least $95,000 for it.

This family is anxious to find suitable housing. What housing alternative do you think would be appropriate for them?

Richard and Alice. Richard and Alice Swenson have been married for 55 years, most of which they have spent in a lovely three-bedroom ranch home. Richard, a retired professor, is 78 years old and in excellent health. He has been retired from his professional position for more than 10 years; however, he is still active in a number of civic and church volunteer activities. Alice, age 73, a traditional homemaker, cared for the Swenson’s three children, who are now scattered across the country with families of their own. She, too, is in good health and keeps busy taking care of the house, writing letters to her grandchildren, and reading.

The Swenson’s house is paid for, and both Richard and Alice take great pride in it. However, they find it increasingly challenging to care for because neither have the energy they need to keep it in good condition. Consequently, they have decided to put it on the market with an asking price of $95,000.

Because of their advancing years and reduced energy level, neither Richard or Alice want to have a house that will require a great deal of care or maintenance. They want a home that is ready to move into. They know it should be accessible in the event either of them become disabled. They need a smaller, comfortable home where they can spend their remaining years. Additionally, they desire a garage for their large late-model vehicle.

Because they have no family nearby, Alice thought it desirable to live in a close-knit neighborhood with people nearby to help in a time of crisis. Richard agreed that a neighborhood support base is needed in times of emergency, or should one spouse die or become hospitalized.
Richard’s pension, along with their savings and investments, have left the Swensons quite secure financially. Their collateral, along with the sale of their home, should open up a number of housing opportunities for them.

What is a suitable type of housing for this household?

2. Your instructor will give you a basic floor plan with only exterior walls. Design the interior of the home, using the rules of good floor planning found in this paper.

3. Using the Evaluation checklist found in this article, evaluate several floor plans that will be provided by your instructor. Given your evaluations, which do you think is the best plan?

4. Evaluate your own home in terms of zoning, circulation, organization of space, and privacy. Again, use the checklist found in this article. What might be done to improve the space plan of your own housing?

5. Using your own home or a home you are very familiar with, redesign the space to accommodate an elderly person who would like to “age in place”. Or create an accessory apartment in the housing unit for an elderly parent or grandparent.

6. Students should be divided into groups of four or five. Each group will be assigned to experience a particular disability. Students will present their discoveries to the rest of the class via media such as slides, videotape, or audio recordings. For example, students could spend a day in a wheelchair and try to maneuver in their dorm or any college buildings. Slides could be taken of the barriers they encountered. Students could spend a day wearing non-prescription glasses with petroleum jelly smeared on the lenses to simulate the problems people with visual impairments encounter in their home and in public buildings. These activities could be videotaped.

7. Each student could be assigned to work with an elder, showing how their existing furniture could be arranged in a smaller apartment or in a congregate home in an assisted-living arrangement.

**Computer Applications in Space Planning**

Consumer-oriented computer software to design floor plans is available at very reasonable prices at most software stores. Some programs are limited to kitchen and bathroom design, while others cover techniques for multi-floor structures. Many of the programs include furniture selection and color options. Some also contain options for construction cost estimates. These inexpensive programs are easy to use and have techniques that are similar to professional CAD programs. Skills learned through consumer software programs provide good background for careers in the area of space planning.

The following is a computer assignment related to space planning.

**Designing an Affordable Home.** You may use any graphic program you wish, to do this assignment. In designing the home you must meet the following requirements:

1. Home must be only one story.

2. Home must be no larger than 1,200 square feet.
3. Include at least 3 bedrooms, one bath, a kitchen, and a living room.
4. The only furniture to be included are beds in the bedrooms, a sofa in the living room, and a table for eating in the kitchen.
5. The kitchen should include a sink, stove, and refrigerator.
6. The bath should include a sink, toilet and tub with shower.

The report format:
Page 1. Copy of floor plan with rooms labeled, circulation patterns drawn, buffers identified, and zones shaded.
Page 2. Second copy of the floor plan with external dimensions printed, kitchen triangle drawn with dimensions, and square footage calculated.
Page 3. Typed report with the following paragraphs numbered:
   A. Discuss affordable features in the plan.
   B. Evaluate zones, circulation patterns, and buffers.
   C. Identify kitchen type and evaluate kitchen triangle.
   D. Your rating of the assignment on a scale of 1 to 5 (1 is poor and 5 is excellent) and an explanation for your rating.
Page 4. One 3-D elevation of the home.

**Glossary**

**Activity systems:** The interrelationship of various activities of the occupants of a housing unit (Rapoport, 1987).

**Buffers:** Spaces such as closets and bathrooms situated in the floor plan in such a way that they buffer the private zone from the public zone.

**Circulation pattern:** The path an individual takes to move from one room to another in a home.

**Concentrated plumbing:** Locating rooms with plumbing fixtures (kitchen, bathroom and laundry) in close proximity in a floor plan.

**Environmental quality profile:** Information about a client’s activities, habits, and preferences that can be used to design an appropriate floor plan for that client.

**Floor plan:** The arrangement of rooms in a dwelling unit.

**Orientation:** The position of a housing unit on a lot.

**Service entry:** An entry to the housing unit used primarily by family members. It is often located coming from an attached garage, or on the side of the house closest to a detached garage.

**Work triangle:** The circulation path that leads from the refrigerator to the sink and then to the range in the kitchen.

**Zoning:** Dividing the floor plan into three areas or zones: public, work, and private.
References


Resources

Videos
Toward Universal Design (video) Universal Design Initiative; available only through the Center for Universal Design, North Carolina State University, Box 8613, Raleigh, NC, 27695; (919)/515-3082.

This video clarifies what the term “universal design” really means: design that considers people of all ages and abilities. It features interviews with design critics, educators, professionals, and students as they discuss the issues driving universal design. The video comes with additional free information on publications, organizations, and upcoming events involving universal design.


This video looks at floor planning from an energy efficiency perspective. It covers landscaping and orientation, windows, insulation, and heating systems as well as home design.


This video shows a kitchen that has been designed so that people of varying abilities can easily use it. It also has an interview with the designer of the kitchen who discusses the importance of universal design in work spaces. A short book with color illustrations of the universal design kitchen accompanies the video.

Books

This handy soft cover book is a wonderful reference for students of space planning. It includes information on all the topics covered in this module, and gives the recommended dimensions for various components (doors, countertops, etc.) within the home. There are chapters on kitchen planning, home office design, and designing for a person who uses a wheelchair. This resource is currently being updated.


Housing and Society 93