Chapter 4 Data Analysis and Design Program

This chapter includes three sections. The first section analyzed the data from the responses of the questionnaire. The second section analyzed the data from the behavior mapping. The third section discusses the design program for the ACITC Educational Technology office area based on the data collected from the questionnaire and behavior mapping.

Summary of Questionnaire Survey

A total of 10 of the 12 questionnaires distributed were returned. The demographic information collected by part three of the questionnaire indicated that the responses included two directors, three programmers, two faculty developers, two graduate assistants, and one secretary. The responses about the nature of work indicated that 80% of the respontants' tasks required them to work at their own workstations more than four hours a day with a high degree of concentration. The same high percentage (80%) of respontants noted that their work required interaction and/or cooperation with others. The nature of work could vary greatly depending on specific projects, especially as to graduate assistants. Director's work featured many meetings. One director said he spent three-to-five hours per day in meetings.

In part one of the questionnaire, the importance of six work space characteristics were evaluated by the employees. The importance degree was scaled using a Likert scale. The means of the responses (see table 2) indicated that the privacy in work space was of high importance. Also, it was highly desired that the privacy of the space might be controlled as needed and the space might be personalized.

TABLE 2. Mean Score of Importance of Work Space Characteristics

Work Space Characteristics	Mean
The space is quiet enough.	2.6
The space can be closed by a door.	2.6
The privacy of the space can be controlled as needed.	2.6
The space permits appropriate visual contacts with co-workers (ex. using half-high partitions).	0.8
The space is conducive to interactions among co-workers (ex. having a shared work surface)	1.6
The space can be personalized.	2.3

Note. The importance degree was scaled as 3 = very high importance, 2 = high importance, 1 = low importance, and 0 = none importance.

The responses to the question about space preferences for different activities confirmed the importance of privacy with 80% choosing private office for individual work. Other results of the question indicated that meeting rooms were desirable for both large and small formal meetings. Partitioned spaces were good for small informal meetings, but for large informal group work, a large meeting room was preferred.

Finally, four workplace spaces were evaluated in terms of overall image preferences. The preference degree was scaled using a Likert scale. The means in Table 3 indicated that the image 4 (see Appendix B) with lots of wood furnishings and finishing was preferred than the others. Compared with the other three images, it looked traditional, although it was actually a contemporary style. It was comfortably arranged with a sofa group aside work stations, but the overall atmosphere was still very formal and professional.

TABLE 3. Mean Score of Preference of Workplace Space Images

Image No.	Mean
1	0.1
2	-0.6
3	0.3
4	0.6

Note. The preference degree was scaled as 2 = like very much, 1 = like, 0 = neutral, -1 = dislike.

Part two of the questionnaire revealed the information in terms of the work pattern of the present Educational Technology Center, especially the information about how, where, and with whom the employees interacted and cooperated during their work process. In response to the question about how often in a week they attended scheduled meetings or unscheduled group work with different types of people respectively, the data (see table 4) collected indicated several interesting findings. First, 60% of the employees reported that they had scheduled meetings with directors and programmers 1 to 3 times a week and 20% employees reported 4 to 6 times a week. It was similar as to faculty developers with a little lower percentage (see table 4). However, the secretary was rarely reported to be in scheduled meetings. Second, the responses as to the graduate assistants varied greatly. 20% of the responses said they had scheduled meetings with graduate assistants above 6 times a week, another 20% said 4 to 6 times a week, another 20% said 1 to 3 times a week, but 40% responded no occurrence. Third, in terms of unscheduled group work, faculty developers and graduate assistants were most frequently involved. It was similar to the programmers (see table 4). Comparatively, the directors and the secretary were in unscheduled group work less. However, the two directors and the secretary had many unscheduled interactions with each other.

TABLE 4. Percentage of Attendance for Scheduled Meetings and Unscheduled Group Work with Different Types of People and of Different Frequencies.

Types of People	Scheduled Meetings (times/week)				Unscheduled Group Work (hours/week)			
	0	1 ~ 3	4 ~ 6	>6	0	1 ~ 8	9 ~ 16	>16
Director	20%	60%	20%	0%	20%	50%	20%	10%
Programmer	20%	60%	20%	0%	0%	90%	10%	0%
Faculty Developer	30%	50%	20%	0%	0%	70%	30%	0%
Graduate Assistant	40%	20%	20%	20%	0%	70%	30%	0%
Secretary	70%	20%	10%	0%	20%	40%	10%	10%

Note. n=10.

Questions about the frequency of attending scheduled meetings or unscheduled group work with different size of groups were also asked. The data collected from these questions indicated that meetings or group work were most frequently held among less than three people. Comparatively, meetings or group work with three to five people were slightly less frequent, and meetings or group work with more than five people were not frequent. Large meetings with more than 10 people were mostly held outside the present Educational Technology Center. Part of the reason for this arrangement was the lack of space for meetings with more than 10 people in the present Education Technology Center.

The spaces in the present Educational Technology Center (see Appendix C) were evaluated by the employees as to how frequently the informal interactions might occur in each of the spaces. The frequency was scaled using a Likert scale. The results in Table 5 indicated that the reception area and the graduate assistant's workstation were most frequently used for informal interactions with a mean frequency of informal interactions above 2. The faculty office, programmer's workstation, the hallway for copy and storage and the kitchen area were also frequently used with a mean frequency of informal interactions near 2. According to some employees, the availability of space was very

important for informal interactions. They said the spaces such as the special project space, the hallway with bulletin board and the sales machine area were too small to stand. A lunch room or a coffee room was highly recommended for informal interactions. Also, sofa groups or informal seating were suggested to be placed in small areas out of traffic for sitting and talking comfortably. The existence of these breakout areas should not disturb others' working, and they should still look professional, not like at home.

TABLE 5. Mean Frequency of Informal Interactions in Different Spaces

Spaces	Mean Frequency
Director's Office	1.4
Faculty Developer's Office	1.9
Programmer's Workstation	1.8
Graduate Assistant's Workstation	2.1
Special Project Space	1.2
Reception Area	2.3
Hallway with Bulletin Board	0.8
Hallway for Copy and Storage	1.8
Sales Machine Area	0.7
Kitchen Area	1.8

Note. The frequency of informal interactions was scaled as 3 = very high, 2 = high, 1 = low, and 0 = none.

The questionnaire survey helped to identify many important features which structured the basic requirements for the space design of the ACITC Educational Technology office area. These features can be summarized as follows:
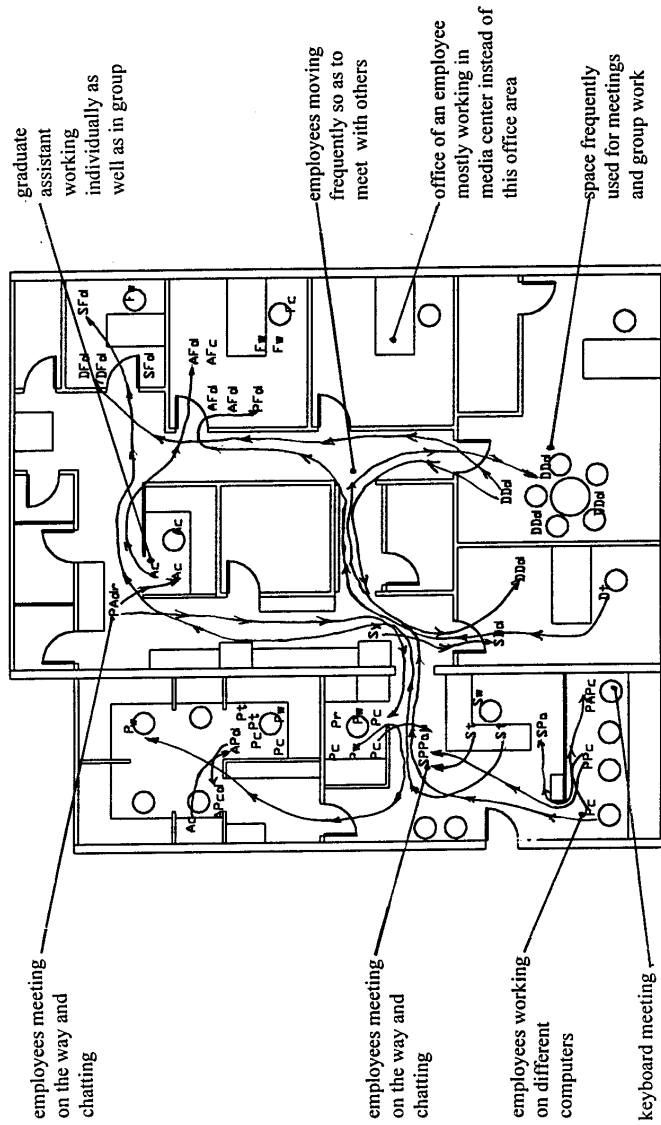
1. The nature of the work required high concentration. Thus, privacy was of very high importance. However, the nature of the work also required many interactions and

cooperation. Thus, it was desirable that the work space privacy level be adjustable as needed.

2. The nature of the work varied depending on specific projects, especially to graduate assistants. Some graduate assistants mostly worked individually, and others had many interactions or cooperation with other employees.

3. Directors, programmers, and faculty developers more frequently attended scheduled meetings than other employees. Graduate assistants, faculty developers, and programmers were more frequently involved in unscheduled group work than others. The two directors often worked together, attended more meetings than others, and they often need the assistance from the secretary.

4. Most frequent meetings or group work were held among less than three people. Also, there were many meetings or group work among three to five people. However, meetings or group work with five to ten people were much less, and meetings with more than 10 people were held outside partially because of lack of space.

5. Small flexible seating areas out of the traffic area would be good spaces for informal interactions. A lunch room or a coffee room was also highly recommended by employees.

6. It was preferred that the overall image of the work space would be professional with traditional emphasis.

Summary of Behavioral Mapping

The data collected from behavioral mapping confirmed some information obtained from the questionnaire survey. As shown on the composite maps (see figure 6 & 7), the employees often worked individually, and many small group activities among two to three people went on. The nature of the work of the Educational Technology employees required both concentration and interactions. Graduate assistants, faculty developers, and programmers involved in many unscheduled group activities. The two directors often worked together, and had more meetings than others. Some information from the behavioral mapping helped to understand certain survey results. For example, the survey

graduate
assistant
working
individually as
well as in group

employees moving
frequently so as to
meet with others

office of an employee
mostly working in
media center instead of
this office area

space frequently
used for meetings
and group work

employees meeting
on the way and
chatting

employees meeting
on the way and
chatting

employees working
on different
computers

keyboard meeting

Key	Activity		Key	Activity		Key	Users
t ---	talking on phone		y ---	copying		D ---	Director
a ---	chatting		e ---	eating		P ---	Programmer
d ---	discussing		r ---	drinking		F ---	Faculty Developer
c ---	computer operating		m---	meeting		A ---	Graduate Assistant
w ---	writing/reading		f ---	faxing		S ---	Secretary
						T ---	Other

Figure 6. Composite Behavioral Map (9 a.m.~11 a.m.)

office of an employee mostly working in media center instead of this office area

employees moving frequently so as to meet with others

space frequently used for meetings and group work

computer shared

programmer spending a lot of time on telephone consulting

employees meeting on the way and chatting

keyboard meeting

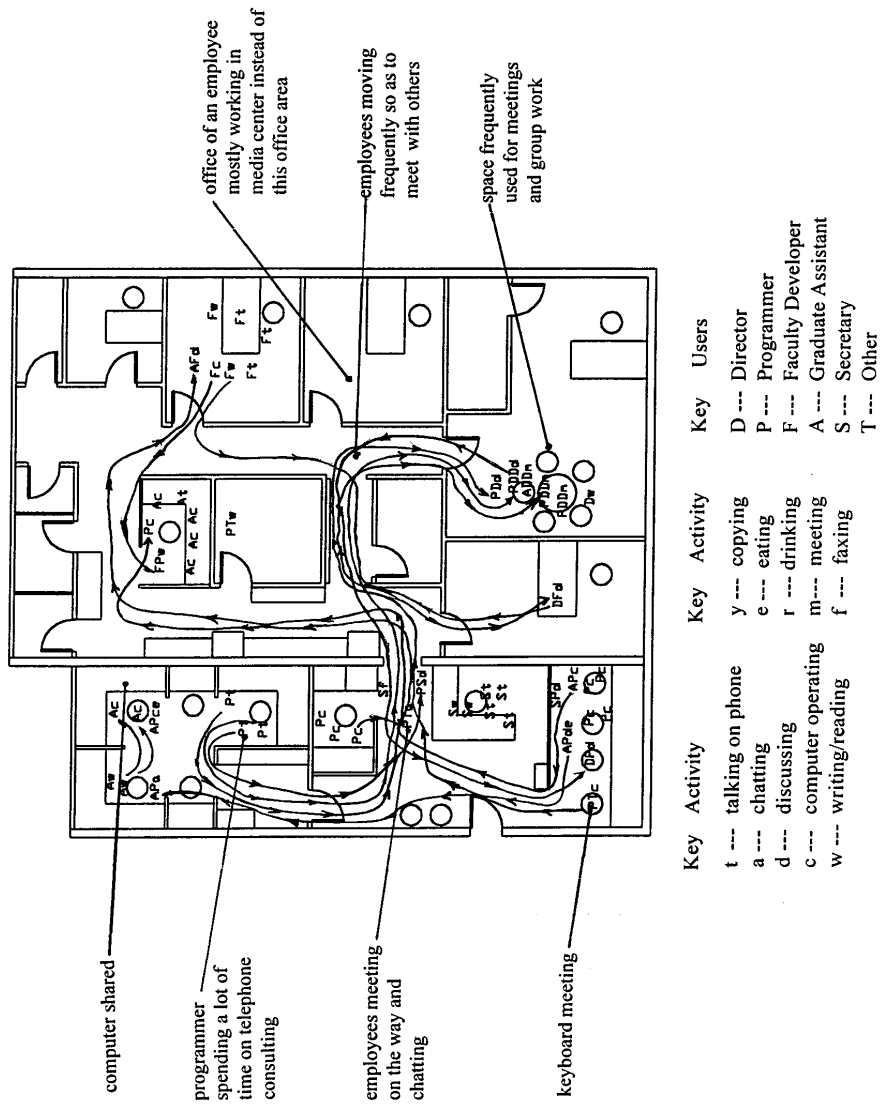| Key	Activity	Key	Activity	Key	Users
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d ---	discussing	r ---	drinking	F ---	Faculty Developer
c ---	computer operating	m ---	meeting	A ---	Graduate Assistant
w ---	writing/reading	f ---	faxing	S ---	Secretary
				T ---	Other

Figure 7. Composite Behavioral Map (2 p.m.~4 p.m.)

results indicated that various work patterns existed in the office area, especially to graduate assistants. The observation confirmed this by finding that some graduate students always worked on their computers by themselves, while some often worked in groups or attended meetings (see figure 6 & 7).

There were also many findings from the behavioral mapping which were not obtained by the questionnaire survey. These findings can be summarized as follows (see figure 6 & 7) :

1. Because the Educational Technology employees need to help to solve any problems from faculties in using different programs with different machines, faculty developers, graduate assistants and programmers were observed to work on two to three different computers. Some computers were shared due to their specific functions.

2. Many group activities occurred in front of computers. In the words of a programmer, they were "keyboard meetings." According to observation, these keyboard meetings were mostly held among two to three people.

3. It was observed that one faculty developer mostly worked outside the office area, and his private office was mostly left empty. In this crowded office area, hoteling might be a good idea for him.

4. In the observation, the employees moved around in the office area frequently to meet their colleagues. Nobody bothered to open and close doors frequently. The doors of the private offices were mostly left open, and functioned as a symbol of privacy instead of a door.

5. One programmer spent a lot of time on telephone consulting. He might need more privacy than others.

6. Sometimes, the employees that ran into each other in the hallway were observed discussing work or chatting for a few minutes. No space was available for this kind of informal interactions in this office area. The only space usable for this type of conversation was the hallway.

7. Many group activities and meetings occurred at the round table in the director's office. This area was the only space capable of having five people together.

In brief, the present work space was not tailored to the amount of computer usage described above. It was cluttered with computers everywhere, because the work spaces were designed for one person with one computer and there was no consideration for keyboard meetings. There was no group work space other than the round table for five in the director's office which could only be used when the director was involved.

Design Program

Functional relationship. Many of the findings in the questionnaire survey and the behavioral mapping can be synthesized into matrixes so as to further identify, define, and measure the relationships among individual items of information. The matrix of the activities in the work process versus the employees' positions (see figure 8) was developed. It illustrated an overall picture of how the present Educational Technology employees were working. Directors, programmers, and faculty developers attended scheduled meetings more frequently. Especially, directors had more meetings than any others. Programmers, faculty developers, and graduate assistants had unscheduled group work more frequently. The matrix of informal interaction (see figure 9) was also developed. It illustrated an overall picture of the informal interactions among the present Educational Technology employees during their work process. Programmers and faculty developers worked with graduate assistants in groups very frequently. Directors frequently need the assistance from the secretary. Also, there were many informal interactions that occurred between the directors, between the programmers, and between the graduate assistants themselves.

	Activities		
	Scheduled Meetings	Unscheduled Group work	Individual Work
Positions Director	●	◉	○
Programmer	●	●	●
Faculty Developer	●	●	◉
Graduate Assistant	◉	●	◉
Secretary	○	◉	◉

Decision Key

Very high frequency ●

High frequency ◉

Low frequency ○

Figure 8. Matrix of Activity Versus Position

	Positions			
	Director	Programmer	Faculty Developer	Graduate Assistant
Positions Director	●			
Programmer	○	●		
Faculty Developer	◉	◉	◉	
Graduate Assistant	◉	●	●	●
Secretary	●	○	◉	◉

Decision Key

Very high frequency ●

High frequency ◉

Low frequency ○

Note: There were 2 directors, 3 faculty developers, 3 programmers, 3 graduate assistants, and 1 secretary.

Figure 9. Matrix of Informal Interaction

The present position categories, director, programmer, faculty developer, graduate assistant, and secretary, in the present Educational Technology Center will be maintained in the ACITC Educational Technology office area. The matrixes discussed above synthesized the basic functional relationship among the employees of different types of positions and their activities during their work process. These matrixes laid a foundation for projecting the adjacency relationship in the ACITC Educational Technology office area.

Space standard. Architects working on the ACITC building have proposed a space standard according to the estimated future needs of the Educational Technology office area. Because many factors of the Educational Technology office area in the ACITC building depend on the future plan of Virginia Tech and the funds available, there are still many uncertainties about this project. Thus, this study had to make use of the space standard developed by the architects (see table 6) as a starting point. Since this space standard still meets most of the basic requirements, the square footage and the number of each kind of space were followed with some revisions. Those revisions were made during the design development based on the information evaluated from the questionnaire survey and the behavioral mapping, the workplace neighborhood design concept, and the new workplace pattern discussed in the literature review. For example, many offices in the present space standard became partitioned workstations in the new design, the two breakout spaces were broken into three smaller ones, a coffee lounge was added aside the lunch room.

TABLE 6. ACITC Educational Technology Office Area Space Standard Developed by Architects

Item	Space	Area (sq.ft.)	Quantity	Total (sq.ft.)
1	Reception	431	1	431
2	Conference room	212	2	424
3	Technical support office	94	1	94
4	Severs/network closet	75	1	75
5	Graduate assistants' room (3 stations per room)	251	2	502
6	Computer lab (for shared computers)	251	1	251
7	Visiting faculty's office	94	4	376
8	workspace (for copy/storage)	155	1	155
9	Programmer/faculty developer office	115	8	920
10	Director office	175	2	350
11	Lunch room	115	1	115
12	Breakout space	161	2	322
13	Large meeting room/small classroom	435	1	435
14	Traffic space	670	N/A	670
Total square footage of the ACITC Educational Technology office area				5120

Note. The information in this table was obtained from the floor plan prepared by Esocoff & Associates and provided by the Educational Technology Center, Virginia Tech.