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ABSTRACT

Space utilization analysis is required as building programs are slowing in community colleges. State planning procedures fail to provide adequate information, since they tell little about the actual use of space. The formula derived by Bareither and Schillinger can evolve a space factor, using square feet per student station, hours per week the room is scheduled, and the percent of time each station is scheduled to calculate square feet per weekly student hours. In most community colleges, the number of students in each class, the size of rooms, and the number of stations in each room can be easily obtained and used to calculate the average station utilization rate and the room utilization by the following formulas: (1) Room Use = actual hours divided by possible hours x 100; (2) Station Use = actual stations occupied divided by possible stations occupied x 100; and (3) Possible Stations = weekly hours x number of stations. This methodology can be used to justify new space in spite of declining enrollments and to reallocate space for better utilization of present facilities. (Author/RT)

Critical Uses of College Resources: Part II Utilization of Space Facilities

By

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CRITICAL USE OF COLLEGE RESOURCES: FACILITIES

by Edith H. Carter

For most community colleges, there are two major budget areas: cost for salaries and cost for facilities. When colleges project enrollments upward, a question that must be answered is: Does the institution have facilities to provide for these increases? When the budget is prepared, especially for capital outlay, the question becomes: Can additional space be justified? Now, faced with the possibility of declining enrollments a more logical question may be: What can be done with the space?

Institutions need to engage in space utilization planning in order to more efficiently allocate space for its various programs while at the same time keeping the faculty happy by allowing adequate office space and convenient classrooms. Utilization of space is necessary for students in order that they may obtain necessary classes to fit their time schedules.

Most of the work on space analysis and utilization has previously been done by senior colleges and universities. We in community colleges are now beginning to find that building programs are slowing down and that in many institutions the need for space is equivalent to or exceeding the available resources. One barely begins work on analysis and utilization of space before finding that even a simple analysis requires a great amount of time and effort. The thesis of my study is that the elaborate space planning procedures outlined in most of the state planning guides provide virtually no information to the space users within the institution. The resources at the state level become space per person. per student. per faculty member. per program. per institution. Most of these formulas are enrollment driven and tell you little about the actual utilization of space.

The pioneers in the field of space analysis procedures were John Dale Russell and James Doi who codified their procedures in 1957. Bareither and Schillinger

developed a "number method" of analysis in 1968. Their assumptions outline several easy methods of calculating space needs such as determining an index for the number of square feet per weekly student hours.

TABLE I.

SQUARE FEET PER WEEKLY STUDENT HOURS (WSH)

Square feet per student station	15
Hours per week room scheduled	30
Percent of time each station scheduled	.60
Factor = 15 ÷ (30 x .60) = .833	

This factor represents the amount of space needed for weekly student hour. This formula is fairly flexible and can be used to come up with a space factor using many combinations of the above figures. Table II. is an example of various combinations involving different size institutions awarding the Associate Degree. Most state agencies use a modification of this formula derived by Bareither and Schillinger.

Methodology for Space Planning:

In most community colleges, the number of students in each class, the size of the rooms and the number of stations in each room are data which can be obtained fairly easy. When all the data for each room is collected, a matrix such as the one illustrated here can be used to calculate the average station utilization rate and the room utilization. These two resources can than be used to justify additional space. The following report illustrates one method of collecting room and station use data.

TABLE II.

CLASSROOM SPACE FACTORS DERIVED FROM ATTAINABLE STANDARDS FOR ASSOCIATE DEGREE INSTITUTIONS

Standards	Size of Institution			
	0 - 999	1000 - 2499	2500 - 5000	Over 5000
Hours per Week for Classroom	30	31	32	33
Percentages of Student Stations Scheduled	57.50	60.00	62.50	65.50
Square Feet per Student Station	17.00	16.50	16.00	15.50
Space Factor	0.99	0.89	0.80	0.72

Space Factor = Square Feet/SS ÷ (Hours/Week x %SS Scheduled)

Square Feet Needed = Space Factor x Weekly Student Hours

ROOM USE REPORT

Quarter _____ Present Stations _____

Building _____ Assigned Sq. Ft. _____

Room No. _____ Type of Seating _____

Room Classification _____

Time		Days of Week					
Begin	End	Monday	Tuesday	Wednesday	Thursday	Friday	Total
8:00	8:50						
9:00	9:50						
10:00	10:50						
11:00	11:50						
12:00	12:50						
13:00	13:50						
14:00	14:50						
15:00	15:00						
16:00	16:50						
Total							

A typical schedule for a classroom in a community college is illustrated in Table III. Notice that each period has two figures. The first figure is the class period size and the second figure is the number of student stations occupied, that is the size of the class. Certain assumptions used in space analysis need to be clarified at this point. Generally speaking, all three-hour lecture classes meet for 150 minutes each week. If they meet on Monday, Wednesday, and Friday, the period is 50 minutes long or if they meet on Tuesday and Thursday, the period will be 75 minutes long. The assumption then is that the period between 8:00 and 9:00 is really a 50 minute period and the figure for calculations is 1. However, if a 75 minute period begins at 8:00 and continues to 9:15, then the whole 60 minutes is thought of as 50 minutes plus 10 minutes or 1.2 periods. The 15 minutes in the next time zone is counted as .3 periods and so on. If the next class starts at 9:30 and continues on until 10:45, then .6 periods will be consumed in the time zone 9:00 to 10:00 and .9 periods in the time zone 10:00 to 11:00. Since the number of stations occupied is a factor of the number of periods, the class size must be multiplied by the period size in order to obtain the number of stations occupied. Thus in Table III. the class from 12:00 to 13:15 contains 39 students. The number of stations occupied from 12:00 to 13:15 is 1.2 x 39 = 46.8. The number of stations occupied from 13:00 to 13:15 is .3 x 39 = 11.7. The following class with 40 students meets from 13:30 to 14:45. The number of stations occupied from 13:30 to 14:00 is .6 x 40 = 24 and from 14:00 to 14:45 is .9 x 40 = 36. Therefore, the total number of periods from 13:00 to 14:00 is .3 + .6 = .9 and the total stations occupied is 11.7 + 24 = 35.7.

The data in Table III. will give us the following information:

Room Use = Actual Use ÷ Possible Use x 100

67.60% = 33.8 ÷ 50 x 100

Station Use = Actual Station Occupied ÷ Possible Station Occupied x 100

73.24% = 1188.2 ÷ 1622.4 x 100

TABLE III.

A CLASSROOM SCHEDULE REPORT

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Total
8 - 9	1/37	1/37	1/37	1/37	1/37	5/185.0
9 - 10	1/39	1.2/15.6	1/39	1.2/15.6	1/39	5.4/148.2
10 - 11	1/39	1.2/24.0	1/39	1.2/24.0	1/39	5.4/165.0
11 - 12	1/48		1/48		1/48	3/144.0
12 - 13	1/23	1.2/46.8	1/23	1.2/46.8	1/23	5.4/162.6
13 - 14	1/39	0.9/35.7	1/39	0.9/35.7	1/39	4.8/195.0
14 - 15	1/41	0.9/36.0	1/41	0.9/36.0	1/39	4.8/195.0
15 - 16						
16 - 17						
TOTAL	7/266	6.4/195.4	.7/266	6.4/195.4	7/266	33.8/1188.2

The room use is based on the maximum daylight use, usually 8:00 a.m. to 6:00 p.m. or 50 hours. The station use, however, is based upon the number of stations occupied if all were occupied when a class met. The two measures tell different things. The room use shows us the activity rate of the room whereas the station use rate merely tells us whether we are scheduling the correct size classes in a particular room. When the station use rate is multiplied by the number of room hours, an average station use index is the result. This index may be compared with one of the standards in Table II. derived by Bareithers'.

$$33.8 \times .7324 = 24.8$$

This figure is better than the index of 18 derived by Bareithers.

In Table IV. the results of scheduling small to medium size classes in a large classroom can be seen. Even though the room use rate is very good and represents a better usage than the standard (57.5 to 65.5 percent) the station usage is not so good (52.6 percent). However, the average station index is 20.5 and is better than the standard.

Table V. is representative of the under-utilization of a room even when all, or nearly all, stations are occupied. In this room, the number of periods is only 18 out of a possible 50 for a 36 percent room use rate. The station use rate (88.6 percent) is nearly perfect. Notice that the station use index (15.9) is below the standard.

Most community colleges having a strong vocation/technical and community orientation will probably schedule classes centering around three periods of the day: from 8:00 to 15:00, from 16:00 to 19:00, and from 19:00 to 22:00. An example of this type is shown is Table VI. Most space utilization analyses will only study the period from 8:00 to 18:00. Notice, however, that the room use statistics soar, if the unique scheduling character of the community college is taken into consideration. While the station utilization rate goes up for the morning classes, new standards should probably be developed for the evening classes.

TABLE IV.

EXAMPLE OF A ROOM HAVING A GOOD ROOM USE BUT POOR STATION USE

TIME	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	TOTAL
8 - 9	1/37	1.2/45.6	1/37	1.2/45.6	1/37	5.4/202.2
9 - 10	1/40	.9/29.4	1/40	.9/29,4	1/40	4.8/178.8
10 - 11	1/32	.9/27	1/32	.9/27	1/32	4.8/150.0
11 - 12	1/50	1.2/42	1/50	1.2/42	1/50	5.4/234.0
12 - 13	1/20	.9/24	1/20	.9/24	1/20	4.8/108.0
13 - 14	1/35	.9/36	1/35	.9/36	1/35	4.8/177.0
14 - 15	1/15	1.2/24	1/15	1.2/24	1/15	5.4/93.0
15 - 16	1.2/30	.3/6		.3/6		1.8/42.0
16 - 17	1.2/30					1.2/30.0
17 - 18	.6/15					.6/15.0
TOTAL	10/304	7.5/234.0	7/229	7.5/234	7/229	39/1230.0

ROOM USE = ACTUAL HOURS ÷ POSSIBLE HOURS X 100 = (39 ÷ 50) X 100 = 78.0%

STATION USE = ACTUAL STATIONS OCCUPIED ÷ POSSIBLE STATIONS OCCUPIED X 100

= (1230 ÷ 2340) X 100 = 52.56%

POSSIBLE STATIONS = WEEKLY HOURS X NUMBER OF STATIONS = 39 X 60 = 2340

TABLE V.

EXAMPLE OF A ROOM HAVING GOOD STATION USE BUT POOR ROOM USE

TIME	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	TOTAL
8 - 9		1.2/66		1.2/66		2.4/132
9 - 10	1/54	0.3/16.5	1/54	0.3/16.5	1/54	3.6/195
10 - 11	1/58		1/58		1.58	3.0/174
11 - 12	1/50	1.2/60	1/50	1.2/60	1/50	5.4/270
12 - 13		0.3/15		0.3/15		0.6/30
13 - 14	1/52		1/52	1/52		3.0/156
14 - 15						
15 - 16						
16 - 17						
17 - 18						
TOTAL	4/214	3.0/157.5	4/214	4.0/209.5	3/162	18/957

ROOM USE = ACTUAL HOURS ÷ POSSIBLE HOURS X 100 = (18 ÷ 50) X 100 = 36.0%

STATION USE = ACTUAL STATIONS OCCUPIED ÷ POSSIBLE STATIONS OCCUPIED X 100

= (957 ÷ 1080) X 100 = 88.61%

POSSIBLE STATIONS = WEEKLY HOURS X NUMBER OF STATIONS = 18 X 60 = 1080

TABLE VI.

EXAMPLE OF A ROOM SCHEDULED THROUGHOUT THE ENTIRE DAY

TIME	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	TOTAL
8 - 9						
9 - 10	1/34	1.2/36	1/34	1.2/36	1/34	5.4/174
10 - 11	1/36	0.3/9	1/36	0.3/9	1/36	3.6/126
11 - 12	1/30	1.2/42	1/30	1.2/42	1/30	5.4/174
12 - 13	1/20	0.3/10.5	1/20	0.3/10.5	1/20	3.6/81
13 - 14	1/36	1.2/42	1/36	1.2/42	1/36	5.4/192
14 - 15	1/25	0.3/10.5	1/25	0.3/10.5	1/25	3.6/96
15 - 16						
16 - 17	1.2/18	1.2/36	1.2/24	1.2/30		4.8/108
17 - 18	1.2/18	1.2/36	1.2/24	1.2/30		4.8/108
18 - 19	0.6/9	0.6/18	0.6/12	0.6/15		2.4/54
19 - 20	1.2/36	1.2/30	1.2/42	1.2/12		4.8/120
20 - 21	1.2/36	1.2/30	1.2/42	1.2/12		4.8/120
21 - 22	0.6/18	0.6/15	0.6/21	0.6/6		2.4/60
8 - 18 TOTAL	8.4/217	6.9/222	8.4/229	6.9/210	6/181	36.6/1059
9 - 15 TOTAL	6.0/181	4.5/150	6.0/181	4.5/150	6/181	27.0/843
16 - 19 TOTAL	3.0/45	3.0/81	3.0/60	3.0/75		12.0/261
19 - 22 TOTAL	3.0/90	3.0/75	3.0/105	3.0/30		12.0/300

	TIME	ROOM USE	STATION USE	INDEX
(8 - 6)	8 - 18	73.20%	80.37%	29.4
(9 - 3)	9 - 15	90.00%	86.72%	23.4
(4 - 7)	16 - 19	100.00%	60.41%	7.2
(7 - 10)	19 - 22	100.00%	69.44%	8.3

Conclusion:

The methodology discussed in this paper can be of use not only in justifying new space but in the face of declining enrollment projections, such methods can be used as a basis for reallocating space and as an argument for better utilization of present space. Further research needs to be done in order to establish standards for the evening utilization of space which is a unique characteristic of community colleges.