

(EDUL 6025) Maintaining and Operating Educational Facilities (1)

A course designed for school principals, with emphasis on the management of custodial care and preventive maintenance of the school and its learning environments. EDUL 6025 is especially planned for students pursuing the L-5 add on certificate in Educational Leadership.

All academic work must meet the standards contained in “A Culture of Honesty.” All students are responsible for informing themselves about those standards before performing any academic work. This course syllabus is a general plan for the course: deviations announced to the class by the instructor may be necessary.

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Grading

Testing. Students who desire to make an "A" in the course are expected to pass a test on knowledge and skills needed for strategic planning in education. The test will be taken from the text and assignments, and the 9 activities listed at the end of this learning module.

The Principal's Role in the Maintenance and Operation of the School Facility

From

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While the persistent need for maintenance and operation of the school facility may seem obvious to seasoned planners and architects, it is important to understand that many school principals have spent their entire professional life in school as a student, teacher or assistant principal. Most principals have limited awareness of the wide array of complexities surrounding their schools' needs for custodial care and maintenance. The majority of educational leadership or educational administration training programs do not provide any substantial information for the school principal regarding school maintenance and the vital role of the school custodian. Given this problem, the information offered in this chapter should help raise awareness and provide information to deal with this vital component of the school system. Maintenance and operation (M & O) are presented in a manner to focus on the physical learning environment as a serious aspect of student learning. Where students learn does make a difference in their attitudes, behavior, and cognition.

Organization and Management of M & O

In most school systems the custodial care and maintenance programs are organized under the Assistant Superintendent for Business Services (Johnson, 2000). If the school system is small, there may be a Supervisor of School Facilities who has direct line authority

over the head school custodian. In larger school systems there may be a foreman in the line of authority between the supervisor and the head school custodian. Given either organizational structure, the head custodian has the responsibility for the other custodians in the school. Johnson (2000) noted that the one thing that has not changed throughout the years is the dual responsibility of the custodian. That is, the head custodian reports to the supervisor or foreman and also to the school principal. "Custodians have distinct responsibilities within a school over which the building principal must exercise control. At the district level, it is important that custodial responsibilities be coordinated to provide comparable work schedules, duties, responsibilities, salaries and benefits. The lines of communication within the custodial staff will normally be through the head custodian (or someone with a similar title); through the principal or his/her designee for day to day direction of activities; and through the supervisor of custodial services for the total job responsibilities and expectations on a system-wide basis. (Johnson, 2000, p. 2).

What is obvious in most school district organizational charts is that the school principal does not have direct formal authority over the school custodians. This may put him or her in a difficult position if the school is not being maintained satisfactorily. The question is, therefore, should the principal have direct "line" control over the duties of custodians that work in his or her school?

Whether the school principal has the responsibility for the management of the custodial program is a function of policy. Those principals that do not have direct responsibility over custodians must somehow work with the school district or a private company delivering custodial services to provide the students and teachers with a safe, clean, healthy, and comfortable environment. The Association of School Business Officials (1981) reported that "...custodians have distinct responsibilities within a school over which the building's principal must exercise control. It is equally obvious that all duties of custodians must be controlled at the system level by the supervisor of custodial services or his designee (foreman or similar title)" (p. 1). According to Davis (1973) it is imperative for the principal to understand the lines of authority for supervisory control of custodial personnel. Policies must be established that stipulate the extent of control that the principal has regarding custodial personnel in the school building and on the school grounds. This is important because without clear policy, the principal and the custodial staff will be confused about work assignments and routine M & O.

Most principals express the view that it is essential for them to have immediate supervisory authority over custodial employees in their schools. This type of power base however; can come into conflict with the practice of giving direct authority over custodians to the district-level supervisor of custodial services. An organization operating under this structure appears to always be in a position for miscommunication. Consequently, this organizational structure may explain why so many schools in the United States are in poor repair. When a problem arises with custodial services concerning productivity, the custodians can easily point to the principal and central office management, simultaneously. Perhaps a more effective organizational structure is the one depicted in Figure 26.1.

In reviewing the suggested structure in Figure 26.1, the assumption must be made that the school facility is part of teaching and student learning. Under traditional educational policy, the school facility, its maintenance, and custodial services appear to be disjoint from teaching and learning. We suggest that custodial services and maintenance, just as the entire school environment, should be considered as part of the educational program because where students learn is an important part of overall instructional model. People in business and facilities services at the district level might view this as a challenge to their power structure. However, all that is being suggested here is to provide the school principal with the authority and power to keep the school's physical environment clean, healthy, safe, and beautiful. Custodial activities may then be viewed as extensions of teaching and learning, not business and facilities services – an office and group of people sometimes far, far away from the actual place where students learn. The business management function, given this suggested structure, might focus on the quality of work through audits and the distribution of supplies and equipment. It might also develop and suggest work schedules and manage payroll and benefits. Hence, under this suggested organizational chart, business services could assume a role similar to the one that it performs for teachers.

A clean and attractive school does not just happen. High quality custodial services require planning and scheduling workloads among the custodial staff, and an adequate budget administered by business services. Custodial services may be provided by professional contractors, but whether services are provided from within the school system or by a professional service, the principal must have a working knowledge of operations. In fact, he or she should have general knowledge of how to accomplish the majority of the activities presented in the checklist in Table 26.1.

Table 26.1

A Checklist Concerning What the School Principal Should Know About School Custodial Services

- Plan and budget for maintenance and cleaning
- Breakdown costs, including personnel, equipment, and supplies
- Analyze custodial time/costs by area of the school
- Compare time/costs among schools to determine effectiveness and efficiency of operations
- Audit work procedures and performance – corners and edges, streaks and residue, dust, build-up and neglect
- Audit problem areas – corridors, offices, conference rooms, laboratories, cafeteria, classrooms
- Control consumption of cleaning supplies and materials
- Standardize supplies and materials
- Implement time standards for various jobs
- Keep custodians on custodial tasks
- Schedule times for various cleaning jobs – daily, weekly, monthly, annually
- Establish standards for cleanliness of all areas of the school
- Develop and implement instructions for various cleaning tasks
- Form and explain lines of authority among the custodial staff regarding work for school building personnel
- Determine which time of the day or week is best for certain cleaning jobs
- Work in harmony with a unionized labor force
- Work with persons contracting special custodial services
- Help to coordinate in-service training programs for custodians
- Supervise the stocking of supplies and equipment
- Set up, take down, and store cafeteria tables and bleachers
- Implement snow and ice removal procedures
- Check off and receive supplies and materials
- Conduct safety checks on mechanical equipment and boilers
- Conduct fire extinguisher checks
- Stock items for food services
- Prepare reports to the district office concerning custodial services
- Manage complaints about maintenance and custodial services
- Keep inventory of supplies, materials, and, equipment
- Monitor the care of equipment after use
- Provide literature to the custodians concerning housekeeping and maintenance
- Review maintenance practices for safety concerns
- Arrange demonstrations of products by suppliers
- Involve custodians when plans are being made for new construction
- Ensure that a healthy and qualified custodial staff is employed
- Provide training for workers beginning work in a new building

- Provide regular training programs for the custodial staff
- Assist the custodian in understanding assignments and responsibilities
- Facilitate computerized maintenance management systems
- Reward suggestions for the improvement of the delivery of custodial services
- Demonstrate concerns for the welfare and appreciation for the work of the custodial staff

(Modified from Davis, 1973 , pp. 107 – 109)

School custodial care and maintenance often rank too low on the list of the school principal's job responsibilities. This may another reason why so many schools across the United States have high maintenance costs and why so many unkempt and unattractive schools can be found. Even if the school's custodial services are contracted out to commercial professional services, the principal should observe many of the tasks in the above checklist. For example, demonstrating concern for the welfare and work of the custodian is just good human and public relations. This pays off by enhancing a positive organizational climate whether services are totally, partially, or not contracted out at all.

As Black and English (1986) noted, "Next to secretaries, custodians are about the most valuable support people in the school" (p. 226). Sometimes called janitors or maintenance engineers, they can be observed "sweeping, cleaning, polishing, digging, fixing, spraying, carrying, moving all kinds of objects, dusting, dumping trash cans, brushing, scrubbing, painting, replacing broken this and that, and interacting with the staff and kids" (p. 226). Black and English pointed out that they are not lowly people, but people. The best custodians run their schools as if the entryway to the school was their own living room, and finding a bit of graffiti in the toilet is a personal insult.

"Custodians we know who make a difference know the kids and the teachers. They go out of their way to help teachers build and maintain a safe environment for kids. They fix things. Classrooms are always spotless. Spilled paint, grease, ink, paste, and chemicals are gone overnight. Those kinds of custodians are always busy... The key person who works with the custodians is the chief custodian. Chief custodians can make things happen that no one else can. They can be human magicians in a school. They can also block things from happening. They can be whiners and moaners who are never around when you need them. They find a thousand reasons why the room was not set up for the Curriculum Council, why the gum was left on the hardwood floor, why burned out light bulbs are not replaced, why there is no toilet paper in the bathroom stalls, and why the place looks filthy and unkempt" (Black & English, 1986, p. 227).

Black and English go on to say that if the chief custodian is not working out and attending to custodial needs, then the principal will not be able to make much else happen in the school. They contend that a trashed out school is an advertisement for an ineffective one. "It doesn't matter if anything else is happening, the stain of the mess leaves a bad impression on anyone entering it" (p. 228).

Black and English advise principals to take careful stock of the chief custodian. "If he is incompetent and can't change or won't change, he's got to go. If he is a blocker, a person who always finds a reason why it can't be done, and he can't change or won't

change, he's got to go" (p. 228)!

It is the job of the school principal to convey the message to the chief custodians that the way the school looks is not only the responsibility of the students and teachers, but also his or her responsibility. The school principals who do not know that the custodial staff is important "...is not going very far in the business. These are the 'little' 'big people' who make the schools effective or ineffective" (Black & English, 1986, p. 228).

Black and English summarize their remarks about custodians and principals:

- the real basics are always custodial.
- the best custodians run your school like it were their own home.
- when a student gets sick in the hall, slops ink on the walls, whom do we call? *The grime busters!*
 - the chief custodian is *your chief* or there are too many chiefs in your school.
 - ineffective custodians work for administrative wimps.
 - if you can't keep the school clean, chances are you are not able to improve learning in it either; so who needs you? (p. 229)

Variables Affecting M & O

Maintenance and operation of the school's environments are logical continuations of planning, design and construction activities. Maintenance and operation may be viewed as the systematic upkeep of schools to ensure safe, secure, clean, healthy, and beautiful places for students to learn. Safety and security are direct functions of design, and proper custodial care and maintenance can also enhance these vital environmental components. People completing well-designed schools have kept safety and security as top priorities in the planning and design phases of development. For example, it is logical that we should start the school facilities development process with confidence that the site is in a safe location. A safe location enhances security and influences exactly how secure the students and educators are and how they feel about safety and security. We all know about the reasons for not locating the school in or near high-density air traffic and ground traffic areas, major air pollution areas, and waste dumps. Furthermore, we should abide by these basic common-sense directives. What may be less obvious is how other aspects of school design influence the safety and security of the students and educators that work there. Key to safety and security is overcrowding and density of the school population per building and site.

Crowding and Density

Crowding and density are factors in safety and security – more space per student is better when it comes to the amount of space needed for learning and instruction. However, these spaces must be maintained and also they should be kept clean. The crowding of too many students into places and spaces designed for learning increases the chances for structural abuse, furniture abuse, mechanical overload, increased behavioral problems, and lower student achievement. Crowding is a direct function of growth and school capacity, while capacity is the result of planning and design. The capacity of a building changes with a significant alteration in the curriculum, even though the physical facilities remain unchanged. Our concepts of school buildings influence estimates of the number of students that may be adequately housed. For example, "If a school building is looked upon

as just a shelter from the weather, many youngsters can be placed within a given space before it is over capacity. On the other hand, if a fundamental purpose is to facilitate the instructional process, the number of pupils who can be placed within a given space without crowding will be different. The school building surrounds the pupils and teachers for a purpose. Crowding interferes with the realization of this purpose. The educational program has an important bearing on the measurement of the pupil capacity of a building” (Davis, 1973, p. 95).

Sufficiency of space is judged by many variables, among the most important are curriculum functions and the multicultural composition of the students and teachers. We do not know exactly how much space is needed given these critical variables. Our current standards for places and spaces needed for student learning were established for and most often by White middle class individuals without information pertaining to territoriality or personal and social distance of other cultures (Tanner, 2000). Crowding and density issues should undergo some rigorous, scientific research to ensure that all students are allowed enough personal and social space for learning.

Capacity of the School

Capacity represents the largest number of students that can be instructed in a school building without curtailing the desired educational program, according to Castaldi (1994). Yet, what we know about capacity should be challenged through research because there are some subjective variables that need to be reconsidered given the time and circumstances in which they were developed. Furthermore, whether school capacity is the what Castaldi (1994) called the sum of the capacity of the individual spaces multiplied by a student station utilization factor of 0.80 for secondary schools and 0.90 for elementary schools is not known - it has only been assumed that these percentages are correct. At best, they are supported by the idea of *best practices*, and at worst they are damaging to the planning and design of schools. When listening to the ‘best practices’ argument, we must always question whose best practices and when and where they occurred.

Until we find a more scientifically defensible answer to this issue, the formula developed by Conrad and published by Brooks, Conrad, and Griffith (1980, p. 60) is recommended as a reasonable procedure for approximating capacity. Given that the school should be planned and designed in terms of the educational program; capacity should include several variables. For example, it should encompass the types of teaching stations, suitability of rooms or spaces, and size of spaces and places. Also the number of student stations, desirable average class size, room and space assignment policies, location of teacher work stations, and the nature of the educational program are extremely important in this calculation. Finally, the length of the class periods, types of schedules (block, for example), and specialization areas should be considered in the formula. Conrad integrated these variables in the following formula:

$$\text{Formula 26.1 } [BC = (TS \times DS \times T \times E) / PP]$$

The building capacity that can be accommodated in a given subject area is represented by BC. TS is the number of teaching stations in a given subject area. DS is the desired class

size in a given subject area, T represents the total effective periods of instruction per week in the schedule of classes, and E is the average total school enrollment for a normal reporting period. These variables are summed and divided by the total pupil periods (PP) of instruction per week in a particular subject area. To determine the capacity of a school, the formula must be applied separately to each subject area.

This formula may be adjusted to various combinations of school organizations (elementary, middle, or high school). If after applying the formula across all subject areas in a given school, the number of students attending is greater than BC, then we may assume that the school is over crowded and that the density is too high. Utilization of technology and philosophy of teaching also become variables in this straightforward formula. Technology may require more space, and a school leaning toward a constructivist philosophy may also require more space. According to Castaldi (1994), the Conrad formula is the most logical and meaningful approach to determining secondary school capacity available.

A rule of thumb approach may be used to approximate the capacity of a secondary school, although it is not exact. Castaldi (1994) introduced this method for approximating capacity. We have modified Castaldi's method such that the capacity of a conventionally organized secondary school can be approximated by *multiplying the number of teaching stations by the desired class size* ($TS \times N = Capacity$). A teaching station (TS) is defined as any space where one teacher (conventional school) instructs a group of students. The number of students (N) represents the desired average class size. Libraries, meeting rooms, cafeterias, and auditoriums are excluded from the determination of teaching stations, however a gymnasium designed so that four classes might be taught in it simultaneously could be counted as four teaching stations.

The expected consequences of the school that is over capacity are a rapidly deteriorating structure resulting from over use and deterioration of student behavior and learning. "... The consequences of high-density conditions that involve too many children or too little space are: excess levels of stimulation, stress and arousal; a drain on resources available; considerable interference; reduction in desired privacy levels; and loss of control (Aiello, Thompson, & Baum, 1985). If the school is determined to be over-crowded, the school principal and other school leaders should make special arrangements for increased care of the school buildings and mechanical systems, with emphasis on safety, security, health, and beauty. Beyond the issue of M & O the principal should also work to educate the community on hazards of high density as discussed by Wohlwill and van Vliet (1985).

Regardless of the program changes or amount of crowding that has occurred, schools and their contents deteriorate over time. But, this is a natural development that may be prolonged through scheduled care and maintenance. We have all marveled at some well-preserved historic sites, imagining the great care and detail that were necessary to maintain them for such a long time. Somehow, the type of care given to these special historical sites must become part of the philosophy for school care if we are to achieve our goals for education and operate effectively and efficiently. School care begins with a positive relationship among the students, teachers, the school principal and the custodial and maintenance staff.

Perceptions of Cleanliness

The level of cleanliness maintained in the school influences M & O in the long run. Cleanliness is directly tied to design and the health of the environment as well as the health of the people that inhabit and care for it. The International Sanitary Supply Association (<http://www.issa.com/>) has set standards for defining “clean”, and the Association of Higher Education Facilities Officers (<http://www.appa.org/>) has developed classifications for ‘clean’ ranging from spotlessness to neglect. The perceptions of health and cleanliness of the people that occupy a space or building and those responsible for the cleaning and maintenance may differ – they usually do. There is a sliding scale among people when it comes to defining “clean, healthy, safe, secure, and beautiful.” We have found that the definition of these important factors of M & O are often left to the principal of the school. The philosophy for M & O should be that “the school can never be too clean, safe, healthy, secure, or beautiful.”

The school principal should know that organizations such as the Association of Higher Education Facilities Officers (APPA) includes k-12 schools in its membership and provides educational programs, including an annual meeting and conference, an institute for facilities management, and a bimonthly magazine covering the scope of facilities management. This organization provides workshops and printed materials including topics on energy and utilities, general administration and management, maintenance and operations, and planning, design, and construction.

Particularly of interest to school principals and other administrators are the Custodial Staffing Guidelines for Educational Facilities (second edition), a publication offered on the APPA web site. It highlights staffing, evaluation, and staff development. Regarding staffing, the organization suggests five levels of custodial services and shows the work assignments necessary to maintain a certain level of cleanliness.

Cleanliness Level 1 is ‘orderly spotless’. This is the highest level developed for the corporate suite, a donated building, or a historical focal point. Floors and base moldings shine and/or are bright and clean; colors are fresh. There is no buildup in corners or along walls. All vertical and horizontal surfaces have a freshly cleaned or polished appearance and have no accumulation of dust, dirt, marks, streaks, smudges, or fingerprints. Washroom and shower tile and fixtures gleam and are odor-free. Supplies are adequate. Trash containers and pencil sharpeners are empty, clean, and odor-free.

Level 2 is classified as ‘ordinary tidiness’ and only slightly lower than the top level. Level 3 is ‘casual inattention’, reflecting the first budget cut, or some other staffing related problem and may be the top level for many schools. This level represents the lowering of normal expectations; and while not totally acceptable, the learning environments have yet to reach an unacceptable level of cleanliness. Floors are swept clean, but upon close observation, dirt and stains, as well as buildup of dirt, dust, and/or floor finish in corners and along walls can be seen. Dull spots are found on matted carpet in walking lanes, and streaks and splashes are observed along base molding. Dust, dirt, marks, smudges, and fingerprints are found on all vertical and horizontal surfaces. Lamps all work and all fixtures are clean, while trash containers and pencil sharpeners are empty, clean, and odor-free.

The definition of Level 4 is ‘moderate dinginess’, with conditions somewhat worse than those described in Level 3. For example, Less than 5 percent of the lamps are burned out and fixtures are dingy. Trash containers and pencil sharpeners have old trash and shavings. They are stained and marked and trash containers smell sour. ‘Unkempt neglect’ best describes Level 5. The facility is dirty, with cleaning accomplished at an unacceptable level. Floors and carpets are dirty and have visible wear and/or pitting. Colors are faded and dingy, and there is a buildup of dust and dirt, and/or floor finishes in corners and along walls. The base molding is dirty, stained, and streaked. Gum, stains, dirt, dust balls and trash are broadcast. There are major accumulations on vertical and horizontal surfaces, and it is evident that no cleaning is done on these surfaces. Over 5 percent of the lamps are burned out and fixtures are dirty. The trash cans and pencil sharpeners overflow. They are stained and marked and trash containers smell sour. Unfortunately, there schools in the United States that approach the level of cleanliness as described in Level 5.

The principal of a school and custodial manager may need help in achieving high cleanliness levels. If this is the case, then professional organizations such as APPA and the Association of School Business Officials (ASBO) can provide suggestions for staffing levels, materials, training, equipment, and supplies needed to reach an acceptable goal. This usually entails providing information about such variables as age of the buildings, square footage, and the number of students using certain spaces on a daily and weekly basis.

Milshtein (1998) described a case that utilized APPA’s techniques. Through association with the APPA organization, Kerry Leider, Director of Facilities, Duluth Public Schools developed a formula to solve some major custodial problems. The primary issue of “how clean is clean” was faced regularly by the Duluth school principals and custodians. After receiving a number of requests to assist with custodial problems in the midst of budget cuts, Leider developed a way to measure the impact of losing custodial staff. His formula was based on the question: What is clean? First, the issue of average time required to clean a space acceptably was determined through some internal studies. These were compared to national standards before settling on a specific time for a specific cleaning assignment. Obviously, it was found that different areas take different amounts of time to clean. While the square footage of a space remained an apparent consideration, materials also constituted another variable. For example, a terrazzo hallway took considerably less time to clean adequately than a carpet-covered one. Wall coverings, furniture, and windows were other variables.

The square footage and its materials were documented on a CAD program having blueprints for all the schools. This created a database for individual spaces, including floor coverings and wall coverings, furniture and other objects that would affect the amount of cleaning time. This procedure yielded exactly how long it should take to clean one square unit of any specific area in a school. Next, the question of how often to clean was addressed. Frequency of cleaning depended upon the nature of the activities taking place within certain spaces and places. Milshtein (1998) noted that a classroom housing preschoolers would obviously need more frequent cleaning than a high school English class. Furthermore, middle and high school corridors, because of constant foot traffic, would need cleaning several times a day, while primary and elementary school

hallways would not need as much attention because they do not get as dirty as pathways in the upper schools.

Armed with the qualitative and quantitative information described above, the formula determined by Leider was straightforward:

Formula 26.2 [(The average time to clean one square foot) x (square footage) x (frequency) = Cleaning Time].

According to Milshtein (1998), a middle school corridor, made of vinyl composition tile, took .005 minutes per square foot to clean. With an area of 4,500 square feet, it should take a custodian 22.5 minutes to clean 4,500 square feet (4,500 x .005). Furthermore, if this space needed to be cleaned two times a day; the hallway would require 45 minutes (22.5 x 2) of a custodian's time per day. If spaces need to be cleaned every other day, then a multiple of 0.5 should be used. It is important to consider that it takes time for the custodian to assemble supplies and cleaning equipment and attend to other emergency situations such as spills in the hallways. A strict schedule may be unrealistic, therefore some flexibility should be built into the custodial work load if high cleaning standards are to be achieved.

Custodial Schedule and Work Load

In most cases it is the job of the school principal to assign custodians extra tasks, since no school actually runs on a lock step schedule. When extra tasks are assigned, the schedule begins to slip. Consequently, it is advisable to build in extra time slots in the custodian's master schedule for the unexpected emergencies daily occurring in schools. Flexibility such as this keeps the partnership between principals and custodians strong (Milshtein, 1998). Creating standards for cleaning and establishing "time to clean" schedules yields positive results for the custodial staff and the schools. With these expectations in place, possible disputes about the work-load and time to do a job are eliminated.

Table 26.2 provides a sample cleaning schedule checklist for a school. The frequency of cleaning for each space will vary depending on the school type (elementary, middle, or high school) and the other variables discussed in this chapter.

Table 26.2 Sample Checklist for Frequency of Cleaning

	Spaces	Twice
	Daily	Alternate
Days	Weekly	Monthly
	Other	Public Areas
	Class rooms	Toilets
	Private Offices	Public
	Offices	Side
	Walks	Gymnasium
	Showers	Locker Rooms
	Windows	(Outside)
	Windows	(Inside)
	White Boards	Major Carpet Care
	Major Hard Floor	Care
	Elevators	Auditoriums
	X	Other

As noted in Table 26.2, the custodial staff is confronted with a large number of varied tasks to be scheduled around school activities. The schedules that were reviewed prior to compiling this table recommended that toilets and gymnasiums be cleaned once daily. However, our observations lead us to recommend that activity at least twice daily in

schools operating at capacity or above to minimize odors in the toilets and to remove dirt from the floor of the gymnasium that might cause hazards and unnecessary wear.

A defensible working schedule is based on what constitutes a proper service schedule for each custodian. Knezevich and Fowlkes (1960) noted that “Determining a proper work load is one of the more difficult administrative problems in the operation of the school plant” (p. 235). They enumerated key factors found by Reeves and Ganders (1928, pp. 28 -30) that influence the service load of the custodial staff (Table 26.3).

Table 26.3

Key Factors Influencing Custodial Service Load

- Pupil behavior in the school
- Area or number of rooms in a building
- Age and physical condition of the building
- The location of the building
- Climatic conditions and type of fuel burned
- Type of building construction
- The kind of school organization - elementary, etc.
- The social background of the pupils
- The total enrollment
- The type and variety of classrooms
- The amount and kind of floor area
- The area, size, and location of windows
- Area, kind, and utilization of chalkboards (white boards)
- Type and arrangements of desks and other furniture
- Size of site and type of playground coverings
- Area and placement of sidewalks
- Type and condition of ventilating (cooling) equipment
- Type and condition of heating equipment
- Amount and installation of plumbing
- Type and condition of service systems to facilitate custodial work
- Custodial shops and storerooms
- Cleaning equipment.

It is interesting that much of this 1928 report is valid today when developing a service load for custodians. The items in parenthesis were added in the above list.

Work ethics of the school principal and the custodial staff also enter into the productivity equation. The classic formula for estimating custodial staffing needs as published by Brooks, Conrad, and Griffith (1980, p. 200) and Castaldi (1994 p. 408) was first developed by Baker and Peters (1957).

Baker and Peters (1957, pp. 77 - 78) outlined a six-step formula for developing a custodial workload. We have made some minor modifications in the format as compared to their original presentation, but the basic formula has not been adjusted.

Formula 26.3 Workload Formula

(Correct to two decimals)

Step 1 – Given one custodian for eight teachers, find the teacher factor.

$$(\text{Number of Teachers})/8 = \text{Teacher Factor (TF)}$$

Step 2 – Given one custodian for every 225 students, find the student factor.

$$(\text{Number of Students})/225 = \text{Student Factor (SF)}$$

Step 3 – Given one custodian for every 11 rooms* to be cleaned, find the room factor.

$$(\text{Number of Rooms})/11 = \text{Room Factor (RC)}$$

*Rooms include all classrooms, toilets, storage areas, and offices that are to be cleaned. For gymnasiums and other large rooms, use 1,000 square feet (~93 square meters) of floor space to define one room.

Step 4 - Given one custodian for every 15,000 square feet of usable architectural area (1395 square meters) of building area, find the square footage factor.

$$(\text{Total Square Footage of the Building})/15,000 = \text{Square Footage Factor (SF)}$$

Step 5 – Given one custodian for each 2 acres of upkeep grounds, find the grounds factor.

$$(\text{Total Acres of Upkeep Grounds})/2 = \text{Grounds Factor (GF)}$$

Step 6 – Sum the five factors and divide by 5 and add the CK factor to find the number of cleaning custodians needed. Frohreich (1987) suggested an additional factor for this timeless equation. Known as the C and/or K factor, it includes 0.1 for a cafeteria and 0.2 for a kitchen.

$$(\text{TF} + \text{SF} + \text{RC} + \text{SF} + \text{GF})/5 + (\text{C} + \text{K}) = \text{Cleaning Custodians Needed}$$

There are some possible modifications to this formula that might be made with information from a local study of custodial operations such as those provided by the Association of Higher Education Facilities Officers. For example, the standards for the number of rooms per custodian might vary from 7 to 12, depending on the neatness and values of the principal, teachers, and students. The total number of square feet per custodian might also vary from 14,000 to 20,000, depending on whether the work is performed during the day or evenings, type of cleaning equipment, or when the students are away from school. Kenezovich and Fowlkes (1960), stated that “The number of pupils per custodian range from 125 to 350. The problem is to justify what are more or less rule-of-thumb designations” (p. 235). The key factors in the formula (8 teachers, 225 students, and 15,000 square feet) have, however remained constant in the literature since 1957.

The question of “how long should a job take” should be answered by research findings in a local school and compared to standards for time and frequency of each task. This becomes the basis for a custodial workload. The work schedule for custodians

presented in Table 26.4 might serve as a guideline for a comparison, but it does not include preparation and clean up times. “For example, the time required to mop and rinse a 900-square foot classroom is 40 minutes. Additional time is required by the custodian to fill a water bucket, add detergent to it, place the container with the cleaning agent back on the shelf, locate the mop, and carry these materials from the custodial closet to the classroom. The time standard of 40 minutes does not include the time necessary for the custodian to return to the custodial closet, clean the mop(s), dispose of the dirty water, and rinse the buckets” (Castaldi, 1994 p. 415).

Table 26.4 Time Normally Required to Complete Selected Custodial Tasks

Task	Frequency	Time Required
<i>Classroom (Assumed area of 900 Square feet)</i>		
Dusting	Daily	5 min. per rm.
Sweeping	Daily	12 min. per rm.
Damp mopping	As needed	23 min. per rm.
Wet mop and rinse	As needed	40 min. per rm.
Machine scrubbing	As needed	25 min. per rm.
Machine polishing	As needed	15 min. per rm.
Wet vacuum pickup	As needed	14 min. per rm.
<i>Servicing classroom</i>	Daily	15 min. per rm.
Removing waste paper	b.	
Sweeping floor with treated mop	c.	
Dusting chalk tray, window sills, etc.	d.	
Closing windows and adjusting shades	e.	
Adjusting temperature controls	f.	
Making note of needed repairs		
<i>Servicing men's lavatory</i>	Daily	35 min. per lav.
<i>Servicing women's lavatory</i>	Daily	38 min. per lav.
<i>Lavatory area</i>	a.	
Cleaning lavatory	Daily	1 min. per fixture
Cleaning toilet bowl and seat	Daily	1 min. per fixture
Cleaning urinals	Daily	2 min. per fixture
Cleaning urinal trap	Weekly	2 min. per fixture
Cleaning wash sink	Daily	2 min. per fixture
Mopping toilet floors	Daily	2 min. per 100 sq. ft.
<i>Stairways</i>	a.	
Damp mopping	Weekly	4 min. per flight
Sweeping	Twice Daily	6 min. per flight
<i>Other</i>	a.	
Cleaning drinking fountains	Daily	1 min. per fixture
Dusting fluorescent tubes	Monthly	12 tubes per min.
Sweeping auditorium	Daily	15 min. per 1000 sq. ft.
Sweeping corridors	Twice daily	8 min. per 1000 sq. ft.
Sweeping gymnasium floor	Daily	5 min. per sq. ft.
Washing glass	As needed	1 min. per 10 sq. ft.
Buffing and reconditioning plastic-finished Floors	As needed	50 min. per 1000 sq. ft.
Machine scrubbing traffic areas		
Light-soil areas		
Medium-soil areas		
Heavy-soil areas		
8-24 months		
Every 6 months		
Every 3 months		
90 min. per 1000 sq. ft.		

100 min. per 1000 sq. ft.

110 min. per 1000 sq. ft. Refinishing floors (waxless finish) As needed
20 min. per 1000 sq. ft. Used by permission of Allyn and Bacon.

A Sample Daily Schedule for Custodians

It is important to schedule custodial activities in such a manner as not to interfere with the educational program. A rotating schedule is an issue that hinders effective supervision of custodians by the principal, but can be an effective way to get the school clean. Many school custodians work a late shift. For example, in one school building, one custodian may work from 6:00 a.m. to 2:00 p.m., another from 10:00 a.m. to 5:30 p. m., and four may work from 2:00 p. m. to 11:00 p.m. Because it is impossible for the school principal to stay at school until 11:00 p. m. nightly, the chief custodian may work this late shift and the principal must rely on her to supervise the rest of the custodial staff. The lesson here is that trust must be placed in the chief custodian to meet the standards for a clean school.

Harrison (1973) developed a sample daily schedule of work for three custodians that may be applicable to various school buildings (see Table 26.5). The assumptions for the sample schedule are no more than 25 teachers, serving no more than 600 students, with a maximum of 35 rooms and 45,000 square feet of usable architectural area. The site contains 16 acres - 6 acres of upkeep grounds and 10 acres used for playing fields and outdoor learning that are not part of the custodial load. A cafeteria and kitchen are also part of this work load. If these data are placed into the workload formula (Formula 26.3) for determining the number of custodians needed, the results are $(3.13 + 2.67 + 3.18 + 3.00 + 3.00)/5 + (0.1 + 0.2) = 3.296$ or 3.3 (custodians). This schedule should serve as a guide for the principal to use in developing a sample custodial schedule. Although all three custodians in the example are working the same eight-hour shift, it is more likely that at least one will begin work at 2:00 p.m. and end daily work at 11:00 p.m.

Table 26.5 A Sample Custodial Schedule

Time	Head Custodian	Custodian I	Custodian II
7:00 – 7:30	Raise flag		
	Open building		
	Check heating plant		
	Check fire bells		
	Check building		
7:30 – 8:00	Dust all classrooms, principal's and secretary's offices, library, and any other room to be used during the day	Same	Same

8:00 – 10:00 Sweep sidewalks

Check with office
Install glass if needed
Check heating plant

Make minor repairs

Wash sweeping mops Begin dusting in corridors

Clean some inside hall glass
Sweep stairs and corridors if needed 10:00 – 10:30 *High School* –
Check all toilet rooms – see that all fixtures are flushed, if needed
Insure proper ventilation
Pick up paper from floor
Replenish towels, paper, and hand soap as needed

Elementary School –
Same as H.S. but completed immediately following the morning recess

Same

Same 10:30 – 11:00 Check boiler

Check with office
Walk building to check for needed repairs Return to dusting and cleaning in halls
Same as helper
11:00 – 12:00 Check toilet rooms

Shake out doormats Lunch Check drinking fountains and wash sinks (clean and replenish soap and towels) 12:00 – 1:00 Lunch Brush and pick up papers in corridors
Clean sweeping brooms and mops Lunch 1:00 – 1:30 All toilet rooms – same as 10:00 – 10:30 Same Same

Time Custodian Helper Maid 1:30 – 2:40 Check drinking fountains and wash sinks
Burn (dispose of) paper and rubbish collected during day

Clean some inside door glass and any writing from walls
(In H.S., right after noon recess)2:40 – 3:00Ready equipment and materials for afternoon cleaning
Give help
5 minute rest periodSameSame3:00 – 4:00Sweep all classrooms and halls
Clean all toilets
Mop toilet floors
Carry out trash and paper
Empty pencil sharpeners

Custodian begin checking behind help so entire building is checked prior to day's end

Secure building

*Take down flag*Classrooms No.

_____, _____, _____, *ten rooms with halls and other areas and two toilets*SameAdapted from Castaldi (1994)

The Custodian's Qualifications and Job Description

Competent and well-trained custodial personnel are the keys to providing top quality house keeping and maintenance. The typical job titles suggested by ASBO and reported by Johnson (2000) were: Head Custodian, Night Foreman, Custodian I, Custodian II, and Relief Custodian. If the school system is large, there may also be a position of supervisor of custodians having duties and responsibilities pertaining to production improvement, personnel relations, and efficiency.

Supervisor of Custodians

According to the results of reviews of several public documents and advertisements for custodial positions, the typical job announcement for the supervisor of custodians includes the following:

Responsibilities: This position reports to the school district administration and principals. The successful applicant will supervise custodians in the cleaning, care and maintenance of school facilities (classrooms, laboratories, corridors, restrooms, offices, conference rooms, and public areas). He or she will

Conduct performance evaluations and inspections

Make commendations and recommendations for counseling or reprimand

Provide training and instruction; coordinate work assignments

Supervise the assignment of keys to other custodial personnel

Provide initial responses to calls from teachers and the principal

Plan and coordinate the activities of custodial services to support school events

Develop department policies and procedures

Evaluate the effectiveness of custodial services and develop

Recommend methods for improvement/expansion of these services.

Qualifications: One to two years of increasingly responsible experience in a supervisory capacity, providing leadership to a large staff involved in facility maintenance activities in a

major complex setting. Demonstrated knowledge and experience in assigning, scheduling and evaluating the effectiveness of services and the ability to manage effectively in a bargaining unit environment; skill in conflict resolution and grievance administration. Experience which demonstrates the ability to form cooperative working relationships; communicate effectively orally and in writing. Demonstrated competence in the use of standard PC software applications. Ability to: act independently to resolve problems, meet deadlines and insure continuity of operations; recognize need and take action; understand, interpret, apply and convey to others, school policies and procedures.

Head Custodian

Most school systems have job descriptions for this important staff position. For example, it is common to find qualifications for custodians listed as follows: “Knowledge of and skill in using materials and machinery necessary for cleaning and general repair of buildings”. But, we suggest stronger criteria. For example, the State of Wisconsin, Department of Employment Relations (2001) listed the following specific qualifications for a job comparable to ASBO’s definition of a head custodian:

1. Knowledge of proper methods, materials, and equipment for a wide range of janitorial work in general, and for cleaning and preserving floors in particular.
2. A trained cleaning eye—habitual alertness in seeing and noting for necessary action unsightly, unsafe, or unsanitary conditions and other indications of needed cleaning or maintenance work wherever they occur.
3. Understanding of the interrelated needs and priorities involved in housekeeping and janitorial activities: cleaning and sanitation; safety; appearance; and results desired by management.
4. Foresight and judgment to plan, lay out, and organize cleaning tasks, projects, and schedules so as to obtain results economically and efficiently; with optimum balance of needed and desired results in all areas consistent with available resources.
5. Skill in promoting teamwork and cooperation among subordinates.
6. Flexibility and willingness to learn, adapt to, and apply new and changing methods, requirements, and priorities.
7. Physical ability to climb, bend, stoop, move furniture, and perform sustained physical activity.
8. Reading skill sufficient to understand a variety of written instructions regarding equipment operation and maintenance, safety rules, work standards and schedules, etc.
9. Knowledge of safety considerations and precautions necessary for housekeeping work.
10. Knowledge of the proper operation and care of floor scrubbing and polishing machines, household and industrial dry and wet-dry vacuums, power sweepers, and other mechanical equipment used in assigned housekeeping and related responsibilities.

In addition to these specific qualifications, the principal and/or school district administrators interviews and checks references of applicants with other characteristics in the forefront. For example, the ideal custodian will also have

- No criminal record
- Excellent health and clean appearance

- Superb work ethic and a sense of responsibility
- An understanding of good sanitation practices
- Comprehend cleaning techniques
- A valid driver's license for the state of employment
- Acceptable language habits
- Good people skills and be able to work cooperatively with others
- Knowledge about school facilities operations
- A willingness to be trained or re-trained, if experienced

Above all, the ideal custodian will understand and respect students and teachers. The ideal chief custodian should possess all of these characteristics.

One important individual in the custodial force is the person in charge on evening and night custodial duties. Johnson (2000, pp. 12-13) outlined a job description for this individual:

Night Foreman

Function: Under the general direction of the head custodian, the night foreman is responsible for the night operation of the physical plant.

Characteristic Duties and Responsibilities:

Supervises the night cleaning shift.

Performs cleaning duties.

Carries out daily and scheduled housekeeping duties as required.

Executes security and fire hazard checks and advises the appropriate supervisor as required of emergencies arising during his or her shift.

Inspects school daily to ensure it has been cleaned to required standards.

Prepares for school rentals and acts as the Board's representative to ensure that Board interests and policy are safeguarded during these rentals.

Handles related duties as required. These may vary in different schools.

Qualifications:

Education-high school graduate, or equivalent desirable.

Two years as a custodian desirable.

Supervisory ability.

Ability to communicate with persons at all levels in the school community.

Policing-Evening Shift Custodians:

These daily policing activities may be performed by the Night Foreman or another member of the custodial staff:

Reports to the head custodian for instructions.

Checks all classrooms to ensure they are secure and that windows are closed (particularly important in winter to prevent freeze-up)

Lowers flag at sunset.

Checks areas periodically where rentals are taking place, to ensure that the school property is protected.

Spot checks the school, particularly when part-time custodians are being used, to

ensure cleaning is up to required standards.
Inspects mechanical equipment before leaving to ensure that heating and ventilation systems are operating.
Ensures that all doors are secure before leaving.

The job description for a Custodian I (ASBO, 1981, p. 17) was:

Custodian I

Function: Under general supervision, the Custodian I assists in cleaning the physical plant, classrooms, and other areas.

Characteristic Duties and Responsibilities:

1. Perform a scheduled housekeeping duties as required
Assumes specific housekeeping duties as required.
 - Vacuuming and cleaning offices
 - Dust-mopping floors
 - Dusting
 - Cleaning washrooms
 - Cleaning board offices and committee rooms
 - Setting up board rooms and committee rooms as required
 - Cleaning spots on tile floors
 - Cleaning glass as required
 - Damp-mopping washrooms
- Carries out related duties as required

Qualifications:

- Eighth grade education desirable
- Some housekeeping experience

Given the complex nature of much of the custodial work today, it is imperative that the school principal and school leaders understand that custodial training classes are as important for the custodial staff as in-service classes are for the teachers. Larger school systems will offer training classes periodically and the principal is expected to expect the custodial staff to attend these important sessions. For example, many school systems and private firms offer classes on issues such as hazardous chemical orientation, asbestos awareness, and procedures for preventing infectious disease.

Student Care of the Learning Environments

The students who attend the school could perform many custodial activities and develop a sense of ownership for the learning environments. This is a reasonable expectation if we assume that part of the school curriculum should be instruction in values such as cleanliness, orderliness, respect, ownership, and responsibility for property. Such a change in American culture would be positive if we could get parents and educators to view student participation in custodial activities as components of the "values curriculum."

One example of students working to maintain and clean the school may be found at the Athens Montessori School, Athens, Georgia, a private school founded on the Montessori and constructivist philosophies. Students attending this outstanding school participate in recycling, cleaning floors, cleaning doors and windows, dusting, washing and

drying cleaning cloths, and cleaning all the toilets. The toilets are conveniently located within the learning areas and are exceptionally clean and odor free. The students perform all of the custodial services at this school and a professional custodial service cleans the school only twice weekly. This is a money-saving management practice as well as a positive learning experience.

The teachers and headmaster at Athens Montessori School find the custodial activities for students to be extremely important in the educational program. Students take ownership for their own learning in Montessori, they also take ownership for care and of the indoor and outdoor learning environments. When students take on a custodial role in the school they learn to respect materials and property and care for things – a significant deviation from what we observe in many schools around the world.

Other public and private schools might consider establishing a value's curriculum that includes custodial services provided by the students. This move would question all of the equations and formulae now in existence under the assumption that "students do nothing" and require a new approach to custodial services.

The Principal's Role in School Maintenance

According to Maciha (2000), the maintenance of school facilities is challenging, rewarding, and frustrating; and, above all, a disciplined maintenance program is essential for long life of the school. "Too often the school leadership cries 'lack of funding' when the root cause is more accurately a lack of maintenance discipline. Maintenance properly addressed is a fraction of the cost of deferred maintenance" (p. 1). Generally maintenance employees are between 20 and 35 percent productive because of poor maintenance management (Wireman, 1994). Immediate attention to maintenance needs is important and a school system policy of "zero tolerance" for maintenance defects is imperative. The mission of the school maintenance program should be to sustain the physical learning and play environments so that future generations can enjoy the educational process in a setting of adequate function and physical appearance (Maciha, 2000).

School maintenance begins while the school is in the planning and design phases through such actions as selection of the school site, materials, wall coverings, floor coverings, light fixtures, windows, width of hallways, and mechanical equipment. Maintenance personnel should be involved in the planning and design of the school. It is in the design phase that far-sighted maintenance personnel can have the greatest impact on future maintenance costs in a school. After construction has begun, the likelihood of making changes to improve maintenance decreases. During construction, Maciha (2000) recommended that maintenance personnel should have access to the building site to view items such as conduits and piping that will be concealed once the construction has been completed. It is a sound policy to employ the school principal during the school's planning and design phase so that he or she can also make frequent site visits during construction to learn about maintenance features.

Highly organized school systems, according to Kowalski (1989), distinguish between tasks that are to be performed by the school district maintenance staff and those to be performed by the school custodians. If union contracts exist, then there are usually boundaries for work assignments. This places the school principal in a position to find out

exactly what responsibilities school custodians can and can not perform to address the needs of the school. When these union controlled jobs are known, the principal may work to establish differentiated assignments for custodians. For example, one custodian may be responsible for removing trash, maintaining floor surfaces, cleaning toilet floors, and ground maintenance, while another may be responsible for cleaning toilet fixtures, cleaning windows, mirrors, walls, dusting, inventorying custodial supplies and equipment, and maintaining equipment.

Regardless of union contracts, the school principal must deal with an elaborate system of policies and procedures concerning various aspects of the maintenance operation. For example, general maintenance, building maintenance, mechanical and electrical, plumbing, appliances and refrigeration, and re-occurring maintenance are some of the possible departments that may exist in a large school system. The Spring Branch Independent School District (SBISD), Houston Texas is an example of such an elaborate school maintenance organization. Each department has a designated Internet link in the SBISD web page and offers on-line ordering of services. To illustrate how detailed the maintenance department may be and how helpful it can be for the school principal, consider SBISD's on-line guidelines for approved planting flower gardens for butterflies and hummingbirds. The principal and teachers should regard this effort as a direct tie to the school's curriculum. This particular department also offers policies and procedures for pest management, a planting guide, a shrub guide, and a tree guide - many technicalities that coordinate with the outdoor curriculum.

Whether the school system is large or small, the principal should be aware of minor maintenance practices that may be performed by the custodial staff or system maintenance workers. The school principal should also be aware of professional organizations that work with custodians and maintenance personnel, for example the National School Plant Management Association (<http://www.nspma.com/>) and the International Executive Housekeepers Association (<http://www.ieha.org/>).

The amount of maintenance to be performed by the custodial staff usually varies according to school district policy and size of the school district and their expertise. According to Baker and Peters (1963), custodians should have all the tools necessary to operate in an efficient manner. Because the replacement of damaged school equipment is costly, it is desirable for custodians to perform minor maintenance duties and to take care of all the tools and equipment issued to them. It is highly desirable that the school principal should have a working knowledge of general needs related to maintenance and simple strategies for caring for tools and equipment. To this end, Baker and Peters (1963) provided some suggestions for caring for tools:

1. Always hang a hair broom up – never allow it to rest on the bristles.
2. Never use hair brooms in water or on a wet surface.
3. Hang dust mops up.

When finished with a scrub machine, clean the machine, including brush and electric cord. Never leave the brush on the machine – hang it up.

Clean and dry tanks of the vacuum pick up.

It is well to mark all tools in your possession so that they might be identified.

Each custodian should always carry a putty knife, pliers, and a screw driver to do minor maintenance and furniture repair. (p. 188).

The Association of School Business Officials (1981) also offered suggestions for the care of housekeeping equipment. For example, ASBO suggested that dust mops should not be used on oily floors; and when soiled, the mop head should be washed and rinsed thoroughly. It should be hung up, with the head not touching the floor, when not in use. Regarding floor machines, ASBO recommended that the machine should rest on its wheels instead of the brush; and the solution tank and its lines should be emptied and cleaned before storage. Never leave the brush on the machine when storing the machine. The mop bucket and wringer should be cleaned after each day's use. Rotating the brush on a push broom helps extend its useful life. Squeegee blades should be dried after each use and stored out of direct sunlight. Vacuums, wet or dry, should be emptied after each use and the tank should be cleaned with a disinfectant solution on a monthly basis to minimize the growth of algae and bacteria. Wet mops, the sources of many offensive odors in the custodial closet, should be hung to dry so that they may drip into the sink or drain and not touch the wall or other objects. Good ventilation in the custodial closet minimized odors from drying mops and other cleaning materials and supplies.

School principals and administrators should treat maintenance of the school building and grounds as continuous and also understand that it too is an important part of the school program. Without adequate maintenance, the educational program will eventually begin to diminish. Since the school principal is responsible for all activities within the building, what should he or she expect of the custodial staff? While it would be impossible to list all the minor maintenance jobs the principal might expect custodians to perform, Baker and Peters (1963) have identified a basic list of jobs:

1. Fix loose screws in tables, chairs, doors, etc.
 2. Install pencil sharpeners and map rails.
 3. Regulate, externally, classroom thermostats (head custodian only) after approval of principal.
- Set up occasional tables and chairs.
Replace faucet washers.
Adjust drinking fountains.
Oil hinges.
Make minor repairs to custodial machines.
Re-varnish table tops.
Water lawns and shrubs.
Clean stopped traps and drains.
Clean grease traps. (pp. 188-189)

Other related jobs of the custodian might include the servicing of sagging doors and repairing them as needed; and checking exterior locks and repairing or reporting any problems or failures. It is also important for the custodian to check door-knobs to ensure that they are turning and that the latches are working properly.

Keys can be a problem. It is highly desirable that original key blanks be used when duplicating keys. This ensures a good fit and helps eliminate the breaking of keys in locks. In the interest of safety the principal and the custodian should keep fire exit doors in good working order by checking latches and servicing them periodically.

Other custodian jobs may include the cleaning of light fixtures regularly and replacing lamps. The custodian may also perform maintenance on lighting fixtures. For example, globes may need replacing and fixtures may need tightening. Unless trained and licensed in the use of electricity, it is not safe for the school or the custodian to engage in major electrical wiring repair.

Like electrical, school policy varies regarding the amount of plumbing duties permitted by custodians. Size of the school and district, influence of unions, and location of the school district influence this activity. However, minor plumbing maintenance is expected in most school systems. For example, flush valve repair is often needed and this activity may require some special training. Custodians are frequently asked to adjust the flow of water at drinking fountains, lavatory sinks, and faucets. This may be accomplished by a regular "flat head" screw driver or an Allen-head wrench. Some modern plumbing systems even require other special tools furnished by the maker of the plumbing appliances. This is usually a strategy to prevent students from adjusting the flow of water with more common tools. Other plumbing maintenance jobs include faucet washer replacement, toilet seat replacement, and the cleaning of stoppages in traps and toilets. Such tools as plungers, force pumps, and augers are required for these jobs.

Fire Prevention and Protection

Most fires are caused from improper maintenance. The school principal and custodial staff should be on guard against the build up of rubbish, the storing of oily cloths used in cleaning, and improper storage of flammables (paint, paint thinner, and gasoline or diesel for lawn mowers). The most effective way to fight a fire is prevention; and of all the mechanical devices used in the maintenance of a school, fire alarms are most critical because they deal with life safety. The school principal should be aware of needed maintenance and repair of fire alarms and ensure that frequent mechanical checks be made on these life-saving devices.

Knowing which fire extinguisher to use in case of fire is vital. First, the custodian, principal, and the teachers should know the classifications of fires. A Class A fire involves the burning of wood, trash, paper, plastics, or cloth, for example. A soda-acid extinguisher is appropriate for putting-out a fire burning these items, or just forcing water on a Class A fire will contain and eliminate it. The Class B fire involves the burning of oils, paints, grease, gasoline, and other flammable liquids. Foam extinguishers having water and aluminum sulfate to blanket an area are effective against a Class B fire. The Class C fire involves electrical wiring and may be extinguished with carbon dioxide and dry chemical extinguishers. If an electrical fire erupts, quickly turning off the power source will be beneficial. Hence, the school principal must know where the school's main breaker is located and be able to quickly turn to power off. A Class D fire involves the burning of metals, potassium, sodium, aluminum, and magnesium and could possibly occur in a laboratory. A special extinguishing agent such as Metal-X and foam are suggested to fight

a Class D fire.

Dry chemical extinguishers extinguish a fire by coating it with a thin layer of dust (fine powder made primarily of monoammonium phosphate and pressurized by nitrogen), separating fuel from oxygen in the air. The powder also works to interrupt the chemical reaction of a fire. A fire extinguisher filled with the dry chemical solution is designed to use on Class A, B, and C fires and a standard blue and white label also indicates the types of fires for which the extinguisher is designed. Proper maintenance and service of fire alarms, just as for fire extinguishers, are vital to the safety and security of the school climate.

Johnson (2000) has provided chart and maintenance schedule for portable fire extinguishers. (p. 85) It includes effectiveness ratings of various fire extinguishers, models, discharge range, and suggested service schedule for nine types of fire extinguishers. When checking a fire extinguisher, it is important to inspect the nozzle for operation and obstructions, determine if seal or tamper indicators are in place, read pressure gauge to determine if it is satisfactory, and ensure that the instructions are legible and face forward.

Some major points for the school principal to consider are that the fire extinguishers are conspicuously located and readily accessible in case of fire. The extinguisher should be set on a shelf, bracket, or hanger, and be approximately four feet (1.1 meters) from the floor. It must have an inspection tag attached, showing maintenance or recharge dates and the signature of the person or service agency that performed the service. Defective extinguishers must not be allowed to remain in service

Mechanical Crafts and Maintenance

Recognizing the contributions made by the mechanical crafts in the schools is important. This unit is responsible for maintaining the air climate in school facilities. It is usually responsible for all the electrical power equipment between the power service and the individual outlets in the classroom. If the clock & bell systems are not working properly, then the school day is disrupted and learning may be diminished. It is vital to school operations that clocks and bells be maintained, this is usually the job of a centralized staff, but the principal and the custodian might also monitor the effectiveness of this service and suggest upgrades and as they become affordable and feasible.

Custodial Closet

The school principal should have some basic criteria to evaluate whether or not the custodian has access to an adequate work-station, the custodial closet. It should be located in a place central to the duties of the custodian and have storage space for tools, equipment, supplies, and materials. Figure 26.2 illustrates a custodial closet having sliding pocket doors. This design allows for more convenient storage and removal of carts and buffing equipment. It also represents a safety feature since the pocket doors do not swing outward into the hallway. The utility sink may be located in the center of the closet or a corner and mops may be hung from the upper shelf directly over the sink. The height of the closet should extend above the normal ceiling height and into the attic area for additional ventilation. The closet may serve as an entry way into the school's attic area.

Priorities and Checklists for Preventive Maintenance

One way to view maintenance is that all school maintenance is preventive. However, preventive maintenance (PM) has found a special place in the literature as evidenced by authors such as Maciha, (2000); Castaldi (1994; Kowalski, (1989); and Davis, (1973). An organized PM program for scheduled routine maintenance tasks is necessary for protecting the public's interest. Also encouraging and allowing the school principal to discover and report maintenance problems as they arise are quintessential. Communications between the central maintenance administration, the school principal, and school custodians are essential. Principals should have the authority to identify and report maintenance needs that are outside the regularly scheduled routine maintenance procedures. Furthermore, the central administration should provide the school principal with the routine maintenance schedule to keep him or her informed about various activities that are planned for the school property. Information sharing cannot be overemphasized, especially for activities relating to the servicing of alarm systems, clocks, fire extinguishers, other safety

equipment, and air filtration systems. One quick way to test how much information sharing takes place in a school organization is to ask the school principal when a certain system was serviced. If the principal knows, then the school system is probably following good communications policy. Furthermore, if the school principal knows where the systems are located and also knows how to check them, then we may assume that an awareness of the total school environment is encouraged by the central administration. Having a principal with such skills and knowledge is a positive influence on the school and its occupants. A school system allowing two-way communications and participation is ideal.

One major issue that the principal must deal with daily is safety and security systems. This includes such items as metal detectors (in some schools), fences, special doors, alarm systems, security officers, dog patrols, monitoring systems, and lighting (or the lack of lighting). Maciha, (2000), has prioritized PM procedures as follows: Life safety, overall safety, regulatory requirements, known requirements, equipment life cycle, energy efficiency, and other. (p. 18)

Monitoring is the key to prevent deterioration and malfunction. The core of PM includes routine inspections and immediate service or repair. A detailed PM checklist is provided in the work entitled Preventive Maintenance Guidelines (Maciha, 2000). Upon purchasing the book, electronic versions of the various checklists may be retrieved from <http://www.rsmeans.com/supplement/schfacil.html>. Topics dealt with by the checklists include:

Asphalt	Kitchen and Dining Areas
Auditorium	Landscape
Automatic Gates/Doors	Library
Alarm Systems	Lighting: Exterior and Interior
Back-Flow Devices	Locker Rooms
Business Offices	Maintenance Carts
Classrooms	Non Power Gates
Doors and Windows	Playgrounds
Electrical Systems	Restrooms (Toilets)
Exterior Stairs, Decks, and Landings	Roofing
Emergency Generators	Security Systems
Fences	Sewer Laterals
Fire Alarm Water Flow Testing	Signage
Fire Extinguishers	Smoke Alarms
Fire System Certification	Structural Members
Gas Connections	Special Requirements
Gutter/Roof Drains	Storm Drains
Gymnasium	Swimming Pool
Hot Water Heaters	Tennis Courts
HVAC Systems	Track and Field Areas
Irrigation controllers	

While it is unlikely that the school principal will have a detailed working knowledge of all of these areas, it is important for him or her to understand the need for PM in these

areas. The principal should learn about some of the most important areas, especially safety and security. For example, the school principal should know the items on the smoke alarm deficiency checklist. They include Batteries, Connections, Housing, Mounting, Overall Operation, Overall Condition, and Other (Maciha, 2000, p.154).

Another area the school principal should have special interest in is the classroom. Maciha (2000) details the classroom PM checklist as follows:

Fire Safety

- Electrical outlet Load
- Positioning of paper/flammable materials away from heat sources
- Accessible route
- Emergency exit visibility

Furniture: desks, chairs, tables, and shelves

- Surface conditions for deficiencies such as excess wear, rough areas, or protruding hardware
- Part conditions
- Cleanliness
- Stability
- Overall Condition

Teaching module

- Task lighting condition
- Lectern location and condition
- Overall condition

Blackboard/dry-erase board

- Mounting condition/stability
- Overall appearance
- Cleaning capability
- Overall condition

Audio/visual equipment

- Overhead equipment condition and stability
- Housing condition
- Electrical Service Condition
- Part conditions
- Screen operation and condition
- Speaker system operation
- Electrical cord and outlet conditions
- Overall condition

Computer system/modules

- Electrical integrity/surge protector conditions
- Equipment condition
- Cleanliness
- Overall operation
- Work station and member parts function
- Overall condition

Partitions

- Lubrication

Stability

Overall condition for deficiencies such as excessive wear, vandalism, improper function, or broken/missing parts

Flooring

Service condition for deficiencies such as excessive wear, vandalism, improper function, or broken/missing parts

Plumbing systems

Sink conditions and drainage

Overall condition for deficiencies such as leaks, corrosion, or failure potential

Trash receptacles

Location

Cleanliness

Overall Condition

Inter-class speaker system operation

Clock Function

Closets/storage areas

Door/lock operation

Appearance, interior/exterior

Overall condition for debris and safety hazards

Wall map function and general condition

Panic button/security operation

Fire extinguishers (see also annual inspection of Fire Extinguishers)

Tag currency

Placement in correct proximity to potential hazards per code

Housing condition

Hose condition

Overall condition

Other (pp. 100 – 102)

Conclusion

Custodial care and maintenance of the school are areas of concern for school principals and they should be informed about the details of these vital services. Once the physical environment has been recognized as an extension of teaching and learning, we can expect to see improved test scores, better student behavior, and an appreciation for school as a place – a community asset.

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Electronic References

These references are suggested as an entryway to a wide variety of interests in school M & O. Because web sites often change addresses, it may be necessary to complete a search for some of these references by name.

Association of Higher Education Facilities Officers
<http://www.appa.org/>

Association of School Business Officials
<http://www.asbointl.org/>

International Executive Housekeepers Association, Inc.
<http://www.ieha.org/>

International Sanitary Supply Association
<http://www.issa.com/>

National Clearinghouse for Educational Facilities

<http://www.edfacilities.org/index.html>

National School Plant Management Association

<http://www.nspma.com/>

Preventive Maintenance Guidelines for School Facilities

<http://www.rsmeans.com>

Suggested Learning Activities

Individual or Team Activity: Select a school (perhaps the school where you work) and determine its capacity by using the following formula: $BC = (TS \times DS \times T \times E) / PP$.

Individual Activity: Determine the number of custodians needed for a school with 28 teachers, 550 students, 30 classrooms, 57,000square feet of assignable area, a cafeteria and kitchen, and 8 acres of upkeep grounds.

Individual or Team Activity: Develop a job description for a Relief Custodian according to the following format:

Function: The person performing this job may relieve the Custodian I or II, Head Custodian or Night Foreman in any school regardless of size. This person also performs other duties as assigned when his or her services at the higher level are not required and may be a retired person or one that is seeking the job of Custodian I or II, Head Custodian or Night Foreman.

Salary:

Characteristic Duties and Responsibilities:

(Develop a list)

Desirable Qualifications:

(Develop a list)

Individual or Team Activity: Outline a Job Schedule for the following positions:

a. Middle School: Custodian I Hours: 6:30 a. m. to 3:30 p. m.

<u>Time</u>	Area to	Sq. Ft.	Description	
M.	Perform Duties			of Work
6:30 – 7:00				

.
.
.
11:30- 12:30 Lunch Break

P. M.
12:30 –

.
.
.
3:00 – 3:30

b. High School Head Custodian Hours: 7:00 a. m. to 4:00 p. m

Team activity (A chat room may also be appropriate). Brainstorm a list of the activities that might influence the workload of a school's custodial staff.

Team Activity (A chat room may also be appropriate).. Brainstorm a list of the 15 most important "things that the school principal should know" about school maintenance and operations.

Individual Activity: Go to your favorite search engine on the Internet or a major library and key in key into an electronic search device such words as school maintenance, school custodians, or other words related to the maintenance and operations of a school. Reviewing the results of such a search will enlarge your perspective of this vital and ever changing part of school operations and make you aware of current information and activities in this field. List at least two sites or references related to topics in the chapter that are not in the electronic reference list or set of references.

Individual Activity: The National ClearingHouse for Educational facilities provides numerous references for school maintenance and operations. Go to <http://www.edfacilities.org/> and conduct a search on school maintenance. Conduct a separate search at this web site for school custodians. List and describe four references that relate to this chapter.

Individual Activity: Find a source such as R. S. Means determine maintenance schedules and preventive maintenance check lists for schools. Develop a checklist of a P M area of your choice and a brief report of your findings.