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ABSTRACT

This document provides a case study of the renovation of Johnson-Williams Middle School in Clarke County, Virginia. Chapter 1, "Planning and Designing a School Renovation," describes considerations for measuring the quality of a school renovation project, including its value to users and its imapct on learning. It summarizes the research methods and rationale used in this study of the renovation, presents the condition of the school prior to renovation, and articulates the planning phases of the construction processes. It concludes by delineating the projected outcomes and expected benefits of the renovation project to its stakeholders. Chapter 2, "Undertaking the Construction Process," discusses the guiding principles of the project and the punch-list phase of construction. Chapter 3, "Outcomes of Renovation," discusses the results of the renovation in terms of industry standards of renovation quality, user perceptions of facility quality, changes in social interactions and school relationships, and student achievement outcomes. The concluding chapter provides thoughts on educational facilities research and implementing school renovation. Appendices contain a list of the primary sources and architectural plans of Johnson-Williams Middle School. (Contains 102 references.) (EV)

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RECONSTRUCTING SCHOOL RENOVATION: A Study of the Renovation of Johnson-Williams Middle School, Berryville, Virginia

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James B. Tuttle II, Ph.D.
Thomas Jefferson Center for Education Design

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RECONSTRUCTING SCHOOL RENOVATION:
A Study of the Renovation of Johnson-Williams Middle School, Berryville, Virginia

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Volume Six in the
Building Blocks to Better Learning Series

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Chapter 1: Planning and Designing a School Renovation

Overview

There are two design processes at work when renovating a school. First, the architectural plans must be developed, and then the blueprints must be implemented. Enacting construction plans within the constraints of a school in session poses additional challenges. Many stakeholders need to be included in the design process. Occupants need the facility to be operational. Without careful planning, continuous communication, and strong leadership, the process of renovating a school can be highly disruptive for teachers and students. Work must be carefully scheduled and executed efficiently in order to maximize the productivity of various groups. Funding is often difficult to secure and may fluctuate once construction has started. Many school functions require full access to the building. Rushed, compromised, or omitted work may result if everything is not skillfully orchestrated. Achieving a successful school renovation is a difficult task that requires developing a carefully coordinated plan that involves stakeholders and construction personnel over a substantial period of time.

The purpose of this chapter is to describe considerations for measuring the quality of a school renovation project, including its value to users and its impact on learning. The chapter begins by summarizing the research methods and rationale used in this study. It presents the condition of the school prior to renovation and articulates the planning phases of the construction processes at the site: Johnson-Williams Middle School in Clarke County, Virginia. The chapter concludes by delineating the projected outcomes and expected benefits of the renovation project upon its stakeholders.

How can we best measure the value of a school renovation?

It is difficult to accurately and comprehensively measure the value of a school renovation to a community, since educational benefits are difficult to quantify. Contractors (as well as taxpayers and their elected or appointed representatives) have traditionally measured the

quality of a school renovation based on three principles: time, budget, and quality. These are limited measures because they do not address the larger question of the *educational* value of the renovation.

Educational researchers have attempted to address this problem by drawing correlations between building quality and standardized test scores. Because of the host of variables involved in the complex relationship between building quality and test scores, linear comparisons of cost and test scores are spurious (see Tuttle, 2001). Previous research has been largely retrospective. Quality measures of school renovations and achievement scores were collected after, sometimes long after, construction was completed. This study benefits from having been conducted concurrently with the renovation. Categories for assessing value were identified before the construction began. Data were gathered before, during, and after the completion of the project.

A mixed method approach was used to assess the renovation. It yielded two advantages, as compared to previous studies. First, research and construction happened simultaneously, allowing the renovation to be studied in much greater detail. Also, by patterning this study after the collaborative model put in place by renovation project leaders, this study was more comprehensive than previous studies. It allowed for measurement not only of performance, but of various perceptions before, during, and after the renovations were completed (see Appendix A for a complete description of primary sources).

How is leadership identified?

Clarke County Public School (CCPS) superintendent Eleanor Smalley began the planning of the renovation project by contacting VMDO Architects of Charlottesville, Virginia. VMDO specializes in building and renovating educational facilities. Throughout the project, the architects and school superintendent remained at the center of the planning team. Architects at VMDO noted, "We are the architects and designers of the renovation, but I think it started even before then in program determination. We tried to help [CCPS] determine

One of the aspects that makes any school good is its sense of community, its sense of itself, and there's nothing that fosters that community sense of school like the participation in the creation of it. So if you're there during construction and you're involved in the decision, you have ownership in it and that makes that bond. That, I think is so critical for the spirit of the school. It's hard to say exactly how that translates within each of the educational pieces. But, the faculty of the schools that have had input are more likely to be successful in your school because they understand why it was done that way and how to use it. It was astounding to me how many times you look at a school building, and it's obvious that somebody had something in mind when they designed something, but the people using it don't have a clue or just missed it, or whatever, so they wind up working against the way it was all laid out to be used. I think by having that kind of involvement, and that participation, that changes that whole dynamic completely. Particularly in a renovation, where there are a lot of decisions going into the design of the school; in a renovation there are millions of decisions and millions of compromises, and then once you get into the process there are going to be many issues that come up. Getting people involved in the process helps.

~Mr. Robert Moje, VMDO

what they needed to do to the building to bring it up to date, not only in terms of capacity but in terms of educational offerings that we were trying to help them achieve within the budget that was available to do so." From the outset of the project, the core project leaders mapped out the necessary architectural changes and communications network among the stakeholders. During this initial planning phase, the construction management firm, SPN, was hired because of their experience in renovating hospitals while occupied and in use.

Who will be included in designing the renovation?

Multiple individuals and groups effect or are affected by a school renovation, yet too often many of these voices are never heard. Traditionally, renovations are designed by architects and enacted by contractors without input from the users of the school facility. Those served by the renovation are teachers, students, administration and building staff. When their input is ignored, renovations may not meet educational needs.

In the first phase of planning the renovation of Johnson-Williams, Clarke County school leaders identified multiple constituent perspectives. They then developed communication channels so these individuals and groups could become collaborators both in the design and execution stages of the renovation project. Dr. Smalley noted that, from the beginning, "We had three committees who participated in the design of the renovation. One was a citizens' committee, one was the entire committee, and we had a student committee. Each group really talked about what their interests and desires were, and then VMDO worked with them to develop them into sets of goals. VMDO then took that input and came back to the [school] board with issue proposals. The board listened to the proposals, and they chose based on what they thought was the best proposal." To remain informed about school renovation issues and progress, the Clarke County Board of Supervisors also appointed one of its members as a representative to the School Board during the design phase. This participatory design process provided constant feedback from multiple sources and fostered a community of trust among key constituents.

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I think that one of the things that is really important to have work on any construction site, is that the architect and the construction team work together, and that the owner, the school people, that we work together. And I think that we've had a very good working relationship. The school board allowed us to have the flexibility to make decisions without having to come to them in official meetings. In fact, the school board told us to make these decisions because at first, we were having so many meetings with them till we earned their trust. But all of that I think goes together to make a good working relationship. Everybody was getting along okay, and the give and take was helpful.

~ Dr. Eleanor Smalley
Superintendent, CCPS

In addition to items on the needs assessment, one big factor was working with the faculty and the students throughout, discussing different ideas in the design phase, from outlandish ideas like Star Wars battle stations, to whatever. But all those things had influence on the project—getting them involved and getting different pieces of it, down to art students painting on the construction barriers, sort of decorating them for the time of the construction, and doing other things that were part of the construction.

~Mr. Moje

The following groups became active participants in the planning and construction stages of the renovation: students, teachers, staff members, and Johnson-Williams administrators, parents of children at the school, community members (whose taxes financed the project), the Clarke County school board, and the county's board of supervisors. Project leaders frequently gathered input from these parties, and kept them abreast of the costs, schedules, and options available during the renovation phases.

Many ideas from representative groups were present in the final design. Administrators and faculty decided to cluster students, especially 6th graders, by grade level within the school. Students selected the hall and floor tile pieces and color patterns. Art students created individual tiles to be showcased in the school's new gallery, which included the new art room. According to the architects, "The whole notion of the big gallery in front is a response to basic student concerns about it being crowded and there not being a place for students in there, and the whole point of that is to provide a social space for the students every day as they enter the building and exit the building, a place where they could display their work and not just be forced through corridors right to where they start their day." Space requests made by faculty were incorporated into the design. According to Mr. Catlett, the principal, "The first thing we wanted to do was to maximize the number of classrooms we could get, so we wanted to be very efficient with the use of space—that's first and foremost, we need more classrooms. But along with that, we wanted to leave open some convertible space in the gallery and in the cafeteria."

Interviews with teachers indicated that most felt included in the process, especially in the design and early construction phases; one teacher perceived less involvement and some miscommunication after renovations had begun. One teacher reported that she periodically talked with the construction workers to understand the exact time frame for phases of work on her room. One department head noted that Mr. Catlett and construction management

encouraged teacher input even when changes were made to original plans: "Mr. Catlett would come to me; I in turn would ask the teachers in my department: should this be here, or should this be there? I would give him input, and as far as I know that was passed on, and a lot of those things I see in the building."

How can we assess our current facilities?

Clarke County Public Schools identified the need to renovate the Johnson-Williams Middle School in its Capital Plan for a period of ten years before construction began. The CCPS Capital Plan identification was enhanced by a needs assessment commissioned by CCPS and conducted by Samaha Associates in 1998. The Samaha report listed six "space addition and modification" recommendations and twelve "system upgrade and modification" items. In all, their recommendations addressed every area and physical plant system in the building.

"The need for renovation clearly was identified based on the needs of the students."
The population at Johnson-Williams had outgrown its outdated facilities. The Samaha report recommended the modification of existing spaces and the addition of approximately 24,500 square feet to meet projected student enrollment in 2010. More importantly, there was insufficient space for conducting the school's primary business of teaching and learning. According to Mr. Catlett, "Our building was strapped to capacity, we were teaching out of closets, we had high class sizes, we'd run out of space for our specials like music—band and chorus—we were using every available space, and needed to expand." The Samaha report also made the following area-specific recommendations:

- Renovate and expand administration, guidance and clinic offices.
- Expand cafeteria to seat 350 students, and renovate cafeteria to include a kitchen.
- Expand gymnasium locker rooms and renovate lockers, toilets and showers.

- Convert the maintenance shop to science labs; add additional core and core support classrooms.
- Expand media center and art space.
- Add a new music room.

"It's a battle every single period, every single day for me to find equipment, to find my materials. I don't have enough cabinet space, and what there is, is too cramped. Because I also don't have enough floor space, I push my tables where the students work against the walls, which have my cupboards and cabinets with drawers. If I need to get something in the drawer, I have to have the students get up, move away from the table, and help move the table away from the wall. I go in, get the one item that I need, and then we put the room back the way it was. Then we do it again on the other side of the room. It's insane."

~ Art Teacher

The following were observed and documented instructional limitations of the school facility prior to the renovation. Grade level clustering within the school was precluded because of the space crunch. Some specialty classrooms, like art, were too small; others were large enough but lacked hot water, room dividers, or adequate outlets. The band met in the auditorium, and traffic through the area, combined with a shortage of storage space, frequently caused damage to the students' instruments. The physical education locker rooms had minimal climate control, inadequate locker space, and insufficient privacy. Book bags were banned from 7th grade classrooms because the rooms were too small and people kept tripping over personal belongings. Students were required to leave their bags unattended in the hall during class.

"The standards say students will investigate and explore...and I don't always feel that we're able to do adequate labs."

Due to equipment and safety requirements in science classes, the laboratory facilities were in particular need of repair and upgrading. The small class spaces resulted in cramped working conditions and increased the danger of accidental chemical spills. Each laboratory had only one sink, some produced hot water only sporadically, while others had no hot water at all. Additionally, some laboratories had no gas or eye wash stations. The classroom laboratories had no exhaust hoods either, and teachers noted that this had caused problems with volatile compounds. It severely restricted the types of demonstrations and experiments that could be conducted.

Some science teachers were limited in other ways. One teacher had to travel around the school because he did not have his own room. He never conducted science experiments because his students did not have access to gas and, hence, could not use Bunsen burners.

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Consequently, his students faced difficulties meeting state science assessment standards.

"I think it would be a real problem if we ever tried to upgrade."
Johnson-Williams was unable to upgrade its technology not only because it lacked the equipment, but also because it lacked the infrastructure to run it. Technology had been installed at the school in piecemeal fashion and the instructional technology director for the county indicated that there were serious limitations in the school. The Samaha report recommended new data and T.V. cabling systems, and systems upgrades. The school used outdated computer units. All the computers were operating with 286, 386 or 486 processors and were "reaching the end of their operational lifespan." The lack of computer facilities denied both students and teachers the opportunity to explore current software, platforms, and websites.

"We were in a building that was opened in 1954, and had undergone some expansion, but no real renovation."
Photos taken of the school in the spring of 1999 revealed many of the physical plant's deficiencies. The Samaha report recommended the following system upgrades:

- Improve and expand parking, parent drop off and bus loading areas.
- Install new roofing and related components.
- Install a new heating, ventilation and air conditioning system, and modify existing boilers.
- Design and install new energy management system.
- Install new water service for complete sprinkler system and new water recirculation system, a new fire alarm system, and new electrical service and distribution.
- New hot and cold water piping.
- New lighting and power receptacles.

Student and teacher interviews showed that room temperatures and ventilation were difficult to control. Unique access, ventilation, temperature, and lighting problems were present in "the dungeon" -

a basement computer lab whose only door opened to the outside of the school - and the in-school suspension room that was accessible only through the computer lab.

"Technically, I think we're out of compliance."
In its 1998 report, Samaha Associates recommended that CCPS "upgrade the building to meet ADA [Americans with Disabilities Act] and applicable building code requirements." Mr. Catlett noted that the school "had safety issues, and we clearly had ADA issues—we needed accessibility for the handicapped." Johnson-Williams also contained hazardous materials such as asbestos, which needed to be removed from walls and ceilings. The school also tested positively for both lead and PCBs from samples taken from around windows. The Samaha report also recommended the replacement of the school's existing steel windows.

In addition to ADA compliance issues and the presence of hazardous materials, Johnson-Williams had safety issues related to the age of the building. "It was a dirty building: floor tiles were cracked, and ceiling tiles were falling. The condition of the building had been neglected over the years, and it was long overdue to clean up the space and make it presentable for kids, " said the principal.

There were also safety and health issues resulting from the school's lack of a cafeteria. Hot food had to be transported to the school from Clarke County High School, and dirty utensils had to be sent back to the high school to be washed because the cafeteria staff had no access to hot water.

It was evident that the physical structure of the school and its instructional capacity did not meet the needs of its occupants. Students, staff, teachers, administrators, parents, and community members were aware that the school needed either significant renovation or rebuilding.

Renovate or rebuild?

The decision to renovate or rebuild typically depends on the relative costs, on the perceived value of the school to its community and on the availability of a vacant facility in which to conduct school during construction. For Johnson-Williams, these relative costs were critical to their decision to renovate. The estimated cost was about 8.5 million dollars for renovating, while rebuilding would have cost more than 14 million.

Johnson-Williams was an important building to the community of Berryville in Clarke County. It was opened as the county's high school in the 1950's, and most of the local residents attended the school during their childhood. Survey and interview data indicated that many Berryville citizens felt connected to the building and were aware it needed improvements. Since Johnson-Williams's building was an important symbol to the local community, renovation was preferred to razing and rebuilding the facility.

If you had your choice, you'd move the students out of the building and separate the two so you wouldn't have any disruptions, in a perfect world that's probably your best choice, but often that's not the case, and if you're going to do construction there's going to be some disruption. It's a given, but how do you work with that? So, by working with the faculty and the students through the course of construction, something else is also gained back.

~ Mr. Moje

It is far easier and more efficient to renovate a school while the building is empty rather than occupied and in session. However, the planned renovations for Johnson-Williams were extensive and could not be completed in just one summer. There was no other local building that could accommodate the school's operations. To minimize disruption, it was decided that the renovations would begin in the summer, last through one school year, and be completed over the second summer. Having the construction completed within one year was a crucial goal of the core project leaders. From experience, they believed that extending a renovation into a second academic year would have negative effects on teachers, students and staff.

Given that the Johnson-Williams Middle School was an important community building and because no other building was available in which to house students during rebuilding, it was decided to renovate and to conduct the work while the school was in session.

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That process was actually a negotiation between the school board and the board of supervisors. Essentially the school board stepped forward and said, 'According to the architects it will cost x dollars for renovation.' The board of supervisors refused to approve the amount, so the school board came back to us [CCPS] and said, 'What can we cut? How can we do it differently?' We developed a list of potential things that we could and could not do. The school board then agreed to the new amount. Then we had a joint meeting at the middle school where the subcommittees presented all their findings for what needed to happen. The school board then gave its final amount to the board of supervisors, who voted on and passed that final amount.

~Dr. Smalley

How are funding and community support secured?

Because Clarke County is a rural county with a limited tax base, all expenditures had to be carefully budgeted and justified. In its report, Samaha Associates projected the renovation would cost between 8.5 million and 10.6 million dollars. Securing funding was an arduous and ongoing process, as Dr. Smalley recounted.

Community surveys, interviews, and researcher notes provided evidence of strong community support during the early phases of renovation planning. Community members had the opportunity to offer their support at public hearings throughout the multi-year funding process. Dr. Smalley assessed support as follows: "I think that the community was pretty much for it. Everyone recognized that it was a need."

To help the project stay on budget, construction and project contingency funds were created. Construction contingencies covered unforeseen expenses, such as removing asbestos unexpectedly found behind walls. Project contingency funds allowed project leaders to make elective changes in features, trading one item from the "wish list" for another. The gymnasium and athletic facility improvements, for example, were sizably reduced. An alternative access road that would enhance vehicular traffic patterns and showcase the school's new gallery had to be abandoned. As a result, access to the front of the school is limited to the bus loop. Plans to renovate the school's auditorium also were deleted to reduce costs. The auditorium renovation was later reinstated as a result of a private donation.

What benefits can we expect?

Assessing the value of a renovation entails identifying projected outcomes of the project early in the planning process. Once physical deficiencies at Johnson-Williams were identified, project leaders adopted industry standards for staying on time, staying within budget, and maximizing quality. The expected benefits to the school included improving facility quality, student achievement, and user perceptions.

Facility Quality

All study participants indicated that refitting the school with new wiring, plumbing, heating, air conditioning, ventilation, lighting, roofing, and acoustics systems were important outcomes of the project. It was also expected that re-wiring the school and installing server spaces and equipment would facilitate the upgrading of technology. New computers, funded partially through a state grant, were expected to help students increase their computer literacy. Adding a kitchen and expanding the cafeteria into a multi-purpose room with an auxiliary stage, walls of windows, and new equipment was expected to improve the quality of the lunch experience, enhance health and sanitary conditions, and provide a space for school and public meetings. Adding a chorus room, converting the old library into a large band room, relocating the art room to the entrance gallery, and adding a boys' locker room were expected to improve perceptions of these specialty classes.

Educators hoped that, after construction, expanded course offerings and activities would be available, and students would not have to exit the building to take advantage of specialty classes. The installation of an elevator and more stairways, a special needs self-contained room, and new ramps at entrances were intended to provide access to all school building users, and enable the school to meet ADA compliance guidelines.

Since generations of local residents have been connected to the school, the renovated auditorium was designed to be a community resource. It was expected that parents, grandparents, and other community members – many of them alumni of Johnson-Williams – would feel a renewed connection to the school through the preservation of its auditorium, the only one in Clarke County.

One negative outcome of renovation was anticipated. Expanding the square footage of the school was likely to overload on the custodial staff.

The instructional space clearly has an impact on students and what they perceive is important in their day; however, I think the most important factor in increasing the quality of student achievement is quality teaching and quality teachers. I expect measurable changes every year regardless of the environment because we need to emphasize quality teaching and we need to retain quality teachers. If we do that, we will see changes in student achievement.
~Mr. Catlett, Principal

Student Achievement

Standardized test score often are used to measure changes in student achievement. Some participants expected a temporary decline in scores on state assessments due to the magnitude of the distractions associated with large-scale renovation. The principal expected, however, that scores would go up at the school each year. A majority of community members and parents believed that student achievement would rise once renovations were complete.

User Perceptions

Finally, it was expected that student, staff, administration, parent, and public perceptions of the building would improve after renovations were completed.

Chapter 2: Undertaking the Construction Process

Guiding Principles

Once funding had been secured and facility designs were completed, final plans were made to execute the work. Guiding principles for this process emerged from participant responses and renovation documents: 1) promote communication among participants within the school and in the community; 2) maintain ongoing collaboration and morale; 3) minimize disruptions while optimizing efficiency and safety; 4) encourage flexibility at all levels; and, 5) use the renovation process as a practical educational experience for students whenever possible. As it had been during the design and planning phase of the project, keeping multiple stakeholders involved and informed was a hallmark of the construction phase.

One important issue regarding communication was that we tried to be very up front with everybody in the community from day one. I was walking in, after the summer of 1999, when the kids came back in August 1999; they knew the building was going to be in a state of demolition: no ceilings, exposed piping, exposed duct work, no floor coverings, bare concrete floors, things like that—we were trying to make everyone well aware of that. The people were able to have expectations of the things that were going to happen.

~ Mr. Doug Wrenn, SPN

Connecting Constituents

Establishing and maintaining an effective communications network among school board members, superintendent, architects, construction management, contractors, principal, teachers, students, parents, and community members during construction was a high priority for the renovation project's leaders and participants. There were practical limits, however, on the number of perspectives that could be included in each decision.

At Johnson-Williams, there was no turnover among project leaders. Consequently, a consistent vision of the renovation process and stable communication channels were maintained for the duration of the project. The architects kept the school principal, the county school superintendent, and the construction manager informed of daily developments. The principal coordinated news with the school's users, and the superintendent kept the school board informed.

The construction manager choreographed the work of contractors and served as a pivot point for communication between school users, county administrators, and construction teams.

There was a committee made up of teachers and others who were primarily concerned with the paint colors and all the aesthetic issues of the school, and they had quite a bit of input on the job. So yes, they did have an impact on it; in a county like Clarke County where it's relatively small, there's a lot more individual interfacing with teachers and other administration in the county than there would be in a larger county. There they strive for modularity in their building—every classroom looks like every other classroom and the teacher changes to meet the classroom; here we were able to work closely with the principal and the teachers, and we were actually able to make changes as we were going through the renovations, so that the classrooms were a bit more individualized than you would find in other areas.

~Mr. Wrenn

I felt like I was very involved in the leadership of the project, and actually it was imperative that I was involved in every decision that was made, because of safety issues, renovating a building where students are continuing to have class, I had to organize everything to avoid problems. So, I would meet on a weekly basis at progress meetings. Any time a contractor had to access a room they had to clear it through me, we had to organize that, we had to maintain security, we had to make sure there was a separation between students and construction workers, so communication was basically everything, and all the day-to-day operations went through me.

~Mr. Catlett

Project leaders stressed the need to inform constituents about how the renovation process would benefit the broader school community. SPN, VMDO, and CCPS administrators gave periodic tours to school board members, students, teachers and community members to help them feel a part of the project and to show them how the old building's features were being transformed.

Ensuring Collaboration and Participation

Keeping teachers and students informed about the renovation process, as well as eliciting their input as the renovations progressed, helped maintain their interest in and support of the project.

Minimizing Distractions, Maximizing Safety and Efficiency

School users and construction teams indicated that the greatest challenge during the renovation process was minimizing distractions and disruptions to classes while optimizing efficiency. One project leader reported that when changes were considered, school administrators focused on financial considerations, while construction management concentrated on time issues and the architect emphasized quality issues. By representing these varied perspectives this way, decisions were made quickly without sacrificing thoroughness.

The goal of moving teachers only once during renovation was achieved for most classes, but there were exceptions where teachers had to move more than once during the construction year. Mr. Catlett described the rotation challenge during construction: "We treated everything in six phases throughout the building. We had to determine which areas to renovate first, and it all had to be planned from my office because we would disrupt the environment. We would move certain segments of the school to different locations so we could renovate an area at a time, but I also was involved in that because I didn't want to move certain grade levels at certain times because of SOL testing; we kept the 8th grade as one of the last changes because of the May testing window. So the timetable for those phases ranged anywhere from two to three weeks to two to three months, and we had it planned out in six different phases."

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[SPN] did an outstanding job, and that was our primary objective: maintain a safe and secure environment. I do not think it happened by chance; we took a very thorough, structured approach to ensure student safety, starting, again, by educating everyone involved. Everyone was involved in making sure that construction workers did their part. The progress meetings were imperative for that as well, because if issues came up they were discussed there, and each individual contractor informed their workers as they should that the school environment is different than a construction site, and it was respected by everyone.

~ Mr. Catlett

I also think it's educational for the students to see what goes on, to have it there every day and understand what they're doing. The disruptions are a lot less when they're that thoroughly involved, they understand that they can't go down this corridor today, because [contractors] have that corridor that day, it's because we've moved onto this phase and our new science room's going to be there, and it's a lot easier to deal with than if it's just sudden disruptions to your life continually with no meaning behind it.

~Mr. Moje

Although synchronizing construction and classroom schedules was a constant challenge, all project leaders noted how the communications network kept all stakeholders informed, and committed to the project.

Staying flexible

Maintaining flexibility was a fourth feature of the construction process. In reflecting on teacher, student and staff flexibility during the process, Mr. Wrenn said, "They were very flexible, and they were a real big help. I'd go to Rick Catlett and say, look, we need to modify a phase a little, just because of the logistics. There's a connection that's got to be made, from a pipe in another room that we hadn't foreseen, and instead of taking room 122 [for example] we've got to take room 130, as part of that phase, and they were real good in working with us on those kind of things."

Tying Construction to Academic Experience

School leaders, architects, and the construction manager sought ways to tie the construction process to educational experiences of the students whenever possible. VMDO presented its designs to Johnson-Williams faculty and students and to the community at large in the early stages of the project. As a project in English class, students wrote letters to Mr. Wrenn during the renovation, providing feedback on features they liked and disliked. Math classes calculated the number of tiles it would take to finish the flooring. Many teachers took advantage of construction in or near their rooms by tying aspects of the work into their lesson plans. This process helped make the construction phase a source of inquiry and learning for students.

Punch Lists

The original completion date for renovation was November 2000. By November the project was in its punch-list phase. All major work had been accomplished, 32 of 35 contractors had finished their jobs, and teachers had submitted punch lists to the construction manager for detail work in their individual spaces. The final phase of construction lingered longer than project leaders originally had

expected. Remaining work negatively affected some teachers and classes more than others. Study participants reported either disruptions or facility inadequacies in particular spaces. Some problems with the new heating, ventilation, and air conditioning system affected the entire school. As the renovation process drew to a close, issues arose concerning new water fountains that had broken, a burst pipe in the new water tower, and floor tiles that were blistering and popping. Although the punch-list items caused concern, Mr. Catlett noted that the presence of a construction manager on site was a blessing during the last phase of the project because he expedited repairs and replacements.

Chapter 3: Outcomes of Renovation

This study of the renovation at the Johnson-Williams Middle School has shown the importance of collaboration and broad-based participation throughout the design, budgeting, and construction phases of the project.

Traditionally, the relative success of a school's renovation has been assessed using construction industry standards of time, quality, and budget. Schools are intended to be places where students achieve at high levels, yet construction industry standards have not comprehensively measured the impact of a school renovation on educational outcomes. They typically have not incorporated student achievement measurements or occupant's perceptions of the building into the assessment. Using participant assessments to describe the value and importance of a facility may not only be a meaningful new direction for measuring the success of a school renovation, but an important complement to educational facility standards.

Outcomes described in this chapter are based on a variety of data sources collected before, during, and after completion of the renovation. As much as possible, the voices of participants are used to describe the school, thereby revealing important considerations for communities planning renovations. A summary of data sources is listed in Appendix A.

When we opened this fall [2000], and we've had parent meetings, or community meetings, giving tours. When everyone came back in August, we came back to a renovated building. The barriers had been taken down, and the first day students walked into the school; as they walked through the front door into the gallery, they could feel the space, they could immediately just sense that the building had completely changed, and it has been absolutely, positively the most positive start to a school year I've been associated with in 14 years.

~ Mr. Catlett

Industry Standards of Renovation Quality

By industry standards, the renovation of Johnson-Williams was a success. The project came in on budget, according to school administrators, the construction manager, and project architects. As articulated in Chapter 1, the budgeting phase was an iterative process. Project leaders worked with the county board to cut costs by adjusting designs and features. The auditorium renovation was originally cut, but was reinstated when a gift was received from a community member. With the exception of the punch list items described in Chapter 2, the project was completed on time.

User Perceptions of Facility Quality

The voices of students, teachers, staff (including guidance counselors, athletic director, administrators, cafeteria workers, and custodians), county administrators, architects, contractors, construction management, parent, and community member ratings were recorded through the use of surveys, interviews, and official documents. Study findings indicated that perceptions of facility quality recorded before renovation increased markedly after the renovation.

Improved Quality of Space

Parents, teachers, and students were asked a series of questions about their perceptions of facility importance and facility quality. Ratings of facility importance remained constant, while ratings of quality increased dramatically across all groups.

Students in elective classes were asked to rate the quality of classroom spaces. Student survey results indicated that 45% of students perceived elective space quality improved after renovation, while only 4% reported worse conditions (for complete outcomes descriptions, see Tuttle, 2001).

Teacher survey results showed that 39% of teachers at Johnson-Williams gave overall facility quality an "A" grade after renovations, as compared to 14% before renovation.

Parents were surveyed on their perceptions of the importance and quality of the Johnson-Williams facility and on whether their child ever complained about conditions at the school before and after renovation. Responses showed that parent ratings of building importance remained almost constant, while quality ratings of "A" or "B" increased from 41% before renovation to 83% after renovation.

Four students from the school were randomly selected and given disposable cameras to photograph their favorite and least favorite places in the school before and after renovation. Visual data analysis indicated that, before renovation, students took 23 pictures of

"favorite" places and 30 pictures of "least favorite" places. After renovation, these figures compared to 42 "favorite" and 20 "least favorite" photos. Photos of "favorite places" nearly doubled. The most-photographed "favorite" places after renovation included the cafeteria, science laboratories, computer rooms, other classrooms, hallways, bathrooms, the gallery, and water fountains. "Least favorite" places varied by individual student photographer. Among these photographs, most students focused on documenting their least favorite subjects and the teachers of those classes.

One intriguing finding of the study was a student's perceptions of the new bathrooms in the school. One student said, "There are too many bathrooms—you can't wander around the hall to find one, because there's always one right across from your classroom."

Increased Safety, Security, and Access

As a result of the renovation, building and county school leaders perceived that Johnson-Williams would be in full compliance with ADA and IDEA regulations and guidelines. Improving the facility for students with disabilities was an important renovation goal for the CCPS, noted Dr. Smalley: "We're ADA compatible now, and we're able to have the TMH (trainable mentally handicapped) population and physically handicapped children accommodated in a way that we certainly were not able to before, which is very powerful." A special education teacher reported that the new self-contained room "is absolutely wonderful. It's downstairs, it has kitchen facilities to do kitchen work if we have students who are lower functioning, so we can have a TMR program here. There's a bathroom, it has its own TV for the kids, but it's divided into sections so you can separate the students; it's beautiful."

Access and enhanced security for the building were also important goals of the project. Before renovation, trailers and the "dungeon" computer room could not be accessed without exiting the school. After renovation, all trailers were removed and the computer room was moved. All visitors to the school now pass directly in front of the school's administrative offices in order to access other rooms in

the building. Overall, study participants indicated that renovation had improved the school's safety, security, and ease of access.

It seems like there's so much more room in the classes. Even if it's in the same classroom, where I think it's the same space, it's just brighter and better organized, so it's easier to pay attention now.

~student

It's more spread out so you can have more room to work, and the previous art room didn't have a sink, so you couldn't wash your hands, which meant you had to go all the way to the bathroom to wash them but this one's good.

~ art student

It took me a long time to get to the old band room because you had to go outside, and you'd circle around to the other end of the school. If it was raining, you'd have to run out with your instrument to get there. But they switched it so now it's where you come in.

~ band student

I think it's enhanced it quite a bit, and also the fact that the three [content area] teachers are so close to each other; that's helped our curriculum planning because we're much closer, we communicate better, and I think for our students across the board it has really enhanced education; we're in the same ball park as far as what we're teaching. Last year two of our offices were side by side, and the other was out in the trailer court.

~ teacher

Increased Space and Flexibility

Teacher and student responses showed that class flexibility and size are important features of their school environment. In terms of square footage, the additions and conversions represented an increase of 30% for the school. Respondents indicated that increased space and improved flexibility were among the most noticeable benefits of the renovation. Sixteen out of seventeen students responded that the size and layout of the school, its shared spaces, and new classrooms were improvements. One student voiced a contrary concern that the large entrance gallery was perceived to be "a waste of taxpayer money."

Students interviewed before and after renovations also noted the increased space, improved space, and more flexible space in their classrooms, especially in elective classes such as art, band, and chorus. Student surveys also indicated improved overall attitudes towards the school. Chorus students reported that the new chorus room was superior to their pre-renovation trailer: One student said, "There's a way to get out when you have a fire, a fire escape." Other chorus students said that benefits of the new chorus room include "the size, and, [the fact that] it goes right out onto the stage."

Teacher data indicated similar perceptions of improved space and enhanced flexibility in their classrooms. Teacher interviews revealed responses similar to those of the students. One teacher described the new space as "huge, almost imposingly so," and another reported, "I've rearranged the room a few times. I used to have [an exhibit] in the middle, so that's why the desks are this way. There's lots of ways I can configure this room because it's a large space." Teachers said improved space and other improvements in their renovated or new rooms helped them better tie activities to learning goals. Some teachers reported that improvements enhanced their evaluation of student work and progress. One teacher reported that, although her

I think the students are much more respectful of the building. I've seen them bend over and pick up paper. The tall ones are always going to jump up and try to touch the ceiling, but you start talking about fingerprints, and they say 'OK,' and they just don't do it anymore. They were very impressed with the auditorium, they love the cafeteria, the halls look so much wider and brighter, and I think it does make a very definite difference [in student motivation].
~ teacher

The food tastes better because they don't have to ship it over from the high school, and eating in the gym [during renovation] wasn't the best, but this year we have a lot of good food that we didn't have last year. They always try to have something new every week, so it's better than it was. My favorite thing is the mashed potatoes and gravy.
~ student

"I would certainly say [the quality of room and equipment] does affect teacher satisfaction. In all honesty if I'd had to come back to work with a building in the state it was before and while renovation was going on, I seriously think I would have gotten burned out. You want to go to a nice place; since everything's been completed, it's certainly made going to work a more pleasant experience. I think overall morale's up, at least based on what I've seen.
~ teacher

room appeared smaller, the improved layout made the space more functional than before.

Cafeteria, Auditorium, and Circulation Areas

A majority of study participants perceived that shared spaces, especially the new cafeteria, were a great benefit of the renovation. One student reported, "I like that the cafeteria's bigger, you have more room to walk around, and I like that we get to have more choices for the lunch meals, and there's more space." Teacher survey data showed that teacher perceptions of cafeteria quality had improved dramatically. Before renovation, only 20% of teacher responses gave the cafeteria an "A" or "B" grade; after renovation, 87% reported an "A" or "B" rating. Cafeteria staff shared how they have been receiving positive feedback since the new cafeteria opened.

Occupants also assessed hallway conditions before and after the renovation. Although most responses indicated improved halls, seventeen of twenty-two student responses indicated that crowds in the hallways still impeded locker use during class changes. Several perceived the 8th grade lockers to be too small, perhaps because they were smaller than the 7th grade lockers had been.

Some teachers reported that students took better care of the new facilities. "When I go into the bathrooms, there used to be writing on the walls; I don't see any evidence of smoking. Very rarely do I have to pick up papers off the floor, very little in the classroom and very little in the halls and stairwells. They're clean," said one teacher. Another teacher responded, "I think the kids are very respectful of the property now. To this date I have not seen any graffiti, any gum stuck in the bathrooms. That's typically where you'd see a lot of it, and I don't see any."

Teachers at Johnson-Williams also indicated that the quality of the facility affects their job satisfaction. Job satisfaction and morale increased as a result of renovations.

I would certainly say [the quality if room and equipment] does affect teacher satisfaction. In all honesty, if I'd had to come back and to work with a building in the state it was before and while renovation was going on, I seriously think I would have burned out. You want to go to a nice place; since everything's been completed, it's certainly made going to work a more pleasant experience. I think overall morale is up, at least based upon what I've seen.
~ teacher

The space is nice; the layout's nice, a lot of loose ends still not complete, like tile is missing in the science storage office. That room is supposed to be storage for chemicals, which needs ventilation. There's no vent in there yet. There's an exhaust in the new classroom downstairs for chemicals, but it's like a bathroom exhaust. But, I guess compared to what we had, it's much better.
~ science teacher

It's very difficult to meet the needs of every teacher through a simple wall mount. We're in a classroom where the teacher has made the decision, she doesn't want her back to her students. This has led to the situation where there's a nest of wiring. But if she wanted to keep this configuration, there would have had to be some sort of floor-mounted molding or ceiling drops, which would have added considerably to the cost. From a technology standpoint, it would be a lot better if her desk were flush against the wall, and her computer back was right next to the cabling.
~technology director

Students were asked if they perceived any improvements in the reputation of their school since renovations had been completed. Of sixteen responses, fifteen indicated that the renovation improved the school's reputation. One student said, "People up our street like coming here for band concerts now." Another said, "I've had a lot of people come to play sports, and they come here and say, 'man, I like your school,' and then they go back and tell all their friends about out school."

Temperature and Airflow

As of mid-March, 2001, students, teachers, and administrators perceived that the new heating, air conditioning, and ventilation systems were better than previous systems, but they still required improvement. Student surveys showed that 43% reported improved temperature in classrooms, while 12% reported temperature problems and discomfort; 50% reported improved airflow, compared to 8% who reported worse airflow. Teacher surveys indicated that overall ratings of temperature and airflow quality remained constant. Teachers disliked the temperature fluctuations and noise associated with the new HVAC system. They preferred to have thermostat controls in each classroom.

Science Laboratories

Students reported improved science laboratories and laboratory equipment, while teachers noted both improvements and a punch list of remaining work. Sixteen of seventeen students indicated that science teachers were conducting more experiments than they did before.

Technology

Students, teachers, and administrators indicated overall positive perceptions of school technology. As noted in Chapter 2, punch list items remained and installation of technology was incomplete in some rooms as of mid-March. Interview data showed that all students perceived improvements in technology. Their comments noted computer quality and access, as well as more classroom activities involving technology.

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Clarke County's technology director confirmed that all wiring and hardware had been replaced. Two new server closets were installed, and there was new 100 MBS wiring throughout the building. Each classroom had been wired for one teacher computer and had data jacks for four student computers. New computers were installed in the redesigned media center, administrative offices, and every classroom. Attendance reports had been networked; computers were linked to the TV/VCRs in every room; and all classrooms had a new telephone system for use within and outside the building. Student records were stored online, and were protected by two separate, password-protected and firewalled networks. Teachers had access to digital cameras and LCD projectors – new technologies at the school.

There were trade-offs between quality and cost concerning the wiring of classrooms. Aspects of technology installation remained on the punch list due in part to the school's decision to downsize its technology plan in order to satisfy budget cuts during the planning phase.

One challenge that arose as a result of renovation involved changing the workload of the custodial staff. Despite a 30% increase in square footage, another custodian's salary was not originally budgeted. Follow-up interviews indicated that the principal requested additional custodial help.

Changes in Social Interactions and School Relationships

Results indicated that social interactions and relationships at the school improved somewhat following renovation. Interviews showed that eighteen of thirty students perceived that social relationships at the school are good or improved, while eleven reported they were the same as before (good overall), and one reported they were the same (bad overall).

The whole idea [of clustering] is to be a tight unit that works together and can communicate on a regular basis. It just makes it a lot easier, when you're doing progress reports on children, when you're talking about honors for children, just being together facilitates communication.
~ teacher

County school administrators, teachers, and students also recorded their perceptions about grade level clustering. They felt the new design contributed to enhanced teaching and learning. Dr. Smalley

observed the advantages of clustering students: "I see that the 6th, 7th, and 8th grade are somewhat separated, so I see there is a team and grade-level approach, and a real ownership of those students by the teachers."

Students also reported some change in traffic patterns and social interactions as a result of classroom clustering by grade level. One student said, "Different patterns [exist]; last year the 8th graders were all spread out in different groups. This year everybody's in one big group—it's like we don't hardly leave anybody out. Folks are getting along better." Another reported, "A lot of students are much nicer; I don't know why, but they are," while a third said, "I think I could name almost every 8th grader. Last year, all the skateboarders would just hang out with each other, and just be nasty with everybody else, but this year they're hanging out with everybody and I just couldn't believe that." One student noted that teachers at the school seemed happier as a result of grade-level clustering.

I think that the instructional space clearly has an impact on students and what they perceive is important in their day; however, I think the most important factor in increasing the quality of student achievement is quality teaching and quality teachers. I expect measurable changes every year regardless of the environment because we need to emphasize quality teaching and we need to retain quality teachers. If we do that, SOL scores will go up. I don't think it's just because of renovation: I think it is also an expectation that we will continue to improve.
~ Mr. Catlett

Student Achievement Outcomes

Relationships between educational facilities and student achievement cannot be assumed to be direct. Achievement is likely to be indirectly affected by facility conditions, as well as other factors. As measured by SOL assessments in Virginia, Johnson-Williams students already achieved highly, especially as compared to other rural school divisions in the state. In 1999-2000, for example, Johnson-Williams had the state's highest score on the SOL technology assessment.

SOL achievement data during the three stages (before, during, and after) of renovation were as follows:

SOL Assessment Content Area	Before: 1998-1999	During: 1999-2000	After: 2000-2001
Writing	73.9	75.5	83.8
English	64.2	68.3	87.2
Mathematics	67.3	75.7	79.1
History	60.1	48	66.9
Science	87	89.2	90.6
Computer/Technology	83.7	97.1	98.7
Algebra	85.7	97	100

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The mean scores demonstrate that achievement for the school improved in every content area. The most compelling pattern shows that, except in history, SOL achievement rose *each and every* year of the study. This finding documents that, under certain conditions, student achievement can actually rise, even while the building is undergoing renovation.

A previous study (Moore & Warner, 1998) of schools undergoing renovation found that standardized test scores dropped during construction, and then rose after renovations were completed. Johnson-Williams, however, achieved the highest SOL technology scores *during* the primary construction year at the school. Clearly, teachers and students at the school were able to offset distractions posed by facility deficiencies and construction during 1999-2000.

Several factors may account for these compelling and important findings. The communication network proved to be an effective mechanism for keeping all parties informed of and included in the renovation process. Large and noisy work was deferred to before or after school hours. Finally, students and teachers only had to endure adverse conditions for one year.

I think we have pushed extra-curricular activities which are vital for the well-rounded student and kids who don't come to school for the basics. They come for the other, and they get caught up in the whole lifestyle. You see your day extend, any time you're over at the middle school, it's a very active school; people own it. Children are there early in the morning; they're not leaving until 5 pm. It's great.

~ Dr. Smalley

Post-renovation conditions were perceived to be more conducive to academic achievement than conditions before renovation. One student, for example, reported that "the labs in the science room really help us learn and get a lot better grades." Another student noted new programs for students in the cafeteria: "We go in there for the after-school activity class, and I'm taking a cooking class they just started up." Dr. Smalley indicated that extracurricular opportunities increased since the renovation.

Eighth-grade student attendance records showed that students were not absent as frequently after renovation. Changes in absence rates suggest that school condition may influence attendance. Absences went up when the building was being renovated, but dropped after renovations were completed.

When teachers were interviewed after construction, five indicated that they had changed some of their teaching methods as a result of renovations to the school. Changes included using new computers and computer software in English; incorporating new reference materials in lessons; enhanced evaluation methods and options; linking the teacher's computer to the TV as a projection screen; and integrating the Internet into lessons.

Chapter 4: Conclusions

A variety of conclusions can be drawn from this case study about the process and outcomes of renovation at one middle school. These conclusions may be classified into two categories. Some of the findings lead to suggested improvements in the field of educational facility research. Other implications address the process of designing and implementing a renovation project.

On Educational Facility Research

This study did not attempt to establish causal or specific correlational relationships between improved facilities and higher student achievement. Given the complexity of these relationships and probable interactions between multiple direct and indirect factors, trying to tie facility quality to a single variable or composite has limited value. Standardized test scores typically have been used as the basis for assessing student achievement. This study showed that multiple measurements of a school's academic program coupled with user perceptions provide a more comprehensive assessment of teaching and learning effects.

This study demonstrates the value of multiple participant perceptions when assessing the success of a school renovation. These sources provided useful information about the renovation process and its perceived outcomes. Further, collecting data on safety and security; class and shared space size and flexibility; physical plant and infrastructure; lighting, heating, and ventilation; science laboratories; and technology provided a useful basis for assessing school facility quality.

There were limitations to the study's design. Outcome data were gathered soon after completion of construction. The true benefit of a school renovation may best be measured over time. A follow-up study of facility conditions, perceptions, and student achievement at regular time intervals could document possible changes related to the school's physical facilities.

This study suggests that the case study method is appropriate for identifying key elements of the renovation process. Research using qualitative methods can contribute to building a more thorough understanding of relationships between learning environments and achievement.

I think that if you could customize every school, and have that process where the community really bought into it, they would value that building in a substantial manner. At the dedication, I was so impressed that people remembered the original dedication of the high school; it was 40—almost 50 years ago. And that it meant so much to them, and then these people get involved with the building, that's a powerful image.
~Dr. Smalley

On Implementing School Renovation

The need for renovating the Johnson-Williams Middle School was documented through a variety of sources and in a variety of ways. The school was fifty years old, and had not been significantly renovated in that period. The school's physical plant and infrastructure were in a severe enough state of deterioration that razing and rebuilding were considered. This idea was abandoned because of the cost, the symbolic value of the building to the community, and the fact that no other facility was available in which to conduct school during the construction period.

I'd say like a 9 [out of 10]; the only things again are the heating and cooling system, which they're trying to get straightened out, and they're working on it, and the hallway space and the lack of closets, but other than that, it's great. It's a beautiful facility, and I love it. My hats go off to the whole team process. There was great communication; Doug [Wrenn] would come to our faculty meetings to talk with us about what was upcoming, who would have to move and where, everyone worked so well together. It amazed me. It worked; if there were problems they were kept where we couldn't see them. And the community was helpful and informed.
~teacher

The school's students, teachers, administrators, staff, parents, and community members perceived the renovation project as a qualified success, pending the completion of punch list items. Participant ratings for the gallery, auditorium, classrooms, administrative offices, cafeteria, technology, and science lab rose substantially. Data suggested that perceived improvements in social relationships may be related to features such as increased space, more manageable space, and grade-level clustering.

Ratings of the heating, ventilation, and air conditioning system were lower than ratings for any other facility category. This finding may be associated with problems getting the HVAC system to function properly.

The construction phase of the project achieved the goals articulated by CCPS Superintendent Smalley: construction was completed without serious incident or injury, on schedule, and under budget. Some facility features, perceived as important by architects and CCPS administration, were cut in order to stay within the budget approved by the Clarke County board of supervisors. In particular, building an

access road to the front of the building was cut due to its high price tag.

Throughout all phases of the renovation process, the single most recurrent theme was teamwork. Architects, construction management, contractors, teachers, students, staff, administrators, parents, and community members regularly communicated. These interactions provided feedback, informed stakeholders about the project, helped rally support for funding, encouraged participation, maintained morale, instilled ownership, and facilitated understanding.

Clarke County is a rural county with only one middle school. Community members appeared eager to participate in the renovation process. It is unclear from this study whether the model of direct collaboration used for renovating Johnson-Williams would be equally effective in larger counties. As population density and the number of schools increase, so also does the complexity of the communication network. Information traveling through longer channels and more levels may diminish stakeholder interest.

Four leaders were responsible for maintaining an effective communication network throughout the renovation design and implementation. The building principal, the county superintendent, the architect, and the construction manager expertly planned and executed the construction phases. The success of the renovation process is an index of their abilities. The pride that the community felt after renovations may be attributed to the high standards that these leaders set and maintained during this project.

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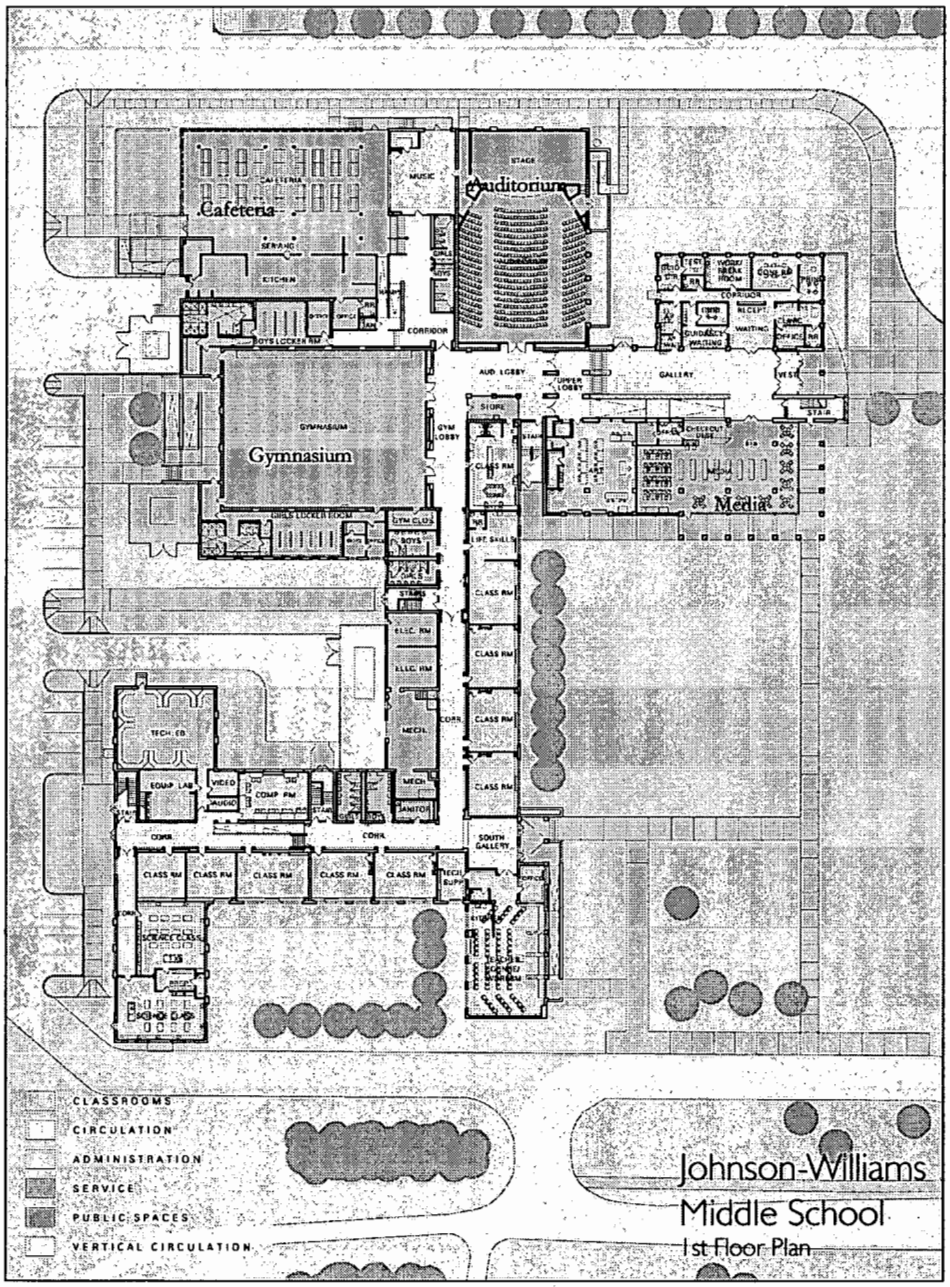
Appendix A: Primary Sources

This summary of data collection instruments constitutes a complete primary source list for information and statements presented in the text. Numbers in parentheses represent the page length of each data source.

A. Interview Protocols (13)
B. Student Post-Renovation Interview Transcripts (113)
C. Student Pre-Renovation Survey Totals (3)
D. Student Post-Renovation Survey Totals (7)
E. Student Photograph Exhibit Totals (1)
F. Digital Photographic History Key to Photographs (6)
G. Teacher Post-Renovation Interview Transcripts (54)
H. Teacher Pre-Renovation Survey Totals (4)
I. Teacher Post-Renovation Survey Totals (6)
J. VMDO Interview Transcript (18)
K. SPN Interview Transcript (12)
L. CCPS Superintendent Interview Transcript (13)
M. Johnson-Williams Principal Interview Transcript (11)
N. Johnson-Williams School Indicators, 1998-9—2000-1 (2)
O. Parent Pre-Renovation Survey Totals (5)
P. Parent Post-Renovation Survey Totals (5)
Q. Community Member Pre-Renovation Survey Totals (4)
R. Community Member Post-Renovation Survey Totals (4)

Architectural plans for the renovation of Johnson-Williams Middle School



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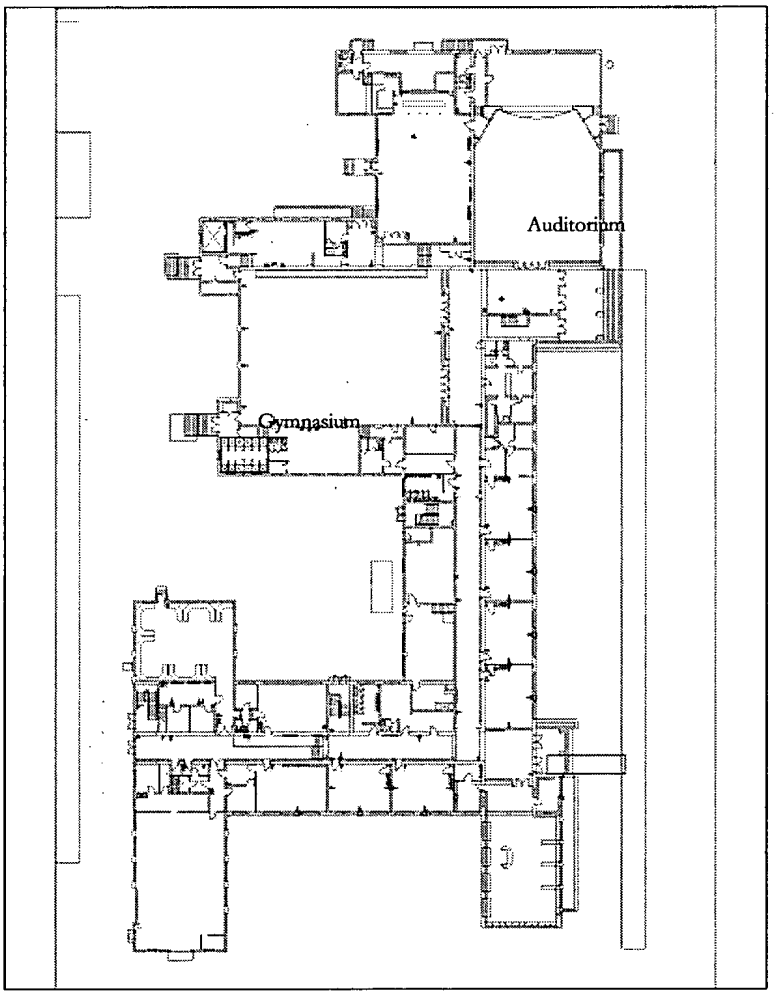
Architectural plans of Johnson-Williams Middle School before construction.



Images are courtesy of VMDO Architects, Charlottesville, VA.

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