Construction Trades Academy at Lakewood High School

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The Construction Trades Academy

at

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Making Small Schools out of a Large High School

Small Schools are schools within schools, autonomous of their district and the larger school building principal in which they reside. They are distinct from one another, focused and committed to equity. They are made up of an interdisciplinary team of teachers that share a few hundred or less students in common for instruction. The students stay with the same teachers for the four years of high school. The teachers assume responsibility for the educational progress of their students and exercise maximum flexibility to act on knowledge of students’ needs. (Oxley, 2005). Teachers are expected to lead in the Small Schools and leaders are expected to teach. Even the principal of each Small School teaches.

High school students experience incoherence, isolation, anonymity, and low expectations and courses that are disconnected. Teachers and students are isolated with little interaction. Only one out of four to six tracks prepares students for college. (Feldman, Lopez & Simon, 2006, p. 7). The effective size for secondary schools has been found to be in the range of 400-800 students. (Williams, 1990). Additionally, large comprehensive high schools are resistance to change. A major restructuring is needed to adequately address these issues. Large comprehensive schools can be converted into four or five autonomous small school academies within their present buildings.

Small Schools have autonomy, personalization, instructional focus, identity and accountability. They maintain control over space, schedule, budget, curriculum, instruction, and personnel. They implement strategies that take advantage of downsized environments and facilitate all students being known well. They emphasize instruction
geared toward improved academic achievement for all students. They demonstrate improvement on assessments as well as progress toward established goals, both academic and affective. (Kailin et al., 2002). The Architecture Research Institute researchers write that, “the extra attention that students get from the staff affords them greater educational, psycho-emotional, and social services, and also makes them feel part of a community.” (http://www.architect.org/institute/programs/smallschool/)

The US Department of Education’s Smaller Learning Communities Grants Program provides funds to assist large high schools of 1000 students or more to plan, implement or expand smaller learning communities. (Kalim, et. al.). The Bill & Melinda Gates Foundation has poured hundreds of millions of dollars into districts and schools nationwide to promote this kind of school reform, including $130 million in New York over the last five years. (Tossi, 2006).

Conversion has not always been successful. One of the first schools financed by the Gates Foundation, the Manual Education Complex in Denver, closed its doors after the foundation invested 1.5 to 2 million dollars in the school. Tom Vander Ark of the foundation said that schools need to focus more on how curriculum and teaching would improve. A report on the Manual School in Denver cited that the Small School that replaced a struggling comprehensive school never developed a clear vision, set of values, or instruction guide. Teachers basically taught as they would in a large comprehensive high school. (Gewertz, 2002)

Vander Ark believes that struggling schools need not only a different structure, but a different mission and culture. Eric Nadelstern of the New York City Department of Education says, “But the primary thing, really, is to get a group of people who believe
something together about how kids learn and then give them an opportunity not only to realize that but to ensure that they prove the efficacy of that approach by ensuring that the kids succeed. Because in the end, it’s the connection between the teachers and the kids.” (Feldman, Lopez & Simon, 2006 pp. 83-84)

After several years of comprehensive school converting to Small Schools, teachers are complaining that they have more classes top prepare for. This can only be resolved by rethinking of curriculum offerings. Also, guidance councilors become overburdened as the schools become more involved in the social and emotional lives of their students. Schools in Boston and New York City have trained teachers to become advisors, relieving the burden of guidance councilors. (Myat, 2005). Another problem is that the amount of collaboration time with co-teachers has not been as great as envisioned. (Wallach & Lear, 2005). Small Schools are advised to release students early at times so that teachers can work together within and without their discipline to plan instruction.

Large comprehensive schools have long traditions. Grandparents, uncles and aunts, and community members, who attended a comprehensive high school, often oppose the breakup of the Alma matter. Staff and community can join forces to continue and sustain programs such as plays and football spirit similar those of and in the tradition of the former school.

The authors of Choosing Small” write that “Students at different levels can be taught successfully in the same classroom—for example, differentiated instruction in a classroom can really replace Honors and Advanced Placement courses and serve the needs of below-skill-level students without endangering those who would have been
assigned to the advanced classes.” (Feldman, Lopez & Simon, 2006, p. 24). I found that
not to be the case in two Small Schools. Students in the Academy of Construction
Technology program at W. T. Loften High School in Gainesville, Florida
(http://www.sbac.edu/~wpops/highschool/act.html#Goals), take course requirements
available to the students as either standard or honors courses

Similarly, the Thomas Edison High School of Technology which houses three
collection schools offers two separate tracks for mathematics.
(http://www.mcps.k12.md.us/departments/cte/con-

Thomas Edison has a particularly interesting program that can serve as a model
for a future Lakewood High School Small School Academy. Thomas Edison put its
whole four-year schedule on-line. The heating, ventilating, and air conditioning academy
prepares students in HVAC principles in a combination of classroom and work-site
experiences. The carpentry program provides students an opportunity to learn about the
home building industry. The masonry school teaches the construction of brick and block
walls, doorways, window openings, fireplaces, chimneys, and basement foundation walls,
how to lay out buildings and establish grades using a survey transit. All three programs
culminate participation in the “student-built” house project.

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Pre-service/In-service Plan for Small Schools

There are two phases to the plan. The first involves the Force Field Analysis of the restraining forces against implementing any Small School in Lakewood High School. We address these forces and actually change their direction. The second phase focuses specifically on the Construction Trades Academy, the Small School for which this curriculum is written.

**Force Field Analysis**

Restraining Forces:

- Organizational resistance to change.
- Large comprehensive schools have long traditions.
- Majority community that has no stake in public schools.

Driving Forces:

- The administration wants to implement the Small Schools Initiative.
- The State of New Jersey is mandating the Secondary Education.
- Large local construction industry.

**Implementation**

Converting a large comprehensive high school into several small learning academies involve more than changing familiar practices that any reform brings to an institution. It involves a change in culture, a deconstruction of paradigms and realities in favor of a new structure. High school students experience incoherence, isolation,
anonymity, overcrowding, low expectations and inertia. High schools are slow to change. Reform does not work; schools must be *reinvented*.

Paradoxically, the degree of change can become a driving force. The new schools will open many opportunities for faculty to become instructional leaders. If the former comprehensive school principal is retained as a building manager, he cannot have veto power over hiring or other operations of individual schools. This undermines autonomy and results in the comprehensive school structures remaining in place. The formal distributive leadership model offers positions for teachers with appropriate credentials without administrative experience. Those positions can be assisted by a visionary teacher without credentials. The degree of restructuring offers opportunity for ten or twenty ambitious, visionary, and assertive faculty member make the program work while furthering their careers.

Large comprehensive schools have long traditions. Parents and community members who attended a comprehensive high school will oppose the breakup of the large school out of nostalgia for memorable events such as football teams, school plays, and clubs. Staff and community can join forces to continue and sustain programs in the tradition of the former school. The Small Schools in the large comprehensive high school can join forces to maintain extra-curricular activities under the name of the former school.

Lakewood is unique as a district in which currently 13,000 students attend the Lakewood Independent District funded by the Yeshiva community (Talmudic), independent of the State of New Jersey and the Lakewood School Board. Lakewood Township’s Master Plan estimates that the Independent District is growing at an annual
rate of 18%. Almost all parents in the Yeshiva community have absolutely no contact with any of the 5,000 children in the public schools. They feel that they are burdened to support a public school system that does not belong to them, while their own children are inadequately housed in schools of one hundred students converted out of single family homes. “The public schools get everything for free and we pay for it and get nothing for our children.”

On a scale of A-E, “A” being the poorest level district, created by the New Jersey Supreme Court in the Abbott case, Lakewood is a “B”. Other towns in the county range from C-E. State aid in Ocean County averages only $2,052 per student, behind the State average of $2241. The average “B” district receives $3350. Lakewood receives only $840 per student. The Comprehensive Education Improvement and Financing Act (CEIFA) formula for calculating aid is based on wealth, district income, and resident student enrollment. Since homes in Lakewood are expensive (as the Yeshiva community is growing-500 new housing starts per year are built—and quickly sold), and close to four times as many students in community religious schools, the formula deprives the town from state aid, despite the average income of $31,000 in the 2000 census. This puts almost the whole burden on local taxpayers who must also support their own independent district.

While the Small Schools initiative cannot address the issue of inadequate school facilities for children in the independent district, it will muster support from their parents who are the political and economic leaders of the town. Housing starts are growing almost exponentially and will continue to grow in Lakewood. The CTA will meet that demand by preparing graduates for post-secondary engineering and technical studies, to
enter the industry immediately after graduation, and to ultimately run their own business in the construction industry. Construction is the largest industry in town and there is inadequate quality, workmanship, and number of laborers to meet the demand.

The administration of Lakewood High School is pushing the Small Schools Initiative. The Central Office is supporting the initiative. The State of New Jersey has implemented the initiative for Abbott Districts. Lakewood is a B district, but can model its program on the class A districts currently mandated by fall 2008. The mandate requires small learning environments with multidisciplinary teams of teachers. Schools must create a personalized system of family-student advocacy through “advisories,” student-led conferences, and home-school interaction.

Construction tradesmen will be enlisted for to establish a summer internship program. Local contractors will be asked to allow students to make monthly field trips to building sites for hands-on instruction. In cooperation with the building department, building supply outlets, licensed masters, and developers, seniors will complete an actual building. A bridge will be form between the public school community and the independent district community through the construction of homes.

The CTA will establish a central database for teachers to enter to download ready made lesson plans and curriculum papers relating to the CTA. Teachers will receive Professional Development hours and or a stipend for each area of research that leads to a new entry into the database that relates specifically to our program.

There are several organizations for developing assessment programs the CTA curriculum among which are Learning Record online, found at www.cwrl.utexas.edu; What Kids Can Do, found at www.whatkidscando.org and Fairtest, at www.fairtest.org.
Off campus workshops are discouraged. All in-service and pre-service training will focus on CTA’s unique circumstance and program. Teachers will be expected to prepare in-service presentations to other teacher on lesson planning, assessment, or any other relevant area of focus at least once a year.

There are several areas that might be sources of funding. The Bill and Melinda Gates Foundation contributed millions of dollars to schools making conversions to small schools and continue to contribute. The United States Department of Education makes grants to schools implementing the conversion.
Algebra Aims, Goals and Objectives

Aim of the curriculum

Algebra I, Track 3, is a full year course designed for the Small Schools Initiate in the Lakewood High School building for ninth grade students enrolled in the Construction Trades School located. The aim of this introductory mathematics course is to begin providing students with the necessary skills to engage in the building industry. Carpentry, sheetrock installation, roofing, sheathing, carpet and flooring installation, electrical work, plumbing, heating and air conditioning, and masonry are mathematics intensive trades. Housing starts are growing almost exponentially and will continue to grow in Lakewood. The Construction Trades Schools will meet that demand by preparing graduates for post-secondary engineering and technical studies, to enter the industry immediately after graduation, and to ultimately run their own business in the construction industry.

Goal of the curriculum

The goal of the Algebra curriculum will be a summer internship program with a local construction company after the sophomore and junior years. Students earning a grade of A or B in both Algebra and Geometry will be eligible to work under a master or journeyman learning their trade with a focus on the pertinent mathematics skills. Additionally, with the assistance of local contractors, all sophomore and juniors will
make monthly field trips to building sites for hands-on instruction. Completion of the three years in the mathematics program will culminate in the senior year construction project. In cooperation with the building department, building supply outlets, licensed masters, and developers, seniors will complete an actual building. Success will be measured in ability to solve the many problems they will encountered while building in the project. Students will not be surprised to discover that most solutions come as a result of a solid foundation in mathematics.

Objective of the curriculum

The construction trades are so mathematical in nature that most New Jersey Mathematics Standards can be tied to job and business related tasks. Teachers in the Construction Trades School will give at least one open ended question in construction every lesson. Math then becomes relevant and indeed necessary for all students. Success in meeting the objectives will be determined by completion of class work, homework, projects, tests, quizzes, and a departmental final examination.

Rational for Change

Lakewood High School graduated only 276 students in June 2006 compared to 403 freshmen who entered in September 2006. Most students are not on a college preparation track having low expectations. Teachers see from one hundred to one hundred fifty students daily under the present structure. A major restructuring of school and curriculum
is needed to adequately address these issues. Lakewood High School can be converted into four or five autonomous small school academies within their present buildings, one of which will be the Construction Trades Academy.

The New Jersey Department of Education recently mandated a curriculum that prepares students for college and careers in small learning environments with multidisciplinary teams of teachers for the lowest socioeconomic districts. Students are placed in an environment in which they spend four years with the same team of teachers who offer them a personalized system of “advisories.” The Construction Trades Academy will build a collaborative learning community with ongoing professional development tied to the new school, increase parental involvement, and foster a new engaging learning environment for students. This will increase the sense of belonging for students and staff, raise expectations for students, and develop a culture of depth over breadth and on-going self-reflection.

*Change Dimension*

The Construction Trades Academy will use data to monitor students’ work and analyze instruction. Student mastery and achievement rather than an effort to merely cover content will guide the curriculum. Mathematics instruction will use the problem-solving approach with on-going self-assessment by students and teachers, so students become aware of areas in which they are having difficulties and articulate their deficits to their teacher.
The problem-solving approach presents tasks to students in which a step-by-step method is not immediately apparent to determine a solution. A student who learns math by working on difficult problems rather than memorizing procedures yields deep understandings, linking conceptual and procedural knowledge.

The theme for students in the Construction Trades Academy involves mathematically intensive industries in which multitudes of problems needing a solution arise. The goal for Algebra I, an introductory mathematics course, is to begin providing students with the necessary skills to engage in the building industry and practical applications. Students will recognize relationships among different topics in mathematics and that mathematics may be integrated into any other area of the curriculum such as science, social studies and literature.


evaluation plan

Strategic planning is necessary for the Construction Trades Academy to direct its resources and to accommodate change. Planning provides a focus for the program, guides the faculty in setting priorities, creates the framework for action and identifies needs. Planning will be connected so that curriculum implementation will be effective. To that end, the Construction Trades School will establish a Curricular Review Team (CRT).

The CRT will adhere to clear written policies by which individual course curriculum modification is assessed. This curriculum should be viewed as a planning framework that leads to the alignment of the taught and tested curricula. A school database will be established for all faculty members to contribute lessons and strategies and to connect the
four core areas of curriculum. The CRT will moderate the database and will clarify expectations regarding decisions for implementing change.

The curriculum will be used as a foundation from which the program will be modified for the best achievement of success for all students. It is the work plan that provides direction for teachers in planning classroom instruction. Teacher plans will include objectives, goals, prerequisite skills, instructional materials, and methods of assessment. This guide teachers to ensure that instruction matches the written and taught curriculum and provides information to supervisors monitoring the curriculum providing cohesion for the entire program.

School leaders will look for well-defined targeted goals and measurable outcomes. Student needs are assessed before introduction into the program and teaching strategies will conform to the cohesiveness of Construction Trades School’s curriculum. Goals and objectives will be clear and tested during implementation of the curriculum.

Faculty development programs will be an ongoing process that involves all parts of the school so that there is collective development. Change to the Small Schools Initiative requires detailed staff development and implementation plans conducted over several years.

A comprehensive student-testing program provides a foundation for the Construction Trades Academy to base decisions regarding curriculum design and delivery and to provide feedback to the faculty regarding how classroom instruction can be more effective. Assessment will be directly related to learning objectives in every course of study so that teachers have a reliable measure of student learning, and parents and students are certain about the extent of student learning. Result of the testing program
will be available on the database for faculty members to make decisions about curriculum and instruction.

The CRT will compare objective performance criteria with other education systems. The S-test and other norms will be used to help the faculty make informed decisions about the design and delivery of programs and classroom instruction. Prudent use of data requires collection of evaluation data also from other sources to indicate the degree to which the Construction Trades Academy is successful in achieving student learning goals.

The following stages will be used in evaluating the program:

*Design Stage*

Teachers will be surveyed the following questions:

- What kinds of instructional support do you have available?
- What kinds of behavioral problems do you have in the classroom?
- What kinds of instructional procedures are you using most?

After collecting information, the CRT or whole faculty will design revisions to the program.

*Installation Stage*

The CRT will evaluate if and how the faculty is using the designed program. If there is a flaw in the program, it will be modified or discontinued. The CRT will address
problems that faculty members have in implementing the program due to lack of resources or skills. At this stage, in-service options should be considered.

*Process stage*

During this stage, results from student evaluation, as describe above, will be compiled and studied. Results will be posted in the faculty database. Modifications will be made to address issues of program adequacy will be addressed.

*Product Stage*

At this stage, evaluation is summative. Is the program working? Are there differences between the actual results and the realistically hoped-for results? Were there flaws in the design, inadequate supplies or in-service training?

*Cost stage*

Was the program result worth the cost?

Algebra Curriculum Philosophy

*Purpose of the curriculum*

Algebra I, Track 3, is a full year course open to ninth grade students who have not yet completed a full year of Pre-Algebra. This course is less rigorous than the Algebra I courses given to students who completed Pre-Algebra in the eighth grade. It is geared
towards helping the student to have a general understanding of the properties and theories of Algebra, while incorporating basic concepts of Pre-Algebra. It will also teach students the critical thinking skills necessary to solve problems encountered in real life situations. The New Jersey Core Curriculum Content Algebra Standards will be addressed.

**Teacher Role**

The teacher will teach students how to solve problems. Teachers are encouraged to briefly explain concepts, assesses student understanding, and ask one open-ended question each lesson. The vast amount of time will be spent on task solving problems. Assigned projects will afford students discovery on their own.

**Student Role**

Success in the course will be determined by completion of class work, homework, projects, tests, quizzes, and a departmental final examination. Arithmetic skills will not be taught and are not prerequisite to the course. Students will be expected to obtain and keep a calculator to use solving practice problems in class, on homework, and during written assessments.

Students will be prepared for college and the job market. Students will develop workplace readiness skills focusing on work habits enabling students to become self-learners.

**Methods**
Each lesson will include drills during class, open-ended questions, closure, and homework exercises that reinforce the lesson. Scientific calculators will be used and encouraged.

Students will use a graphing calculator to gather, analyze, and display mathematical data. They can then make generalizations and reach conclusions about mathematical concepts and relationships and apply them to real-world situations.

Several software packages and textbook web sites are available to enhance students learning. They provide math resources for tutorial assistance, references for student resources, and classroom activities.

*Curriculum*

I. From Patterns to Algebra  
II. Operations in Algebra  
III. Equations  
IV. Proportional Reasoning and Statistics  
V. Linear Functions  
VI. Inequalities and Absolute Value  
\(\n\) Exponents  
VIII. Polynomials and Factoring  
IX. Rational Functions  
X. Radicals  
XI. Matrices
XII. Probability