Date: March 31, 1997

To: Bill Kincaid
Domestic Policy Council

From: Tamara Monosoff
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Comments:

Enclosed is a list containing ten urban high schools that have been selected as part of the New American High Schools Initiative. Per our conversation, I am forwarding you information on three of the ten urban high schools. Information on *Central Park East Secondary School, Fenway Middle College High School,* and *William Turner Technical High School* has been provided for your review. Turner was also recently acknowledged by the American Federation of Teachers. Should you need more information on these three schools or the remaining schools on the list, please let me know.

While I know that there may be other impressive schools to choose from, I do not think that you would regret selecting one of our schools over the others. Choosing a school that has been selected by OVAE would support the tremendous work and effort that this office has contributed.

Your consideration would be greatly appreciated.

Thank you.

New American High Schools

The following are **Urban High Schools** that were nominated and selected for their outstanding commitment to recreating themselves for the benefit of their students. Each of these sites has successfully incorporated at least three of the six elements of school reform on a whole-school basis, and at least one of these elements in an exemplary fashion. In the aggregate, the sites represent a broad range along the dimensions of program type, size, geographical location, and exemplary features.

1. Central Park East Secondary School, New York City, NY
2. Fenway Middle College High School, Boston, MA
3. William Turner Technical High School, Miami, FL
4. Hoover High School, San Diego, CA
5. St. Louis Academy, St. Louis, MO
6. Chicago Vocational Essential High School, Chicago, IL
7. David Douglas High School, Portland, OR
8. Chicago High School for the Agricultural Sciences, Chicago, IL
9. The High School of Economics and Finance, New York, NY
10. Gateway Institute of Technology, St. Louis, MO

Changing the Subject Matrix: Site Profiles

School	Type	Students	Staff	Avg Teach. Load	Structure
Central Park East **CPESS** New York City	Neighborhood 7-12	460 45% Lat 45% Af-Am	36 full-time 40% of color	Most 40, some 60	Divs: 7-8, 9-10, 11-12. Avisory. Personalized. Flexible block schedule
Chicago Voc. Chicago, IL	Vocational/ Comprehensive	2700 99.5% Af-Am	182 T, 25% voc. 71% Af Am 28% W	50-60 for many teachers, esp. Grade 9 Academy	8 schools + Gr. 9 Acad. Block schedule Department chairs out
Edison H.S. Minneapolis	Comprehensive HS	1580: 34% W, 31% Af Am, 31% As Am, 3% N Am	105 T: 73% W, 14% Af Am, 9% As Am, 2% N Am	60-100	3-4 magnets 4x4 schedule
Ely H.S. Broward County, FL	Comprehensive HS	2500: 63% Af-Am, 17% W, 8.5% Lat, 8% Haitian	130: 65% W, 32% Af-Am, 3% Lat	60-100	4+1 days = "Classroom Broward" 4x4 block schedule
Fenway Mid Col Boston	Middle college	250: 54% Af Am, 20% Lat, 20% W	30 full & part-time 12 Af Am, 14 W, 3 Lat, 1 Pac Isl	60-80 + 20 advisees, with some overlap	3 Hses: CVS, Hospital, Crossroads. Mod block schedule
Gateway Tech St.Louis	Tech magnet	1,176: 59% Af Am, 37%W, 3% As Am	152: 49% W, 48% Af Am	max. 90	4 specialties =13 majors Hybrid sched: 4 & 7-block extended days.
Hoover H.S. San Diego	Comprehensive HS	1849: 51% Lat, 21% Af Am, 20% Ind Ch 36% LEP	97: 80% W, 8% Lat, 5% Af Am	<90 for many T's	Career strands @ 11-12 2 hr blocks
Horizonte Ctr Salt Lake City	Alternative HS/ Adult Training Center	ca. 700, 75% of color	75 teachers 25% of color	Variable by season. T's teach 6, avg 20 sts. w. overlap of students	Site + satellites. "Adult milieu" 7-block schedule
Howard Tech Wilmington	County Tech	637: 48% W, 45% Af Am, 6% Lat, 33% Title I	52: 85% W, 15% Af Am	80-100 (?)	16 career progs Dual cert. 6-period day
Turner Tech Miami	Tech magnet	2147: lottery among eligible. 69% Af Am, 27% Lat, 4% other	100: 55% W, 25% Af Am, 17% Lat	60-90	7 progs. = 22 acads. Dual cert. 4x4 block schedule

School	Students in WBL	Post-sec data	Other Data	SD/Planning	District/State Rel
CPESS New York City	All (Comm. Serv. @ Gr.8-10; Internship Portfolio @ 11-12)	Graduation rate >90%. 90% of grads: college.	30% eligible for SPED, all fully integrated	3-4 hrs/wk uninterrupted plan time.	Small schools collaborative, Center for Collaborative Ed
Chicago Voc.	40% of seniors 20% of juniors	70 % post sec ed, of which 60% 4 yr. coll.; 15% work, 5% mil		9th Teams daily, others 1x/wk. Summer SD/Lab, Winter conf.	On "review" yet citywide model. Exemp. leadership award.
Edison H.S. Minneapolis	160 in apprenticeships, summer internships, misc. field experiences	48% 4-yr, 31% 2-yr, 16% tech (N=97)	Daily attendance 89%, up 5%. LEP center: Hmong	Faculty interdisc. mtgs, 1x/month. Long prep block.	Model for district. Broad commun. support State stds Pilot
Ely H.S. Broward County, FL	263 (ca. 20 %), projected to 1333 in '97	73% 4 yr, 20% 2-yr, 3% trade school, 5% military (N=286)		8 early release days. Team ldrs reduced time, Inst. ldrs meet.	Broad community support. Minn. Standards Site.
Fenway Mid Col Boston	All: comm serv., job shadow, sr 6-wk full-time intern & sr proj	81% post-sec ed, most to 4-yr colleges	12-14% teenage parents Free-reduced lunch 60% Other primary lang 19%	3 mtgs/wk: dept., house, faculty.	Boston Pilot School Center for Collab. Ed.
Gateway Tech St.Louis	70 srs. in internships, the rest do sr projects	49% 4-yr., 31% 2-yr., 8% trade sch., 7% mil., 5% work.	1995: 82% to post-sec, 63% still there 1 yr later.	Common meeting time for interdisc. teams, 9-10. Extensive Prof Dev	Hill 2000 Committee (neighborhood)
Hoover H.S. San Diego	WBL: 10% srs, 1% jrs 43% in job shadows CS all 9th & 10th gr.	22% 4-yr, 40% 2-yr, 26% work, 10% milit., 2% other. 84% continue 2nd sem in Cal system.	Drop-out: from 13% in '87 to 2.5%. Gains in grades, ASAT reading & math	Summer insts,wkly team mtgs. pers 6-week release time	1274 Restruct. Electronic transcript Transition collaborative
Horizonte Ctr Salt Lake City	20 + SBE S's: ca 20%. New Tech Ctr for SBE in place. Job shadows planned	75% work 21% post-sec. ed.	150 in teen parenting. 90% passed SLC Writ. Test. SAT gains v. matched sample.	Periods shortened every Fri., giving 1 1/2 hours staff planning etc.	Demography the reverse of SLC. City commitment.
Howard Tech Wilmington	100% soph/jr job shadowing & practicum 85% srs in co-op	41% 4-yr., 4% 2-yr., 35% work, 8% other, 6% unemployed	attend 93%, drp-out 5% Test scores show gains	3-day summer retreat Team planning	Business advisories, etc. Supt. support.
Turner Tech Miami	Over 50% of jrs. & srs. in various internships & other WBL	17% 4-yr, 46% 2-yr, 10% tech sch., 11% job in field, 13% unknown	Avg reading level gr 5.5 Att. 95.5%, d-out 2.7% S's test 7th of 30/Dade	interdisc. planning. 30% T's in Crit. Friends groups	Business advisories Supt. support

School	Networks, etc.	Obstacles/Needs	Spec. Features	Exemplary	Remarks
CPESS New York City	CES, Ctr for Collab. Ed., Jr. Achiev, BSA	Acad/WBL/CS connection; site supervisor training	Personalization, reflection, habits of mind, support	WBL Career exploration Supportive environment	Strong in all criteria
Chicago Voc.	CES, Small Schools Net., Chic. Exemplary School, CoVis	CityWorks? Expand internships Reflective Contexts	8 schools, 8 plans (9th gr. Acad, 7 career schools), teams	Voc-acad integ. Supportive envir	Strong principal reorg'd school, staff. Untracked
Edison H.S. Minneapolis	MathNet IMP TERC	Integrate curric., create small units, go to scale.	City-wide plan, partnerships. 70% T's visit worksites.	Secondary/post-sec linkages	Moving in system approach. Shared vision.
Ely H.S. Broward County, FL	CES application in process. Padaeia pilot in Int'l Business	More internships. Move to scale.	Hi-qual internships. ICLU prog for troubled youth. Student-run mall	WBL Supportive environment	Poised to move forward. "Harvard bound to lock down"
Fenway Mid Col Boston	CES, NAHS Nat. Middle Coll Consort.	Acad/WBL connection	Personalization, reflection, habits of mind, support	WBL Sec/Post-secondary Supportive environment	Strong in all criteria
Gateway Tech St.Louis	NAHS	Gifted program?	Merger of math-sci magnet & voc	Voc-acad. integ. WBL	Strong principal, vision Internships.Untracked, except gifted math-sci.
Hoover H.S. San Diego	CES, 1274 Restructuring Sch., Title I Sch.	More internships and other supported WBL	"HLO's," portfolios, career strands, senior exhib.	Voc acad integ Career exploration Supportive envir	Strong principal Job shadow as grad req.
Horizonte Ctr Salt Lake City		Curriculum integration More internships	Adult milieu Tech integration	Supportive environment	Strong principal. Breaks our mold. Exc growth potential. Transiency.
Howard Tech Wilmington	SREB Schools that Work	Occupational specificity Stronger math-sci & post-sec; schedule.	Dual Certification 9th grade curric Quest for Quality	WBL?	Permeability issue: rigid policy.
Turner Tech Miami	CES, NAHS	More peer coaching Feedback for curr. units New staff orientation	Dual certification Integrated units	Voc-acad integ Career explor	Strong principal Permeability issue: reconsidering

Matrix, p. 4: Selection Criteria

School	Voc/Acad Integration	Internships + other WBL	Sec./Post-Sec. Links	Mentoring	Career Exploration	Supportive Environment	Whole School?
CPESS NYC	**Developing** internship portfol., exhib., Mt. Sinai & CTI	**Exemplary** -- CS + all S's min. 100 hrs.	**Yes**- Students take college courses	**Yes** incl. 7th: Oper. Smart, Brotherhood	**Exemplary** personalized + events	**Exemplary** Advisory, adult conversation	**Yes**
Chicago Voc.	**Exemplary** curric. & staff integ, essential q's	**Yes** 40% sr, 20% jr + much SBE	**Yes** Tech Prep, other collaborations	**Developing** 120 students, plan more	**Yes** Career academies, exploratory	**Exemplary** Lesson: small units	**Yes**
Edison Minneapolis	**Limited**	**Yes** in magnets	**Yes** Links to colleges and employers	**Developing** through partnerships	**Yes** 9th grade Career Choices class	**Yes** in magnets	**Developing**
Ely Broward Co.	**Developing** in magnets, SBE	**Exemplary** in quality & vision. Need expansion.	**Yes**	**Developing**	**Developing**	**Exemplary**	**Yes** Sept. '97
Fenway Boston	**Developing** Teachers in work site, portfol	**Exemplary**--all Srs. 6 wk. full-time > sr. proj.	**Exemplary**	**Yes**	**Yes**	**Exemplary**	**Yes**
Gateway St.Louis	**Exemplary**	**Exemplary**	**Yes**	**Yes**	**Exemplary**	**Yes**	**Yes**
Hoover San Diego	**Exemplary** strands, integrated units. S at ctr.	**Developing**	**Yes** - Transition project (electronic transcript) etc.	**Yes** - alumni and business mentoring	**Exemplary:** via curriculum, structure	**Yes:** Advisory, Soc Serv Ctr, AVID, ROTC	**Yes**
Horizonte Salt Lake City	**Developing** Tech. integration in academics	**Developing** internships, SBE in new Tech Ctr.	**Yes** - dual cred., SLCC counselor on site	**Yes** for April '97 thru city offices	**Yes** - intake & program planning	**Exempl:** adult milieu, agencies on site, day care	**Yes**
Howard Wilmington	**Developing**	**Yes**	**Yes**	**Yes**	**Developing**	**Yes**	**Yes**
Turner Miami	**Exemplary** curriculum units, planning	**Yes**	**Yes**	**Yes**	**Yes**	**Exemplary**	**Yes**

Comparison Between the President's Goals for all of America's students and Central Park East Secondary School.

- **To learn according to challenging and clear standards of achievement and accountability.**

Central Park East Secondary School [CPESS]
· High standards are set for all students. In order to graduate, students must clearly exhibit mastery of their school work through the presentation of 14 portfolios to a graduation committee. Examples of portfolio areas include: literature, mathematics, ethics and social issues, geography, fine arts, etc. Students must be prepared to discuss not only the content of the portfolio, but their computer knowledge and growth in particular fields of work. · The major criteria used by the Graduation Committee to judge the portfolios are quality and depth of understanding, good use of CPESS's five habits of mind, and the capacity to present competent and convincing evidence of mastery as relevant to each particular field.

- **To have a talented, dedicated and well-prepared teacher in their classroom.**

Central Park East Secondary School [CPESS]
· To foster an environment that attracts and maintains talented, caring and dedicated teachers, CPESS employs the following strategies: · The school gives teachers high amounts of personal freedom and sets the limit for class size at 20 students, a very small number compared to other city schools. · Teachers serve as advisors to a group of 15 students for two years. This group meets for several hours each week, and it is the advisor who has long-range, in-depth relationships with each student's family. · CPESS has created a system of professional development that allows for powerful conversations about curriculum, learning, assessment and standards during the school week. Staff members are allowed 5 hours per week for collaborative planning, professional planning and staff development. The work is staff-initiated and staff-sustained and is a regular and an integral part of the school culture.

- **To learn in strong, safe, and drug-free schools.**

Central Park East Secondary School [CPESS]

· To promote an environment where students feel safe to participate in the educational process, CPESS has develop behavioral norms for both studnets and staff.
  · The school's values include high expectations, trust, a sense of personal decency, and respect for diversity.
  · The fundamental aim of CPESS is to teach students to use their minds well, to prepare them for a well-lived life that is productive, socially useful, and personally satisfying.

- **By age 18, to be prepared for and able to afford at least 2 years of college, and to pursue lifelong learning.**

Central Park East Secondary School [CPESS]

· Most of the students at CPESS are from low-income families and many have a history of average or below-average academic achievement. Yet,
  · only 5 percent drop out during their high school years,
  · more than 90 percent of graduates go on to college directly.
· CPESS offers interdisciplinary college-preparatory courses for all students, as well as, career-oriented course work.
· Students take courses at Borough of Manhattan Community College, New Schools for Social Research, Hunter College, Teacher's College and Bard College.
· To expose students to the university environment, students participate in the Summer University Opportunities at Columbia University, Cornell University, Syracuse University, Cooper Union and City University, among others.

- **To have their classroom connected to the Internet by the year 2000 and to be technologically literate.**

Central Park East Secondary School [CPESS]

- CPESS has created a program called "Tech-Scouts" which consists of 14 students who have made a two year commitment to the technology program. During the first year students are learning to trouble shoot hardware and software problems, and become expert in various software applications. During the second year students will be assigned to internships in the school, the district and the community using the technology skills they have developed.

Central Park East Secondary School

Central Park East Secondary School (CPESS) was founded in 1985 as a public school in Community School District 4 in New York City. It shares a building with two other schools, each housed on a different floor but share common facilities such as the library and gym. The 450 students are drawn mainly from the East Harlem Community. There are no criteria, tests, or interviews required to attend the school. The population of the school reflects the neighborhood with 45% Latino students and 45% African American students. Approximately 30% of the students are eligible for special education resources and those students are fully integrated into the program. CPESS receives the same per-pupil budgetary allocation as all other New York City schools.

In a city where the graduation rate has been about 55%, CPESS graduates an average of at least 90% of its students with a regular New York State diploma. CPESS has a dropout rate of only 5% during students high school years. Compared to the rest of New York City public schools where 77% of the graduates enroll in postsecondary education (55.9% 4-year colleges, 21.1% two year colleges), 90% of CPESS graduates go on to college, most to four-year schools. CPESS operates in partnership with District 4, the Alternative High School Division of the Board of Education, and the Coalition for Essential Schools. The school is guided by the principles of the Coalition of Essential Schools, a national organization of high schools directed by Ted Sizer. The Coalition's principles include:

1. *Less is more.* It is more important to know some things well than to know many things superficially.

2. *Personalization.* Although the course of study is unified and universal, teaching and

learning are personalized. No teacher is responsible for teaching more than 80 students (40 at CPESS) or advising more than 15.

3. *Goal Setting*. High standards are set for all students. Students must clearly exhibit mastery of their school work.

4. *Student as Worker*. CPESS teachers "coach" students, encouraging them to find answers and, in effect, to teach themselves. Thus, students discover answers and solutions and learn by doing rather than by simply repeating what textbooks (or teachers) say.

A key element of the school is the Community Service/Learning Program. The philosophy behind this program is that students are part of a larger community, and they should participate in and benefit from regular community service. CPESS arranges a variety of community service activities for students to participate in for a minimum of three hours each week. CPESS has an office responsible for arranging the community service program, and keeping track of student attendance, as well as the arrival and departure times of the students. The time that students spend in service activities also helps provide time for teachers' collaborative planning. With students participating in community service activities, teachers use the time for professional development and planning.

CPESS offers a common core curriculum for all students in grades seven through ten that is organized around two major fields: mathematics/science for half of the school day and humanities (art, history, social studies, and literature) for the other half. Interrelationships between different subjects of study are integrated and communications skills are taught in all subjects by all staff. At the end of tenth grade, students enter the Senior Institute.

The Senior Institute is designed to be a transition to college and the world of work beyond high school. Teachers in the Senior Institute usually teach two courses, and act as advisors to the

students to support them in the completion of graduation requirements. In order to graduate, students must complete 14 portfolios over a period of two years. The 14 Portfolio areas included: postgraduate plan, science/technology, mathematics, history and social studies, literature, autobiography, school and community service and internship, ethics and social issues, fine arts/aesthetics, practical skills, media, geography, language other than English/dual language proficiency, physical challenge. Of these 14 Portfolio areas, seven are presented and defended orally before the student's graduation committee and must include the core academic subjects. The other seven are completed through a variety of media, including written reports and video or art presentations. The advisor organizes the student's graduation committee which comprises, in addition to the advisor, a second faculty member, another adult of the student's choice, and an assigned tenth grader. The committee is responsible for assessing the quality of the student's work and must testify to his or her readiness in all 14 required areas before his or her name is presented to the full faculty for approval. A CPESS diploma is earned only after these requirements have been fulfilled.

Both teachers and students at CPESS are given high amounts of personal freedom for development. While teachers do not receive extra pay for working at CPESS, class size at the school is kept very small by most city or other school standards. A maximum of 20 students per class is set. In addition, students receive a substantial amount of individual attention, which brings the home and school together.

Mission Statement

Fenway Middle College High School's mission is to create a socially committed and morally responsible community of learners which values its students as individuals. Fenway's goal is to encourage academic excellence and habits of mind, self-esteem, and leadership development among all the school's students.

Envisioning Fenway At Its Best

- **The Fenway community has a common culture**, and a set of common intellectual experiences which embrace *Coalition of Essential Schools* Principles.
- **The school's program is academically rigorous** and will embody a set of standards which include preparedness in technology, math, sciences, and the Humanities.
- The school **graduates students through exhibitions and portfolios.**
- The school ensures **a work experience for every student.**
- The school **offers students the opportunity to work in teams** and to build the skills requisite for team effort.
- The school will strive for **a flexible schedule that supports the educational program and student learning.**
- The school's program **recognizes the importance of students' physical and mental health as integral** to their overall success.
- **The school maintains and strengthens its networks in Boston's communities** including ties with families and relationships to other organizations in the city.
- The school makes **most effective use of Bunker Hill Community College resources while contributing to the college program.**
- The school is **independent from bureaucratic constraints** and has an **administrative structure which facilitates Fenway's mission and ensures good communication.**

Goals

I. To ensure that students and faculty enjoy a common set of experiences that reflect the core values or culture of the school.

II. To ensure a program that is academically rigorous and embodies a clear set of standards.

III. To graduate students on the basis of portfolios, exhibitions, and other demonstrations of mastery.

IV. To ensure the enrichment of the academic program for all students through working partnerships with a variety of employers.

V. Each year, every student will learn the power of collaboration by completing a collaborative learning project.

VI. To create a school schedule that is flexible enough so as to support the school's priorities.

VII. To support the physical well being of students and teachers. To provide the opportunity to reflect on mind/body connections.

VIII. To provide the best physical environment that will enhance students' and teachers' performance.

IX. To support the mental/emotional well being of students and teachers.

X. To enhance and strengthen Fenway's relationship with Bunker Hill Community College.

XI. To explore the creation of a middle school to be implemented by the 1995-96 school year. (The consensus is not to do this but to pursue perhaps linking up in some way with an already existing middle school with similar philosophy.)

XII. To ensure Fenway's independence with respect to governance, financing, and administration in order to make these other goals possible.

An Overview of Fenway

Introduction

Fenway Middle College High School, located on the campus of Bunker Hill Community College, is a Pilot School within the Boston Public Schools. The school serves two hundred fifty students in grades 9-12. Students are grouped into three Houses, classes are small, and each teacher serves as an advisor to less than twenty students. As a result of this all students are known well.

Location

Being located on the campus of Bunker Hill Community College allows many students to enroll in college courses during their time at Fenway. This, coupled with the individual attention given to our students, helps them to understand that they can successfully handle a college environment. The result of this has been that over seventy-five percent of our students have gone on to further education, and many have continued beyond undergraduate school to pursue advanced degrees.

School-to-Career Program

Fenway has a strong school-to-career program built upon long-standing collaborations with Children's Hospital, CVS Pharmacies, and the Museum of Science. In each case integrated curriculum and in-class experiences are paired with on-sight work which culminates in a six-week senior internship. This program has been a significant contributing factor to the success of Fenway graduates in college as well as in the work place.

Curriculum

Our curriculum combines various disciplines into three major areas of study; Humanities, Science, and Math. Art, music, drama, and foreign languages are also offered. All classes require students to work both individually and in cooperative groups. While the correct answer is valued, so is the process of deriving that answer. "How did you arrive at that solution?" and "Were there other possible solutions or ways to view the problem?" are questions asked in every class. Advisory groups also meet three times a week and address, among others, the topics of personal growth and development, respect, and responsibility.

Central to our curriculum are the five habits of mind we seek to instill in each of our students. These are: **1. Perspective and Viewpoint:** What viewpoint are we seeing/hearing/reading? Who is the author? What is his/her intention? Are there other ways of looking at this? **2. Evidence;** How do we know what we know? What is the evidence? Is the evidence credible? **Connection;** Where have I seen this before? How are things connected to one another? **4. Relevance:** Why is this important? What difference does it make? Who cares? **5. Supposition:** What if...? Can we imagine alternatives? Suppose that ...?

Senior Institute

When students have completed three years of high school courses and have demonstrated sufficient progress and knowledge, they enter the Senior Institute which is the culminating academic experience. The Senior Institute consists of seminars, advanced course work, senior internship, a major research paper, a senior project, and the completion of graduation portfolios. The six components of the portfolio are: Humanities, Math, Science, Internship, Senior Project, and Advisory. All students must

successfully complete the Senior Institute in order to graduate from Fenway. Students will accomplish this with the help of individual coaching and at their own rate.

At the conclusion of Senior Institute, students present their graduation portfolios to a graduation committee which is composed of the student's advisor, a teacher from an academic discipline different from the advisor's, a younger student, and an outside collaborator. If the committee decides that the student is eligible, it recommends to the faculty that a diploma be granted.

Assessment

Fenway evaluates students in various ways: 1. Classroom-based and graduation portfolios, 2. Exhibitions, 3. Standardized testing such as PSAT's, Metropolitan Achievement Tests, and other system-wide tests. When students present their exhibitions they are judged by external review committees which are composed of Fenway teachers, guests from other schools and agencies, and college. Before these public demonstrations of their knowledge and understanding, students have received coaching from their subject teachers, and some have received additional help from the Student Support Team.

Support Services

A Student Support Team of four counselors help students with academic counseling including post high school careers, personal issues, and outreach to the students' families. Fenway also has a Learning Center which functions throughout the school day as well as after school to help students who need extra attention on any academic issues.

The Faculty

Our teachers bring a wide variety of experiences and backgrounds to the school. The faculty is racially and ethnically diverse and two are Fenway graduates. Of the thirty teachers, eighty-five percent presently hold advanced degrees while others are engaged in further studies. Faculty are directly involved in running the school and make many of the decisions concerning curriculum, student assessment, and scheduling.

Governance

Fenway Middle College High School, in addition to reporting to the Superintendent and the Boston Public Schools School Committee, has its own Board of Trustees who oversee the operation of the school. This board consists of faculty, administrators, parents, interested people from the Boston community and professors from higher education. They meet on a regular basis to discuss issues pertaining to the running of the school and serve as advisors to the administration and faculty.

Affiliations

As a member of the *Coalition of Essential Schools,* Fenway is part of a nation-wide effort of nine hundred schools engaged in rethinking educational practices. Fenway is also a member of the Center for Collaborative Education - Metro Boston, an organization dedicated to educational innovation, and the Boston Educators for School Reform.

Accomplishments

1983 - 84

- Began as a program at English High School with 90 at-risk students

1984-85

- Doubled student enrollment to 180, also doubled number of faculty

1985 - 87

- Faculty engaged in integrated curriculum development across all disciplines
- Piloted social issues curriculum
- Began collaboration with Facing History and Ourselves
- Collaborated with World Education, Inc. on curriculum development; received seed funding)

1987 - 88

- Began key collaboration with Harvard Graduate School of Education
- Drafted first mission statement, goals, and action plan
- Received first grant from Boston Globe Foundation
- Engaged public relations consultant

1988 - 89

- Piloted Children's Hospital Collaborative with 20 students
- Piloted American Studies team teaching and performance-based assessment

1989 - 90

- Joined *Coalition of Essential Schools*
- Moved to Jamaica Plain High School
- Undertook strategic planning process
- Created Friends of Fenway

1990 - 91

- Received US Department of Labor award for Children's Hospital Collaboration
- Created Advisory Board of parents, community leaders, business leaders, and supporters
- Moved to Bunker Hill Community College and became a "middle college high school"
- Humanities classes began assessment by portfolio and exhibition as part of the curriculum
- Implemented student advisory system
- Implemented Project Week

Statistics 1996-97

Total Enrollment: 250 Students

Demographics: Male: 40% Female: 60.%
African American: 54% Caucasian: 20% Latino: 20% Asian: 6%

Attendance: (average daily)
Fenway 95.2% Boston Public Schools: 85%

Primary Language Other Than English:
19% (Spanish, Serbian, Portuguese, Haitian Creole, Russian, French, Polish, Vietnamese, Chinese, 3 African dialects)

Teenage Parents: 12-14%

Educationally Disadvantaged: (defined by the Commonwealth of Massachusetts as those students scoring below the 40th percentile on the MAT Math test) 52%

Eligible for Free or Reduced-cost Lunch: 60%

Advanced to next grade:
Fenway: 96% Boston Public Schools (high schools): 95%

College Enrollment: (class of 1995)
Fenway 81% (including one to City Year and three to trade school)
Boston Public Schools: 60%

Community Service:
All Fenway students are required to do substantial community service

Faculty: 30 full and part-time staff
Male: 13 Female: 17
Caucasian: 14 African American: 12 Latino: 3 Pacific Islander: 1
Advanced Degrees:
Fenway: 85% Boston Public Schools (high schools): 77%
Average years of teaching: 10
Average Daily Attendance 99% Boston Public Schools 95%

Fenway Middle College High School Children's Hospital Collaborative
Four-year Curriculum

	Ninth Grade	Tenth Grade	Eleventh Grade	Twelfth Grade
	Who Am I?	Where Am I Going?	How Will I Get There?	Step into The Future.
Academics Classes	Core Academics	Core Academics	Core Academics	Core Academics Senior Institute
Science/Health Classes	Computer Science	Anatomy and Physiology	Chemistry Bunker Hill Community College Classes Computer Science	Physics Bunker Hill Community College Courses
Occupational and Personal Growth Classes	Self Awareness & Personal Growth Adolescent Issues • Social • Health • Future planning • Child develop. What does it mean to be a Fenway Collab student? Ethics and Values • What is work? • Why do people work? • What is the link between education and work? Study Skills Career Exploration Team Building Conflict Resolution	Career Options and Exportation Team Building • Meyers Briggs • Cooperative Learning Community Building • What makes up my community? • Building networks • Using Resources History of Medical Science • Case studies • Family history Wellness • Stress • mental Health • Nutrition • CPR Basic Skills • Financial planning • Time management	The Business of Healthcare Medical Office Technology Medical Terminology Career Exploration Internship College Exploration • SAT Prep • Finances • Other options Mentors	Ethical and Legal Issues in Healthcare Death and Dying Further College Exploration • SAT Prep • Finances • Other options Economics • Labor • Market

Fenway Middle College High School
Changing the Subject

Letter of Application

It has only been in the last decade that educators and corporate leaders have joined together in their recognition that this country is in the midst of an educational crisis. High school drop out rates have soared and many who do graduate lack adequate academic and work place skills. It has become clear that systemic chance is necessary and that not only must schools rethink their approach to educating young people, but businesses and schools must change the ways they support and interact with one another.

Fenway has responded to this challenge by establishing close collaborating partnerships with Children's Hospital, CVS Pharmacies, and the Museum of Science. The school has recognized that students learn best when they can apply what they are learning to practical, real-world situations. By creating a school-to-career program at Fenway that combines academic instruction with work-based training, the school helps students to make the connection between what they need to learn for academic success and what they will need to know in order to be successful in their careers. Central to the success of this program are three core areas:

1. School-based learning which includes helping students to become aware of and to explore career opportunities at an early age which helps them understand how their own interests can translate to career objectives.
2. Work-based learning which includes paid and unpaid work experience in a well-planned training program which exposes students to all areas of the workplace and encourages staff members to become involved in mentoring relationships with the students.
3. Connecting activities which are designed to assist coordination between work sites and school. These may include school projects which call upon work experience; courses jointly developed by teachers and industry representatives; or helping graduating students develop post high school plans.

Fenway Middle College High School's Program

Integration of Vocational and Academic Curriculum

Fenway Middle College High School is divided into three houses: CVS Pharmacies, Children's Hospital, and Crossroads (partnered with the Museum of Science and other smaller partnerships). Employees of the collaborating institution work with Fenway faculty to develop school and work-based curricula, a variety of connecting activities, and internship opportunities. (See Appendices A & B for the curricula from two houses.)

One of Fenway's strengths is the ability and willingness of faculty to put aside defensiveness about business people and other "outsiders" influencing curriculum and school structure. For example, once a year several partners from CVS Pharmacies and all of the faculty from that house have a two-day retreat to review curriculum and to identify gaps in skill areas required by colleges or potential employers. This involves an in-depth review of the skills being taught and the levels of student success. The results of this review brings about a re-focusing and fine tuning of the curriculum as well as an analysis of teaching and learning. The partners also help to answer the questions "What is good work?" and "How do we recognize it?" Through this collaborative process it is possible to identify gaps in Fenway's programs (See Appendix C, Gap Analysis for the CVS House). Fenway have begun a similar process with the other two partners and hopes to build upon the insights and vision that the collaborators bring to the school's work.

This close relationship with collaborating partners has brought about significant integration of work-based and school-based learning and curricula. For instance, this past year the Children's Hospital House, in conjunction with the hospital, TERC, and the science team at Fenway, created a science curriculum based upon the cardiovascular system. This was tied directly to "real" work students did. Students did experiments using the various equipment the hospital has for testing and examinations and were able to explore and learn about this area in person. They were able, through hands-on applications, to see how the cardiovascular system works and to understand how it is effected by outside influences. For instance, in class students studied the heart and how it works. After studying this unit, a doctor from Children's hospital came to class and talked about EKGs and what doctors learn from them. Students then went to the hospital to see the actual machines where the doctor met them and actually administered a test on several students. The physician then took the print outs, showed the students what each line meant and what things to look for in interpreting the results, and had the students do it themselves. The link between skills learned in the classroom

and the application of those skills in the work place became clear as students now saw the connection in a graphic demonstration of what they need to understand and be able to do.

Another time, after studying the anatomy of the heart, the students met with a nationally respected cardiologist who showed them hearts from various animals and then human hearts. He was able to show hearts which had been damaged by certain diseases and talk about the effects certain life habits have on the heart. Here students were able to see the results of behavior in a direct demonstration of cause and effect through a classroom/work site project.

Hands-on learning also is stressed in whole -school projects. Each year a week in the spring is set aside and students explore an aspect of the city of Boston through a central question such as "What makes a good museum?" or "How does the city work?" Students interview people, visit sites, and compile information concerning their particular topic. Fenway's belief is that primary resources are as valuable as secondary ones and in many cases more meaningful to the students.

While it is easy for students to become pigeon holed in one area of a work-site experience, each of the houses requires that significant "on-site" time by students be spent being exposed to the various parts of the business as well as to an overall understanding of the various parts that make up the whole of running a business. They must understand all the aspects of the industry. While students do apprenticeships in specific areas, depending upon interests, they have been exposed to the "whole" of the organization and can make informed decisions on which area they want to pursue knowing its role in the success of the complete business. Through required shadowing and through "rotations" of learning about each area at the work-site, students see how the various parts contribute and collaborate to create a fully-functioning organization.

Fenway believes that all students should have a significant school-to-career experience, and this is viewed as complementary to a demanding and stimulating academic experience (See Appendix E, Teaching and Learning at Fenway). To this end, while the school accepts special education students and bilingual education students, they are all mainstreamed upon entry to Fenway. Most classes are grouped by house except where there may be a difference in level of accomplishment such as being a year ahead or behind one's classmates in math. While these groupings represent a wide range of ability and talent, extra support for those needing it is available through the Learning Center and other resources.

The Fenway program is college preparatory and designed with the expectation that students will go on to further education after graduation. The curriculum is designed taking into account the core requirements

which colleges have for admission. Students must all take the PSATs and the SATs. Students, due to the location of the school on a community college campus, have the opportunity to take college courses while still a high school student. Last semester, over fifty-five college courses were registered for by Fenway students and many Fenway graduates go on to college with several college courses already on their transcripts. Furthermore, they realize that they can handle college level work and be successful in a college class.

In order to enter Senior Institute, the final phase before graduation from Fenway, a student must first pass Junior Review. This is a process in which juniors present a portfolio to a panel of teachers and collaborating partners demonstrating their readiness to handle the more sophisticated work required in Senior Institute. The Junior Review portfolio consists of work from each discipline, a college essay and evidence of research on three colleges, a copy of the student's transcript, and a letter to the Review Committee stating why the student feels that he or she is ready to move on to the Senior Institute, must demonstrate that a student is capable of the independent work necessary in Senior Institute. The Senior Institute consists of seminars, advanced course work, senior internship, a major research paper, a senior project, and the completion of graduation portfolios. The six components of the portfolio are: Humanities, Math, Science, Internship, Senior Project, and Advisory. All students must successfully complete the Senior Institute in order to graduate from Fenway.

In order to accomplish these goals, it is necessary that the faculty have time together to discuss common issues and approaches. There must be time to reflect upon our practices and to jointly plan for future goals. To this end, Fenway has established three regular meeting times each week. The faculty meets as a whole once a week for professional development sessions. These workshops have included topics such as: teaching in a heterogeneous classroom, shared standards, Graduation Committee work for content areas, writing across the curriculum. In addition, the faculty meets in houses to discuss student and classroom issues. Each curriculum team also meets weekly.

This is not enough time for joint planning and for sufficient communication to take place. The school continues to search for ways to structure reflective time for thinking about practices and teaching and learning .

Internships and Other Work-Based Learning

Within the three houses there are varying requirements for work at the site and for internships within that particular program. Students learn

skills specific to the particular workplace as well as general skills which are applicable to all jobs. Some of this is done during the school year and some through a summer requirement.

In addition to specific house requirements, every student, during his or her senior year, is required to do a six-week, full-time internship off campus. Internship sites have been as varied and different as the interests of the students. The Boston Police Department, Legal Services, a radio station, a sound studio, and at a day care center are but a few examples. At the conclusion of the internship, students must present a portfolio which clearly demonstrates what they have learned and the relevance of the experience to their future goals. The portfolio must include a description of the site's overall purpose and mission, a description of the student's role and responsibilities at the internship, a summary of the work-site rules, an organizational flowchart, a daily journal, and informational interviews with at least two other workers, one of whom must have been the supervisor.

The internship leads directly to the Senior Project, an independent study opportunity for students to explore in depth a topic related to the internship. The end result of this project is a portfolio centered around six major components: A question or focus; a journal; research on the focus or question from at least three resources; a final product (paper, or presentation); a bibliography; an exposition.

Quite often, as part of the site-based curriculum, students are given the opportunity to work on issues and problems being faced by the particular partner. Last year, for instance, the CVS juniors were given a year-long task of researching a location for a new store in Boston. This was in fact, a location the company was actively exploring, and they sought the students' help. The task was divided up into areas such as real estate concerns, neighborhood reaction, available business for the pharmacy, etc. Students even had to research the impact on surrounding businesses and help devise ways to make that impact acceptable. At various times during the project, students met with the corporate people responsible for each area and shared their findings. At the end of the project a full report was presented at CVS Headquarters in Woonsocket, Rhode Island. As a direct result of the research and work done by students in conjunction with the people from CVS, the decision was made to build the new pharmacy in the Dudley Square area of Boston.

High School/Post-Secondary Linkages

Fenway's location on the campus of Bunker Hill Community College provides special opportunities for both students and faculty. Many students enroll in college courses and successfully complete them.

It also provides access to the college library, the science labs, and the college cafeteria. In addition, faculty have the opportunity to partner with college professors to explore curriculum and to assess teaching and learning with the assistance of a person teaching at the college level. College professors teach units in Fenway classes. Last spring a Criminal Justice professor taught a Humanities class about trial procedures and then led students through a mock trial. Fenway assesses students using portfolios and exhibitions and often college teachers serve as judges for our math exhibitions and science and Humanities projects.

Fenway has joined with the college to pursue and administer joint grants which have been used to purchase equipment and support other combined efforts. This year, as a result of the grant money, both the Art and Music Departments at the college will purchase equipment which will be used by students from both schools. The Fenway art teacher will be supervising the design and painting of a mural by Fenway and Bunker Hill Community College art students. A Bunker Hill Community College student will be hired as a lab assistant in the science program and will be involved in designing lab units within the curriculum.

Mentoring

Each of the collaboration programs incorporates mentoring opportunities for students and employees. For instance, students at Children's Hospital develop close relationships with their supervisors through the work itself (it is not an easy task to get past the uneasiness of learning to insert a needle in someone's vein to draw blood) as well as on a personal level. Because the partnerships are designed so that people and resources can flow freely between school and work place, adults from the collaborations often get involved in school projects with students. Close relationships develop because often the mentoring role is maintained for a period of two to three years so the participants have the opportunity to get to know one another well.

Fenway has a strong advisory system which meets three times a week and focuses on students' academic and interpersonal needs. The curriculum, developed by the staff and the students, covers such topics as health, sexuality, HIV/AIDS, decision making, parenting, stress management, violence prevention, civil rights and responsibilities, and community building. The course is flexible enough to be able to respond to the immediate needs of students when they arise. Advisory is also a time for students to work on their portfolios and to do a general "check in" with their advisors to assure that the student's work and emotional life, both critical to the student's success in school, are on track. Advisors keep track of how a student is doing academically and are in regular communication

with the parents of each advisee. As the advisors get to know the students well, the students, in turn, recognize that the advisor is their advocate and a readily available support system. In addition, Fenway has four counselors on the Student Support Team who also provide one on one support and help to students. After school, the Student Support Team runs a variety of support groups such as a women's group and a men's group, peer mediation training, and time management.

Career Exploration

Through both the collaborations with partners as well as through various activities in a house, students are exposed to the entire range of the operation of a given industry. The curriculum, integrating school and work-based curricula gives students an in-depth understanding of the requirements and skills necessary for success. Through portfolio requirements and Senior Projects (an in-depth research project and report growing from the senior internship), students demonstrate their grasp of the over all view of the organization.

Supportive Learning Environment

While the school is divided into three houses which are based upon possible career choices and not on academic ability and achievement, Fenway does have systems, both preventive and crisis driven, to support students academically and emotionally. The Student Support Team, the advisory system, and the informal counseling by faculty members provide a network of support. In addition, the school maintains a Learning Center staffed by three faculty members, one of whom is certified in Special needs, which operates during the day with regular classes and after school for small group and one on one work to help students improve skills and develop stronger study habits. We also have a Chapter I teacher.

One of the areas which continues to confound Fenway is the full integration of work-based learning into the school-based curriculum. While the school has made significant progress over the past years, it still struggles with the seemingly inflexible requirements of certain disciplines. For instance, Fenway uses the Integrated Math Program to teach mathematics. This program has had a positive impact on the math skills our students have upon graduation. Every student who completes Fenway now has mastered at least the equivalent of Algebra II and many have moved significantly beyond that into higher math. However, IMP has a very inflexible structure and it has been difficult to find strong work-based linkages. The school needs to explore the barriers and possible solutions to this dilemma.

This spring, a Humanities teacher and a science teacher are taking twenty-five students out of the regular curriculum and teaching them for a full month in a totally integrated program using water as the unifying theme. It is their goal to eliminate the boundaries between the disciplines and to teach with a project-based, interdisciplinary approach. This type of fully integrated curriculum which could link school-based and work-based learning is a direction Fenway want to pursue in more depth.

Some other questions to explore are:

- Does the schedule and structure of the school confound or compliment the school-to-career program?
- Does the advisory system confound or compliment the school-to-career program?
- Are we serving all of our students
- Does graduation by portfolio and exhibition increase the opportunities for school/wok site collaboration?
- How are programmatic needs different for ninth versus twelfth graders?

How We Would Use The Grant

1. To provide the school with the opportunity to look deeply at its practices and beliefs, its teaching and learning, and at its articulation of philosophy and approach. By having the grant/program spread over a two-year period, Fenway will have the opportunity to slow down and spend the first year looking, investigating, questioning, and exploring all the implications of our beliefs and practices. It will allow teachers to reflect on the above questions as well as uncover new questions and explore new answers. The second year allows the opportunity to implement and evaluate changes and responses to the journey of the first year.
2. The grant will provide the funds to document and disseminate present work as well as the process of questioning and discovering the strengths and weaknesses of what the school is doing and the process for responding to those discoveries.
3. The grant will support curriculum revision in areas such as math, science, and Humanities to better integrate them with the work-based experience of our students.

Relationship With Mentor

Fenway would envision its relationship with its mentor to be a close and meaningful one for the whole faculty and not just for one particular

group. Mini workshops would occur on a regular basis in which faculty would bring issues surrounding a pre-agreed upon topic to the gathering. The mentor will observe classes and work-sites and then report back both to the individual teacher about specifics and to the faculty as a whole about broader issues observed. Perhaps video tapes can be used to illustrate or focus on an issue. The mentor will facilitate the explorations into the school's practices and help teachers to look closely at what they are doing. It would also be hoped that the mentor would be available to individual faculty members by phone to serve as a resource and support in our journey to becoming a better school.

Contributions To The Work Of The Project

The grant will allow Fenway, as part of its documentation and dissemination, to create an instructional video on graduation by portfolio and exhibition which other schools can use to bring about authentic assessment in their schools. Fenway would also disseminate the documentation of its present program as well as our process of exploring dilemmas and the resolutions reached. Fenway welcomes almost three hundred visitors a year to its campus who observe our practices and learn from talking with our staff. Descriptions of curriculum would become available to other schools for their use. Through various workshops and seminars presented by Fenway faculty and administration at conferences locally and nationally, the school's journey will be shared.

Current Efforts To Provide Planning Time And Professional Development

In addition to the weekly house meetings, content team meetings, and full-faculty retreats, one hour each week is set aside for a full-faculty meeting. This is a time when some issue surrounding professional growth is presented and a workshop is conducted. It could be tape of a teacher teaching which is then responded to by using a tuning protocol (see Appendix D) or it could be a mock Graduation Committee. In addition, the school provides the opportunities for various groups to do intensive work during the summer for one or two weeks. Consultants are made available to facilitate the process and faculty are paid for their time. In addition, two faculty members who are on the National Faculty of The Annenberg Institute for School Reform who lead critical friends groups on campus.

JOBS FOR THE FUTURE

One Bowdoin Square
Boston, MA 02114
(617) 742-5995
FAX 742-5767

Mr. Larry Rosenstock
Project Director,
Changing the Subject

November 20th, 1996

Dear Mr. Rosenstock,

I am delighted to learn that you have invited the Fenway Middle College High School to apply to become one of the six urban high schools that will participate in your national project. I am writing in support of the Fenway School's application, and to urge you to include this exemplary schools you will support and study.

Education reformers urgently need models that show how school-to-career strategies can help us achieve broader school reform goals, such as the integration of academic and work-based learning and the development of environments in which every student is valued, and where all students are actively learning. For many years, we have expected the best of a few students, and expected very little of others. This must change. When I think of a school that "expects the best of every student", I automatically think of the Fenway school. I believe that if this school is chosen, it will contribute substantially to defining a new vision for the American High School.

You have an exciting new venture in front of you and I hope you will make the Fenway a key part of it. For you and Rob Riordan and Barbara Roche, these will be exciting and challenging times and I wish you strength and good fortune! Do let me know if there is anything I can contribute to this work.

Yours sincerely

Margaret Vickers

BUNKER HILL
COMMUNITY COLLEGE

250 NEW RUTHERFORD AVENUE, BOSTON, MASSACHUSETTS 02129-2991
(617) 228-2000

The Big Picture
118 Magazine Street
Cambridge, MA 02139

November 29, 1996

Dear Colleagues:

I am delighted to write in support of the Fenway Middle College High School at Bunker Hill Community College application for *Changing the Subject: The New Urban High School*. As Fenway Middle College High School's host collaborator, we are in a unique position to observe, partner with, and comment upon the significant contributions being made to the current and future shape of urban high school education.

Not only is the Fenway a place of significant learning, it is a community in the best sense of the word. Built upon a philosophy that all students can achieve and an insistence upon high academic standards, the Fenway has a long history of academic success with urban youth. Whether measuring student attendance, persistence, achievement, or college placement, Fenway has consistently out performed the district high schools of Boston.

This praise is echoed in the recognition Fenway has received nationally having been selected as a "New American High School" in 1996 by the United States Department of Education and the National conference for Research on Vocational Education, and earlier in 1990 recognized by the United States Department of Labor for its Collaborative with Children's Hospital. Locally the work of the Fenway received recognition in gaining approval as both a Charter School and in receiving Pilot School status by the Boston Public Schools. Choosing Pilot School status it has more recently been noted as a lead school for the Boston Plan for Excellence's Twenty-First Century Schools Program.

The six criteria for selection as a site for *Changing the Subject* are core features of the Fenway approach. Integration of academic and vocational curriculum have been key to the success of the schools efforts; partnerships with Children's Hospital, CVS Pharmacy, and the Museum of Science have enabled countless students to know real career situations and the relevance of academic and vocational skills. Each senior at Fenway is required to complete a six week internship as a condition for graduation. The partnership with Bunker Hill has allowed student to experience the demands and rigors of a collegiate atmosphere and has permitted many qualified students to enroll in college level courses. The college entrance rate at Fenway is 80% of all graduates. Based on the principles of the Coalition of Essential Schools Fenway Middle College High School at Bunker Hill Community College has created a new highly supportive environment for learning and vocational awareness. It is Bunker Hill Community College's honor and continuing opportunity to be a partner and collaborator with this significant school. It is through such collaboration we are enriched, enlivened and able to create the learning environments which will prepare the new leaders for America.

Sincerely,

Robert G. Ross
Assistant Vice President and Liaison to the Fenway Middle College High School

Shafi Shilad
Vice President
MIS-Pharmacy Systems

CVS/pharmacy
Subsidiary of Melville Corporation

The Big Picture
118 Magazine Street
Cambridge, Mass 02139

Dear Sir/Madam:

It is my understanding that The Big Picture is in the process of coordinating a project which will identify, describe, assist and disseminate the work of schools which have demonstrated a commitment to linking school-to-career initiative.

The intent of my letter is to commend you for coordinating the development of such an important vision. The vision to prepare our students become "thoughtful, productive citizens". Also, I would like to take this opportunity to recommend Fenway Middle College High School as a participant in this project. In 1992, CVS and Fenway Middle College High School initiated a partnership that is designed to introduce inner-city youths to pharmacy career options, help them develop the skills needed to enter the field, and expose them to role models in the workplace. The program is in its fifth year, including summers and consists of the following activities:

- School-based learning, with emphasis on Math and Science
- Work-based experiences, including job shadowing and internship in CVS stores and visits to CVS headquarters
- "Connecting Activities" including pharmacy-related class room projects, mentoring and partnership projects with Mass. College of Pharmacy, career and college awareness activities, and a hands-on senior project

Not only that, Fenway Middle College High School has the experience in school-to-work programs, and execute their programs with excellence. In 1996, they were selected as a New American High School by US department of Education and the National Conference for Research on Vocational Education. They were also named a Lead school for the Boston Plan for Excellence's Twenty-First Century School's Program.

In closing, I hope you will consider Fenway Middle College High School as a participant in this project and if you have any questions, please feel free to call me.

Sincerely

Shafi Shilad

Shafi Shilad
Vice President- MIS Pharmacy Systems

Children's Hospital
300 Longwood Avenue
Boston, MA 02115
617-355-6506
617-355-7940 (Fax)
617-355-6956 (TDD)

Institute for Community Inclusion

Children's Hospital

November 22, 1996

Mr. Richard Perry
Fenway Middle College High School
250 Rutherford Ave.
Boston, MA. 02129

Dear Rich,

I am delighted to have the opportunity to support the Fenway Middle College High School in their application addressing Changing the Subject. The Fenway program has in our opinion and the opinion of many other educators been on the cutting edge in supporting learning and teaching in an urban setting. The innovation that the program has fostered over the past several years has born fruit with the very commendable record of eight out of ten students who are graduated continuing their education. We at the Institute for Community Inclusion can attest to the very substantial success of the program having had the opportunity to both hire one of the more recent college graduates who had come through the Fenway program and have interns from Roxbury Community College who were also graduates of the program.

The challenge of providing educational services and supports to students in an urban setting has been well documented. The approaches that the Fenway program has used including the active involvement of community partners such as the Children's Hospital has both responded to the students needs and incorporated industry into the educational process in a very concrete fashion. We value our relationship with the Fenway students and have found them eager to learn and motivated to participate with the many work areas in the Hospital.

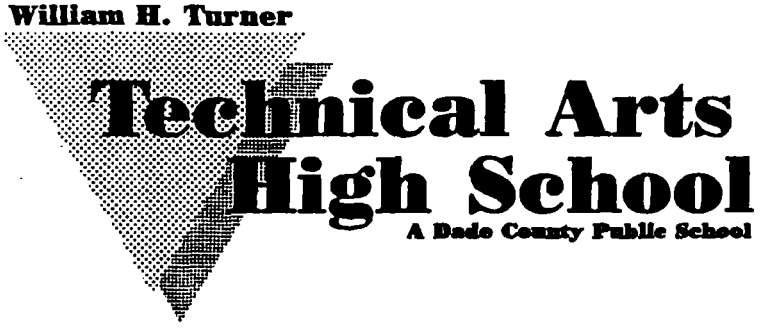
For the above reasons, and in light of the very innovative leadership that the Fenway Middle College High School has provided in Boston, we strongly support the Fenway application. We look forward to working with the Fenway program in the coming years and in hiring the graduates as they enter the employment arena.

Sincerely,

William E. Kiernan, Ph.D.
Director

Profile Three: William H. Turner Technical Arts High School

Dade County, Florida



The Two-for-One System: Where A Rigorous Academic and Vocational Education Co-Exist

Acknowledgments

The instructors, principals and administrators who work at Turner Tech and the Dade County public schools have made this publication possible. Turner Tech hosted our three-day intensive site visit in May and fielded numerous phone calls leading up to publication. They arranged for us to speak with business and labor representatives, instructors, students, test directors, county administrators, curriculum writers and principals. They allowed us to take stacks of primary source materials, such as competency-based curriculum, applied lessons and evaluations.

At Turner Tech and the Dade County Schools, we would like to thank those whom we interviewed: **Genevieve Yarnold** (AFT union representative), **John McKinney** (former principal), **Enid Weisman** (principal), **Alicia Green** (former vice principal), **Jack Moller** and **Albert Carvalho** (assistant principals), **Nelson Perez** (Regional Director), **Lois Kahn** (Academy Leader, Finance), **Shawn Beightol** (science instructor, Agriscience), **Michael Axelrod** (student, Finance), **Peggy Jones** (assistant principal), state Senator **William Turner, Joe Mathos** (Assistant Superintendent), **Becky Nyberger** (SAIL Lab), **Vernon Wilder** (guidance counselor, test director), **Averell Miller** (Academy Leader, Agriscience), **Dr. Nancy Tigar** (Information Center Chair), **Tony Mateo** (student, television production), **Sergio Munoz** (student, agriscience), **Quintin Robinson** (student, Health), **Bob Collins** (accountability), **Tina Whitacre** (Academy leader, Health), **Gem Home Therapy, Tyrone Corliss** (vocational instructor, Agriscience), **Pete Ramirez** (History instructor, Agriscience), **Janis Masztal** (English instructor, Agriscience), **Pat Vengnani** (Applied Technology Advisory Committee), **LaShondra Avery** (student, Public Service), **Barbara Silver** and **Craig Sturgeon** (DCPS Competency-Based Curriculum specialists), **Karen San Emeterio** (academy leader, Residential Construction), **David Pincus** and **Michael Ali** (occupational placement specialist), **Herb Weinfeld** (Office of Educational Accountability) and **Mayra Roldan**.

Table of Contents

Overview

Dade County, Florida—To understand the significance of Turner Tech's academic and vocational accomplishments, you need to appreciate the community from which it emerges. In an unincorporated suburb on the north-central side of Dade County, the population is almost uniformly economically disadvantaged. Its surrounding schools are among the most dangerous, with armed "school resource officers" in each. All other area high schools are overcrowded. The dropout rate is high; minimum competency test scores, low. Of those who graduate, few go on to college, and few have skills that help them immediately earn what they need to support themselves and, eventually, a family.

Seventeen years ago, William H. Turner, a school administrator and then-resident of these neighborhoods, had a dream: to create a senior high school that provided both a high-caliber academic curriculum and entry-level technical training to prepare students to gain professional certification in a skilled field. Turner thought that with an "A" faculty, "A" building and facilities, and an "A" set of expectations and curriculum, these normally "C" and "D" students could make tremendous academic strides and provide a new, well-educated, highly trained backbone to this economically disadvantaged community.

Turner ran for and won a position on the Dade County school board in the late 1980s. By the early 1990s, Turner became school board chair, and, along with Roger Cuevas, current superintendent of schools, helped shepherd a $180 million bond issue to passage; in essence, guaranteeing funding for the construction of his dream school. By August 1993, the doors to the city's only magnet vocational school, William H. Turner Technical Arts High School, opened in the center of William Turner's economically depressed community.

The result has been a continuing experiment in how school-to-career systems, with their high expectations for personal conduct, quality academic and vocational achievement, can provide committed students a solid education. Each year of its existence, Turner Tech has fought the traditional poor image of a vocational high school that serves as a dumping ground for "dumb voc-ed kids who can't handle academics." According to Assistant Principal Jack Moller, "Many administrators, including myself (I was serving at a different high school at the time), saw Turner as an opportunity to unload problem students."

However, after only three years, 20 percent more students pass the state's minimum competency test, called the High School Competency Test, than do other nearby high schools. More importantly, Turner Tech is quickly closing the gap with the "premier" Dade County high schools, despite the fact that many of the ninth-grade students started at a much lower achievement level.

The Shaping of Turner Tech

Groundbreaking began in 1991, in the predominantly African-American, economically disadvantaged community in north central Dade County. Builders did not purchase new land. Instead, Turner Tech was built on the site of the old Miami Agriculture School. Money saved on land purchase was reallocated for purchase of current technology and better school facilities.

In subsequent months, discussion heated up on the school board as to the "appropriate" function of the center. One faction wanted to create a vocational/technical center that could service local high schools. In this scenario, high school students from the area could take a few

classes each semester in an advanced vocational field at the technical center, in addition to required academic courses taken at their "home" high school. The other faction, led by Board Chair William H. Turner, argued for his "dual education" function. In this way, the school could provide a more rigorous education for the neighborhood's economically disadvantaged, yet motivated students. While at the same time alleviating the overpopulation at nearby senior high schools that were all running between 20 percent to 60 percent over capacity.

The Turner faction finally won the argument, after a few concessions, and hired Dr. John A. McKinney as the school's first principal, in 1992, a year before the scheduled opening of the school. McKinney, who lived in the community and had served at various times as an elementary, high school, and adult education principal, was given free rein to hire each of the Academy leaders. McKinney hand-picked the vocational teachers from existing schools across Dade County.

In turn, these Academy leaders hand-picked their academic and vocational staff, in preparation for the 1993-94 school year. During the hiring process, prospective staff had to be aware of and agree with the program's goals and objectives, its distinctive approach to education, and the high expectations for its students. In subsequent years, those not "on board" with the system did not remain.

Turner Tech administrators sent a strong message that discipline and academic application were its guideposts. Nearly 100 of the 250 students were "exited" that first year for failure to meet academic standards. With each succeeding year, as competition for the 500 first-year slots has increased, Turner's class quality has improved. Despite its improved reputation, and standards for entry, Turner still has 34 percent of its students considered "at risk" of dropping out because of their economic status, compared with 32 percent district wide.

The school district provides the same amount of direct funding for Turner Tech as it does for any DCPS senior high school. The school receives strong financial support—over and above the district allocation—from Perkins vocational money, grants from the Dade County Public Education Fund, the Fannie Mae Foundation and the National School-to-Work Office. Also, area businesses and community organizations donate different products and services.

Career Academy Balance: Strong Academic and Vocational Education

Turner Tech chose the career academy model to teach students the academic core and vocational specialization courses. From the beginning, the focus, has been on balance: to require a strong academic foundation and augment it with enough vocational training that students can complete a professional certification, either while in high school or in one to two years thereafter, in an apprenticeship, community or technical college program.

Turner Tech created seven career academies that students could enter upon enrollment: Agriscience, Applied Business Technology, Finance, Health, Industrial Technology, Public Service/Television Production, and Residential Construction. Each academy acts as a school-within-a-school where students take all academic and vocational courses together. For an explanation of each Academy see Appendix A.

Solid Academic Foundation that Follows State Content Standards

Each career academy requires solid

academic core courses. All academies require a minimum of four years of English and three years of social studies, at levels universities accept as prerequisites for entry (no basic or remedial English). All academies, except Industrial Technology, require math courses up to and including Algebra II. Half the academies require at least two "hard" science courses that are accepted by Florida state universities as fulfilling prerequisites for entry (i.e., biology, chemistry, physics; not Principles of Technology or Environmental Science). The one academic weakness at Turner Tech is in foreign languages—only the International Business and Finance programs require any courses. (To see a complete listing of the number of academic requirements for each career academy, please see Appendix B.)

Turner Tech academic instructors, regardless of career academy, follow the content standards spelled out in the Dade County public school's Competency-Based Curriculum (CBC). This county curriculum has specific, content-based standards that provide clear, concise direction for the instructor. For example, in core academic areas students must:

Science:

- Use laboratory experiences, compare insulators and conductors.
- Demonstrate accurate metric measurement techniques using common laboratory apparatus to measure length, volume, temperature and time.
- Explain how solutions can exist as solids, liquids and gases.

Social Studies:

- Describe the effects of mass production and technology on labor-management relations in the 1920s.
- List reasons for citizen unrest in Central and South America, past and present.
- Explain the concept of majority rule with protection of individual and minority rights.

Language Arts:

- Write a precise thesis statement that is declarative, compelling, and defensible, and support it with fully developed paragraphs.
- Recognize and understand idioms, puns and euphemisms.
- Analyze reports based on technical and/or scientific information that includes statistical data and examines language and style.

Math:

- Represent irrational numbers geometrically.
- Translate between the use of local axiomatic sequences (synthetic proofs) and the informal explorations of coordinate representations.
- Determine maxima and minima of graphs and interpret the results in a problem situation.

Because academic content drives academic courses, there is not a big concern that students must sacrifice their academic education to receive vocational training. Academic instructors know what they have to teach. Students know what they have to learn. So students receive both academic and vocational training—there is no trade-off. (To see a sample of the math CBCs, please see Appendix C.)

To ensure that students are, indeed, learning this CBC content, beginning May 1998, Dade County will test all eleventh-grade students in English, math,

social studies and science. These tests will be aligned to the specific content standards from the Dade County curriculum. The subject exams will be field tested in May 1997, to determine how well eleventh-grade students are learning these subjects. Passage of all four eleventh-grade level tests will be a prerequisite to earning a diploma in 1998.

Vocational Specialization—Career Majors

Before enrolling at Turner Tech, students have already received informal counseling on their choice of Academy. Upon acceptance, eighth graders receive phone calls from students and academy leaders who offer to answer questions and provide a deeper understanding of the academy focus. Like college recruiters, academy instructors and students conduct visits to middle schools throughout Dade County to talk to interested students about Turner Tech. Those accepted attend an orientation during spring semester of eighth grade to learn about curriculum offerings and the overall focus of academies they are interested in.

Once a career academy is selected, students can choose a more specific specialization, or "career major." Most academies encourage the student to decide on a career major upon entering their ninth grade, so they can complete their vocational sequence. In most of the academies, however, students can take a one-year introductory vocational course. In tenth grade, specialized vocational courses are offered.

The selection of a career major determines the specific vocational courses that help prepare the student for certification in their career field. For instance, in the Public Service and Television Production Academy, students choose from three career majors: Criminal Justice, Television Production and Teacher Assisting. In the Health Academy, students choose from Dental Lab Assisting, EKG Aide and Vision Care, among others. Selection of a career major by the end of ninth grade ensures that each student has a purposeful course of study that works toward the completion of some specific credential that will gain them immediate access to the skilled labor market after graduation. (For a complete listing of all available career majors, please see Appendix D.) For an example, the course schedule for the Carpentry Program of the Residential Construction Academy is listed below.

Compared to students in a traditional vocational program, Turner Tech students are taking fairly rigorous academic courses. But these are the academic courses

Grade 9	Grade 10	Grade 11	Grade 12
English 1	English 2	English 3	English 4
Pre-Algebra or Algebra 1	Algebra 1 or Geometry	Geometry or Algebra 2	Algebra 2 or elective
Physical Science or Biology	Biology, Chemistry or Environmental Science	Environ. Science, Chemistry or Principles of Technology 1	American Government/ Economics
World History	Life Mgmt\Drivers Ed	American History	Carpentry 5
Practical Construction	Carpentry 1	Carpentry 3	Industrial Cooperative Education—(2 periods)
P.E. and Fine Arts	Carpentry 2	Carpentry 4	

and skills that are needed to function effectively in the carpentry field. (To see a listing of the course schedules for each of the 22 career majors, please see Appendix E.)

Solid Vocational Foundation that Follows State Content Standards

Many traditional vocational programs suffer from vocational courses that are not of professional quality. Students in these traditional programs often take courses which do not train them on current technology and do not teach content at levels approaching those of professional training schools. Turner Tech has two ways to certify its high vocational course quality. First, the state lists the required vocational course content for each of the traditional "blue-collar" courses, such as the Health Academy's Medical Lab Assisting. If teachers cover all vocational course content material and the student can demonstrate mastery of the skills, the student will pass and receive state certification as being proficient in the skills of this program.

State-determined course content alone, however, may not be sufficient to meet all the specific technical skills that employers require. Therefore, all of the traditional "blue-collar" academies, such as Residential Construction, have advisory committees, comprising local union, university and business representatives in their career field. These committees, which create an important community connection, meet three times a year to evaluate course curriculum, make suggestions for improvement and determine whether to validate the courses as "professional" quality.

The high-quality vocational courses taken by students at Turner Tech qualify them to receive credit for advanced courses in their career field. For instance, the union members on the Masonry Advisory Committee give students who complete the full Masonry program advanced standing (two grade levels) in the Dade County union apprenticeship ladder. Students who complete the Criminal Justice program in the Public Service Academy receive advanced consideration in their application to the county police academy. These unions and businesses recognize and promote high-quality courses by awarding advanced credit.

The "white-collar" vocational programs (such as Finance and International Business) do not yet have state-regulated content because their programs are unique in the state. Each, however, does have an advisory committee of business and university representatives that helps vocational teachers construct the syllabus for these courses. Further, five articulation agreements exist between Turner Tech and the Miami Dade Community College (MDCC) that validate the quality of these Turner Tech vocational courses. These agreements state that if vocational courses like Accounting I and II in the Finance Academy cover the same content as their MDCC counterparts, students who earn an 'A' or 'B' can receive community college credit for those courses if they enroll at MDCC. (For an example of a Turner Tech articulation agreement, please see Appendix F.)

Students Accept Greater Responsibility

Turner Tech focuses its attention on the reciprocal responsibility between student and school. It starts with admission. Unlike the traditional neighborhood school, students have to apply for entry to Turner Tech, a magnet vocational institution. They are not automatically accepted. Eighth-grade students complete a one-page application. Acceptance is based on their junior high school grades, attendance, conduct and articulated inter-

est in vocational studies. A faculty team studies the applications (for the 1996-97 school year, there were 1,000) to fill 500 slots in the ninth-grade class. Students with "Ds" and "Fs" usually do not gain enrollment, however most students who enroll are also not straight "A" students either. Most applicants fall in the range of fourth to fifth stanine (on a 1-10 scale) as average-achieving students on the eighth grade Stanford Achievement Test.[1]

Accepted students must agree to professional standards of dress and conduct. As assistant principal Jack Moller puts it, "We want students to dress for the workplace, because for four years this school is their workplace." For instance, students wear a school uniform: a polo-style shirt that bears the school logo. Each student must wear a photo identification badge. Hats are not allowed. Faculty follow suit. Although the AFT-negotiated teacher contract prevents schools from requiring standard teacher uniforms, many voluntarily wear the Turner Tech polo to support its mission.

Student behavior must also meet a high standard. This tone was established at the school's opening parent orientation. Explains Nelson Perez, Turner Tech's Regional Director:

> The very first time that we had our orientation for the parents, we filled the gymnasium... [School principal] Dr. McKinney was [talking] and you could literally hear a pin drop. Totally quiet. Then he goes to somebody else. There was a lot of rustling going on. Parents. All parents, right? The next person came to speak, and many parents are just talking. Dr. McKinney goes back to the microphone and he says, 'If we are going to ask your kids to be courteous, to have discipline, then we can expect no less from the adults.' And all of a sudden it was silent, you know? Then a couple people clapped, then everybody clapped. But that right there was the defining moment that instilled discipline in this school.

As a result, Turner Tech had the second-lowest incidence of student suspension and misbehavior in the Dade County system. There are no metal detectors; a school resource officer's presence is more to keep troublemakers (easily spotted by their lack of school uniform or ID badge) from wandering onto campus than to control Turner's own population.

Because of this application process, which Turner Tech administrators call a "hiring process," and the higher expectations for student conduct, the school ends up with a population that is motivated to learn. As one student in the Residential Construction Academy puts it:

> You choose to come here. You have to want to learn. You have to be goal-oriented. You understand that when you come here you have to wear an ID, you have to wear a uniform. You understand that you don't have to stay. So when you come here you understand that. And you still have a lot of people who apply and say yes, they want to come here. People who want to learn. You don't get a lot of people who just go to school because they have to. You have people concerned about their education.

Nearly all students are transported by bus. Some commute up to three hours each day, with morning buses beginning pick-ups between 5:15 a.m. and 6:30 a.m. Student attendance, which has hovered between 95-96 percent every year since Turner Tech opened, shows that students make a serious effort to wake up extremely early to catch the bus every day. If students have more than ten unexcused absences in a year, they are "fired," sent back to their home school.

Student motivation allows Turner Tech to hold strict academic standards. The school has raised the minimum GPA to 2.0. In 1996, Dade County followed suit in raising its GPA. Further, students who earn two or more "Ds" on a report card are put on academic probation. If it happens twice, the student is "fired." Since its opening in 1993, Turner Tech administrators have "fired" more than 300 students.

Because some ninth-grade students start farther behind academically, they take summer school classes before high

[1] The Stanford Achievement test is nationally norm referenced. Students are grouped into one of 10 categorical, or stanine rankings. The lowest is 1, the highest is 10. Therefore, students in the fourth and fifth stanine rank at the average to lower-than-average- end of the scale.

school, including non-academic courses, like fine arts and physical education, so they can focus on academics during the school year. Before and after school, students can go to the System for Applied Individualized Learning (SAIL) lab to get computer-aided remedial instruction in reading on one of its 20 computers. Faculty members set a reading standard of 70 (on a 1-100 scale), based upon the Degrees of Reading Power (DRP) program, that indicated 70 was a level sufficient to be prepared for college. SAIL is the tool Turner uses to ensure all students get to 70.

In return for student commitment to meeting high academic and behavioral standards, students receive instruction at a unique institution.

Turner Tech houses an amazing architectural building. There is a real college—not a high school—"feel" to the 34-acre campus. Constructed in an Art Deco style, Turner Tech is painted in yellow, teal, and orange pastels (earning it the derisive name of "Crayola High" from its detractors). Walls are stucco. There is a lot of open space, including interior courtyards. Turner Tech shares these facilities with the Adult Education High School, which conducts courses at night. This partnership means additional money from the Adult Education program can be used to keep technology current.

The school is equipped with thoroughly modern equipment in every academy to train students in the essentials of their trade, paid for mainly from the initial bond issue. For example, Agriscience has 16 head of cattle, three aqua culture tanks and two cloning machines. TV Production has two "network-quality" cameras, a graphics generator, and a satellite dish. Industrial Technology has CAD drafting software and a three-story warehouse for residential construction, masonry and carpentry lessons. Computer labs are available to all students. Finance, heavily backed by home mortgage giant Fannie Mae, has access to the stock exchange, the Wall Street Journal, and many of the financial businesses in Miami. Classrooms are networked for Internet capability and TV Production-produced daily video announcements.

There is a great deal of trust and collegiality among faculty members, students and staff. Because this is a new school, trying many new ideas, there is a constant air of improvement, feedback and dialogue. Staff, administrators, faculty members, students, and even cleaning crews met in teams throughout the second year to set five achievable school wide goals for the following year. Students have input on issues affecting them, such as the dress code and lack of an auditorium, through the Principal's Advisory Council.

Faculty meet frequently to discuss problems with their curricula or class lessons. In fact, for the first two years of the school's existence, the district spent $500,000 a year for a seventh period—though the rest of the district had only six—to allow Turner Tech instructors both one professional planning period and one period for academies to meet, to integrate the academic and technical curriculum. The district cut the additional professional development money for the 1995-96 school year because the curricula had already been integrated; it is now more difficult for faculty to meet because they no longer have a seventh period for academy planning.

School spirit is quite different at Turner Tech, more a manifestation of its unique focus as a career academy magnet high school. Turner Tech does not have varsity athletics because it recruits its student body and wants to ensure that academic qualifications remain the singular determiner in the application process. While students can return to the "home" high school in their neighborhood to participate in cheerleading, varsity activities

or sports, most students focus their energies instead on vocational service organizations (VSOs), such as Vocational Industrial Clubs of America, Future Farmers of America and Future Business Leaders of America. Turner Tech does have a band, but pep rallies focus more on such nontraditional ceremonies as student achievement on academic teams, VSOs and county fair competitions, not Friday night football.

Students at Turner Tech are focused. They see a direct correlation between academic learning and its use in their career field. They receive daily training for that career. Their instructors, facilities and curriculum are top-notch. People expect quality academic and behavioral standards to be met by these students. Turner Tech students rarely disappoint. They seem to understand the excellent opportunity that they have been offered, as one junior points out:

> Turner Tech students are distinguished from anyone else because we have a different attitude about us. It is not all fun and games. I know friends of mine that skip class, or go out to lunch or who go out to the beach. We don't do that here. We are very different. At the other school I was at, students acted a lot different. Everyone supports everyone at this school. There are hardly any fights. At the other schools, there are fights almost every week. So I think that we distinguish ourselves with our attitude.

The Career-Orientation of Turner Tech's Academic Lessons

How well do students learn the academic core curriculum? Do they receive a broad understanding of the work world before them? Do students learn the academic and vocational skills they will need to take their place within this world?

These are far more difficult questions to answer as Turner Tech continues to evolve. In their zeal to provide a high-quality vocational program that trains students for certification, is the academic portion being sacrificed? Is the Competency-Based Curriculum being sacrificed to teach industry skill standards? Can this difficult balance be realized at Turner Tech?

"Absolutely," says Turner Tech Assistant Principal Albert Carvalho. "Our approach provides a more meaningful exposure to curriculum and more meaningful learning for students [than the traditional high school experience]. There is a perfect marriage between geometry, and its abstract concepts, and masonry...between anatomy and biology and the Health Academy, math and the stock market, financial analysis, and currency exchange in the Finance Academy."

From its beginning, each Turner Tech academy has struggled to present its academic courses with an "Agriscience" or a "Health" focus without betraying the founding content of the Competency-Based Curriculum. All academies have written fully integrated academic and vocational curricula. For example, Residential Construction, because it is a new program, just wrote its curricula this past summer to fully integrate the curricula of the science, math, English and vocational courses.

For example, assignment sheet #4.1B, on the basics of laying concrete, has students solve shell carpentry problems using algebraic conversions. It requires students to measure the volume of a prism, then calculate the amount of concrete required to lay the foundation. Finally, students follow the performance and safety measures to actually perform the vocational task in their Shell Carpentry class.

The geometry course likewise draws from shell carpentry to better explain, for example, the academic concept of calculating pressure (load) and showing its use in the career field (determining the load that objects of various shapes can hold). The discussion questions at the end of the geometry unit ask, for example:

Due to an increase in load as more blocks are being added while the bottom surface area remains the same, one may see a greater pressure on that one single bottom block. In order to support the column of blocks, a carpenter would try to disperse the load at the bottom of the column by increasing the surface area of the foundation or by adding footers to the bottom. According to your information on weight and pressure, how would a larger surface area footer reduce the pressure and support the increasing column of blocks?

(For the full lesson plan, please see Appendix G.)

Agriscience English instructors assign not only the traditional Greek plays and Shakespeare, but well-written novels more in tune with a student's career and personal interests, such as Sounder, Of Mice and Men, and The Jungle. Criminal Justice American history teachers draw more heavily upon Brown vs. Board, Marbury vs. Madison, and other influential Supreme Court decisions as the launching point for historical discussions of greater depth and complexity.

What's more, many lessons integrate employability skills, such as calculating resources or acquiring and evaluating data, to better teach their core academic and vocational content. For instance, in the Materials Management (warehousing) vocational course, the instructor has students do a comprehensive oral presentation on the import and export products of a South American nation. Students use the top-notch Information Center, run by Dr. Tigar, to access resource databases, non-fiction books, and reference materials to gather academic information for their "briefing." International Business students worked in groups to research the home pages of South American countries for similar purposes, fusing academic content, vocational specialization, and the ability to access information sources.

On a day-to-day basis, classes spend far less time on lecture than traditional academic high schools, with little sacrifice in academic quality. Desks are spread around the room, students work in groups, oral presentations and projects are more prevalent. By and large, students say they enjoy their classes, learn from them, and are excited about going to school.

Now, of course, instructors can get carried away with a project and lose sight of the academics. For example, in one lesson at the Agriscience Academy, students were to walk through to a wildlife preserve, record and graph soil, water, and life conditions on a plot. Based on their study, the student group would offer a proposal on land usage (garden plots, park plots, throughways, and a waste site). Time, however, only permitted a walk through the park. Students did not discuss their chemical or biological findings; they did not write a proposal; they did not negotiate a "purchase" of the land. While the lesson held potential, it was far from successful. Instructors need to be careful to manage class time more wisely.

Turner Tech does not stretch vocational/academic connections so thinly that they become tenuous. For instance, the residential construction program's integrated curricula does very little with history because, as former social studies teacher and now Academy facilitator Karen San Emeterio said, "it would seem [that] we were making connections more for the sake of making connections, [not] because they were logical and helpful."

This is the essence of the Turner Tech academic and vocational system: instructors take content from the vocational and academic areas to teach students how to write better, learn more history, perform higher-level mathematics, and above all, master the academic core curriculum better than they would in a "chalk and talk" pedagogy.

The results are clear. Nearly all Turner Tech students, who started out as average-achieving ninth-grade students, take geometry, chemistry, college preparatory English and social studies. While their

friends at other senior high schools graduate with the same DCPS high school diploma, the students at Turner are prepared with skills and knowledge that enhance their next step after high school.

The Two-for-One Diploma

In addition to an academic diploma, Turner Tech issues a vocational certificate of completion that communicates the unique skills acquired by students.

The academic degree is earned by meeting the county academic course graduation requirements: 24 credits, a 2.0 GPA and a 75-hour community service project. Those who take a proscribed number of academic courses, maintain a 3.0 GPA and have 1,100 or above on the SAT, earn a Florida Scholars seal on their diploma. Those who maintain a 3.0 GPA (and a 3.5 GPA in the vocational courses of their career major) earn a Gold Seal certificate. Florida Scholars and Gold Seal recipients are eligible for Florida state college scholarships.

To earn the vocational certificate of completion, a student must fulfill the more stringent academic course requirements: usually including Algebra II and two to four "hard" science courses and all vocational course requirements (generally between five to seven).

A student may earn an academic diploma absent the vocational certificate; however, no student earns the vocational certificate without also mastering the academic diploma. For example, a student must fulfill both stringent academic and vocational course requirements to earn a vocational certificate, in addition to the 75-hour (over four years) community service project. There is no "backdoor" out of an academic education at Turner Tech.

Progress Report

Because Turner Tech has only graduated one small class in May of 1996, it is impossible at this point to determine whether this approach is more effective at educating students than the traditional academic program at nearby schools. No comparison has been made between similarly matched students in terms of successful completion of university or technical college, earning power or job quality.

There are, however, some short-term indicators that Turner Tech is producing quality students. Each year, Turner Tech's standardized test scores increase dramatically. For example, on the Florida Writing Assessment, (see Table 1) on a 1-5 scale, Turner's scores increased from a 2.5 in 1993-94, to 3.3 in 1995-96, compared to a 2.8 to 3.3 increase county wide over that same period.

Table 1
Florida Writing Assessment

	1993-94	1994-95	1995-96
Turner Tech	2.5	2.9	3.3
Dade County	2.8	3.1	3.3

On its minimum competency test (see Table 2) , the percentage passing the mathematics component increased from 50 percent to 64 percent, while the District remained constant at 66 percent. Turner held steady, above district average, on the reading component of the minimum competency exam, with 82 percent passing (compared with 80 percent county wide). Compared to other high schools in the neighborhood, however, Turner Tech's approach seems to be much more effective at teaching students the basic academics. Miami Edison High, within walking distance, scores far lower.

Now, a 20 percent Turner Tech failure

Table 2
High School Competency Test—11th-Grade Passing Rates

	1993-94	1994-95	1995-96
Mathematics			
Turner Tech	n/a	50%	64%
Dade County	n/a	66%	66%
Miami Edison High	56%	56%	56%
Communications			
Turner Tech	n/a	82%	82%
Dade County	n/a	79%	80%
Miami Edison High	55%	39%	46%

rate in communications and a 38 percent in math on a minimum competency test is unacceptable. This is, after all, a minimum competency test. However, progress has been made—an encouraging sign.

To show what it has done with its economically disadvantaged students, Turner scores far better than area high schools with similar socio-economic school populations on nationally norm-referenced tests. Miami Northwestern and Central are two zoned high schools also near Turner Tech. Below, in Table 3, we compare the national percentile ranking for Turner with Northwestern, Central and Dade County.

Turner's success may be double-edged for the school-age students in the school's vicinity. With heightened competition for entry, and school administrators actively

Table 3—Grade Ten Assessment Test

	1993-94 percentile ranking	1994-95 percentile ranking	1995-96 percentile ranking
Reading Comprehension			
Turner Tech	24	24	29
Dade County	33	35	31
Northwestern	24	22	24
Central	17	17	17
Mathematics			
Turner Tech	23	30	30
Dade County	38	38	38
Northwestern	23	26	26
Central	18	21	20

aiming for a 50 percent non-African-American population to more accurately reflect the ethnic diversity of the city, fewer neighboring African-American students will have access to its high-quality program. If Turner can prove to be a further success, other neighboring schools may consider its "dual education" approach, with a strong emphasis on discipline, personal and parental responsibility, as a model worthy of emulation.

Concerns and Recommendations

Turner Tech is only three years old. While it is beginning to show significant success, it still has problems, as would any new school.

First, the school provides an excellent immersion in the many academic and vocational requirements for their twenty-two different career programs. However, their internships for eleventh- and twelfth-grade students, designed to give on-the-job training in the career field, face many potential and current problems. Some administrators now contemplate whether students will miss academic classes, sometimes for up to six weeks in the Industrial Technology Academy, to observe and participate on a job site; academic courses should never be missed. Further, there is some evidence that adult workers were not hired because summer interns could help input data; adult hiring should never be compromised by student interns. Also, because vocational teachers receive only marginal help in procuring internships, their quality is erratic. Some students are in jobs that they master quickly, then merely repeat day-after-day; quality must be uniformly maintained.

Second, Turner Tech instituted a number of "softer" science courses, such as Environmental Science and Principles of Technology. These courses take the academic content of their "hard" science counterparts, biology and physics, and try to be more specific in tailoring it to the world of work. This may seem confusing when all academic courses are attempting to do the same integration with real world tasks. Some may interpret that these "soft" science courses do not teach as much content, creating a lower, less difficult track. Turner instructors and students alike say these courses do prepare you for college. However, if this watering-down does occur, these courses should be seriously upgraded or considered for elimination in favor of the integrated—yet harder—science courses.

Third, Turner Tech's professional development seems to have lacked a coherent strategy from the beginning. In a new school, with a pioneering strategy for using both academic and vocational instructors to better teach academic and vocational concepts, a more strategic effort to assess the individual needs of teachers would have been useful. While all faculty have been trained on the school's rich technological resources, many have not received considerable help on integrating a curriculum.

Implementing a school-to-career system from nothing is an imprecise process, which requires a continual process of communication to fine-tune and improve. Having a common planning period for the teachers of each academy would greatly aid this effort. Currently, only the Agriscience has this needed joint planning time.

Fourth, some academies are considering lowering its academic requirements, dropping Algebra II. High standards should not be compromised. It will not help students succeed in their careers if they do not have the necessary academic skills to gain promotions or handle additional responsibilities as technologies improve. More intense student remediation and different instructional strategies should help to get all Turner students to

learn and retain these necessary academic lessons.

Fifth, Turner has a fairly advanced system of internal indicators to tell how well students are learning their academic materials. The county and state require them to take a minimum competency test. In 1997-98, students will take criterion-referenced tests in all four core academic subjects to determine how well they learned the Competency-Based Curriculum. Drop out and attendance levels are also monitored annually.

However, Turner has not thought much about how to track at least a sample of its students, to compare their academic and career placement to those from high schools with similar demographics and with the premier high schools in the Dade County schools. Without solid information on the quality of the educational experience, Turner Tech may run into difficulties in receiving additional needed funds after their grants from the National School-to-Work Office and the Public School Funds come to an end.

Conclusion

Turner Tech is a model for starting a vocational magnet school in the career academy model. Students must exhibit academic achievement and motivation to get "hired." They must conduct themselves with discipline, apply themselves to their studies, and be well organized to meet all their obligations. The responsibility rests with the students.

The Turner Tech curriculum follows the Florida state standards, the Dade County aligned standards for all academic and most vocational courses, insisting upon high achievement. Instructors use academic and vocational examples, when appropriate, to help students learn and retain the content in their courses. The vocational courses have validation of their rigor and real-world applicability within their career field because the vocational certification represents quality academic and vocational learning to the community's employers, parents and admissions counselors.

Best of all, Turner Tech seems to be a school that economically disadvantaged kids in the surrounding neighborhoods can turn to for an academic and vocational education that is rapidly reaching the standards of the premier schools in the district. For William Turner, now a state senator who remains actively involved in the functioning of the school that bears his name, he feels as if he is only getting warmed up:

> If this school is doing the same thing this year that it was doing last year, something is wrong. Because if we are doing the same thing this year, we will do the same thing next year and the year after that. And then we will fail. Improvement at Turner should never end.

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Appendix A—Explanation of Each Turner Career Academy

Agriscience Academy—The goal of the Academy is to prepare and guide students toward a worthwhile career. The program focuses on "learning by doing," such as, working with and raising animals, developing an aquaculture program, and/or growing plants using various methods of propagation, including hydroponics and tissue culture techniques. Public speaking, field trips, local and state competitions are also a very important part of this program.

Academy of Applied Business Technology—The mission is to prepare students to enter the business world and successfully participate in a rapidly-changing, culturally-diverse global society by using human and technological resources in the school environment, in the business community, and in the family setting.

Health Academy—Health Occupations Education prepares competent health care workers to meet the needs and demands of the rapidly changing health care industry. This is based on national and state health care reform initiatives and predictions that the predominant health care worker of the future will be cross trained and will be working in non-traditional settings. Turner Tech Health Academy provides basic training and medical skills for students to earn certifications in one or more health fields.

Academy of Industrial Technology—Students will be trained using industry standards in both practical application and computerized instruction. The goals of the Industrial Technology program are to develop students to become trained technicians or professionals. They will be able to go directly in to the workforce or support themselves through college while preparing for management as well as professional positions in such areas as engineering, architecture and contracting.

NAF/Fannie Mae Academy of Finance—Motivates students to excel in school and prepares students for post-high school education and training. The Academy of Finance provides incentive scholarships, workplace readiness seminars, cultural and educational field trips, internships, and a pre-college summer leadership experience. To prepare students for the 21st century, computer technology is integrated into all subject areas.

Academy of Public Service and Television Production—Criminal Justice offers students an educational experience in the American court systems while preparing them to become lawyers, HRS workers, private investigators, district attorneys, police officers, corrections officers, or even circuit court judges. Private Security Guard offers instruction in family protection, armed and unarmed security guard, and public service. Teacher assisting studies pedagogy, paraprofessionalism, and student teaching. Students in this program are the future television broadcasters of tomorrow. In the television production studio, students will be trained on the latest high-tech equipment. Through contacts made at local stations, Turner Tech television production students can look forward to finding job opportunities waiting for them following graduation.

Academy of Residential Construction—Provides an opportunity to enter a career in residential construction. The curriculum is focused instruction in carpentry framing and provides skills necessary for students who complete the program to enter the home building industry. The Academy integrates academic studies and work experience to provide for advancement in the home building industry. Training occurs in the classroom, shop, and at job sites, where students experience framing and shell carpentry as well as general construction.

[Source: Turner Technical Arts High School, Read, Write, Communicate! Agenda 1994-1995. William H. Turner Tech Arts High School, 1994, pages 8-9.]

Appendix B—
Academic Requirements for Each Career Academy

Academy	English	Math	Science	Soc.Stu	Comput	For.Lang
Agriscience	4	4	4	3	0	0
App.Bus.Tech.	4	4	4	3	1	0
Health	4	4	4	3	0	0
Industrial Tech.	4	3	3	3	0	0
Finance	4	4	4	3	2	3
Public Service	4	4	3	3	0	0
TV Production	4	4	3	3	0	0

MATHEMATICS

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COMPONENT	OBJECTIVES	COMPETENCY
I. Functions	1. Find domains, ranges, and specific values in functional notation. 2. Given two functions, perform the algebra of functions including compositions of functions. 3. Determine if a given function is: a. symmetric (with respect to the axis/or the origin) b. periodic c. monotonic d. bounded e. continuous 4. Identify and graph polynomial and rational functions and determine asymptotes and intercepts 5. Define and use parametric forms of functions and convert from parametric to Cartesian form. 6. Given a set of parametric equations, sketch the graph. 7. Given a function, determine the inverse and state whether or not the inverse is a function.	A. Demonstrate an understanding of the theory of functions using graphs, models, graphing calculators, computers, projects and cooperative learning groups.
II. Trigonometric and Circular Functions	1. Evaluate circular and trigonometric expressions involving any of the six functions and their inverses. 2. Given the equation for a circular or trigonometric function, identify and/or sketch its graph and the graph of its inverse relation and state domain and range of the original function and its associated inverse function. 3. Identify its equation, when given a graph of any of the six circular functions.	A. Demonstrate an understanding of the connection between circular and trigonometric functions and their inverses by evaluating, graphing, and applying these functions using calculators, computers, models, projects, and cooperative learning groups.

COMPONENT	OBJECTIVES	COMPETENCY
	4. State the period, amplitude, phase shift, and vertical shift of a circular function and then graph the function. 5. Compare and contrast circular and trigonometric functions. 6. Prove and demonstrate knowledge of trigonometric identities including the sum and difference formulas, double angle formulas, and half-angle formulas for sine, cosine, and tangent. 7. Solve problems involving right or oblique triangles. 8. Solve problems by applying the Law of Sines and/or Law of Cosines. 9. Find area of oblique triangles 10. Estimate the solution to a problem involving right or an oblique triangle. 11. In the SSA case, determine whether 0,1, or 2 triangles exist and determine the triangles if they exist. 12. Use circular functions to model and describe real-world phenomena. 13. Find general solutions for trigonometric equations. 14. Find particular solutions for a trigonometric equation within a given domain. 15. Solve equations involving inverses of circular/trigonometric functions.	

COMPONENT	OBJECTIVES	COMPETENCY
III. Coordinate Systems	1. Graph points in the polar coordinate system. 2. Convert between polar coordinates and Cartesian coordinates. 3. Convert equations in Cartesian form to polar form 4. Express complex numbers in polar or trigonometric form 5. Graph polar equations and identify specific types (roses, limaccons, cardioids, spirals, and conics). 6. Discuss the symmetry of polar graphs and shifts of polar graphs when changing equations involving sine and cosine. 7. Use De Moivre's theorem to find powers and roots of complex numbers. 8. Demonstrate an understanding of the connections between trigonometric functions, polar coordinates, and complex numbers.	A. Demonstrate an understanding of graphs in the polar coordinate system and their relation to the cartesian coordinate system using graphing calculators, models, computers, projects, and cooperative learning.
IV. Vectors	1. Find a vector in standard position equal to a given vector. 2. Determine magnitude and direction of vectors. 3. Identify perpendicular and parallel vectors. 4. Determine the measure of the angle between two vectors. 5. Resolve a vector into component vectors. 6. Add, subtract, and multiply a vector by a scalar. 7. Find the dot product of two vectors. 8. Use vectors to solve real world problems.	A. Demonstrate the ability to solve problems using vectors by incorporating the use of models, computers, graphing calculators, projects and cooperative learning groups.

COMPONENT	OBJECTIVES	COMPETENCY
V. Exponential and Logarithmic Functions	1. Evaluate expressions involving rational exponents. 2. Sketch the graphs of exponential functions and logarithmic functions of different bases. 3. Compare graphs domain and ranges of each, and discuss axis of symmetry. 4. Solve equations involving exponential functions and logarithmic functions. 5. Solve real-world problems involving exponential functions and logarithmic functions. 6. Demonstrate an understanding of the properties of logarithms. 7. Simplify expressions using the relationships between logarithms and exponents. 8. Express the number e and the expression e^x as an infinite series.	A. Demonstrate an understanding of the relationship between exponential and logarithmic functions and their application to problem situations using models, graphing calculators, computers, projects, and cooperative learning groups.
VI. Conic Sections	1. Given the description of a locus, determine the equation of the locus. 2. Given the equation of a line, determine slope, y-intercept, and the graph it. 3. Given the equation of a circle, determine center and radius, then graph it. 4. Given the equation of a parabola, determine vector, focus, and direction, then graph it. 5. Given the equation of a ellipse in standard form, determine the center, fool, and vertices, then graph it.	A. Demonstrate an understanding of conic section and loci using models, graphing calculators, competency manipulatives, project and cooperative learning groups.

COMPONENT	OBJECTIVES	COMPETENCY
III. Statistics	1. Interpret and evaluate statistical measures: e.g, relative frequency mode, median, mean, percentile, quartile, correlation, variance, and standard deviation. 2. Interpret and display statistical data in the appropriate form as graphs, tables, histograms, box plots, and scatter plots. 3. Apply transformations to statistical data. 4. Use the Central Limit Theorem to estimate solutions to problems. 5. Determine a line of best fit and use it to predict an event. 6. Test a hypothesis using confidence intervals.	A. Demonstrate knowledge of statistical measures, distributions and graphs using tables, computers, graphing calculators, projects, and cooperative learning groups.
IV Probability	1. Evaluate and use counting principles to solve problems: fundamental principle of counting, combinations, and permutations. 2. Demonstrate knowledge of the binomial theorem 3. Determine the probability of a single or a compound event. 4. Determine whether events are mutually exclusive, independent, or dependent. 5. Graph a probability distribution and determine its mean. 6. Use a table of random numbers to simulate an event. 7. Identify and compute binomial probabilities.. 8. Use Z scores and a table of values for the standard normal distribution to determine the probability of an event.	A. Demonstrate knowledge of probability measures and distributions by devising and carrying out experiments and simulations using models, graphing calculators, computers, projects, and cooperative learning groups.

COMPONENT	OBJECTIVES	COMPETENCY
V. Exponential and Logarithmic Functions:	1. Evaluate expressions having rational exponents. 2. Simplify expressions with rational exponents by applying the properties of exponents. 3. Graph exponential functions. 4. Define a logarithmic function as the inverse of an exponential function. 5. Evaluate and graph logarithmic function with base 10 and base e. 6. Compare domain and ranges of both exponential and logarithmic functions. 7. Compare graphs and discuss axis of symmetry. 8. Simplify expressions using the properties of logarithms. 9. Solve exponential equations 10. Solve logarithmic equations 11. Use exponential functions to describe real-world situations 12. Use logarithmic functions to describe real-world situations.	A. Demonstrate knowledge of exponential and logarithmic functions using graphing calculators, computers, models, projects, and cooperative learning groups.

COMPONENT	OBJECTIVES	COMPETENCY
VI. Trigonometric and Circular Functions	1. Convert between angle measures in degrees and radian measure of arc length 2. Write the values of the six trigonometric ratios for the acute angles in a given right triangle. 3. Solve problems using the trigonometric ratios of angle measures. 4. Write the values of the six circular functions for a given rotation. 5. Differentiate between the domains of trigonometric and circular function 6. Solve problems using the Laws of Sines and the Law of Cosines. 7. Demonstrate knowledge of trigonometric identities including Cos (A +__ sin (A+B), Cos 2A and sin 2A. 8. Evaluate and graph the six trigonometric and six circular functions. 9. Understand the connection between trigonometric and circular functions. 10. Apply transformations amplitude, period, phase, shift, and vertical shift) to graphs of trigonometric and circular functions. 11. Use circular functions to model and describe periodic real-world functions. 12. Graph and evaluate inverse trigonometric and circular functions. 13. Solve trigonometric and circular equations and verify identies. 14. Write complex numbers in polar form.	A. Evaluate, graph, and apply trigonometric and circular functions using graphing calculators, computers, models, projects, and cooperative learning groups.

COMPONENT	OBJECTIVES	COMPETENCY
	15. Use e oivre's Theorem to find roots of complex numbers. 16. Graph polar equations. 17. Understand the connections between trigonometric functions and polar coordinates, and complex numbers. 18. Explore fractals using the computer.	

COMPONENT	OBJECTIVES	COMPETENCY
I Spatial Sense	1. Identify and describe the properties of points, lines, and planes (using models and diagrams). 2. Identify angles and determine relationships between them (using models and diagrams). 3. Identify and describe the properties of parallelism and perpendicularity in a plane and in space, using models and diagrams. 4. Identify, classify and describe properties of two- and three-dimensional figures. 5. Identify and describe properties of circles. 6. Identify and describe properties of three-dimensional figures. 7. Describe the effects of transforming geometric figures. 8. Use constructions and geometric properties to describe figures. 9. Identify and describe relationships of geometric shapes to the real world.	A. Develop spatial sense by identifying, comparing, and classifying geometric figures. Use representations to describe relationships among the two- and three-dimensional shapes and connections to the real world and to solve problems through the use of manipulatives, technology, models and drawings.

COMPONENT	OBJECTIVES	COMPETENCY
II Measurement	1. Identify and apply the relationships that exist among points, lines, subsets of lines, and planes. 2. Discover properties and relationships between parts of a given triangle. 3. Apply the measurement relationships that exist between congruent polygons. 4. Solve problems using properties of similar polygons. 5. Solve problems using measurement related to arcs, chords, and related angles of circles. 6. Estimate and determine angle measures, perimeters, and areas of plane figures. 7. Estimate and determine surface areas and volumes of solid figures. 8. Extend the relationships of perimeter and area of similar plane figures to the area, and volume of similar solid figures. 9. Demonstrate an understanding of the Pythagorean Theorem by giving algebraic and geometric interpretations and by applying it to problem-solving situations. 10. Identify and describe applications of estimation and exact measurements in the real world. 11. Define and apply trigonometric ratios to solve right triangle problems.	A. Develop geometric models to illustrate an understanding of the structure of geometric figures and use these relationships to solve problems involving congruence, similarity, and measurement of figures. Apply estimation and measuring techniques to solve real world problems.

COMPONENT	OBJECTIVES	COMPETENCY
III Logic and Proof	1. Using inductive reasoning, discover the properties of real numbers and betweenness and use these to develop deductive arguments involving angles and lines. 2. Use inductive reasoning to discover properties and relationships of parallelism and perpendicularity in the plane and in space and apply deductive reasoning to prove these properties and relationships. 3. Apply relationships of congruence and similarity to triangles and other polygons to deduce properties. 4. Use inductive and deductive reasoning to solve real world problems. 5. Deduce properties and relationships involving circles, arcs, chords, secants, tangents, and related angles. 6. Use indirect proof techniques to complete a proof by contradiction. 7. Distinguish between deductive and inductive reasoning. 8. Recognize the hypothesis and conclusion of a conditional statement. 9. State the converse, inverse, and contrapositive of a conditional statement using appropriate symbols. 10. Recognize conjunction, disjunction, and the negation of statements. 11. Use truth tables to determine the validity of statements.	A. Use inductive reasoning and definitions to discover formulas and properties and to state postulates and theorems. B. Use definitions, postulates, theorems, and logical reasoning to develop deductive arguments in paragraph or flow-chart proof format and to solve a variety of real world problems.

COMPONENT	OBJECTIVES	COMPETENCY
IV Geometry From An Algebraic Perspective	1. Use a coordinate plane and the distance, midpoint, and slope formulas to verify geometric properties and solve problems. 2. Deduce properties of figures using transformations and using coordinates. 3. Translate between the use of local axiomatic sequences (synthetic proofs) and the informal explorations of coordinate representation. 4. Identify congruent and similar figures using transformations. 5. Apply transformations and vectors to solve problems from science.	A. Discover, define and demonstrate properties, relationships and formulas of geometric models by using coordinate and transformational geometry. Apply these concepts to solve real world problems through the use of inductive reasoning, manipulatives and technology.

COMPONENT	OBJECTIVES	COMPETENCY
I Real Numbers	1. Classify real numbers as whole numbers, integers, rational numbers, or irrational numbers, and justify the classification. 2. Identify and apply the field properties of the real number system, and follow logical arguments involving these properties. 3. Graph any real number on the real number line. 4. Solve problems involving absolute value statements. 5. Solve problems that involve simplifying and evaluating numerical and algebraic expressions. 6. Identify and apply the properties of equality and order within the real number system and its subsystems. 7. Solve problems involving radicals. 8. Perform basic operations with radical expressions, using diagrams, manipulations, and technology. 9. Translate English phrases and sentences into algebraic expressions and/or equations.	A. Perform basic operations with real numbers using manipulatives, calculators and the real number line.

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COMPONENT	OBJECTIVES	COMPETENCY
II Symbol sense	1. Understand the concepts of variable, expression and equation. 2. Develop the laws of exponents and then use to simplify polynomial expressions and solve problems. 3. Perform basic operations with rational algebraic expressions, (using diagrams, manipulatives, and technology). 4. Perform basic operations with polynomial expressions (using diagrams, manipulations, and technology). 5. Demonstrate the ability to factor polynomials (using diagrams, manipulatives, and technology). 6. Represent mathematical functions and number patterns with tables, graphs, verbal rules, and equations and explore the interrelationships of these representations. 7. Solve real world and mathematical problem using first degree equations, and inequalities. 8. Solve real world and mathematical problems using a system of two first degree equations in two variables. 9. Solve first degree equations in one variable involving absolute value. 10. Solve real world problems involving quadratic equations in one variable. 11. Solve equations involving rational and radical expressions.	A. Demonstrate an understanding of algebraic procedures and symbolism by formulating mathematical definitions and expressing generalization discovered through investigations.

MATHEMATICS

COMPONENT	OBJECTIVES	COMPETENCY
III Patterns and Functions	1. Organize data by constructing charts, tables, and graphs. 2. Represent algebraically relationships found in charts, tables, and graphs. 3. Solve multi-step problems with extraneous information. 4. Use mathematical skills to estimate, approximate and predict outcomes, and judge the reasonableness of results. 5. Solve problems using the algebraic concepts related to probability and statistics. 6. Describe and represent patterns algebraically. 7. Use patterns and functions to solve problems. 8. Justify arguments involving the definition of functions. 9. Apply functional notation and language in situations involving mappings, tables, Cartesian graphs, composition of functions, and inverse functions. 10. Use technology (e.g., calculators, computers) to explore exponential growth, and other algebraic functions. 11. Translate among tables, symbols, and graphs representations of functions.	A. Using a "real world" situation, the student will use graphs, charts, and tables to analyze functional relationships to explain how a change in one quantity results in a change in another.

COMPONENT	OBJECTIVES	COMPETENCY
IV Applications of Geometric Concepts to Algebra	1. Solve a system of linear equations by a graphical method and relate the geometric solution to an algebraic solution. 2. Analyze and identify characteristics of graphs, e.g., range domain, relation/function, odd/even, x— and y— intercepts, zeros of a function. 3. Graph and solve linear inequalities in a coordinate plane, and relate the geometric solution to the algebraic solution, with and without technology. 4. Determine the equation of a line given a graphic representation of the line. 5. Represent functions and relations with ordered pairs, mappings, tables, and cartesian graphs. 6. Determine solutions of linear and/or quadratic equations in two variables by graphing the system on a Cartesian coordinate plane, and justify the reasoning. 7. Model equations and polynomial operations geometrically (area models). 8. Use technology to explore the graphs of higher degree polynomial and exponential functions. 9. Determine relationships involving numerical coefficients, slopes, and y-intercepts between first degree equations in two variables and lines in the Cartesian plane.	A. Solve real world problems using charts, tables, graphs, and visual representations of algebraic concepts.

COMPONENT	OBJECTIVES	COMPETENCY
I The Real and Complex Number Systems	1. Compare and contrast the properties of real numbers with properties of complex numbers. 2. Perform basic operations on complex numbers, using diagrams, technology, and algebraic procedures. 3. Define and apply absolute value of complex numbers and relate to the real numbers. 4. Solve problems involving equations and inequalities with complex coefficients. 5. Demonstrate an understanding of the logic of algebraic procedures.	A. Compare and contrast the properties of the complex number system and its sub-systems.
II Symbol Sense	1. Perform operations on polynomials, rational expressions, and radical expressions, and relate to geometric models. 2. Simplify problems that involve exponential expressions and logarithmic expressions. 3. Use the binomial theorem and Pascal's Triangle to expand binomials and to solve probability problems, as appropriate. 4. Factor polynomials over complex numbers, represent geometrically and apply to real-life problems. 5. Determine and apply relationships among synthetic division, synthetic substitution, polynomial factoring, and the rational root theorem to solve polynomial equations. 6. Solve problems involving first degree equations, inequalities, quadratic equations, exponential equations, and logarithmic equations in one variable.	A. Demonstrate an understanding of algebraic procedures and symbolism by: a. operating on expressions and matrices. b. solving equations and inequalities.

COMPONENT	OBJECTIVES	COMPETENCY
	7. Use the discriminant to determine the nature of roots and apply the relationship to solutions of quadratic equations. 8. Solve systems of linear and/or quadratic equations in two and three variables by a variety of methods, including the use of technology. 9. Evaluate determinants, using calculators and technology, and use determinants to solve system of equations. 11. Solve problems involving basic operations with matrices. 12. Use properties of matrices to solve problems involving systems of equations.	
III Patterns and Functions	1. Represent and analyze relations and functions verbally, symbolically, graphically, including tables or charts. 2. Translate among tabular, symbolic, and graphic representations of functions. 3. Recognize that a variety of problems can be modelled by the same function. 4. Use exponential, logarithmic, and other non-linear functions to model real-life processes. 5. Understand operations (sum, product, composition) on functions. 6. Describe general properties and behavior of functions.	A. Use functions to model real world phenomena by representing functions symbolically, graphically, and verbally.

COMPONENT	OBJECTIVES	COMPETENCY
IV Graphical Representations	1. Translate among tabular, symbolic, and graphical representations of absolute value and quadratic functions, and their corresponding enequalities. 2. Relate the number line graph of $ax^2 + bx + c = 0$ (or $ax^2 + bx + c < 0$) to the Cartesian graph of $ax^2 + bx + c = y$ (or $ax^2 + bx + c < y$), and to the Quadratic Formula. 3. Graph a function and its inverse in a Cartesian plane. 4. Analyze the effects of parameter changes on the graphs of functions. 5. Represent exponential and logarithmic functions graphically. 6. Identify the graphs and equations of the conic sections, including the circle, parabola, ellipse, and hyperbola, and use them to solve problems. 7. Represent complex numbers on a complex number plane. 8. Determine maxima and minima of graphs and interpret the results in problem situation.	A. Solve real-world problems using graphic representations of algebraic concepts.

COMPONENT	OBJECTIVES	COMPETENCY
V Discrete Mathematics	1. Solve problems using the fundamental counting principle, permutations, and combinations. 2. Solve real world problems involving arithmetic and geometric sequences. 3. Find the probability that a simple event will occur and interpret it in mathematical and real-world contexts. 4. Identify independent and dependent events, find the probability of such events, and interpret in mathematical and real-world contexts. 5. Identify mutually exclusive and inclusive events, find the probability of such events, and interpret in problem situations. 6. Define sequences recursively. 7. Investigate limiting processes by examining sequences, series, targets, and areas under curves graphically.	A. Represent problem situations using discrete structures, such as combinations, finite probability, sequences, and recursion.

Appendix D—Listing of all Turner Tech Career Majors

Agriscience Academy
Animal Science
Ornamental Horticulture
Veterinary Assisting

Academy of Applied Business Technology
Business Computer Applications
Desktop Publishing
Insurance
International Business

Health Academy
Health Unit Coordinator
First Responder
Nurse Assisting
Home Health Aide
Dental Aide
Electrocardiograph Aide

Academy of Industrial Technology
Materials Management and Distribution
Diesel Mechanics
Building Maintenance

NAF/Fannie Mae Academy of Finance

Academy of Public Service and Television Production
Criminal Justice
Teacher Assisting
Law Enforcement

Academy of Residential Construction

Drafting
Finish Carpentry
Shell Carpentry
Masonry

AGRISCIENCE

PROGRAM: Landscape Operations/ Sports and Turf Operations

GRADE 9 Freshman	GRADE 10 Sophomore	GRADE 11 Junior	GRADE 12 Senior
English I	English II	English III	English IV
Pre-Algebra **or** Algebra I	Algebra I **or** Geometry	Geometry **or** Algebra II	Algebra II **or** Pre-Calculus
Physical Science **or** Biology	Biology **or** Environmental Science	Environmental Science **or** Chemistry	Chemistry **or** Physics
World History	Life Management **and** Driver Education	American History	American Government **and** Economics
Agriscience Foundations 1	Introductory Horticulture 2	Landscape and Turf Science 4	Landscape Operations 6
Personal Fitness **and** Fine Art	Horticultural Science 3	Landscape and Turf Science 5	Sports and Turf Operations **or** OJT*

* On the Job Training (OJT): Student must meet work related requirements.

APPLIED BUSINESS TECHNOLOGY

PROGRAM: Computer Applications/ Desktop Publishing

GRADE 9 Freshman	GRADE 10 Sophomore	GRADE 11 Junior	GRADE 12 Senior
English I	English II	English III	English IV
Pre-Algebra **or** Algebra I	Algebra I **or** Geometry	Geometry **or** Algebra II	Algebra II **or** Pre-Calculus
Physical Science **or** Biology	Biology **or** Chemistry	Chemistry **or** Principles of Technology I **or** Physics	Physics **or** Principles of Technology I or II **or** BCE
World History	Life Management **and** Driver Education	American History	American Government **and** Economics
Keyboarding and Document Processing	Business Computer Applications 1	Business Computer Applications 2	Workplace Communications and Presentations
Personal Fitness **and** Fine Art	International Business Systems	Desktop Publishing 1	Desktop Publishing 2 **or** Introduction to Insurance

HEALTH

PROGRAM: Medical Lab Assisting

GRADE 9 Freshman	GRADE 10 Sophomore	GRADE 11 Junior	GRADE 12 Senior
English I	English II	English III	English IV
Pre-Algebra **or** Algebra I	Algebra I **or** Geometry	Geometry **or** Algebra II	Algebra II **or** Pre-Calculus
Physical Science **or** Biology	Biology **or** Chemistry	Chemistry **or** Physics	Health Elective*
World History	Life Management **and** Driver Education	American History	American Government **and** Economics
Health Technology	Anatomy and Physiology	Medical Lab I	Medical Lab II
Personal Fitness **and** Fine Art	Health Careers II	Health Elective*	Health Elective*

* Health Electives: Dental Lab Assisting, First Medical Responder, Health Unit Coordinator, Home Health/EKG Aide, Nursing Assisting, Vision.

INDUSTRIAL TECHNOLOGY

PROGRAM: Diesel Engine Mechanics

GRADE 9 Freshman	GRADE 10 Sophomore	GRADE 11 Junior	GRADE 12 Senior
English I	English II	English III	English IV
Pre-Algebra **or** Algebra I	Algebra I **or** Geometry	Geometry **or** Algebra II	Algebra II **or** Elective*
Physical Science **or** Biology	Biology **or** Chemistry **or** Environmental Science	Environ. Science **or** Chemistry **or** Principles of Technology I	Elective* **or** ICE/OJT**
World History	Life Management **and** Driver Education	American History	American Government **and** Economics
Diesel Engine 1	Diesel Engine 2	Diesel Engine 4	Diesel Engine 6
Personal Fitness **and** Fine Art	Diesel Engine 3	Diesel Engine 5	Elective* **or** ICE/OJT**

* Electives: African-American History, Band, Drama, Foreign Language (Spanish French, Sign Language), Psychology/Sociology, Speech.

** Industrial Cooperative Education–(ICE/OJT): Student must meet work related behaviors.

NAF/FANNIE MAE

PROGRAM: Academy of Finance

GRADE 9 Freshman	GRADE 10 Sophomore	GRADE 11 Junior	GRADE 12 Senior
English I	English II	English III	English IV
Pre-Algebra **or** Algebra I	Algebra I **or** Geometry	Geometry **or** Algebra II	Algebra II **or** Pre-Calculus **or** Calculus
Physical Science **or** Biology	Biology **or** Chemistry **or** Environmental Science	Chemistry **or** Physics **or** Environmental Science	Chemistry **or** Physics
World History	Life Management **and** Driver Education	American History	American Government **and** Economics
Keyboarding and Document Processing **and** Pract. Computers	Business Computer Applications I	Business Computer Applications II **or** Accounting I	Business Computer Applications II **or** Accounting II
Foreign Language **or** Personal Fitness/ Fine Art**	Foreign Language **or** Elective*	Foreign Language **or** Elective*	Foreign Language **or** Executive Internship **or** Elective*

* Electives: African-American History, Band, Drama, Foreign Language (Spanish French, Sign Language), Psychology/Sociology, Speech.

** Strongly recommended to take in summer school.

PUBLIC SERVICE

PROGRAM: Teacher Assisting

GRADE 9 Freshman	GRADE 10 Sophomore	GRADE 11 Junior	GRADE 12 Senior
English I	English II	English III	English IV
Pre-Algebra **or** Algebra I	Algebra I **or** Geometry	Geometry **or** Algebra II	Algebra II **or** Pre-Calculus
Physical Science **or** Biology	Biology **or** Chemistry	Chemistry **or** Environmental Science	Physics **or** Elective*
World History	Life Management **and** Driver Education	American History	American Government **and** Economics
Principles of Public Service	Teacher Assisting 1	Teacher Assisting 2	Teacher Assisting 3
Personal Fitness **and** Fine Art	Foreign Language	Foreign Language	Psychology **or** Elective*

* Electives: African-American History, Band, Drama, Foreign Language (Spanish French, Sign Language), Psychology/Sociology, Speech

ARTICULATION AGREEMENTS

Between

Secondary Schools and Postsecondary Vocational/Technical Education Centers

Program Area	Date Signed	Secondary Program (Number of Credits)	Postsecondary Program (Length in Hours)	No. Credits Awarded/ Waived, etc.
Agribusiness and Public Service Education		None	None	
Business Technology Education	6/29/94	8206100 Computer Applications (3)	8070302 Computer Applications (600)	200-400
	6/29/94	8203100 Financial Records (3)	8070199 Financial Records (600)	200-400
	6/29/94	8209000 Office Support Technology (3)	8070702 Office Support Technology (800)	200-400
	New	8203200 Accounting	8070103 Accounting	200 - 400
	New	8212300 Secretarial Services	8070607 Secretarial Services	200 - 400

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ARTICULATION AGREEMENTS

Between

Secondary Schools
and
Postsecondary Vocational/Technical Education Centers

Program Area	Date Signed	Secondary Program (Number of Credits)	Postsecondary Program (Length in Hours)	No. Credits Awarded/ Waived, etc.
Diversified Education		N/A	N/A	
Family and Consumer Sciences	6/29/94	8503000 (Title/Prog. # Change) Child Care Assisting (3)	V200205 (Title/Prog. # Change) Child Care Supervision (750)	150
	New	8503210 Early Childhood Education	V200210 Early Childhood Education	150
			V200217 Child Care Provider ( )	150-200
	New	8506300 Fashion Production Core (3)	V200302 Fashion Production Core ( )	150-200
			V200315 Fashion Design for Industry ( )	150-200
			V200314 Custom Garment Maker/Tailor ( )	150-200
	New	8515200 Food Production Services (3)	V200402 Food Management Production ( )	150-200
			V200403 Nutrition and Dietetic Services ( )	150-200
Health Science Education	6/29/94	8415100 Health Service Occupations (3)	H170605 Practical Nursing (1,320)	130

ARTICULATION AGREEMENTS

Between

Secondary Schools
and
Postsecondary Vocational/Technical Education Centers

Program Area	Date Signed	Secondary Program (Number of Credits)	Postsecondary Program (Length in Hours)	No. Credits Awarded/ Waived, etc.
Industrial Education	New	8709000 Automotive Body Repair and Refinishing (6)	1470603 Automotive Collision and Refinishing (1,400)	300-500
	New	8709200 Automotive Technology (6)	1470607 Automotive Technology (1,440)	300-500
	New	8709200 Automotive Technology Assisting	1470607 Automotive Technology (1,400)	300-500
	New	8720300 Building Maintenance and Repair (7)	1460401 Building Maintenance Technology (1,400)	300-500
	New	8722100 Carpentry and Cabinetmaking (6)	1480704 Cabinetmaking (1,400)	300-500
	New	8722100 Carpentry and Cabinetmaking (6)	1460201 Residential and Commercial Carpentry (1,400)	300-500
	New	8718000 Commercial Art (6)	1480200 Commercial Art Technology (1,400)	300-500
	New	8763000 Commercial Foods (8)	1200403 Commercial Foods and Culinary Arts (1,400)	300-500
	New	877200 Commercial Photography (6)	1480204 Commercial Photography Technology (1,400)	300-500

ARTICULATION AGREEMENTS

Between

Secondary Schools
and
Postsecondary Vocational/Technical Education Centers

Program Area	Date Signed	Secondary Program (Number of Credits)	Postsecondary Program (Length in Hours)	No. Credits Awarded/ Waived, etc.
Industrial Education (Cont.)	New	8730100 Consumer Electronic Repair	1470113 Consumer Electronic Product Servicing (1,400)	300-500
	New	8742000 Diesel Engine Mechanics (6)	1470605 Heavy Duty Truck and Bus Mechanics (1,400)	300-500
	6/29/94	8725000 Drafting (6)	1480101 Drafting (1,400)	300-500
	New	8733000 Dry Cleaning and Laundering (3)	1120101 Dry Cleaning and Laundering (1,400)	300-500
	New	8757200 Grooming and Salon Service Core (11)	1120404 Grooming and Salon Service Core (120)	
			1120414 Nail Specialty (240)	
			1120424 Facial Specialty (260)	
	New	8720000 - Introduction to Pipe Trade 8726000 - Plumbing Technology (10)	1460513 Plumbing Technology (1,400)	300-500
	New	8751000 Marine Mechanics (6)	1490306 Marine Mechanics Technology (1,400)	300-500

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William H. Turner Technical Arts High School
Academy of Residential Construction

UNDERSTANDING WEIGHT, PRESSURE AND LOAD

OBJECTIVE: The students will understand the basic principles of weight, load and pressure.

INTRODUCTION

WEIGHT

The **weight** of an object is normally due to the force of gravity exerted on an object. Gravity is a particular force that pulls objects down toward the center of the earth. The most commonly used unit for weight in the United States and England is **pounds (lbs.)**.

Weight varies for the same object as it moves further away from earth. As the object moves higher up in the atmosphere the lighter the object becomes. As the object moves closer to sea level the heavier it becomes. For example, your weight is slightly heavier at sea level than on top of a mountain. Or as you are traveling from an area at higher altitude to an area of lower altitude, your weight may increase without actually gaining body mass.

Since there are different elevations levels throughout the united states, building materials weigh differently from one level to another. This is one of the reasons building codes and specifications varies from one area to another

PRESSURE or LOAD

Pressure is the weight of an object per unit area. In carpentry and construction, pressure is normally stated in the units of **pounds per square inch (lbs/in.^{2}** or **psi)** or **pounds per square foot (lbs/ft.^{2}** or **psf).** Commonly used terms for specific cases of pressures are *load bearing walls, live load, dead load,* etc; however, all are expressed in **psf's** or **psf.**

Understanding loads and load displacement is important in creating a stable foundation and preventing building structures from sinking into the ground underneath.

ACTIVITY – CALCULATING PRESSURE (LOAD)

PURPOSE: The students will learn how pressure or load changes with weight and surface area.

NOTE: The *load* is the same as the pressure exerted by the weight of the object on the bottom surface of the object.

MATERIALS:

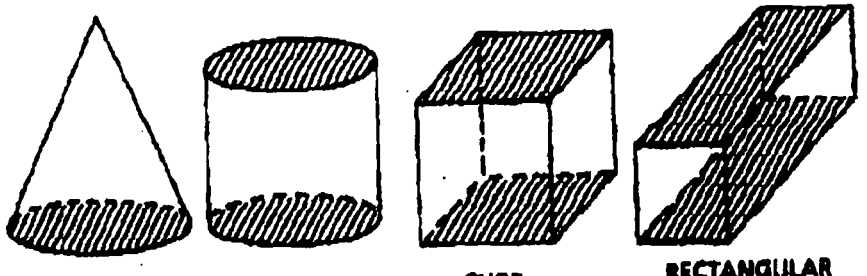
Several miscellaneous objects with a defined bottom surface area:

i.e. A minimum of ten objects to measure the load.

2X4 wood	rulers (inches)
CBS blocks	weight scale
2X8 wood	

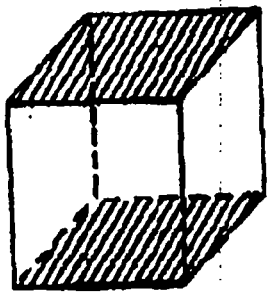
PROCEDURE:

1. Students are to break up into 4-5 groups.
2. Each group is responsible for calculating the pressure (load) of 10 objects.
3. Use the weight scale to measure the weight of the object
4. Calculate the surface area at the bottom surface of the object. The general shapes of most objects fall into the four basic geometric shapes. Estimate the shape closest to the object you have chosen.

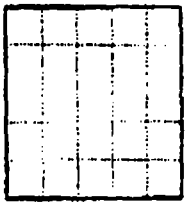


5. Determine whether the bases of these objects are either rectangular or circular (Make an estimate).

6. If the base surface is rectangular, measure the length and width of the base surface. Then multiply the length with the width.

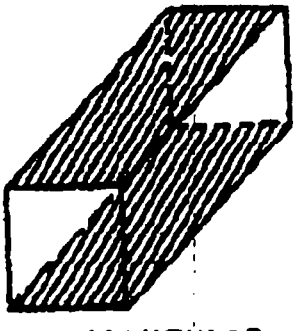


CUBE



The area of the large square is equal to the numbers of smaller squares inside. It can be counted by multiplying the L X W.

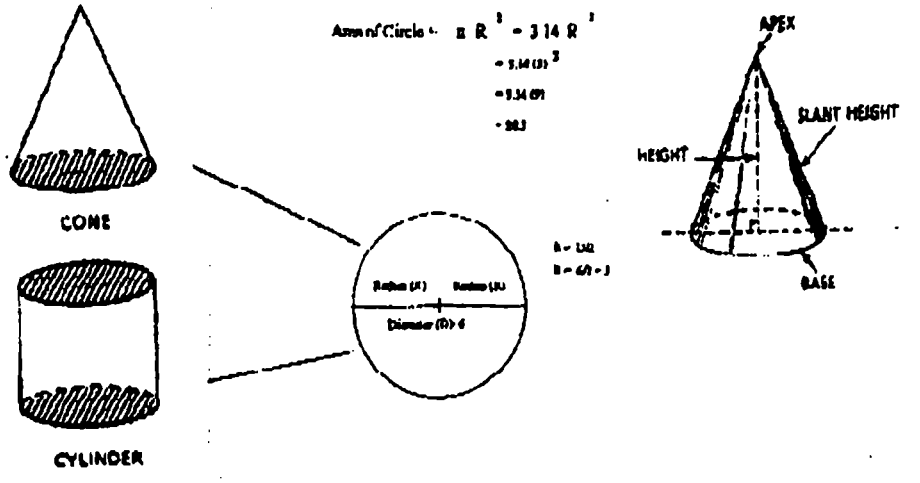
i.e. Area = L X W
= 5 X 5 = 25



RECTANGULAR SOLID

i.e. Area = L X W
= 10 X 3 = 30

7. If the bottom surface is circular, then measure the surface area by determining the diameter in inches and dividing it by 2 to get the radius. Calculate the surface area using the formula below. Use the examples below to guide you.



DETERMINING THE PRESSURE

8. To determine the pressure on the base surface, use the following formula:

$$\text{Pressure} = \frac{\text{Weight of object}}{\text{Bottom surface area}}$$

ex. 1.

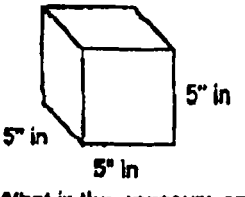
$$\text{Pressure} = \frac{15 \text{ lbs}}{5 \text{ in} \times 5 \text{ in}} = \frac{15 \text{ lbs}}{25 \text{ in}^2} = .60 \text{ psi}$$

ex. 2.

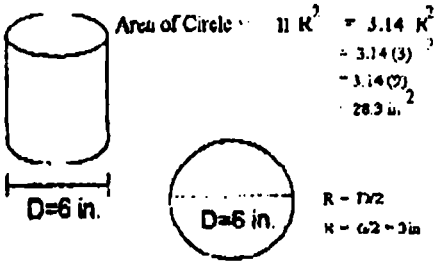
$$\text{Pressure} = \frac{4 \text{ lbs}}{28.3 \text{ in}^2} = .14 \text{ psi}$$

Example Problem:

1. What is the pressure on the bottom surface of a cube of cement 5" X 5" X 5" that weighs 15 lbs.



2. What is the pressure on the bottom surface of a cylindrical gallon of ice cream with a bottom diameter of 6 and weighs 4 lbs.



CONCLUSION

1. Using the objects assigned to you, complete the following table. Use the examples provided to guide you.

	Objects	Weight or Load (lbs.)	Surface Area (SA) (ins^2)	Pressure (weight/ surface area)
ex. 1	1. Block of Cement	15 lbs	25 in^2	15 lbs/25 in = .60 psi
ex. 2	2. Gal. of Ice Cream	4 lbs	28.3 in^2	4 lbs/28.3 in = .14 psi
	1.			
	2.			
	3.			
	4.			
	5.			
	6.			
	7.			
	8.			
	9.			
	10.			

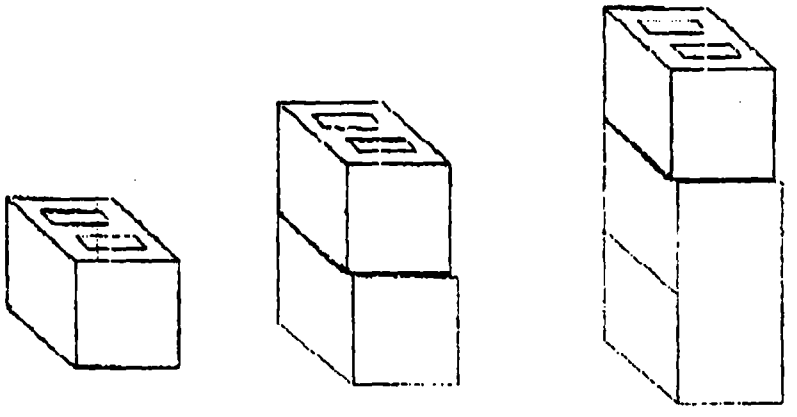
2. According to your table, which object has the greatest load per unit area?

3. Which object has the least load per unit area?

4. How would changing the surface area on the same object change the pressure?

DISCUSSION

1. According to what you have learned, what would happen to the load on the bottom of the 8" X 8" X 16" CBS blocks if you were to continue to add one on top of the other?



2. If the blocks were supported by a soft soil foundation, what would happen to tho soft soil as more blocks approximately 20-50 blocks high? In order to avoid this, what would the shell carpenter need to do to prepare the foundation prior to laying the blocks?

3. Due to an increase in load as more blocks are being added while the bottom surface area remains the same, one may see a greater pressure on that one single bottom block. In order to support the column of blocks, a carpenter would try to disperse the load at the bottom of the column by increasing the surface area of the foundation or by adding footers to the bottom. According to your information on weight and pressure, how would a larger surface area footer reduce the pressure and support the increasing column of blocks?