Christa McAuliffe Award
2003 Final Proposal Submission

Name of Program:
The **T**oledo **A**rea **P**artnership in **E**ducation: **S**upport **T**eachers as **R**esources to **I**mprove **E**lementary **S**cience **(TAPESTRIES)**

Name and Address of College or University:
The University of Toledo
2801 W. Bancroft St. Mail Stop 953
Toledo, OH 43606
and
Bowling Green State University
Bowling Green, OH 43403

Name, Title, and Complete Address of Individual Submitting Final Proposal:
Charlene M. Czerniak
Professor
College of Education
The University of Toledo
2801 W. Bancroft St.
Toledo, OH 43606
Phone: (419) 530-2094
Fax: (419) 530-4145 (fax) or (419) 843-1302 (fax at home)
Charlene.Czerniak@utoledo.edu

Award Category: Outstanding Professional Development Program

Describe your program: mission, goals, structure, etc.

The **T**oledo **A**rea **P**artnership in **E**ducation: **S**upport **T**eachers as **R**esources to **I**mprove **E**lementary **S**cience **(TAPESTRIES)** is a collaborative partnership between the fourth largest urban school district in Ohio - Toledo Public Schools (TPS), a suburban district - Springfield Local Schools (SLS), and the Colleges of Education and Arts and Sciences at two universities - The University of Toledo (UT) and Bowling Green State University (BGSU). It is designed to achieve a comprehensive, system-wide transformation of K-6 science education and to improve science teaching and learning through sustained professional development of all K-6 teachers.

Both the TPS and SLS school districts face severe challenges in raising student achievement in science, and TPS is ranked as an "at risk" school district by the state's standards. TPS has a student enrollment of 37,315, including 46.73% qualifying for free or reduced lunch. Nearly one third of its students are from single-parent homes and/or living below the poverty level. Of the system's nearly 40,000 students (K-12, 45.1% are Caucasians, 46.0% are African American, 6.7% are Hispanic, 1.3% multi-racial, and .01% other cultural groups. The TAPESTRIES project (which was initially funded for 5 years by the National Science Foundation and is now funded with local district monies) has five goals:

1. To develop, support, and utilize a cadre of Support Teachers along with other sufficient support structures in order to provide local leadership for the implementation of effective science programs within their districts (evaluated by yearly questionnaires & interviews).
2. To provide effective and sustained professional development for all K-6 teachers of science in the participating school districts (evaluated by teacher and principal questionnaires and outside evaluator ratings of professional development sessions).
3. To implement quality inquiry-based science curriculum and instruction in classrooms that are consistent with local, state, and national recommendations so that all students may receive opportunities to become scientifically literate (measured by a comprehensive questionnaire provided by Horizons Research Institute, trained evaluator's observations of teachers' classrooms, and the science proficiency scores of 4^{th} and 6^{th} grade students).
4. To coordinate curriculum, classroom practice, and student assessment with the district adopted science courses of study and statewide assessments (evaluated by a comprehensive questionnaire provided by Horizons Research Institute).
5. To enhance the science content knowledge of elementary teachers in physical, earth/ space, and life science (monitored in summer courses).

The following are the **key organizational components** of the TAPESTRIES program that play a critical role in the implementation of systematic science reform:

***Support Teacher Development* –** Sixteen Support Teachers, elementary teachers who are given full time release from teaching responsibilities, provide assistance to classroom teachers implementing science inquiry, help teachers with district assessments, and execute their district action plans for improving science literacy. Support Teachers receive more than 200 contact hours of leadership training in the form of a two-week Summer Institute, 2 three-semester-hour courses, a staff retreat, and a spring conference.

***Project Staff Retreat* –** To establish a cohesive project staff with shared philosophies, expectations, and true collaborative decision-making, the entire project staff (science educators, scientists, elementary Support Teachers, and graduate assistants) attends a two-day retreat each spring. This retreat prepares the staff for the summer institute by informing them of latest research on science teaching and learning, by reflecting on comments made by teachers' evaluations from previous years, and by developing a plan of action in content and pedagogy for the upcoming Summer Institute and the following academic year.

Summer Institutes **–** Six, two-week-long Summer Institutes for classroom teachers have been conducted each year for the last five years at UT and BGSU. Teachers participate in sessions aligned with the *National Science Education Standards* that focus on inquiry-based instruction, science content knowledge, and science process culled from the districts' K-6 scope and sequence and adopted curriculum (FOSS, STC, and Scholastic kits). The Institutes run eight hours a day for two weeks (80 contact hours). The summer institutes are co-taught by science educators, Support Teachers from TPS and SLS, and scientists from UT and BGSU.

Local Academic Year Activities **–**Professional development is sustained during the academic year by focusing on the implementation of the curriculum and assessments. The Support Teachers visit an assigned cohort of teachers biweekly. They provide assistance with science curriculum preparation, give strategies for teaching science, supply science content background information (if necessary, with the help of the university scientists), assist with classroom and district science performance-based assessments, model science lessons, and offer peer coaching for the classroom teacher. Each teacher conducts a "research lesson" - a Japanese-style lesson study that involves the teacher writing a lesson in the inquiry style 5-E learning cycle model (Bybee & Landes, 1988). The teacher's assigned Support Teacher views the lesson, critiques its effectiveness utilizing the NSF-Horizon Research Institute "Classroom Observation Protocol," and provides written feedback to the teacher. Subsequently, the teacher writes a two-page reflective analysis of the lesson identifying specific strengths and weaknesses. The research lesson assignment gives each teacher an opportunity to analyze his or her teaching and receive constructive feedback from a peer in a nurturing environment. These academic year activities provide 24 additional hours of professional development. Nearly 1000 classroom teachers (approximately 72% of all of the district's elementary teachers) have received 104 hours of staff development in science content, pedagogy, and assessment as they implement their curriculum.

Annual Science Symposium **–** A symposium is held each year for TAPESTRIES teachers. The symposium provides professional development and support for implementing science inquiry. Topics focus on science teaching ideas, activities, and resources than can improve teaching and student learning. These sessions are facilitated by the entire project staff and invited speakers (i.e., community leaders, Center of Science and Industry, Toledo Zoo, and MetroParks).

Retreat for Principals **–** All principals participate in a one-day retreat and follow-up sessions throughout the academic year. Model lessons are presented, and principals are made aware of science education reform research. Additionally, the TAPESTRIES leaders solicit their support for the project and their input on the challenges of implementing science reforms.

Community Involvement – Support Teachers schedule two local community meetings to involve city leaders, parents, and local principals in this science reform effort. These meetings take many forms - - i.e., family science days, PTO meetings, and proficiency test information sessions.

Newsletter –TAPESTRIES has a presence throughout the district in the form of a newsletter published fall and spring. The newsletters contain information about the program, research articles, data about the program's effectiveness, teaching tips, and anecdotal field accounts.

Web Site - A web site (http://www.tapestries.ut-bgsu.utoledo.edu) serves as a networking and information platform. The "Ask a Scientist" feature, for example, gives classroom teachers the opportunity to ask questions of the university scientists. Under "Resources" a variety of tools are provided such as lesson plans, sample assessments, teacher tested tips for implementing the science kits, and useful web sites related to the kit topics.

What evidence do you have of the program's positive impact on its teacher candidates?

Our program used mixed methods of assessment in the form of formative and summative evaluation as well as quantitative and qualitative measures. As a National Science Foundation (NSF) funded Local Systemic Change grant, the TAPESTRIES program's core evaluation was developed by Horizon Research, Inc. to measure the impact on teacher candidates. One component of this evaluation consists of a comprehensive quantitative questionnaire that was sent yearly since 1998 to 300 randomly selected teachers and all of the principals. The questionnaire measures 5 categories: quality of the professional development provided to teachers, the teacher's classroom culture, science content accuracy, pedagogical effectiveness, and perceived support in the school district. A second component of the core evaluation is yearly observations of classroom teaching by NSF trained evaluators using scoring rubrics that rate the lesson design, implementation of the lesson, classroom culture, accuracy of science content, and overall effectiveness in helping students learn science. The TAPESTRIES program staff also collected summative assessments in the form of exit questionnaires and portfolios. We have a vast amount of evidence that the program had a positive impact on the teachers, but the following excerpts (quotes) from external evaluators in the final report submitted to the NSF illustrate our success:

Quality of the Professional Development *– The quality of the professional development providers was superb. There was consistent growth and improvement in the professional development activities over the length of the project as evidenced by the professional development observations and teacher interviews. Both evaluators and classroom teachers gave the providers very high marks regarding the quality of the professional development activities. The professional development providers brought diversity and a wealth of experiences to the project. They possess valuable experience in the areas of content and pedagogy. The staff members were well supported and energetic about their roles.*

Culture *- The culture of the professional development was one on the strongest parts of this project. The culture not only fostered the professional development but helped teachers understand the nature of science. Ideas were freely exchanged and ample time for reflection was provided. The average synthesis rating score for the professional development culture was 4.2 on a scale of 1-5 clearly indicating a positive culture. Teachers consistently commented during the interviews that the culture of the activities helped facilitate their professional growth. The professional development sessions fostered an air of trust and respect. Teachers' views on both content and pedagogy were solicited, discussed, and addressed. Many teachers were truly impressed with the sessions and valued the lessons they learned. Teachers were consistently reflecting on issues related to content and pedagogy. Several teachers expressed concern and fear about the project before participating but were genuinely pleased with their participation afterwards. Many teachers commented that the project changed their views about science teaching and learning.*

Content *- The science content presented in the professional development by scientists and educators was directly linked to the curriculum and instructional materials. The average professional development observation rating for Content Knowledge was 4.2 on a scale of 1-5*. Compared with all other NSF funded local systemic change grants, this rating is in the upper half of the nation. *The observers noted that during the summer institutes, the teachers were actively engaged in the science content by participating in the activities from their adopted instructional materials. The observers noted a strong emphasis on applications of content to real-world applications. When teachers completed evaluations of the Summer Institute, they overwhelmingly agreed that they had learned the science content inherent in the instructional materials they are assigned to teach. It was apparent that their comfort level with the content increased drastically causing them to become more confident teachers of science.*

Each year NSF trained observers visit at least 15 classrooms to evaluate the impact of the project on classroom teaching. It is apparent that their science content knowledge has been strengthened qualitatively by the fact that the classroom observation synthesis rating for content was 3.8 on a scale of 1-5. Observers noted that students were intellectually engaged in content and that content was tied to real-world applications. Content was seen as being accessible to all students.

Teachers' science content knowledge appears to have been positively impacted by the project. When asked to indicate the extent that the project increased their science content, a large majority of teachers indicated that the project impacted their content knowledge; only 4% indicated that it did not impact them at all. The strong focus on science content knowledge coupled with the instructional materials gave teachers ample opportunity to correct their misconceptions and provide strong background knowledge.

Pedagogy *- When asked to indicate the extent that the project increased their understanding of how children learn, a large majority of teachers indicated that the project impacted their knowledge; only 6% indicated that it did not impact them at all. The average professional development observation rating for pedagogy was 4.2 on a scale of 1-5* (this rating is in the upper half of all NSF funded Local Systemic Change grants). *The observers noted that the teachers were actively engaged and that the 5E learning cycle was successfully modeled for the teachers. Summer institute sessions did a good job of integrating the instructional materials with applications in the classroom. One observer noted that pedagogy was "addressed at every turn" during professional development activities. Pedagogy was made very explicit during the professional development. The observers consistently noted that the PD providers routinely and easily moved between content and related pedagogy. Most of the academic year professional development focused on pedagogical issues related to using the instructional materials.*

When asked to indicate the extent that the project increased their ability to implement the instructional materials, a large majority of teachers indicated that the project impacted their ability; only 3% indicated that it did not impact them at all. "TAPESTRIES changed my teaching style and made it different by being more hands-on since it included exploring and observing."

The project appears to be having impact on the way science is taught. The classroom observations revealed that teachers are beginning to implement pedagogical practices from the project such as the 5E learning cycle and graphic organizers. The observed lessons were well organized and involved all students in the learning process. Students' prior knowledge was assessed and addressed, students were engaged, and a variety of instructional strategies were utilized to reach all students. The Design synthesis rating from the classroom observations was 3.6 on a scale of 1-5 and the Implementation synthesis rating was 3.4 on a scale of 1-5. The teachers were implementing instructional strategies such collaborative learning, 5E learning cycle, and student assessments that were learned during the professional development.

Support *- There are three primary modes of support provided for classroom teachers during the academic year including teacher leaders, materials support, and scientist support. The use of full-time Support Teachers worked extremely well in this project. These teacher leaders are the key to successful implementation of the curriculum materials. The teachers overwhelmingly expressed their gratitude and appreciation for the Support Teachers. 73% of these teachers indicated that they received some sort of assistance from the Support Teachers. Fifty-one percent (51%) of teachers received coaching by the Support Teachers. The Support Teachers provide an invaluable resource for the teaching of science in the participating districts. They provide peer coaching and assistance for using the instructional materials. Ample opportunities are provided for teachers to collaborate with one another regarding the teaching of science.*

What evidence do you have of the program graduate's positive impact on P-12 pupil learning?

The TAPESTRIES partnership has experienced much success regarding K-6 student science learning. We measured this impact with 1) classroom observations and 2) by tracking and comparing 4th and 6th grade Ohio science proficiency score gains over 5 years. One of the most substantial measurement challenges we overcame (and one that few districts accomplish) was to collect data over multiple years that tracked students to the teachers they had over the course of their elementary experience. This oftentimes meant tracking transient students through one or more teachers in a given year and linking them through complex databases to their teachers and the records we kept regarding the teacher's accumulated TAPESTRIES professional development hours, classroom or school location, and classroom observation ratings.

Classroom Observations - The first step to making a positive impact on P-12 pupil learning is to improve the quality of classroom teaching. To measure the quality of teaching, we conducted yearly observations of classroom teacher's teaching using Horizons Classroom Observation (rating the lesson design, implementation, classroom culture, accuracy of science content, and overall effectiveness in helping students learn science). The ratings range from 1-8 with 8 being the highest score. The observations were conducted by National Science Foundation / Horizon Research, Inc. trained observers. There were significant improvements in teaching scores for those teachers who attended the TAPESTRIES institutes. The average score for a teacher who went through TAPESTRIES was 5.17. For teachers who had not gone through TAPESTRIES, their teaching score was 3.75.

Ohio Proficiency Tests - A second means of evaluating the program's impact on P-12 pupil learning is to examine the effect on 4th and 6th grade Ohio's Proficiency Test scores. Based on the availability of both 4th and 6th grade proficiency scores in Toledo Public Schools from 1998-2002, an initial sample consisted of 21,773 students. However, after the transient students were removed from the data set, the sample was reduced to 8,060 students. For these 8,060 students, both 4th and 6th grade science proficiency scores were available, and the students could be tracked to their teachers in TPS. Therefore, this matched sample data set was used for all statistical analyses. The following findings were found:

1. **Science proficiency scores improved after the implementation of the TAPESTRIES program in Toledo Public Schools.** Independent t-tests were performed to examine difference in achievement before and during the TAPESTRIES implementation. For 4th grade scores, 10 schools significantly increased their average test scores during the TAPESTRIES implementation. Twenty-eight schools experienced no significant changes in proficiency scores, but 15 of these schools had trends toward higher scores after the TAPESTRIES implementation. See Table 1.

   Independent t-tests were performed to examine difference in achievement before and during TAPESTRIES. For 6th grade scores, 20 schools (more than 50%) significantly increased their average test scores during the TAPESTRIES implementation. Eighteen schools experienced no significant changes in proficiency scores, but 10 of these 18 schools had trends toward higher scores after the TAPESTRIES implementation. See Table 2.

2. **High implementation school's proficiency scores for sixth grade were higher than those at the low implementation schools**. Ten elementary schools known to be similar in demographics but markedly different with respect to participation in TAPESTRIES were ranked and paired by lead TPS Support Teachers regarding level of implementation of inquiry-based science. Level of implementation was defined as level of participation in TAPESTRIES inquiry-based science program, support of science reform by the administrator in the school, and parent/community

support of science. To examine differences in student achievement at high and low implementation schools in 1998 – 2001, a two-way ANOVA was performed for each pair of schools. The results revealed that significant differences existed between the five pairs of schools. Tests of between-subjects effects revealed that no significant differences existed between the pairs of schools, but in every case, the high implementation school's proficiency scores were higher than those at the low implementation school. See Table 3.

3. **Student achievement (4th and 6th grade) differed significantly between the schools with the highest percentage of teachers' professional development (PD) hours and lowest percent of professional development (PD) hours.** The 1998-1999 student proficiency scores were matched with the 1998-1999 PD hours. The 1999-2000 student proficiency scores were matched with the total of PD hours of the teachers these students had in 1998-1999 and 1999-2000. The 2000-2001 student proficiency scores were matched with the total of PD hours of the teachers these students had in 1998-1999, 1999-2000, and 2000-2001. Finally, the 2001-2002 student proficiency scores were matched with the total of PD hours of the teachers these students had in 1998-1999, 1999-2000, 2000-2001, and 2001-2002. Computing total PD hours across years allowed for accounting for the effect of the accumulated long-term PD. A total of 10,507 fourth grade data and 9,699 sixth grade data were analyzed. Correlating student performance on the proficiency test in science and PD hours of the teachers these students had the year they took the test yielded a significant positive relationship at both 4^{th} grade and 6^{th} grade levels (see Tables 4 and 5).

4. **The cumulative effect of TAPESTRIES trained teachers is associated with increased student achievement.** Student achievement scores in science were considered in terms of the TAPESTRIES training of the teachers the students had when they took the 4^{th} or 6^{th} grade test. A new variable was created with 0 = prior years, 1 = TAPESTRIES year but no TAPESTRIES trained teacher in either 4^{th} or 6^{th} grade and 2 = TAPESTRIES year and having a TAPESTRIES trained teacher.

   For 4^{th} grade, a one-way ANOVA revealed an overall significant difference among the categories of the independent variable. The post-hoc test revealed that a highly significant difference exists in the achievement during TAPESTRIES years when students had one or more TAPESTRIES trained teacher compared to student achievement during the years before TAPESTRIES – the average test score is significantly higher when students had one or more TAPESTRIES years compared to the average achievement before TAPESTRIES. A highly significant difference was also observed in student achievement during TAPESTRIES between students who had one or more TAPESTRIES trained teacher and students who had no TAPESTRIES trained teacher – the average test score is significantly higher for students who had one or more TAPESTRIES trained teachers.

   For 6^{th} grade, a one-way ANOVA also revealed an overall significant difference among the categories of the independent variable. The post hoc analyses showed that students all three groups (before TAPESTRIES, during TAPESTRIES but having no TAPESTRIES trained teacher, and during TAPESTRIES and having one or more TAPESTRIES trained teacher) differed in their science achievement. The average test score is significantly higher for those students who had one or more TAPESTRIES trained teacher compared to the two other groups.

   Stated differently, when comparing the percent pass rate of 4^{th} and 6^{th} grade students whose teachers participated in the TAPESTRIES program, the TPS schools outranked all other large urban school districts in Ohio (Toledo is the 4^{th} largest city) on the 2002 science proficiency tests. See the chart below:

Percent Pass Rate for Five Largest Urban School Districts in Ohio

School District	Percent Pass
Grade 4	
Toledo Public (students of TAPESTRIES trained teachers)	38%
Cleveland City	26%
Columbus City	35%
Cincinnati City	36%
Dayton City	21%
Grade 6	
Toledo Public (students of TAPESTRIES trained teachers)	34.5%
Cleveland City	25%
Columbus City	29%
Cincinnati City	32%
Dayton City	19%

Additional Evidence – We collected a vast amount of qualitative and anecdotal data from teachers in the form of reflective essays, yearly interviews, surveys, and portfolios. Many teachers' comments support the notion that science is being taught and students are learning. For example, one teacher stated, "I found myself teaching more science this year." A special education teacher stated, "I didn't realize that my students could learn [science]." In exit interviews with Support Teachers on June 11, 2003, one said, "More science is being taught than ever before and students are ASKING for science to be taught."

In addition to classroom qualitative data, observations of classrooms, and science proficiency test scores, the TAPESTRIES program received a BEST Practices Award from the Ohio Educational Improvement Consortium. The award honors practices with documented outstanding performance that is worthy of replication and that should broaden in scope greater systemic impact. Recipients of the BEST Practices Award have demonstrated exemplary focus on quality, continuous improvement, and measurable positive results. The award for BEST Practices in 2001 carried with it $20,000.00 cash to work with the Toledo Public and Springfield Local Schools. Individual teachers and/or groups of teachers representing whole schools wrote grant proposals to apply for this money to use in their classrooms. As a result, all of the award money directly impacted students. For example, some teachers wrote proposals to purchase supplemental materials for their classrooms (oftentimes those modeled by the scientists and science educators during the Summer Institutes). Others wrote proposals to visit and field-test local community resources such as the Toledo Zoo or the Center of Science and Industry museum (COSI-Toledo).

In summary, this partnership is not a test carried out by a small number of university faculty in a few chosen classrooms. It is a local systemic change program with considerable numbers of individuals and significant impact. Over 5 years, the program involved nearly 1000 teachers (72% of the total elementary teachers), over 20,000 elementary students, hundreds of parents and community members, 100 principals and assistant principals, and over 60 university faculty in the colleges of education and arts and sciences at two universities. The TAPESTRIES program made significant gains in achieving its goals of improving teaching and learning and has helped the districts continue to move in a striking manner beyond the initial grant-funded phase. Superintendents of both school districts and the school board of TPS elected this past year to finance the continuation of the program from their own budgets when the NSF funding ended. This decision is not one to be taken lightly considering the budgetary constraints in Ohio at this time.

Appendix

Table 1. *4th Grade Proficiency Scores Before and After Implementation of TAPESTRIES Program (1996-2002)*

		Before TAPESTRIES, 1996-1998		During TAPESTRIES, 1998 – 2002			
Code	School	M	SD	M	SD	df	t
100	Arlington	208.09	29.93	211.16	29.46	395	-1.031
111	Elmhurst	215.89	31.84	220.22	27.72	313	-1.285
110	Edgewater	212.93	31.78	208.29	30.89	226	1.099
130	Larchmont	198.42	33.41	201.19	30.04	309	-0.755
150	Riverside	189.09	28.65	190.16	31.17	558	-0.416
156	Spring	166.67	30.41	171.27	30.61	602	-1.825
112	Fall Meyer	218.76	28.26	218.86	27.74	258	-0.027
104	Burroughs	202.23	33.10	218.65	29.93	443	-5.463***
159	Walbridge	199.98	28.90	202.36	28.73	452	-0.862
162	Westfield	178.20	28.23	180.07	29.12	353	-0.591
160	Warren	161.01	26.82	172.27	28.46	199	-2.752**
131	Lincoln	189.52	27.02	176.06	31.58	298	3.563***
134	McKinley	195.19	29.18	193.07	29.21	575	0.843
132	Longfellow	205.27	30.60	212.32	32.83	828	-3.158**
149	Reynolds	190.10	30.69	189.73	28.62	457	0.132
163	Whittier	203.14	32.94	192.44	31.86	830	4.692***
102	Beverly	234.15	30.68	227.18	34.90	226	1.593
103	Birmingham	186.71	27.68	199.97	35.93	296	-3.376***
105	Chase	180.18	29.58	176.23	28.24	253	1.088
106	Cherry	181.42	28.04	177.32	29.90	427	1.414
107	Crossgates	211.36	32.29	210.86	39.25	317	0.121
109	ES Central	183.81	28.36	190.28	29.39	452	-2.360*
114	Franklin	198.56	30.92	197.72	25.24	296	0.257
115	Fulton	171.97	29.06	173.32	30.60	405	-0.444
116	Garfield	190.89	32.42	189.64	31.54	348	0.358
119	Glenwood	168.91	27.83	172.90	27.42	476	-1.525
121	Hale	168.74	27.98	181.08	91.87	639	-2.085*
123	Harvard	221.87	31.11	227.36	33.93	247	-1.290
124	Hawkins	215.84	30.45	207.27	32.67	451	2.773*
127	Keyser	181.91	29.94	206.49	33.31	455	-8.070***
129	Lagrange	181.93	33.17	174.07	29.64	315	2.220*
135	Mt Vernon	184.99	28.16	189.65	29.48	335	-1.466
136	Marshall	191.70	30.99	185.88	30.39	386	1.833
138	Navarre	185.69	33.22	189.43	30.31	375	-1.138
139	Newbury	187.94	27.82	199.71	38.36	351	-3.139**
140	Oakdale	190.34	29.66	193.07	36.69	460	-0.832
141	Old Orchard	199.79	38.54	204.53	32.64	409	-1.351
142	Ottawa River	210.89	28.93	106.97	33.43	188	0.845
145	Pickett	166.56	26.51	162.06	27.44	528	1.864
148	Raymer	195.32	33.98	188.07	31.09	517	2.513*
152	King	169.75	26.43	167.68	28.21	469	0.792
154	Sherman	166.47	28.81	171.66	28.75	569	-2.059*
157	Stewart	165.96	28.13	173.79	26.61	373	-2.740**

*p < .05. **p < .01. ***p < .001.

Table 2. 6th *Grade Proficiency Scores Before and After Implementation of TAPESTRIES Program (1996-2002)*

		Before TAPESTRIES, 1996-1998		During TAPESTRIES, 1999 – 2002			
Code	**School**	**M**	**SD**	**M**	**SD**	**df**	**t**
100	Arlington	193.05	21.79	197.59	21.11	479	-2.301*
111	Elmhurst	211.60	20.00	205.59	22.28	308	2.427*
110	Edgewater	187.88	18.80	202.38	19.66	168	-4.852***
130	Larchmont	193.86	25.37	193.28	18.96	252	0.203
150	Riverside	174.41	20.34	179.10	21.37	486	-2.413*
156	Spring	172.97	21.82	177.41	23.29	608	-2.380*
112	Fall Meyer	189.31	20.40	197.94	19.24	231	-3.312**
104	Burroughs	189.50	22.36	193.27	18.96	419	-1.872
159	Walbridge	186.43	21.88	191.55	20.32	404	-2.394*
162	Westfield	185.33	20.61	180.99	19.87	302	1.849
160	Warren	167.06	16.08	178.33	20.87	157	-3.706***
131	Lincoln	177.64	21.05	175.58	21.89	216	0.588
134	McKinley	180.41	24.97	184.28	21.39	559	-1.932
132	Longfellow	196.40	20.85	204.10	21.53	757	-4.927***
149	Reynolds	186.01	19.92	187.72	19.87	380	-0.829
163	Whittier	187.40	22.45	188.95	20.27	809	-1.028
102	Beverly	211.63	23.39	205.11	24.59	273	2.167*
103	Birmingham	180.57	23.94	180.30	20.35	267	0.098
105	Chase	176.65	20.90	179.02	19.75	218	-0.861
106	Cherry	174.36	18.66	179.13	22.02	299	-2.028*
107	Crossgates	199.76	23.40	196.34	24.35	266	1.141
109	ES Central	182.25	21.26	185.60	22.16	402	-1.521
114	Franklin	187.73	19.87	191.28	22.05	292	-1.431
115	Fulton	168.09	19.92	178.71	20.79	331	-5.017***
116	Garfield	179.81	21.49	184.63	19.72	336	-2.148*
119	Glenwood	172.46	20.53	176.67	21.87	436	-2.020*
121	Hale	169.94	21.35	174.00	19.49	582	-2.394*
123	Harvard	196.85	25.48	203.47	21.77	246	-2.186*
124	Hawkins	194.16	23.55	194.43	20.73	484	-0.135
127	Keyser	176.69	21.61	187.77	19.02	391	-5.350***
129	Lagrange	180.05	22.15	192.06	24.46	241	-3.854***
135	Mt Vernon	185.61	18.71	181.76	21.31	388	1.834
136	Marshall	176.61	21.70	181.68	23.16	337	-2.056*
138	Navarre	185.17	19.31	180.59	23.59	362	2.000*
139	Newbury	178.22	21.70	182.98	22.16	297	-1.832
140	Oakdale	188.10	22.60	198.25	22.95	399	-4.387***
141	Old Orchard	193.10	25.92	192.47	24.35	415	0.257
142	Ottawa River	204.40	20.73	192.88	25.98	152	2.894*
145	Pickett	162.20	19.36	173.45	17.62	477	-6.599***
148	Raymer	189.03	23.38	184.67	24.32	481	1.955
152	King	167.97	20.59	177.37	17.79	387	-4.785***
154	Sherman	169.72	23.29	172.90	20.20	501	-1.602
157	Stewart	165.63	18.90	175.63	17.48	312	-4.825***

*p < .05. **p < .01. ***p < .001.

Table 3. *Group Differences in Achievement by School Implementation Level for Paired Schools*

Low Implementation			High Implementation				
School	M	SD	School	M	SD	df	t
Larchmont	194.9	20.1	Edgewater	201.3	20.0	197	-2.16*
Spring	177.3	22.0	Riverside	181.2	21.0	529	-2.10*
Burroughs	193.3	19.9	Fall Meyer	195.8	18.4	330	-1.15
Westfield	180.7	20.5	Walbridge	190.3	22.0	356	-4.17***
Whittier	188.4	20.9	Reynolds	190.7	19.5	563	-1.24

*p < .05. **p < .01. ***p < .001.

Table 4. *4th Grade Correlation of Student Performance and PD Hours of the Teachers*

Correlations

		SSS_4 Scaled Science Score, 4th grade	PD
SSS_4 Scaled Science Score, 4th grade	Pearson Correlation	1.000	.060**
	Sig. (2-tailed)	.	.000
	N	10502	10428
PD	Pearson Correlation	.060**	1.000
	Sig. (2-tailed)	.000	.
	N	10428	10433

**. Correlation is significant at the 0.01 level (2-tailed).

Table 5. *6th Grade Correlation of Student Performance and PD Hours of the Teachers*

Correlations

		SSS_6 Scaled Science Score, 6th grade	PD
SSS_6 Scaled Science Score, 6th grade	Pearson Correlation	1.000	.094**
	Sig. (2-tailed)	.	.000
	N	9699	9699
PD	Pearson Correlation	.094**	1.000
	Sig. (2-tailed)	.000	.
	N	9699	9699

**. Correlation is significant at the 0.01 level (2-tailed).

References

American Association for the Advancement of Science. (1997). *Project 2061 Workshop Plan*. Washington, DC: Author.

Bybee, R. W., & Landes, N. M. (1988). What research says about the new science curriculum (BSCS). Science and Children, 25, 35-39.

Horizon Research Institute (www.horizon-research.com/LSC)

National Science Teachers Association. (1997). *Pathways to the Science Standards: Elementary School Edition*. Arlington, VA: Author.