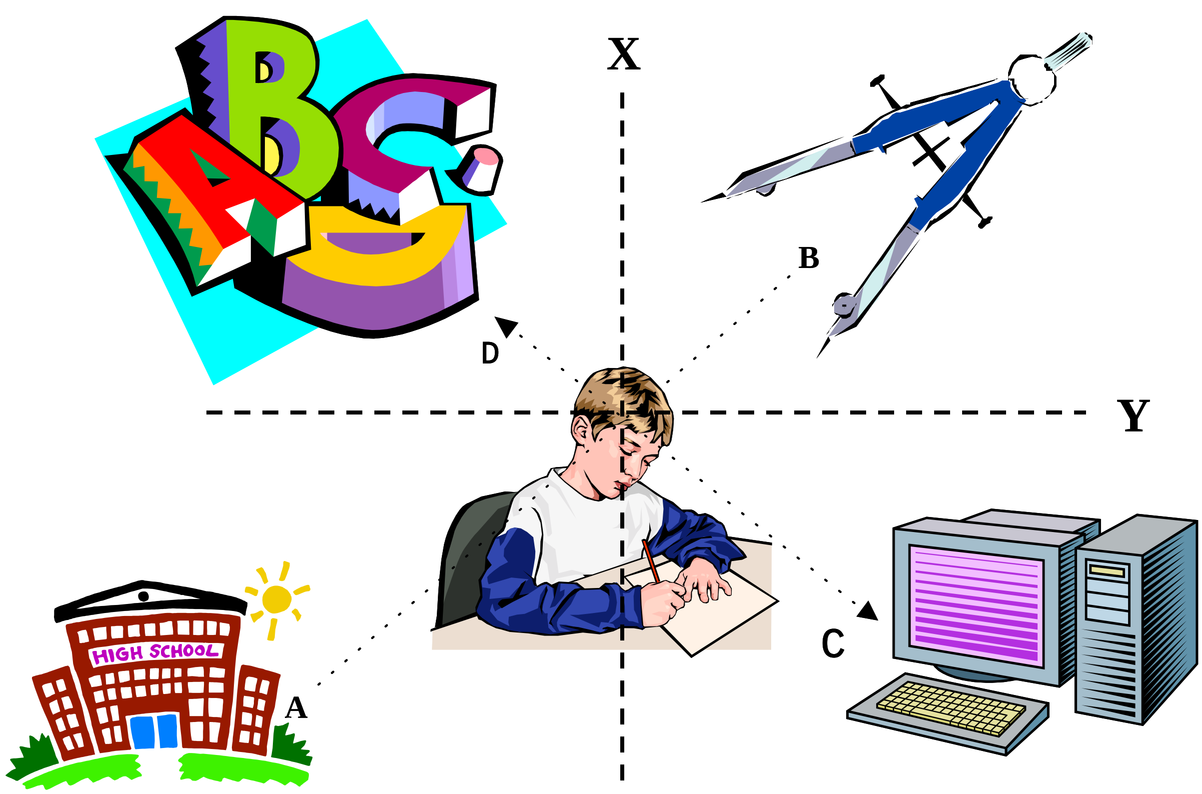
CEPRI
Council for Education Policy,
Research and Improvement

DRAFT
Evaluating Florida's K-12 Computer Technology Infrastructure in terms of the Florida School Grade System

February 25, 2002



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Executive Summary

In preparing the CEPRI overview of technology in Florida's K-12 system, one of the questions that came out of this effort was whether there was any measurable influence from the technology infrastructure on student achievement. In an initial attempt to answer this query, a decision was made to review the technology infrastructure with respect to school grades. School grades in Florida use the student achievement data from the Florida Comprehensive Assessment Test (FCAT) as the primary criteria for calculating school performance. The FCAT is the vehicle used to establish both proficiency levels and annual progress reports for individual students. CEPRI staff wanted to select a sample of Florida public schools, using school grade to determine the highest and lowest performers.

As there are no "F" or failing schools in the state for school year 2000/2001, CEPRI made the selection of schools from those having school grades of "A" and "D" . For each selected school, specific data elements on computer technology deployment and usage from the Department of Education (DOE) Technology Resources Survey (TRS) for school year 2001/2002 were merged with data elements for student population and free/reduced lunch from the School Accountability and Indicators reports from school year 2000/2001 (These reports have the most current data). This combined collection of data and information was then used to perform this analysis on the impact of deployed technology and its usage on student achievement.

The analysis reviewed student access to technology and found, somewhat surprisingly, the "D" schools actually had greater access opportunities to computers than did the "A" schools. Yet in overall comparisons of generalized computer usage, the "A" schools out performed the "D" schools. Comparisons of teacher usage and deployment of technology also had the "A" schools at a higher level of performance. It is at the detailed level of teacher proficiency with technology that the most compelling evidence comes to light – teacher competency with technology is in a direct relationship with student performance. Using the sample, individual data elements are compared across the "A" and "D" schools and the following conclusions were reached:

- **The sample data verifies that the presence of technology itself does not necessarily produce a positive outcome in terms of student achievement.**
- **Socio-economic conditions appear to have a greater influence than can be overcome simply by the presence of technology in schools.**
- **The competency of educators in utilizing technology is an influential factor on student achievement.**

Last, this paper offers some thoughts on how Florida may address the key issue of educator professional development and acquiring the necessary tools to assist and support a higher level of educator competency in technology.

Evaluating Florida's K-12 Computer Technology Infrastructure in terms of the Florida School Grade System

February 25, 2002

I. Introduction

During the research necessary to prepare the overview of the technology in Florida's K-12 system, one of the questions that arose dealt with whether there was any measurable influence from the technology infrastructure on student achievement. A decision was made to review the technology infrastructure with respect to the Florida scheme for school grades. As a first encounter with this issue, CEPRI staff selected a sample of Florida public schools and then combined selected parameters from the Department of Education (DOE) Technology Resources Survey (TRS) for school year 2001/2002 and the school Accountability and Indicators reports from school year 2000/2001, which have the most current data. This combined collection of data and information was then used to perform this draft analysis on the impact of technology on student achievement.

II. Selecting a Sample of Schools

A decision was made to initially restrict the analysis and corresponding sample to only computer technology. Comparisons would be made between "A" and "D" performing schools (there are no "F" schools in Florida this school year), in an effort to review the computer infrastructure and it's usage between the highest and lowest performing schools. The method used for the sample was based on the following criteria:

- Compare an equal number of "A" and "D" schools,
- Perform a random selection, involving as many districts as possible,
- Select a pair of schools (one "A" and one "D") from each district, for every 30,000 student FTE population,
- In 30,000+ student FTE districts where only "A" schools or only "D" schools exist, match with a corresponding "A" or "D" school from another district of similar size. Use districts having < 30,000 student FTE when there are no more comparable alternatives, and
- Have a sample in excess of 3% of all Florida public schools.

Using these criteria, the following sample was established:

- ✓ Random selection of 73 elementary schools having a grade of "A", and a

random selection of 73 elementary schools having a grade of “D”.
- ✓ Random selection of 23 middle schools having a grade of “A”, and a random selection of 23 middle schools having a grade of “D”.
- ✓ Random selection of 33 high schools having a grade of “A”, and a random selection of 33 high schools having a grade of “D”.
- ✓ The sample was comprised of representation from 42 districts.
- ✓ The sample makes up 13% of Florida’s K-12 student population.
- ✓ This selection resulted in establishing a 7% sample of all Florida schools.

The reason for the sharp drop-off in the sample between the elementary and the middle and high schools is the lack of “A” and “D” schools. Numerous districts had neither grade in the middle and high levels. It took considerable efforts to identify even this lower than desired sample pairing for the middle and high schools.

III. Comparisons between the “A” and “D” Schools:

The sample resulted in schools involving a student population of 318,154, where 59% were from “A” schools and 41% from “D” schools.

The computer system infrastructure was quite similar between the two groups. Consider the following points:

- ❖ Both had almost an identical percentage of schools with a school-based instructional local area network (85.3% for the “A” group and 86.1% for the “D” group). While this fact was somewhat surprising, it is also extremely encouraging and indicates a commitment by district and school management to applying technology for instructional purposes.

- ❖ Both groups had almost identical network bandwidth connection capability for access to district resources and for Internet access.

- ❖ From an in-school support standpoint, the “D” group has a full-time technical coordinator in 66% of the schools while the “A” group reports 60%. When part-time technical coordinators are added to the mix, the “D” group has 84% of their schools with some level of technical coordination, compared to 91 % of the schools in the “A” group. This element of comparison is also surprisingly close, but it does give a measurable advantage to the “A” group.

The “A” school group had more instructional computers (44,825) than did the “D” group (37,196). This is expected, based on the student population characteristics of the sample.

The entire sample had highly similar numbers of instructional computers located in classrooms, computer laboratories and media centers. When the ratio of students to instructional computers was derived, another interesting statistic emerged. The “D” school group has a lower ratio of students to instructional computers. This ratio is a common indicator for measuring educational technology capability. The lower ratio is considered an advantage, as it permits more students an opportunity to avail themselves of the technology.

This lower ratio was found to be true for both the total number of computers for instructional use and also, to a lesser degree, for those instructional computers having a connection to the Internet. While both these ratios are within 15% of each other, a detailed inspection clearly shows that in this sample (barring any local school restrictive policies that may be in place for student computer access), the “D” school students have more opportunity to access computer technology than do the students in the “A” group. Table I give an illustration of this finding:

TABLE I

Comparison of “A” & “D” Schools – Student Access to Instructional Computers

	All Instructional Computers		**Internet-Connected Computers**	
	“A” Schools (All Grades)	“D” Schools (All Grades)	“A” Schools (All Grades)	“D” Schools (All Grades)
Ratio of Students to Instructional Computers	**4.02 : 1**	**3.47 : 1**	**5.45 : 1**	**5.28 : 1**

SOURCE: Technology Resource Survey for school year 2001/2002 and School Accountability Report – 2000/2001

There are some logical reasons for this phenomena: For the past three fiscal years, the DOE administrations have placed an emphasis on having resources prioritized toward “D” and “F” schools. This priority has been applied to federal grants for technology awarded by the State of Florida and in selected state resources appropriated for public schools.

In looking at where the schools say technology funding comes from, both groups say the majority of funding for technology comes from State and District allocations. “A” schools report that 74% of their technology funding comes from the State and District, while for the “D” group, this corresponding figure is 51%. It is interesting to note that Federal and Grants funding sources for technology makes up 27% for the “D” Schools, but only 9% in the “A” group. This is a further indication that positive efforts are in place to apply resources toward improving the performance of the lower-graded schools. Funding from school support organizations for technology shows a slight edge for the “D” group, with most of this coming through the elementary schools. This is encouraging, as it reflects community interest in providing for improvement at the elementary level.

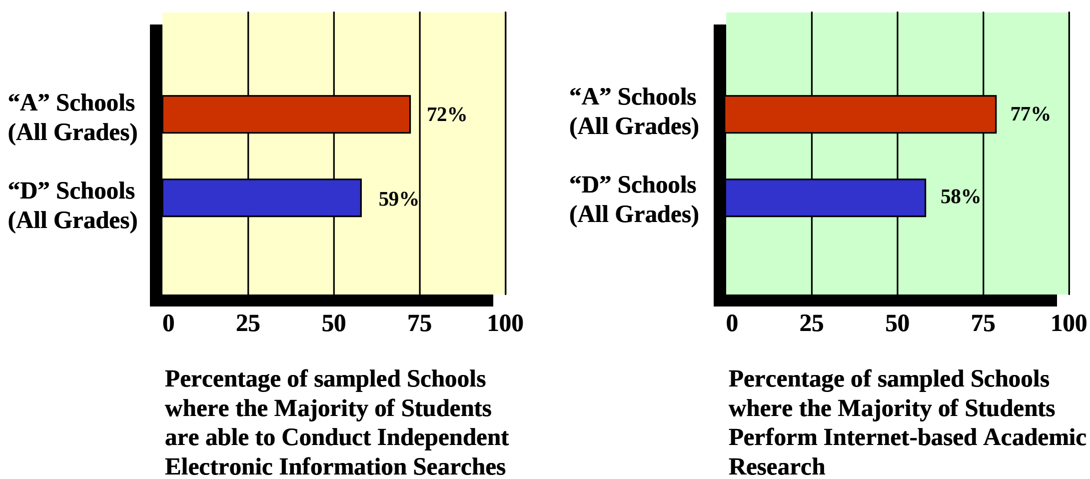
After deriving the information for Table I, a more detailed look at the data available on how these instructional computers are being used by students was initiated. There were two questions in the TRS survey that are most directly related to student use of computers. The questions, as presented to the school technical coordinators were:

> "Are the majority of students in your school able to independently conduct electronic information searches?" and
>
> "Do at least 50% of students in your school use the Internet for academic research?"

The responses to these questions are presented in Figure 1:

FIGURE 1

Comparison of Computer Usage Characteristics between "A" & "D" Schools

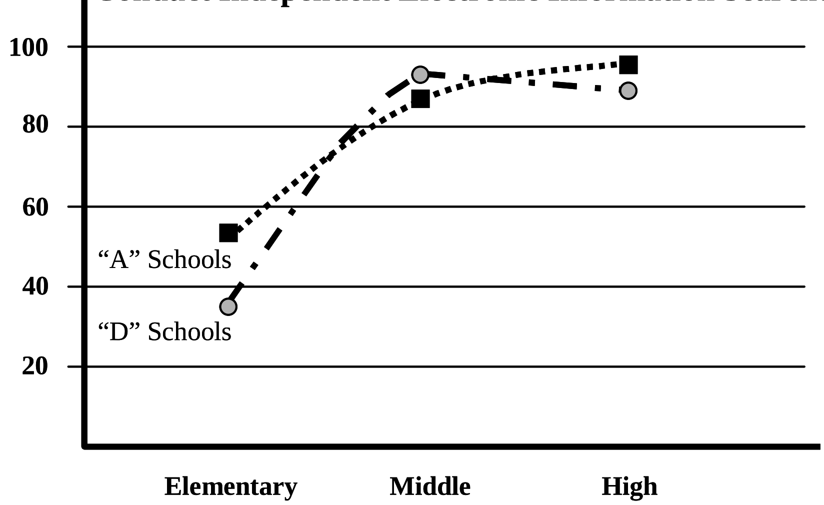


SOURCE: Technology Resource Survey for school year 2001/2002 and School Accountability Report – 2000/2001

Clearly, the student population of the "D" schools lags behind the "A" group with regard to these two types of rather nominal computer workstation usage. Since the "D" group has more access opportunity, the question is why?

In researching further into the data, the two questions were reviewed by grade and at the elementary, middle and high school level. The following Graph I shows the three levels for students conducting information searches:

GRAPH I
% of Schools where the majority of Students are able to Conduct Independent Electronic Information Searches

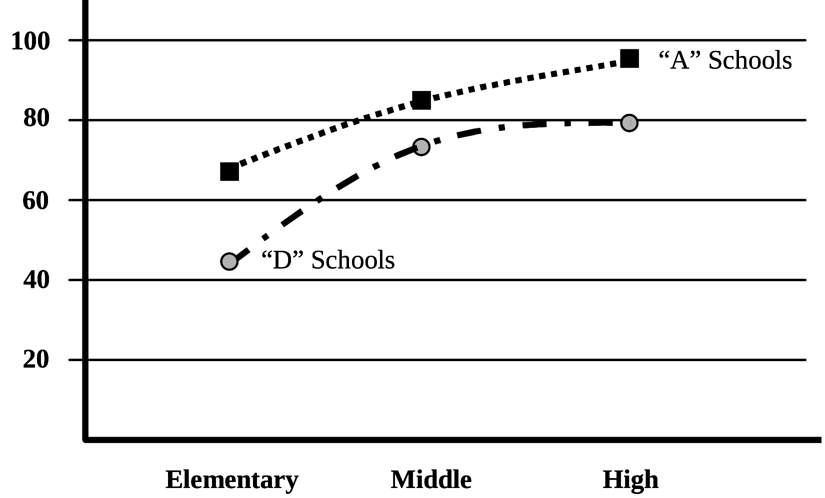


These data show a progress in achievement through the K-12 years of study, independent of school grade. While there is a sizable separation at the elementary level, the "D" group passes the "A" group in middle school and drops slightly behind at the high school level. Overall, the gap narrows considerably from elementary to high school. Why does the "D" group out-perform at the middle school level? There is not a significant data element trend to fully explain this occurrence; however, it is interesting to note that at the middle school level, the "D" schools with full-time technical coordinators is significantly greater that in the "A" group (48% for "A" schools and 65% for "D" schools). As all educators interviewed by staff during the assimilation of this report strongly indicated having dedicated technical resources at the schools was necessary to attain optimal student participation, this is certainly a plausible hypothesis.

When corresponding data to the question on student usage of the Internet for academic research are plotted (see Graph II), there is also an expected ever-improving slope of the curve through all K-12 grades. In this issue, the separations are more dramatic at all points on the curve and the "A" group remains consistently ahead of the "D" schools. While the "D" middle schools never exceed the performance of the "A" schools, there is a noticeable closer performance at the middle school level. In moving from middle to high school, the achievement difference between the groups grows larger in spite of the "D" high school group enjoying a lower student-to-workstation ratio advantage. Why does this achievement skill become less in the "D" high schools? There is no readily apparent answer; however, there is one difference worth noting. In the area of the majority of high school teachers using the Internet for instruction delivery, the "A" group has 58% of the schools participating, while the "D" group is at 39%. Certainly, these data do not fully respond to this difference, yet they do have the potential of being highly influential

Graph II presents the same view for the second question:

GRAPH II
% of Schools where the majority of Students are able to Perform Internet-based Academic Research



In both performance examples, the difference in capability between the “A” and “D” groups either crosses over or draws closer between the elementary and middle years, then increases when students move from middle to high schools.

These data document that even with more access to technology on a per student basis, performance, in terms of student usage capability, is not improved by this fact alone. More evaluation of these findings is in the following section.

VI. Influencing Factors:

There is no single, overriding factor that stands out and explains the presented findings on student instructional computer usage from the sample. While there is more access to computer workstations in the “D” group, the type and release level of the software on these workstations can be a factor in usage. Other than information on the lack of workstation standards in a majority of the schools, there is no detailed information on the software configuration on instructional computers available from the TRS. Two areas in the sample data were identified to be the most likely influencing factors.

1) **Comparison of the Free/Reduced Lunch percentage across the two groups.**

   This parameter is an overall indicator of socio-economic conditions with respect to student population. It is also an indicator that has been used to project conditions of access and general exposure to technology outside the classroom. Generally referred to as the “digital divide,” there is considerable information on the impact of the lack of access to technology in lower income homes. On the Federal Commerce Department’s National Telecommunications and Information

Administration (NTIA) web site, the following statement is given as background:

> ***"To be on the less fortunate side of the divide means that there is less opportunity to take part in our new information-based economy, in which many more jobs will be related to computers. It also means that there is less opportunity to take part in the education, training, shopping, entertainment and communications opportunities that are available on line. Now that a large number of Americans regularly use the Internet to conduct daily activities, people who lack access to those tools are at a growing disadvantage."***

Many students in low performing schools are on this less fortunate side of the divide. This results in few opportunities outside school to be exposed to, become comfortable with and experiment with these technologies. This lack of opportunity will naturally make it more difficult to gain full advantage of school-based infrastructure. Home computers and Internet access have an initial investment and recurring cost that few low-income families are able to afford. Further, low-income neighborhoods are less likely to have higher performance network services that are required today in order to effectively utilize Internet-based web page applications. It is highly likely that this difference is a major influencing factor in why "D" school students do not take full advantage of the available computer infrastructure in the schools. The DOE School Indicators report has data on the percentage of students in the free or reduced lunch program, but only for the elementary and middle schools. There is no data on this element maintained for high schools. Table II shows the significant difference between the elementary and middle school groups in the value of the average of this parameter:

TABLE II

Free/Reduced Lunch Percentage by School Performance Grade	
"A" School Average	"D" School Average
32.6%	79.9%

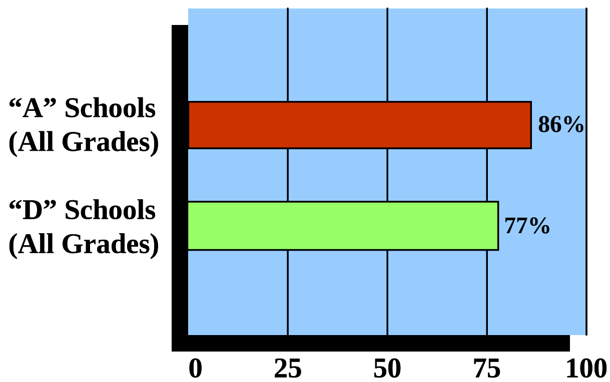
Lower economic conditions have a negative effect on overall student achievement, by virtue of the school grades themselves. Such a difference would be expected to also have an effect on student computer usage patterns from school.

2) The overall ability of the teachers in the groups in using technology as a part of the instructional process.

The TRS devotes questions to both teacher professional development in technology and to teacher's use of the Internet as an instructional resource. When reviewing the teacher use of the Internet, it is interesting to note that there are seemingly conflicting usage patterns. Consider the evaluation of the next two issues:

FIGURE 2

Comparison between "A" & "D" Schools of Teacher Usage of Internet Access



Percentage of Sampled Schools in which the Majority of Teachers Use the Internet for Academic Research

SOURCE: Technology Resource Survey for school year 2001/2002 and School Accountability Report – 2000/2001

While a high percentage of teachers across all levels report using the Internet for academic research, teachers in the "A" group tend to participate more in this activity than do their counterparts in the "D" group. Figure 2 gives an illustration of this finding:

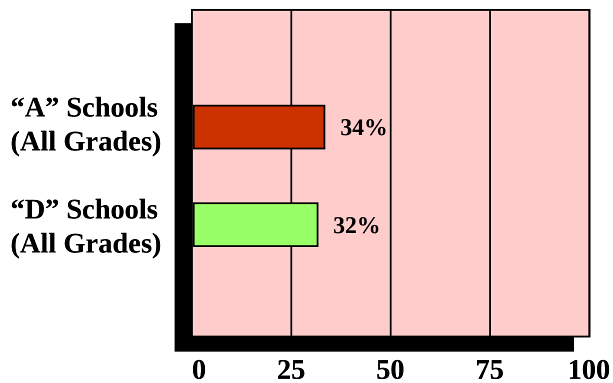
Actually, all teachers in the sample, independent of school grade or level, utilize the Internet for academic research more than expected. In fact, the sampled "A" group for high schools shows 100% of the schools have teachers participating in this activity for research. The lowest percentage across all levels and for all schools grades is 74% in the elementary "D" group. This fact is highly encouraging and indicates a strong willingness to migrate toward a more technology-robust instructional environment.

When considering the use of the Internet as a vehicle to deliver instruction, the results are certainly counter to the data in support of using the Internet for research. In spite of the high Internet research usage, when it come to using the Internet for the delivery of instruction, neither the "A" nor "D" group shows a strong tendency toward this activity. The percentage of schools having the majority of teachers participate in using the Internet for instructional delivery is woefully low, with only the "A" group high schools achieving above 50%.

Neither group shows a very active application in the area. This is a strong indication that educators are making a conscience effort to use technology for their own research, but are hesitant to deploy such techniques in the classroom. Figure 3 shows this activity in terms of the grade groups:

FIGURE 3

Comparison between "A" & "D" Schools of Internet Instructional Delivery by Teachers



Percentage of Sampled Schools in which the Majority of Teachers Use the Internet for Instructional Delivery

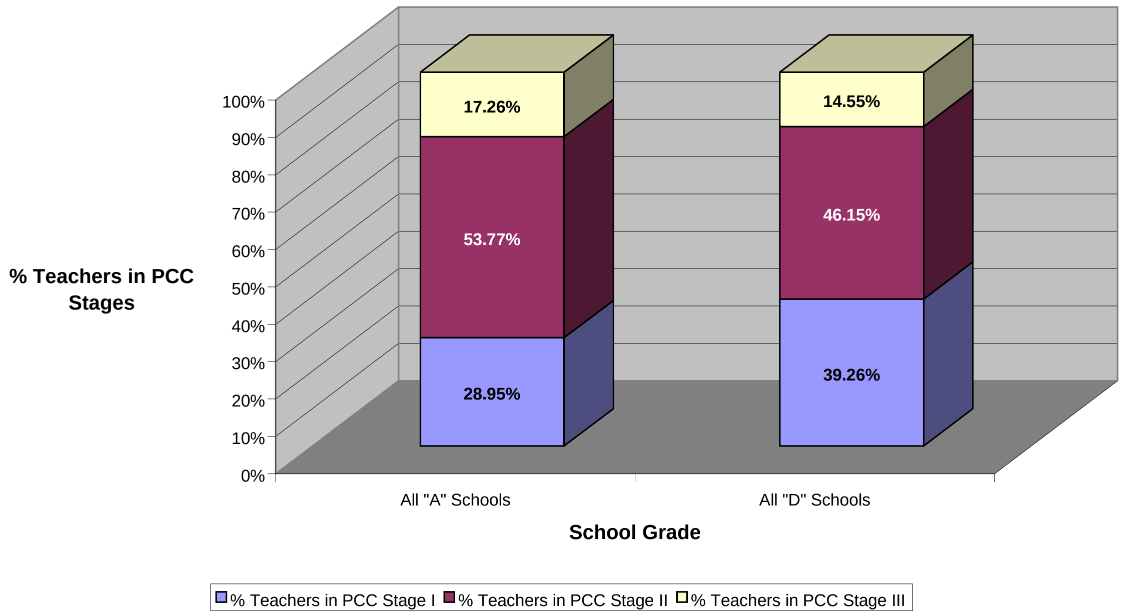
<u>SOURCE:</u> Technology Resource Survey for school year 2001/2002 and School Accountability Report – 2000/2001

Thus, more teachers are performing Internet-based academic research, yet few teachers actually use the Internet for the delivery of instruction to students. These two bits of information are highly interesting, yet they alone do not fully address the impact of teacher use of technology and its corresponding effect on student achievement.

One other interesting aspect in the TRS is an area devoted to educator professional development in technology. The survey asks for information from schools on the percentage of their teachers who fit into one of the three stages of the Milken Family Foundation, Educational Technology, Dimension 3, Professional Competency Continuum (PCC). This continuum assesses the professional skills for the digital age classroom. (More information on the PCC is available at **http://www.mff.org/edtech/***)*

The PCC establishes three progressive stages that teachers evolve through in making technology a part of their teaching style. Stage I is a general entry-level understanding of technology and its application. Stage II begins to have technology integrated into the classroom in support of existing practices. It is at Stage III where teachers really begin to use technology to peak the interest of students and to truly enhance the learning process. Stage III is touted to be the desired educator competency level, where teachers become proficient at transferring skills from current technology tools and begin challenging students to learn independently. Figure 4 depicts the sample school groups with respect to all three Stages:

FIGURE 4
Teachers from all Levels and by School Grade in the Milken Professional Competency Continuum (PCC) Stages



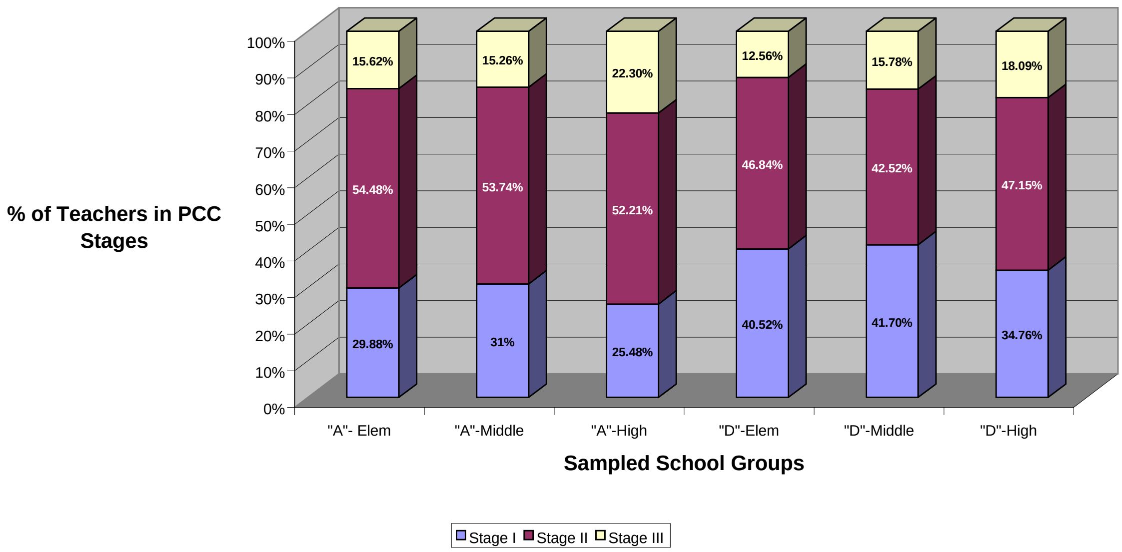
SOURCE: Technology Resource Survey for school year 2001/2002 and School Accountability Report – 2000/2001

This visual notes a significant difference in the "A" and "D" groups, when considering all three stages. The TRS data shows "D" schools have more teachers at Stage I (i.e.: entry level in understanding and using technology) and less in Stages II and III, when compared to the "A" schools. It is desirable for educators to be at Stage III in the Milken continuum, in order to optimize the student use of technology in the learning process. Competency at the Stage II level is a logical step toward this objective.

Such a difference in the competency level of the educators could indeed play a major role in the explanation of the difference in student computer usage. This sample and evaluation suggests that educators must first be properly trained and prepared to optimize the use of technology for instructional purposes, before any positive effects on student achievement can be realized. Even though data shows that educators in the lower performing schools are making efforts to have the technology become a part of the instructional process, the student usage pattern does not reflect positively as a result of these efforts. While all teachers would benefit from an enhanced technology professional development program, these data strongly support the fact that teachers in lower performing schools must be better prepared to utilize available technology. Only then can educators incorporate technology into their individual style of instructional delivery, and have this combination of properly trained educators and functional technology tools be in a position to have a positive influence on student achievement.

Consider a view that illustrates the percentages of teachers in the PCC stages at elementary, middle and high schools from the sample:

FIGURE 5
Teacher Levels by Group in Milken PCC Stages



<u>SOURCE:</u> Technology Resource Survey for school year 2001/2002 and School Accountability Report – 2000/2001

It is worthy to focus on the trends in PCC Stage III percentages, as this stage is where teachers begin to challenge students in independent learning. When educators achieve Stage III in this professional competency continuum, they begin the introduction of new learning opportunities through the creative application of technology. Further, the Milken Dimension 3 stages of progress notes that "at Stage III, technology is a catalyst for significant change in the learning process. Students and teachers adopt new roles and relationships." It is therefore reasonable to anticipate that when more teachers reach this stage in their technology evolution, the most significant aspects of improved student achievement should be noticed.

Now reconsider the information represented in Graph I (on page 5). Here, at the middle school level, the "D" schools exceed the capability of the "A" schools in the area of having the majority of students conduct independent electronic information searches. Notice in Figure 5 (page 11), that the change from elementary to middle schools for PCC Stage III is –2% for the "A" group (dropping from 15.62% down to 15.26%).

Now notice that for the "D" group, this relationship increases by a rather significant +26% (rising from 12.56% to 15.78%)! Thus, the "D" middle school teachers have made significant progress in the innovative application of technology, when compared to their corresponding peers in elementary schools. Further, they are also slightly ahead (by some 3%) of the "A" group in Stage III representation.

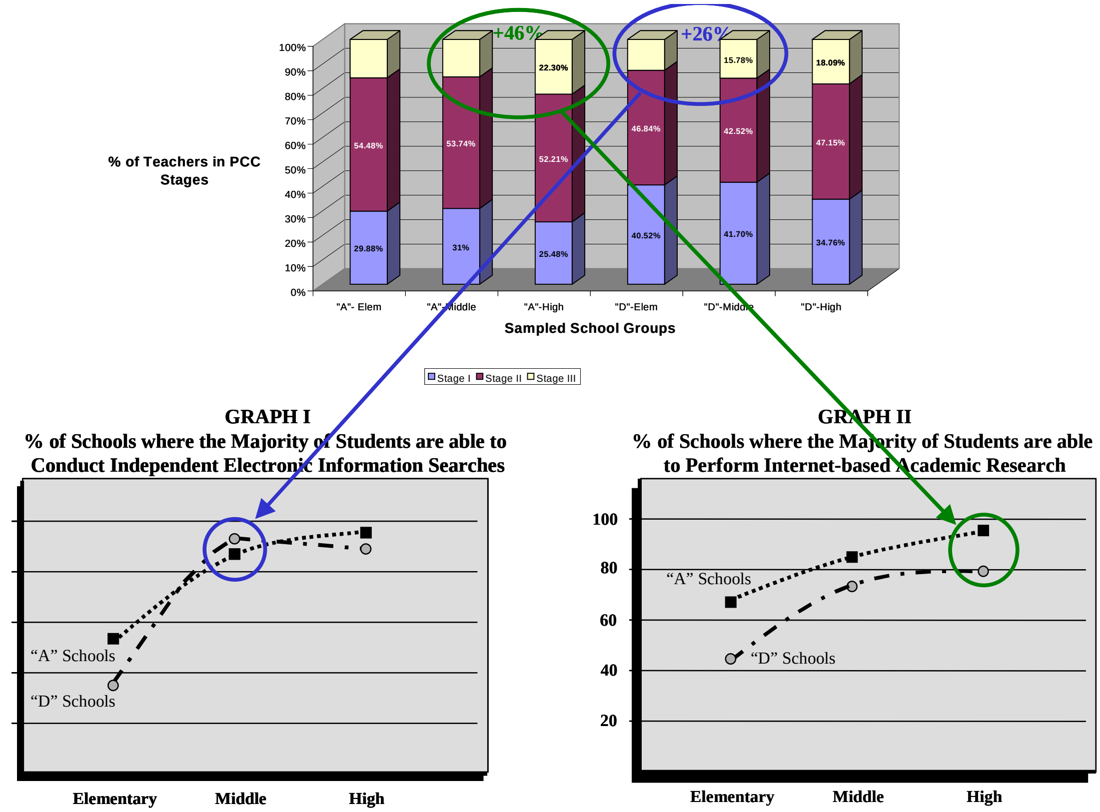
It is, therefore, believed that this fact, along with the previously noted increased amount of dedicated full-time technical coordination resources in the “D” middle schools, could well explain the perturbation in Graph I, where the middle school “D” group surpasses the corresponding “A” group capability for conducting independent electronic information searches.

While the size of the middle school sample was smaller than desired due to the lack of “A” and “D” pairs and, accordingly, could be a factor in this finding, care was taken to eliminate and replace any selections having extreme perturbations in data ranges.

Now focus on the movement from middle to high school in the PCC Stage percentage for both groups: here, there is also a noticeable difference in the teacher population estimate in Stage III of the PCC. The “A” group has an increase of +46% (from 15.26% to 22.3%), while the “D” group experienced an increase of only +15% (from 15.78% to 18.09%). This implies high school students are more challenged by teachers in the “A” group toward independent learning through technology than those in the “D” group.

These data offer a very plausible explanation for the divergence pattern evident between the middle and high schools in Internet based student research, as depicted by Graph II on page 6. Figure 6 on page 13 below, has been constructed to provide all three graphics for a comparison. Here, the migration into PCC Stage III and resulting impact on student performance in the specific technology-related tasks is graphically identified between the three graphics:

FIGURE 6
Teachers in PCC Stages by Level, Compared to Graphs I & II



Generally, it can be concluded from the evaluation of the data and trends contained in these three graphics that a teacher's technological competency is directly related to student achievement in technology-related exercises. Thus, it is the technology-competent teacher ***and*** appropriate access to technology that makes the difference, not just the presence of technology.

V. Conclusions:

Does the presence of technology for instructional purposes have a positive effect on student achievement? As a result of this research, the following conclusions are presented in response to this question:

- **The sample data verifies that the presence of technology itself does not necessarily produce a positive outcome in terms of student achievement.** Technology is simply another tool in the educator's collection of tools and aids for imparting knowledge. Educators must be properly prepared to apply technology in order to produce increased student achievement.

- **Socio-economic conditions appear to have a greater influence than can be overcome simply by the presence of technology in schools.** Lower performing schools have students at the lower end of the economic spectrum. Technology, by itself, does not alter student achievement in economically depressed area schools.

- **The competency of educators in utilizing technology is an influential factor on student achievement.** Overall teacher competency levels in technology for "D" schools is clearly at a lower level than teachers in "A" schools. This suggests that "D" school students are not challenged to take full advantage of their overall higher access ratios to technology. In specific instances where educator competency in technology is at a higher level, positive results are seen in student performance, independent of school grade.

These conclusions are certainly consistent with other related information found on the Milken Exchange web site. In a report titled **The Impact of Education Technology on Student Achievement**, this fact is further supported in two specific instances:

1) In the West Virginia Basic Skills/Computer Education (BS/CE) Statewide Initiative, where one of the positive findings was: *"Consistent student access to the technology, positive attitudes towards the technology (by both teachers and students), and teacher training led to the greatest student achievement gains."* and

2) In a National Study of Technology's Impact on Mathematics Achievement, the following positive finding is recorded: *"Higher order uses of computers and professional development were positively related to students' academic achievement in mathematics for both fourth and eight grade students."*

Further evidence supporting these conclusions may be found in a February, 2002 article in Phi Delta Kappan (URL: http://www.pdkintl.org/kappan/kappan.htm), titled: **Techno-Promoter Dreams, Student Realities**. This article documents research done by Craig Peck, Larry Cuban and Heather Kirkpatrick on the use of technology at two high schools in Silicon Valley (San Francisco Bay Area). Under a section on "Why so little impact", they offer the following:

> *"We are left, then, with a puzzle: Why has increasingly high access to technology in schools had so little effect on the classroom and the instructional experience of students? On the surface, the most obvious answer to this conundrum lies in the organizational norms of high school. Teachers hold the ultimate authority over what occurs in classrooms on a day-to-day basis. Students are thus subject to the pedagogical choices of their teachers. If teachers choose not to use technology, students will receive little exposure to the machines."*

This research goes further to document four distinct factors that have a direct effect on the under-utilization of technology in schools:

1. *Structures* – meaning classrooms and subject departments in schools.
2. *Time Constraints* – teachers have little time to devote to developing technology courseware.
3. *Defects in Technology* – teachers must resort to back-up plans when technology fails to function properly.
4. *Competing Educational Priorities* – technology is perceived as a secondary rather than a primary delivery tool for education.

Educational professionals in Florida, who have been exposed to the K-12 School District Comprehensive Council on Management Information Systems (SDCCMIS), can attest to hearing comments about experiences in dealing with these four factors during this groups bi-annual work-sessions. CEPRI staff have had the opportunity to observe these meetings. Based on input from this statewide council, individual conversations with various district MIS staff and direct conversations with a large number of teachers in the classroom, the attitude toward achieving a higher level of competency with technology is not on a positive track. Unfortunately, it appears most teachers view developing and using technology-based teaching tools as something that:

- will require a great deal of personal attention to keep up and running,
- does not have a high priority with administrators,
- will be very difficult to obtain resources for maintenance and upgrades, and
- will require more personal time and commitment that most are willing to devote.

Thus, first hand knowledge and understanding of this phenomena and these factors are certainly not new or unknown to Florida. This fact can be best summarized by considering an excerpt from the Citrus County School District 2001-2004 Technology Plan:

"Student proficiency with technology will never increase until our students have time and opportunities to use these tools with teacher encouragement. And to complete the cycle…teachers will never provide this encouragement until they feel comfortable and have a minimum level of skill and functionality with technology…and, non of the above will be possible until the appropriate tools are made available to them."

VI. How to Address this Issue?

How does the state change such a pervasive yet daunting attitude? As documented in the CEPRI Overview of Technology in the Florida K-12 System paper, Florida has done an outstanding job of creating and preparing a technology infrastructure. This facility is poised to house the appropriate tools to achieve student proficiency in technology. As the new K-20 system of education becomes defined and unfolds into reality, it presents an excellent opportunity for Florida to properly address the teacher preparation, training and support issues and then reap the benefits of increased student proficiency.

One of the efforts in progress under the new educational governance reorganization is the creation of strategic and master plans for the K-20 system. It seems logical that the place to start in addressing this issue is by having it as a part of this planning process. While it is not the intent of this paper to fully define such a plan element, the following are presented as an initial listing of issues for consideration:

- **State Level Leadership –** Any effort to address this educator professional development issue will require strong leadership at the state level. Recommendation #2 in the Overview paper references this need. There is a tendency for the DOE to refrain from taking directive stances with districts, due to their autonomy. In this case, many district staff recognize that DOE leadership will be essential in establishing any statewide plan to address standards, identify resources, secure appropriate training curriculum and to assist with product identification and validation.

- **Detailed Research into Product Functionality –** Such an effort can best be coordinated at the state level, in order to be effective and consistent across all districts. It also is important to include representation from colleges and universities, both from an expertise standpoint and to insure that seamless upward movement in these type applications is properly addresses. Any such effort must place an emphasis on having classroom teacher input. This is where the tire meets the road and it is vital to understand what is needed and how it must work. Developing a statewide plan to garner district resources and have them participate in developing common specifications, identify potential product solutions and validate functionality through testing and experimentation will not be a trivial assignment. There are, however, staff in each district who have valuable insight into what is needed in classroom management and support software. Identifying them will be a key element and most likely, the MIS directors either know who they are or know someone who does.

- **Careful Coordination with the Districts –** Districts are and will remain autonomous. Proper coordination and communications will be necessary so that any state level effort lets the districts work out the operational and implementation details that will be required in establishing standards and in identifying viable products. Districts must view the state participation as assistance rather than a directive.

- **Establishing Standards -** the introduction of standards for classroom management and support software tools and for educator professional development courseware will certainly be unpopular with some segments of the private sector. Any such criteria must be carefully thought out, involve higher education and have an operational basis from the districts in order to withstand what could become intense lobbying efforts.

- **Investigating Partnerships –** It is highly unlikely that any product will have all of the functionality the will be desired by Florida educators. It is further unlikely that Florida will be able to afford the wish list that could come out of the functionality research part of this definition, if indeed it occurs. Therefore, it will be necessary to identify opportunities for establishing partnering terms and conditions with selected companies that are willing to tailor products toward the suite of Florida standards and features. This goal will be to produce as much of what is desired as Florida education can afford. If Florida has any measure of success with this effort, there are a wealth of other states with needs that are practically the same. The private sector recognizes this and would likely be receptive to a functional working relationship.

- **Funding –** Any such effort will require fiscal resources from the legislature. The key will be to present the requests for such funding as a part of a feasible and approved plan of action.

This will not be an easy task, yet it is so vital to the future of Florida and our society. Technology is now ingrained into our everyday lives and this inter-twining will continue to grow, as it influences both economic and entertainment aspects of society. People want these technologies and the benefits and pleasure they can bring to their lives. A recent survey by the International Technology Education Association (ITEA) and the Gallop organization indicates the American public overwhelming regard technological literacy as an important goal for all people. Technological competence is an attribute that is both desired and expected from the education system of our country. We simply must take advantage of this opportunity, harness this expectation from education and apply its energy toward a framework that improves and benefits our Florida K-20 learning process through the proper application of our investment in technology infrastructure.