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A Study of the Development and Effectiveness of Educational CIOs in the United States

ZAORSKI Spence

【要旨】

コンピュータが教育でますます重要な役割を果たすようになるにつれ、学校の管理者にとって、その管理と効果的な導入方法が重要な課題となってきた。そして、インフラのサポートと、ユーザーのニーズに合わせるソリューションが提供できるスタッフの採用やトレーニングとサポートのシステムを導入する必要も生じた。これらは、従来の教育機関のスタッフでは対応が難しいと考えられる。そこで米国では、近年、教育CIOを設置するところが多くなりつつある。

本研究では、日本にさきがけて教育CIOの導入が進みつつある米国を対象に、教育CIOの変遷と現状を調査した。教育CIOへのインタビュー調査などから、米国の教育CIOは、企業をルーツとして誕生し、コンピュータの教育への普及につれて導入が進んでいった等、米国における教育CIOの変遷が明らかになった。加えて、米国における教育CIOの最近の報告として、教育CIOが設置された学校では、テクノロジの管理が改善されるだけでなく生徒の成績向上、スタッフの知識が増加、コミュニティとのリンクが深まる実績のあることがわかった。

1 Research Overview

1.1 Background

As computers take a more and more prominent role in education, the management of computer resources and development of effective usage within schools has become an important issue for school administrators. When only a small number of computers are used in a school, a technologically-savvy teacher could manage the systems, but nowadays schools are moving towards "one-to-one computing" with one computer per student and integrating computer usage into all facets of education from teaching to administration. Entire computer districts are being connected with networks and servers providing shared resources to both internal schools and the external community. However, procuring and installing the necessary hardware is only the beginning. Staff capable of maintaining the technological infrastructure and responding to the needs of the faculty and administrational staff must be hired. A system of training and support that fosters interest in the new technological tools available and provokes the development of newer and more effective teaching practices needs to be created and implemented.

These tasks are beyond what most members of a traditional school district's teaching and administrational staff are qualified or capable of so it has become necessary to bring in people with these special skills. When computers are used sporadically in school districts, a "technology coordinator" (or similar position) is typically charged with maintaining the computer equipment and training teachers.

However, when technology becomes an integral part of the school district, the implications of decisions regarding technology usage are much greater and high-level administration becomes a necessity. Superintendents typically don't have the technological background nor the time to handle supporting current needs while planning for the future (with technology constantly changing and developing). As a result, some schools have developed new positions within their management infrastructure. In the United States, schools borrowed the Chief Information Officer (CIO) model that businesses had created to deal with increasing integration and dependence on technology in all aspects of business. Educational CIOs are cabinet-level positions that include control over administrative, financial, staffing, and training for the technology-related infrastructure of a school district.

1.2 Goals

This research examines the establishment and effectiveness of educational CIO positions in the United States based on interviews with top CIOs and site visits to representative school districts along with educational technology leadership resources and CIO-related publications from the US. The position of the Educational CIO, while a vital role in the organizations that have implemented them, is still not very well known to the average educator so one of the goals of this research is to provide an introduction and overview of the educational CIO role to educators and researchers interested in large scale technology leadership solutions for the education sector.

1.3 Research Methods

Business-related background material comes from my own experience working in technology-related fields in the United States with responsibilities including technology management supplemented with books and periodicals from CIOs in the United States. A survey of several US schools with award-winning CIOs was conducted in January 2007, providing first-hand accounts from active educational CIOs and other school personnel regarding the successes and challenges of working as an educational CIO and effectively integrating technology into education. Reports from the Consortium for School Networking (CoSN), an organization supporting advocacy and leadership development for educational technology leaders including educational CIOs, and education-focused periodicals with recurring columns on topics geared toward educational CIOs were used for additional background material on School CIOs.

2 What is a CIO?

CIO stands for Chief Information Officer. It is one of the top-level management positions of modern business with a title of the format, CxO, where the 'x' is replaced by a word denoting the primary area of focus. Chief Executive Officers (CEOs) and Chief Financial Officers (CFOs) are probably the most well-known and recognized positions, but Chief Operating Officers (COOs) and Chief Information Officers (CIOs) have also increased to provide more targeted attention and management to areas that would have previously been part of other existing managerial positions' responsibilities. Sometimes companies or organizations have Chief Technical Officers (CTOs) in addition to or in place of CIOs.

Information Technology (IT) managers traditionally focused on technical issues almost exclusively.

However, the increased usage and dependence on computers and technology in the workplace to manage information resources and core services for all parts of a corporation has changed the demands and responsibilities placed on technology managers. Synott and Gruber conceived of the title, Chief Information Officer, as a "senior executive responsible for establishing corporate information policy, standards, and management control over all corporate information resources" in their book, Information Resource Management in 1981 as this change started to spread in the US (Synnott & Gruber 1981, p. 66). They talk about how companies need to recognize the value of information as a corporate resource and that a chief information officer is necessary to "exert a broad corporate perspective and a leadership role in bringing together and managing" corporate information resources and "to educate senior management as to what can be done to make more effective use of information resources through the development of technological delivery systems to bring needed information quickly to those who need it, when they need it, and in the form they need it." (Synnott & Gruber 1981, p. 67) The creation of the CIO/CTO (hereafter referred to only as CIO) position did take off and spread as Synnott and Gruber predicted (Synnott & Gruber 1981, p. 67). Every organization has unique needs and so the CIO roles can vary widely. Al Pappas, CIO at several major corporations, lists common roles for the CIO: technology leader, business leader, strategist, mentor, and corporate influencer (Lane 2004, p. 10-11).

This increasing technology dependence and need to better manage information resources is not limited to industry and now many non-profit, government, and educational organizations have also established CIO positions to try to better manage, utilize, and benefit from technology investments.

3 Survey of US Schools with CIOs

3.1 Overview

Professor Takanori Maesako of Osaka University, Professor Takashi Kuroda of Toyama University, and I carried out a survey of three school districts in the United States and one educational CIO consultant between January 4, 2007 and January 13, 2007. With only limited time to perform our survey, I contacted Ray Meyers, Senior Program Analyst at the US Department of Education, and Anita McAnear, National Program Chair for ISTE (International Society for Technology in Education), for referrals of top educational CIOs that could contribute valuable experiences and show us successful educational technology programs they have helped to bring about. The list of referrals was filled with award-winning CIOs from districts around the country. We chose districts on that list from different parts of the country and arranged visits including school facility tours and meetings with district leaders.

Montgomery County Public Schools is located in Maryland and was the 16th largest school system in the United States as of 2008. At that time, they had 139,276 students enrolled.

Fairfax County Public Schools is located in Virginia and was the 12th largest school district in the United States as of 2008. At that time, they had 168,742 students enrolled with 22,309 employees. Their operating budget for fiscal year 2009 was $2.2 billion with a technology budget of $74,343,145.

Broward County Public Schools is located in Florida and was the 6th largest school district in the United States as of 2008. For the 2008/09 school year, there were 284 K-12 schools, 16 adult/vocational centers, and 55 charter schools with 255,738 students enrolled and approximately 39,000 permanent and

part-time employees. Their 2007/08 budget was $5.65 billion.

Kent School District is located in Washington state outside of Seattle and was the 4th largest school district in the state as of 2008. As of October 2008, 26,833 students were enrolled with 3,292 employees. There are a total of 40 schools in the district. Their budget at that time was $235,205,695. Hall managed a $12 million annual operating and capital technology budget while CIO.

3.2 CIO Backgrounds

We met with the following CIOs at the school districts in our survey:

John Q. Porter was hired as the first CIO of Montgomery County Public Schools in 2000 reporting to the Chief Operating Officer (COO), but in 2004 he became the Deputy Superintendent, Office of Information and Organizational Systems and his job was expanded to include control over the following new departments: Office of Organizational Development, Department of Technology Implementation and Support, Department of Student and Business Technologies, Department of Reporting and Regulatory Accountability, Department of Shared Accountability, and Department of Technology Consulting (CoSN Compendium 2006, p. 40). He was honored as the 2005 School CIO of the Year by SchoolNet, Inc. and Public CIO Magazine.

Maribeth Luftglass serves as the Assistant Superintendent and Chief Information Officer for Fairfax County Public Schools. She has a Master's degree in operations research from George Washington University's School of Engineering and Applied Science, did work computer programming and systems analysis work for a Department of Defense contractor, and spearheaded several technology initiatives while working at the Red Cross for 15 years.

Vijay Sonty became the CIO of Broward County Public Schools after a 20+ year career in technology management including serving as Senior Vice President and Chief Technology Officer at the Interpublic Group of Companies Inc. which was reported as the largest advertising and marketing communications company in the world. In 1999, Business 2.0 Magazine named Sonty, "CIO of the New Century." 2005 School CIO (Chief Information Officer) of the Year.

Don Hall served as the CIO for the Kent School District from June 2000 through the 2006 school year. He has a Master's degree in education and served as North American Director of Training and Development for GE Capital. He has done educational CIO consulting for the BLE Group and is currently the CIO for the Muscogee County School District in Georgia.

3.3 CIO Positions and Reporting Hierarchies

While the official titles of the CIOs we surveyed varied, the position in the organizational hierarchy of the CIO was consistently set as a cabinet-level position reporting to the Superintendent. In large organizations such as the districts surveyed, department leaders often report to a subordinate of the Superintendent (e.g. a Deputy Superintendent), but CIOs have been placed directly under the Superintendent.

School District	CIO Position Title	Position CIO Reports to
Montgomery Public Schools	Deputy Superintendent, Office of Information and Organizational Systems	Superintendent
Fairfax County Public Schools	Assistant Superintendent of Information Technology and Chief Information Officer	Superintendent
Broward County Public Schools	Chief Information Officer	Superintendent

3.4 Large-scale initiatives of each CIO

3.4.1 Montgomery Public Schools

The demographics of Montgomery County changed greatly starting in the late 1980's and now the county is home to many different minorities and people from many different countries (163 at the time of our visit in January 2007). Traditionally, these students have difficulty meeting national and state standards particularly in English and reading. In spite of this, they have a majority of their students testing above national averages. Jerry D. Weast became superintendent of the Montgomery County Public School District in 1999 and hired John Porter in 2000. Rather than lowering expectations of students, Weast worked with parents, teachers, students, and elected officials to set higher academic goals (Cooper, Online Case Study: Montgomery County Public School District). Then funding was secured and metrics were established to allow continuous monitoring of the projects to achieve these goals. When Porter became CIO, he took control over not only the technical departments, but also all of the data-oriented and professional development related departments. This allowed him to reorganize the technology management infrastructure to allow for a unified approach to information management, timely and differentiated professional development, evaluative research, and quality control (Porter, Delivering on the Promise) As a result, he was able to provide tools that allowed for targeting instruction towards individual students' needs, training geared towards specific staff-members' needs (administrators, teachers, support staff, etc.), and continuously monitor the success or failure of his projects. Their Integrated Quality Management System (IQMS) is comprised of the Instructional Management System (IMS) and Data Warehouse System (DWS). Teachers and administrators use the IMS to continuously monitor and evaluate students' academic progress. Local and state curriculum standards are built into the system, allowing teachers to easily determine if students are meeting curriculum requirements at any time. The DWS provides tools for assessing student academic and curricular achievement levels, analyzing performance based on different groupings (race/ethnicity, native/foreign English speaker, special education, etc.), viewing performance versus benchmarks based on other similar schools, analysis based on factors that may indicate potential success in high school. The Technology Modernization Program (TechMod) began in 2000 with the goal of more efficiently refreshing out-of-date computer and network technologies in the district. They've improved student to computer ratios, improved uptime of the network, and increased staff usage of technology.

3.4.2 Fairfax County Public Schools

Fairfax has an enterprise-quality network and created the 24-7 Learning portal which allows for access

to homework, class assignments, enrichment activities any time from anywhere. When we visited the district, their network included 95,354 computers, 25,000 printers, 1100 servers, high-speed wired and wireless access connecting all locations. All schools have had Internet access since 1996 and now it is an integral part of the curriculum. Their information technology management practices led CIO Magazine to select them as a Top 100 IT Organization in 2006. The have also created a data-warehouse called the Education Decision Support Library (EDSL) that brings together a wide-range of data that traditionally was stored and managed separately and now allows them to keep up-to-date on students' progress and quickly respond to student learning difficulties. This has proved to be an effective tool for identifying problem areas as well as looking for solutions. For example, Oak View Elementary School Principal Debbie Lane used EDSL to find other schools in the district that performed better on a particular skill area her students were having difficulty with, contacted them and exchanged ideas, and ended up improving their test scores the following year (Murray 2006). They have patented the system and have sold it to other districts struggling to keep up with the data management requirements for No Child Left Behind and other educational reporting. Their technology plan covers curriculum integration, professional development and training, infrastructure and connectivity, and educational and administrative applications. The Office of Instructional Technology Services provides training materials and services for the district. At the school-level, School Based Technology Specialists provide a wide-range of services to facilitate technology use by teachers and staff. Their roles include carrying out local training on site based on each school's particular needs, acting as a liaison between the school and the district technology infrastructure, managing local computer resources including the school's web team and technology instructional assistants, troubleshooting basic hardware/software issues and escalating larger issues to the appropriate department/vendor, on-site consulting on a wide range of technology related areas for staff, and collaborating with teachers to plan lessons and better integrate technology into all aspects of the curriculum.

3.4.3 Broward County Public Schools

Sonty implemented many enterprise-level technology reforms while CIO. A data-driven and people oriented "Continuous Quality Improvement" program was implemented which serves as the basis of the District's Strategic Plan 2010. His group also created The Information Technology Blueprint (IT Blueprint), a guide to all technology processes, standards, training and implementations of technology within the district, with 82 projects defined. Two years after starting this initiative, they had completed almost half of the projects. Part of this success may be attributed to one of the projects, Project Management Office (PMO) created by Microsoft and Pcubed, which helps to complete information technology projects on time more than 90% of the time (eSchool News Vanguard Report 2006, p. 5). In addition to monitoring projects, an enterprise-level support system was created to tame technical support issues. The district has widely implemented video-conferencing and video-on-demand that can be used virtually anywhere using the district-wide wireless network. A data warehouse allows teachers to keep tabs on student performance, but parents and teachers can also access attendance, grades, graduation requirements, and other information online through the district's Virtual Counselor system. There are a variety of professional

development resources offered including the Digital Education Teacher Academy and the Broward Virtual University. The Digital Education Teacher Academy helps teachers use technology to produce standards-based, results-driven teaching materials for all subjects. Teachers taking the course can earn three graduate credits from Broward County Public Schools partner for this program, Florida Atlantic University. The Broward Virtual University provides 24-7 online learning professional development opportunities for teachers from anywhere they can access the Internet. Courses cover all parts of the curriculum from art to world languages. Sonty also created a centralized support system to minimize support resources while providing support for over 110,000 devices on their network (including Windows and Macintosh computers, as well as other devices). Representatives from Dell, their PC vendor, and Apple have desks in the call center to provide immediate on-site support for platform-specific issues.

3.4.4 Kent School District

Hall completely overhauled the existing training system and created matrices that aligned skills with outcomes for students, teachers, and staff to determine training and professional development needs. He integrated students into the professional development process pairing students and teachers (1 teacher with 3 students) so that both teachers and students would become knowledgeable about technology solutions for the classroom. Students could help deal with small technical issues on the spot and teachers could focus on teaching. Hall also was able to reduce tech support needs by implementing a Student Technology Leadership program. He tapped into the interests of students and allowed them to do real projects paired with professional staff members and learn real-world skills while contributing to projects for the school and the community. A big focus of his work was to "create a culture of change" (Hall interview January 11, 2007). Leaders using (rather than just talking about) technology can get teachers to use technology. He worked with teachers addressing their concerns and needs. He developed rubrics for technology assessment to help find areas for improvement and monitor progress as technology skills were acquired or improved. Technology skills were also made part of teachers' evaluations. Another major effort by Hall as CIO was to improve communication with the community. Community events, instructional technology and curriculum fairs, and family technology nights that highlighted the programs and successes of the district were scheduled regularly.

4 The Role of the School CIO

4.1 Need for School CIO Positions

Small districts with smaller technology infrastructures may be managed without any problems with traditional Technology Coordinator / Technology Director based models. However, as computer use at school increases and becomes integrated into the curriculum and government reporting requires increasingly complex data acquisition and analysis, a district's needs can become very similar to modern enterprise. Without the enterprise-level expertise and management skills of a CIO, technology can get out of control and rather than uniting and empowering students, teachers, and staff, it can divide, hinder, and demoralize. The initiatives listed in 3.4 that the US Survey school districts implemented are too large and complicated to be implemented by a single person. They required experienced staff working under the

direction of an experienced CIO who had to get cooperation from a wide variety of stakeholders in their organization (not just technology-related).

4.2 Requirements for School CIOs

Just as corporate CIOs have to work across the boundaries of the organizational hierarchy of a company, School CIOs have to reach out to all members of a district community, understand and service their needs while also overseeing traditional technology support and development responsibilities. In addition, a School CIO must be looking several years into the future and working with district management to plan initiatives that will support educational, administrative, and technology goals. The Council of School Networking (CoSN) identified essential skills for a K-12 CTO (CTO being used the same as CIO): leadership and vision, planning and budgeting, team building and staffing, systems management, information management, business leadership, education and training, ethics and policies, and communication systems (CoSN Compendium 2004, p. 1-8). They summarized this saying that a CIO "must be a skilled administrator, a knowledgeable educator, an effective communicator, and a technologically-savvy individual who can work with all district staff at all levels within the organization" (CoSN Compendium 2004, p. 8). The Broward County Public Schools CIO job description lists 15 years of IT management experience required (with 5 years successfully managing a major IT operation). The CIOs responsibilities include leadership and policy, strategic planning, budget and procurement, and compliance and security. The goal of the CIO is listed as being "responsible for leading and improving the planning, procurement, implementation, operation, support, and maintenance of IT systems that support and enhance education and business operations as well as improve cost effectiveness and efficiency. The CIO will develop a high-performing IT organization that supports the district's goals and objectives."

4.3 Where are School CIOs found?

During our interview with Don Hall, he suggested that there were about 50 districts with more than 50,000 students in the US and that you would find School CIOs in those districts. The title of CIO has gained popularity so there may be more districts with CIO positions, but they still may be doing the same job with the same hierarchy as they previously were. It can be hard to attract the required talent for a School CIO position. The work may be on par with that of an industry CIO, but salaries in the education sector are often $30,000 to $40,000 lower (Hall interview January 11, 2007). All of the CIOs we met during our January 2007 survey had technology management experience in industry before becoming School CIOs. Smaller districts can have difficulty in attracting the high-level talent required for a CIO position.

4.4 Creation of School CIOs Positions in Districts

When a district grows such that its technology management needs outgrow technology-centric traditional technology management models with narrowly focused technology management, a CIO position may be the best solution. Typically superintendents or technology-centric boards will propose the creation of a CIO position. For mid-size districts, the superintendent may hire a CIO with the advice of other educational leaders. In larger districts, the cabinet (CEO, COO, etc.) may make hiring decisions.

4.5 Most Important Skills for School CIOs

In 4.2 Requirements for School CIOs, a long list of skill areas that a CIO should have to be effective is presented. However, in my talks with various School CIOs, leadership and communication have been emphasized more than anything. A CIO is not a popular job and it often calls for affecting change in an organization. Good communication to understand the needs of a district as well as to clearly communicate the value that change can bring is essential. Don Hall demonstrated how professional development for staff, better communication with the community, and all-around inclusiveness can overcome initial hesitance and resistance to change initiatives proposed by a CIO. When asked what the most important thing to him as CIO was, he responded that it was to know that he was making a difference for teachers and students.

4.6 Challenges for School CIOs

New CIOs in an organization can face a lot of opposition as other departments resist change, especially from someone 'outside' of their departmental hierarchy. A new CIO will have to reach out to these other departments and show them that technology can be an ally and a valuable tool that benefits them. Also, it can be easy to get mired in present-day issues, especially since CIOs are often hired when technology has "gotten out of hand" and technology issues have greatly accumulated. A CIO must be able to deal with present issues, but also plan for the future.

5 Conclusions

Technology use in education is growing at all levels, from the classroom to administration, making the effective management of related staff and resources along with the development of training and planning for future needs critical to the operation of modern school districts. This requires a broad range of skills and technical expertise more often found in the corporate business world the authority to implement policies and manage resources spanning all divisions of a school organization. The role of educational CIO was created in the United States to answer these needs in some of the largest school districts nationwide. During our survey, we saw how the establishment of large scale technology infrastructures by educational CIOs provided enhanced teaching and learning in the classroom and streamlined administrative processes. The educational CIO position has become a necessity in larger school districts in the United States, but any district that is seeking to more fully integrate technology into its curriculum may benefit from a CIO or similar technology management leadership position since improperly implemented technology infrastructures can be inefficient, costly, result in disconnectiveness rather than increasing collaboration, and hinder the education process as technology becomes critical for day-to-day teaching and learning.

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Computers are taking increasingly prominent roles in education and as such the management and effective use of computer resources have become important issues for school administrators. Personnel capable of maintaining large-scale technological infrastructures and responding to the needs of faculty and administrative staff have to be hired. Also, training programs and support infrastructures have to be designed and implemented. Managing these tasks is beyond what most members of a traditional school district's teaching and administrative staff are qualified or capable of so it has become necessary to bring in people with these special skills. In the United States, a position called a "School CIO" has been created to fulfill this role.

This paper discusses a research project carried out to study the pioneering development and current state of the School CIO position in the United States. The study found that the School CIO position was inspired by the business world and is spreading in school districts with increasing usage of computers in education. Interviews with School CIOs revealed many benefits to the establishment of School CIO positions not limited to improved management of technology, including improved student grades, more knowledgeable staff, and better communication with the local communities.