Needs Assessment Report

Education & Career Center
West Valley Campus
Division of Adult & Career Education
Los Angeles Unified School District

CAD/ Design Technician Program
Industrial Department

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December 12, 2008

Education & Career Center ECC, West Valley Campus

ECC is part of a network of more than thirty schools situated throughout the Los Angeles Unified School District. These centers serve an important community service by providing the diverse population of Los Angeles with "quality lifelong educational opportunities that empower each student to contribute to and benefit from an ever-changing society." ECC core demographics include high school students, students with disabilities, and adults seeking job training. The school offers an array of services commonly found at community colleges and universities such as: support services for disabled students, job preparation and placement assistance, financial aid, and additional language and math tutoring. West Valley has been the leader in serving the most students out of any other center and continues to offer a variety of training programs that meet the needs of California's service economy.

ECC provides simulated work environments for training programs in disciplines such as: Accounting, Computer Programming, Automotive Technology, Electronics, Drafting, and many more. All training and instruction are under Business, Health & Child Care, Technical, Industrial, or Academic programs. These programs are then administered by the Business, Industrial, or Academic departments. Coordinators for the various programs supervise teachers and report to one of two Vice principals. Some instructors serve as Teacher Advisors counseling instructors on day to day classroom administration while others serve as Union representatives addressing teacher issues related to employment and working conditions. I have personally served on the Accreditation committee, school-wide planning committee, school safety committee, and Advisory committee. Most teachers also tend to be involved, at some level, in the job preparation

of their students. For the most part, teachers feel they know the procedures and people to address with a problem, issue, or request.

The Industrial Department's CAD/Design Technician Program

As lead teacher for the CAD/ Design Technician program, I manage the curriculum development and computer lab maintenance. This includes developing instructional plans, materials, presenting lectures, providing one-on-one coaching, maintaining and upgrading computers and software, requisitioning equipment and supplies, and liaising with professional and other community organizations. The CAD program is designed as a sequence of courses to deliver instructor led, learner based occupational training in a one year program of study and practice. In this modularized curriculum, students benefit from a variety of project based experiences in different scales and types of projects. Some interesting opportunities include working on real world projects such as: The Lowe's & Canoga Park High School Green Learning Garden and H_20 Global Solution's Storm water Drain project.

The program is divided into Architectural Design or Mechanical Design tracks in basic, intermediate, and advanced courses. Students embarking on the Architectural Design track learn how to use various software packages such as AutoCAD, ArchiCAD, and SketchUp to develop, document, and visualize both two-dimensional and three-dimensional building information models. The training focuses on showing students how to develop efficient workflow's, techniques, and procedures for common industrial applications in interior design, green building design, general architecture, and site planning.

Mechanical Design students also learn two-dimensional and three-dimensional project development and visualization for Engineering. Students use Solidworks software to develop parametric models and perform design analysis with COSMOS software. All students are expected to demonstrate minimum competency in an array of skills as outlined by the various curricula. Students are expected to produce a portfolio demonstrating their ability to produce standardized technical drawings and effective model renderings. Upon completion of each course, students receive an achievement award noting their skill level and hours of practice. Upon completion of the series of courses and at least 1200 hours of instruction and practice, students are then presented with the CAD/Design Technician Program Certificate of Completion.

The Way Things Are

The current practice of technical instruction for the CAD/Design Technician program involves classroom lectures and presentations within a networked environment with each student at a single computer. Course assignments, schedule and other administrative forms are distributed through an intranet website accessible only to registered students in the class. All instructional materials are also distributed through the web site, presented with an overhead projector onto a screen, or printed on paper. Beginning with Basics, students learn the fundamentals of the AutoCAD program interface, the format settings for drawings, and develop a template. All instruction is conducted as an informal lecture/discussion session. These sessions are supplemented with written instructions or posted web pages for additional information. To illustrate procedures, an overhead is employed to demonstrate work flows, command input, and dialog box negotiation. In this way, students have written procedures to review and overhead

demonstrations to observe and better understand the functionality and application of the AutoCAD program as it relates to the development of drawings.

Continuing with intermediate skills, students then apply what they learned about setting up drawings to actually developing drawings with standardized views. Students begin to work in the simulated work environment by accessing data over the classroom network and sharing data they discover during research. Students collaborate by partnering on projects in which the responsibilities are divided and must be coordinated to produce a completed project. Students develop parts of designs and share the information in real time over the network to enable coordination of these parts into the whole of their group designs. In this way they learn to use technology to develop data and to access and manage it across distances and in coordination with various disciplines. These are key job responsibilities that students get to learn and practice working on simple to complex projects.

In order to deal effectively with the two disciplines, wide scope and varying levels of the CAD program, I have developed blended course curricula. This enables any instructor to provide all students with instructional materials, examples, and demonstrations from any computer by simply navigating the course web site. Since the course is divided into Architecture or Mechanical Design and further divided into Basic, Intermediate, and Advanced levels, the website mirrors this and provides instructional materials by discipline and modules. The website provides students with a calendar, notices, resources, and syllabi for each module of either discipline. Students are able to view instructions coupled with annotated images, open sample files, download reference material and view demonstration videos.

In all, this approach has worked very well as can be evidenced by class performance from year to year. In the year 2000, the attrition rate for first time students was from 25-35%, with less than 5% actually completing the course. Little or no information is available regarding employment for this time. However, since the institution of the class website, the class performance from year to year has practically inverted. For the year 2007, 14% of students completed the course and 76% advanced to a higher level. Only less than 10% left the class before completing. In addition, the course now regularly experiences wait lists up to 15 students. Developing blended curricula has also made it possible for greater learning experiences mirroring real-world contexts. By working in a networked environment with industry software, students are learning to collaborate and develop common industry practices. This has also led to community based projects in which students are able to realize their designs in service to local businesses and organizations, while developing a high level of professionalism.

The Shortcomings

As a technical and occupational training program, the CAD Design Technician course needs to stay current with industry standards. In addition to providing students with a project-based curriculum, students need to work with advanced software and professional class hardware. The purpose of the training program is to prepare job seekers for entry-level employment in industry and not having familiarity with the tools of the trade can lead to serious disadvantages, albeit a failure of the school to provide adequate training.

For lectures and discussions, students sit at their individual computers and listen to the instructor while watching an overhead demonstration. These demonstrations, however, are not

always effective because it may be difficult for someone to clearly see depending on a student's proximity to the projection screen. A reconfiguration of the desk layout would in fact be a costly solution as each desk is hard wired with cables and tubing through holes in the suspended ceiling to the server in another room. Another reason for the ineffectiveness of the demonstrations is that the instructor is facing the students while the students are facing their computers. It is impossible to take control of the students' computers during the lectures or prevent them from engaging in web surfing or other activity resulting in their distracted attention to the lecture.

Other problems that contribute to bottlenecking include old computers incapable of handling the large amounts of data processing. Currently, the CAD Class consists of two lab rooms, each accommodating sixteen student computers, one instructor computer, and one overhead projector. The computers are five years old with less than adequate memory. These machines can barely operate our current software and with the expected changes in future software versions, this will certainly become an impediment. With less than adequate hardware, the software sometimes stalls or even crashes, losing students' work and setting production back. This also results in frustration, leading to incomplete or missing assignments.

Impeding changes to the curricula as prescribed by the school district also represent a challenging mountain of obstacles. The school district is planning to reduce the program hours of instruction and restructure the courses to attract greater numbers of students and make course completion a more attainable goal. By having the curricula modularized and online already, the task of reorganizing and rescheduling will be rather easy. The problem again will be accommodating greater numbers of students in shorter time periods. With budget cuts happening

almost monthly, it is unlikely that I will be able to maintain any of the existing machines much longer. For the last couple of years I have been cannibalizing machines to replace parts and make repairs. As technology evolves and industry practices adapt, new software versions are released. In order to remain an industry-level training program, some significant investment will need to be made in hardware and software.

As mentioned earlier, some opportunities that have arisen from the current situation include reduction in paper consumption and waste, on-line course materials, and shared data storage. With the availability of a network I have been able to develop and distribute multimedia and other instructional aids that promote deeper understanding of CAD. In addition, students are able to develop valuable hands-on skills through collaborative project development while working in a simulated working environment.

Initially, I sought the assistance of several other instructors to develop the network and create effective instructional web pages. The Electronics instructor made it his class project to wire the lab computers and setup a Novell server. I learned to develop student profiles and class groups to grant access to printers and other network resources. Drawing from the work developed by the Web Applications instructor, I learned to layout web pages and present text and images for instructional presentations. And after my first year in the Master's program I was able to update the course website to dramatically improve the appearance, navigation, and overall effectiveness of the site. In all, I feel the current organization of the CAD curricula into an online, modularized website enables me and the other two instructors to be more effective and dynamic when it comes to teaching and the delivery of instructional materials.

Looking forward to the future, it will be important to make changes to the curricula to accommodate not only the district's desire to reorganize but also to respond to the changes in industry. In light of current proposals by people like Mayor Antonio Villaraigosa and Governor Swartzeneggar, a shift to developing a Green Industry will require trained and skilled individuals prepared to advance this vision. The CAD curricula could include projects that address the challenges of planning for sustainable site development or developing green technologies for energy development. However, to make this a viable reality for the program, investment in up-to-date software and hardware will be critical.

The Way Things Should Be

The use of technology by utilizing computer networks, servers, and software, enables any instructor to provide structured presentations for scheduled and unscheduled learning opportunities through web based distribution. On a day to day basis, I contend with two labs filled with students training for two different disciplines and three different levels. Keeping a lecture schedule is critical to organizing discussions and providing time for one-on-one coaching. Using computerized tracking software like Easy Grade Pro is what makes dealing with the open entry, open exit nature of the program manageable. Since students can leave or renter the program at any time, each class may have students at varying ends of the program. The online curricula were specifically developed to accommodate any student at any time with instruction for any module. However, by reorganizing the CAD program into six different courses with separate meeting schedules, it will then be possible to better address the needs of individual students and groups of students without being overburdened trying to address all levels and

disciplines all at once. Alternating meeting times for both disciplines with scheduling for all levels will reduce the student to teacher ratio to 18:1 instead of the current 32:1. This would not only reduce the workload for the instructor but also provide students with a clear track of courses to take in a shorter period of time. Replacing the computers would reduce time-consuming tasks and enable students to develop more complex and collaborative projects. Upgrading software to the Autodesk Design Academy suite would provide a single solution for both Mechanical and Architectural CAD software. This set of programs provides seamless cross application support and integration with the same look and feel of the industry standard.

Ultimately, if no funding is made available for new computers or software, the one single investment that could significantly improve student performance would be the investment in classroom management software such as NetOp School. With this software it would be possible to completely involve all students in the total learning process. This software solution would take advantage of the existing network, computers, server, and intranet to provide the instructor with dynamic access and presentation capabilities.

The NetOp School classroom management software is truly a complete solution installed on both student and teacher computers as separate modules. The software enables the teacher to effectively monitor and broadcast any screen to any other screen, keep students on task by locking screens during instruction, and produce online tests for immediate feedback and progress charting. The software is licensed as a teacher and student module combination with optional modules available. The software utilizes a peer -to-peer communication protocol to gain control of student computers. Using network protocol, the teacher computer monitors all student

computers, and with a few button clicks the teacher can broadcast and share any screen with the whole classroom. By creating policies, the teacher can control student program and internet access. Teachers can also prepare for lessons from home and be ready to share with students.

The current practice of hands-on demonstration and student feedback coupled with poor overhead visibility and inadequate computers, results in less than standard or adequate training. Students are distracted by the internet or other activity, or are unable to clearly see the projection screen. Inadequate computers contribute to frustration and incomplete assignments. The value of the website would be more fully realized with the addition of NetOp School because it would enable the teacher to direct, monitor, and facilitate design collaboration projects among students. Implementing a classroom management software solution together with a computer and software upgrade would dramatically and positively change student performance. This would be an essential compliment to the existing computer network, server, and classroom website.

NetOp School provides the teacher compete control of the learning environment and provides students the opportunity to share and interact dynamically over a network connection. No longer would students need to strain looking at a dimly projected screen, NetOp school broadcasts the teacher computer screen so that students can follow right along from their own computers. With control over student computers, the teacher can almost eliminate off-task activity by locking student computers and inviting them to participate collaboratively. Deeper learning opportunities can be created when a teacher can share with the rest of the class, various examples from student work in real-time during hands-on demonstrations. The learning process is dramatically enhanced by the software's ability to improve teacher demonstrations and reduce

off-task activity.

In addition to the above benefits, NetOp school has a whole host of utilities for teachers to develop instructional presentations, tests, and track student progress. General maintenance of all computers would also also be better performed as the software would provide remote access for diagnostics and updates. Announcements would no longer need to be repeated as these could be projected to every screen with sound and text. Break times could be strictly enforced by posting warnings, then taking control of student computers, further reducing time lost to classroom management.

For the CAD class to grow and be successful it would need to receive a substantial investment in technology in the form of hardware and software. Without these critical investments, students will not be able to train at the level of industry or with the right tools. Without the implementation of NetOp School, students can be expected to not all be on task, and not engaged.

Cost / Benefit

The addition of NetOp School to the CAD/ Design Technician program would provide positive results in a number of ways. Principally, the software would be used to gain remote control of the computers in two adjacent lab rooms with the intent to provide a more complete and engaged learning experience. The resulting benefits would be numerous: reduced time-wasting tasks such as diagnostics and maintenance; a learner-based, collaborative learning opportunity; an online modularized, multi-level instructional system; and better organized data for mining. Implementation of the NetOp School software can prove to be successful when all

CAD Design teachers can integrate with existing forms and methods of classroom administration. This can be measured by how well teachers can utilize the software's ability to remotely control computers and share monitors. Other measurements can include a teacher's ability to create projects, deploy projects, assess and provide feedback.

Initially, the lead instructor would need to install and prepare the software modules for all lab computers totaling twelve hours of computer administration. Another twelve hours would be required to create basic policies, permissions, and produce a training presentation for all CAD instructors. All teachers could spend four to eight hours working with the lead CAD teacher to orient themselves with NetOp School and its basic features. The lead CAD instructor will provide direction for the best practices regarding integration with current classroom administration methods. This time investment in preparation and training may total up-to forty-eight teacher hours at the current contract rate. In addition, the cost of the licensing for the software totals some $2,100. These changes alone to the CAD Design Technician program would however, produce positive changes for the total learning process. To bring the training program up to the level of current industry standards, a more significant investment in hardware and software would be necessary. This wold mean replacement of all thirty-two student and three instructor computers totaling $80,000. Additionally, the cost of the licensing for the suite of programs from Autodesk would total some $25,000, but provide a perpetual site license and a complete industry level solution for Architectural and Mechanical CAD. With these latter investments, students will have the right tools to perform at industry levels, engage in collaborative design projects, and learn to apply their technological skills to solve problems for

sustainability and Green engineering.

Technology can facilitate learning by functioning as instruments in the form of the computers themselves, or as the collections of files and web pages that is shared among groups of users, or as a component of software enabling dynamic telecommunication. Technology in the end, should only be used appropriately by addressing each learning objective and desired result. Rather than learning to use technology to merely store and retrieve data, the goal should be to develop tools, learn to adapt to varying contexts, and to utilize a cross-disciplinary, integrative perspective. Investment in key hardware and software changes would produce immediate results by reducing time wasted performing periodic, time-intensive tasks, or enabling teachers to share and monitor work, or enable student participation and reducing off-task activity. How well teachers can utilize evaluation and feedback tools to measure student performance can also be used to determine success. Whether a small or large investment is made, changes to the current practice are eminent. What is clear is that technology is central to CAD training and that some technology, that is, hardware and software upgrades must be made in order to support an industry-level course of study.