A Sabbatical Report

By

Tony McRae, Ed.D.

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This paper is a compilation of research, interviews, workshops, and other resources on the current trends in the workplace and the implications of new emerging technologies that will be forthcoming after 2010. These developments will dramatically impact the minimal skills our students will need for the new workplace.

The current state of the workplace has already been inundated with new technologies that have required our students to return to a formal study to gain skills that will provide them with a means to maintain their employment. These changes will impact our current students seeking gainful employment. The way work is performed is evolving constantly from the traditional cubicle, assembly line, and research lab to a collaborative, virtual workplace. Many employees have the opportunity to work from home as part of their work week. Some companies have moved away from this due to problems of productivity of the virtual worker. But this is only a temporary set back. Many companies have been very successful in maintaining productive virtual workers.

These changes place a demanding challenge to the way our students learn and perform. The format of the learning process has several “new” components that need to be leverage to better prepare our students adaptability to the new work environment. These new components have been around, but not pushed to the forefront as required in all learning processes. The biggest one is collaboration, this has been going on since the concept of work, but now it takes ol a new dimension through virtualization. This dimension has to become second nature to our students so they do not give a second thought to performing in such an environment.

I have become aware of the deficiencies that many of our students have with collaborating virtually. Some adapt readily and others are so intimidated by the entire concept. There is no reason why any student should not jump at the chance to get their education through online courses. Many of our students (of any age) seem to think that they are computer literate, just because they know how to send an email, turn on a computer, or type up a document. What I have found is that they are lacking in all three areas. This was my motivation on conducting research on a sabbatical to find out how much of a hindrance this will be to students seeking employment, especially beyond 2010.

This paper will cover a number of topics dealing with all forms of technology (current and emerging). Since my department and division cover a broad spectrum of curricula that is impacted by developments in technology, I felt that it would be necessary to cover a wide range of areas. I will provide some insight to emerging technologies that will impact networking, programming, information systems, hardware, software and the use of the Web.

Thus, the journey begins with one of the most pervasive problems in the work place today. Everyone is aware that communication technologies have become more intrusive then ever before in our history. So it is fitting to start with a current issue and move forward.

**Return to the Tower of Babel**

The biggest complaint that I came across in talking to various corporate personnel is text messaging, face book, and other folksonomic applications being brought into the
workplace. Several managers from different industries complained about emails they receive that are completely unreadable. There is no formal grammar structure, spell checking, punctuation, and complete words, sentences and thoughts. Many people are promoting these new applications, but they are not suited for the workplace. They interfere drastically with productivity and collaboration. The mantra should be “what you do in your own social setting stays in your social setting”. Some companies have established policies related to these technologies and the technologies are not to be used if they do not contribute directly to meeting corporate objectives and goals.

One of the most upsetting situations that I came across during my sabbatical was the training sessions provided by Region XI. Dean Blitt provided me the information in order to attend this professional development activity. During a few of the sessions the issue came up with dealing with students not using standard formal communication language in their emails and collaboration postings. When the question was posed to the leaders of the training, their response was “We don’t do anything about it”. This is one of the glaring problems with our current educational system. At a time when we are to get back to basics, the basics are not mandated by the educators. The students are allowed to communicate in any format they wish to use and are allowed to do so in the classrooms. This is counter productive for student preparation for the workplace. Some of the teachers stated that some teachers respond back to the students in the same vernacular. It seems that some teachers are swept up in a fad. The business people I talked to would not be happy to hear this kind of attitude towards building student skills for the workplace. I did not come across a single entity that has any restrictions on this matter; the control is only from a few individual teachers.

The topic of social technology use in the work place has been very aggressive recently. At a meeting with an administrator at Intel security division, he stated that they had an incident with MySpace. An employee received an email from a friend to go to a MySpace to see a Flash demonstration. When the employee opened up the Flash demo, a nasty virus spread very rapidly through the Intel global network. By the time the security team could get preventative measures engaged over 10,000 computers were affected. Intel immediately established a company policy of no social technologies (Web 2.0) such as Face book; MySpace, LinkedIn, Xing, and UTube are to be used by employees on company computers.

Another administrator at Intel stated she has incorporated Blog technology into their Customer Relationship Management system. So far the results have been effective with giving customers a process of voicing their opinions directly on the company web site. At the end of this report are some cautions for companies using blogs as a tool to engage customers.

A Texas Instrument manager says they do utilize Twitter in a very narrow application of their business. They have found that Twitter is a convenient method of team members updating each other on project developments. The teams are given training on how to use Twitter effectively and keeping messages focused on the business at hand. Social messages are not acceptable. The messages have to be in formal business format and stay within the policies of the company with regard to sensitive data.
As businesses begin to deal with the Web 2.0 social technologies another new technology has emerged for businesses. It is Enterprise 2.0 which is based on “SLATES” framework, created by Harvard Professor Andrew McAfee (the “father” of Enterprise 2.0).

The term is an acronym for:

- **Search** – Discoverability of information drives reuse, leverage, and ROI (Return on Investment).
- **Links** – Using URI’s (Uniform Resource Identifiers) to forge thousands of deep interconnections between enterprise content 24 hours a day, 7 days week.
- **Authorship** – Ensuring every worker has easy access to Enterprise 2.0 platforms.
- **Tags** – Allowing natural, organic, on-the-fly organization of data from every point of view.
- **Extensions** – Extend knowledge by mining patterns and user activity.
- **Signals** – Make information consumption efficient by pushing out changes.


The process is not to provide transparency to all information, relationships and conversations amongst these relationships, but to provide valuable, business-impacting aspects of the interactions between people. The full schema implemented in the business environment is outlined below (an extension of the SLATES acronym to create the acronym of FLATNESSES):

- **Freedom**
- **Links** – content and people
- **Authorship**
- **Tagging**
- **Network-Oriented** – reusable, addressable, small pieces – web-based
- **Extensions**
- **Search**
- **Social** – non-hierarchical and transparent
- **Emergence**
- **Signals**

Tim Berners-Lee and his “Semantic Web” acolytes are against this process because they feel that everyone should be provided with full access to all information. But corporations are keenly aware of the need to protect sensitive or privileged data and information in any social systems.

Few businesses are actually incorporating these social networking technologies into their businesses. A survey conducted by the Association of Information and Imaging Management showed that only 13 percent of the respondents stated their organization had implemented social networking products. Another 13 percent stated their organization
had acquired the technology but had not implemented it, and 25 percent stated their organization was planning to acquire social networking technology (AIIM survey, 2008). The interest in having web-based collaboration capabilities in their enterprise brings a key concern that implementation of these technologies will generate an increase in use and therefore the organization could be at risk of exposing protected information.

There has been research on the actual participation of users with regard to social technologies. Early Inequality research (Nielsen, 2006) indicates that user participation follows a 90 - 9 - 1 rule: 90% lurkers (no contribution), 9% intermittent contributors, and 1% heavy contributors. This means that only a small number of users are actually posting with content. Therefore, this can influence the majority by a very small minority. The report warns that the downside means:

- Companies using Web postings for customer feedback on its products and services are getting an unrepresentative sample.
- Customers checking reviews are getting only a very small exposure to actual experiences.
- Most Web searches are based on how many links have occurred, so if the 1% is doing a lot of lurking, then this impacts the remaining 99% in terms of getting useful results.
- Within discussion groups, users stop using the site due to the signal-to-noise ratio of postings with flames and low-quality and the quality postings.

**Computer Literacy**

The one requirement for the new generation of workers will be the need to be more literate with computers and technology in general. Primarily, workers will need to be able to use computers and technologies that allow them to analyze and determine best solutions to given problems. They will need to perform their work with minimal supervision. In fact the trend for the work place is to use contract workers. Workers will not actually belong to one organization, but will provide services to a variety of companies. In order to meet this demand will require workers to be proficient with numerous applications. Workers will have to exhibit solid work ethics, honesty, integrity, and self-motivation. The workers will need to be able to ask very analytical questions about the service they are to provide and be able to present their work with very specific detail.

A simple résumé will no longer be a simple document with a brief description of training, skills, education, and work experience. Many companies assign a task related to the service required to ensure that the user is able to produce at an efficient and expedient effort. In many cases they will have to complete the task and then return their work by email through an attachment or other electronic means. Their communication skills with email can be the deciding factor whether or not they get hired. A graduate from Collin County Community College had this experience, he was not hired. The company thought his work was superb and he was what they were looking for, but he failed on two fronts. The company complained that the student never sent a thank you letter for the interview and the email had the attachment correct, but his message was not in formal business structure. He had written to the company using “alternative” format. The company
complained they could not determine what the student was trying to convey. This is not good for our institution.

Students will need to have a very solid understanding of how a database works and how it is constructed. The same is true with electronic spreadsheets. The one area that will impact our students is the use of unstructured data in these applications. Most companies are bringing data in to a very complex information system and the data has to be appropriate in order for the information system to make all data available for manipulation. Putting regular data into a cell of a spreadsheet is not acceptable. Those items need to be put in word document that is associated with the spreadsheet (or database). The information systems are set up to handle unstructured data as long as it is in a proper format.

Students will need to know how to normalize databases and spreadsheets. The electronic spreadsheets are currently the main problem, as most individuals have not been taught to normalize spreadsheets. This means they have to learn what should be included in spreadsheet and what should not be in the document. They have to know how the data should be setup and formatted in order for that data to be processed to a database without the intervention of a human. The reason for this is that the information systems will bring that information in and store the data in a database. The user can use an electronic spreadsheet and the data stored will be presented in the spreadsheet properly. Electronic data is going through tremendous changes in the way it is constructed, manipulated, and stored. The information systems will automatically do error checking on the data content and reject data not in the proper format, or if it is not complete. When workers use old methods for working with data, this causes a major decrease in productivity due to the strain on the information systems ability to handle the data as it is expected to handle input. Many companies are now scanning hard copy forms and documents so that they are going to the automated information systems directly.

**Hardware and Software Technologies**

Most of the hardware that we use with our computers has been through a tremendous evolution. We have many devices that are able to functions that are directly related to the initial device. Cameras are a good example. First, they do not use film any more which allows use of the camera to do more than what the device’s traditional capability. A lot of editing features provide the user with the ability to perform pre-production activities such as cropping, re-sizing, changing the file format, color correction, brightness and contrast, and other functions. These activities in the past were performed after the picture was processed in a usable format (paper scan or digital image) using an image processing application. Some cameras can send the stored image directly to a printer, an application, or into an information system.

Many entities (corporations, court systems, law enforcement, etc.) are now digitizing hard copy to be stored in an electronic format. In some cases, the hard copies are destroyed or they may be archived to an external storage management system. The Collin County court system is currently transitioning their documents into electronic format and new data is not being published in hard copy but entered into an information system that will allow reproduction in a variety of formats. The biggest problem with the transition is the resistance of some employees (many judges refuse to use a computer to call up cases
and this really slows up the legal system efficiency). In electronic format will allow all data involved to be updated, appended, shared, and secured much more efficiently than the traditional hard copy method. The only snag will be the employees that refuse to move along the direction of transition.

Computer systems are going through a tremendous transition, but they have always been in a state of flux. Moore’s Law (developed by Gordon Moore, co-founder of Intel) drives the development of integrated circuitry. Integrated circuits will double in the number of transistors within the integrated circuitry every 18 months. Some contend that the end is near for this philosophy, but Intel has just developed new nano-technology (32nm silicon technology) that allows the increase of number of transistors within a smaller integrated circuit. Atom processors are one of the first circuits developed with this newest technology. Small high end processors designed for field applications that will have access to high end processors within an organization. This technology will provide the first 2-billion transistor processors within the next few years.

From a physical perspective, it is evident that Moore’s Law will come to an end, but it appears not to be as soon as some have stated. Fabric computers, Quantum computers, DNA computers (and other organic systems), light (physical light not weight) computers are in use and provide tremendous computing power in a small foot-print. Intel and Carnegie Mellon University have a joint grant from DARPA (Defense Advanced Research Projects Agency) and are developing “catoms” (claytronic atoms). According to University researchers these technology will allow the attainment of “singularity”. This is the point of cross over, where computer intelligence will surpass human intelligence. The project has developed several working models and Intel is moving forward to shrinking this technology to level of their current capacities. What catom systems will provide is a high end computing device that will fit in a pocket. The user can take it out their pocket and form it into an earpiece communication device or lay it out on a table and use it like a regular computer. Intel states that it sounds like science fiction, but they believe they are very close to making this a reality. Supercomputing at the desktop (a long time dream of Seymour Cray) is a reality. The desktop supercomputer cost $25,000, which is small price considering the traditional Cray computers cost millions of dollars. The price of these systems will eventually come down to a point that many users may have access to that type of computing power.

The keyboard and mouse are seeing their last days with the invention of surface technology. The first commercial product to use surface technology is the IPhone by Apple Corporation. Microsoft has developed their own device using surface technology called the surface table. This device will provide the food industry with a giant boost by using these tables in clubs and bars. These tables can be applied to other uses, including as a collaboration tool for students in the classroom or study areas. The table provides interface to communication devices simply by the users placing the devices on the table. The table will update each device with data (address/phone numbers, calendars, etc.). At eating establishments the customers will be able to place their orders from their tables without the need to wait for a waiter. When they have finished they lay their credit cards on the table, and the table will correctly charge or debit each customers order on their card. CNN has put this technology to use in the 2008 election. The “big” screen allows full interaction through surface technology. This could be placed in the classrooms
meeting rooms as well) in place of chalk/white boards. Hewlett-Packard has a new computer system that has a display that is surface technology and allows the user to use the system without a mouse or keyboard.

Virtualization is a hot topic that has been around for a couple of years, but lately has become the focus of most software manufacturers. The use of virtualization will require the base system to have a high end capacity in terms of speed, throughput, memory, and graphics capability. Then the storage units (TeraByte capacity SANS) can be set up with almost unlimited number of virtual systems. These virtual systems will be able to run a variety of operating systems on one platform (the only one left out in the cold is Apple).

The virtual systems are treated as independent computers and they can be networked and communicate with each other regardless of operating system platform. Virtualization was the key to the partnership between Microsoft Corporation and the Novell Corporation, two bitter rivals just a few years ago. Microsoft Server 2008 has management tools (Hyper V mode) for managing these virtual processor/storage “farms”. The Hyper V (Novell version is Zen) has to be running on a 64-bit processor and requires the 64-bit version of Windows Server 2008. Windows SQL Server 2008 has complete compatibility in this environment. Microsoft has put most of its focus on going completely to virtualization.

This plan puts Microsoft on target with their plans of Service Oriented Architecture (SOA) and Software as a Service (SaaS). The Vista operating systems was originally programmed as a SaaS platform. Businesses did not buy into this concept and Microsoft had to hack their new operating system to convert it to a standard operating system. In doing this, Vista has a lot of major issues and concerns that have put businesses in a holding pattern as to migrating to the Vista platform. With the announcement of Windows 7, many businesses are planning on waiting for that platform to come out in production. Windows 7 is actually Vista, but the marketing department of Microsoft was put to task to turn everyone’s attention away from Vista and their solution was to give the operating system a new name. Windows 7 is a retooling of Vista to fix all the issues caused by the hacking of the original software. This has been a costly and challenging measure for Microsoft.

Original software is being extended by others. To use the new software, everyone has to buy the original. This has given a major push for many people to consider using open source software in place of the traditional well established commercial applications.

The problem with most of the open source contingencies is that there is no official technical support. The user’s that adopt these technologies have to rely on one another, individual developers and other sources to get support. This does not always work out well for everyone. Some of the more popular open source resources have done a very good job of “organizing” a substantial and stable support system. This has influenced more users to attempt to adopt these resources. It is difficult to say whether or not these open source resources will have a major impact on established commercial resources.

Jonathan Swartz CEO of Sun Microsystems stated in a question and answer CNET blog that they would be looking at moving to open source resources. He stated that his motivation was that Sun must respond to the customer’s expectations and desire for new
resources. Microsoft has dabbled in this arena, but has not offered any traditional software as open source and they don’t feel that they should go in that direction.

An application that is not new but is emerging as a software component for more businesses and other entities for data gathering and managing is Geographical Information Systems (GIS). With the addition of support with Global Positioning System (GPS) software companies are leverage this software as part of their enterprise resource planning. In addition, resources that are dispersed geographically can be monitored and maintained accurately with GIS software. Application of this software was primarily used by the oil industry and by surveyors, but homeland security uses it to track terrorist activity. The Centers for Disease Control uses it to determine the vector of viral/bacterial infections globally, allowing them to get ahead of mass infections and begin preventative measures. Television news and weather make use of it daily. Schools can use it to tract student populations, parcel distribution, tax information, and many other data items needed to keep their districts on top of the fluctuations that occur with the changing populations.

**It takes Green to be Green**

Another hot topic is green initiatives, whether they are for reducing energy consumption, reducing carbon footprint, or for saving the planet. This is a costly endeavor to undertake and come out ahead. It requires three basic points at the foundation of the initiative: planning, implementation and maintenance. These are the same basics for any project that is being considered. The problem is that most everyone wants to see a quick return on investment (ROI). In planning, the quickest way to a return on investment is the most expensive approach, doing everything now. It costs a lot of money up front, but the return is much better and efficient in this approach. Most companies cannot take this approach because of budget constraints. It takes investment and savings to put the plan in action, so as companies plan their initiatives; they have to keep in mind that the plan has to include time to invest and save for the initiatives. This means that many companies will be behind for quite sometime before they can put their plans into action. So most efforts are done piecemeal, and this can doom the initiatives from the beginning. If company stakeholders are only interested in a quick return of investment then the projects get terminated before any real effects are evident for most projects. It takes very thoughtful and careful planning to successfully bring about green initiatives that are sustainable.

Case in point, a company decides to use waterless urinals; some areas need this type of initiatives with their dwindling water supplies. So the company installs the waterless urinals and they see a good return on their investment, at least initially. Over time the waterless facilities can be quite problematic due to odor. In order to maintain the benefit without the smell requires that the maintenance crew follows the procedure for cleaning and maintaining the facilities. In one local case, that was not done and now the company’s men’s room smell like a sewer system. What usually happens is that someone high up in the organization reacts by changing the facilities back to the original installations, when all it would take is to set up training of maintenance personnel to understand the importance of maintaining the facilities properly.

In other cases, the approach was not well thought out and the initiative appears to cost more than the original setup. For example, deciding to put light sensors in rooms to conserve energy. A good reason and can be cost saving if it is handled correctly. But the
planners most take in consideration the habits of workers. A majority of people have conditioned themselves to turn off lights when they leave a room. Now they are not to do this since the lights are automatically controlled. So what happens when all the rooms are not equipped with sensors, the employees turn no lights off. If the number of rooms that do not have sensors is greater than the ones that do, then there will not be the savings anticipated for the initiative. So once again, someone that can make the decision may decide to forget the sensors and go back to the original setup. This is the problem with going green, it is too new and such a different point of view that many people can not react correctly to set up efficient systems and realize a good return on the investment.

Dell computers and Intel are investing a tremendous amount of money on providing computers that reduce the carbon footprint for computer users. They also have put into place green initiatives within their organization. They are putting on seminars for companies to see what they have done and the savings they realize for the effort.

**Information Systems**

The impact of technology is seen in the fact that work is more collaborative, transparent, and amplifies the potential of people. The collapse of time and space brings a new paradigm into the world of work. The current state of integrated information systems has changed work for most workers. The change is evident from the immediacy of communications, collaboration, and access to information, and visibility makes new modes of interaction among people, data, and structured workflow are new challenges to the worker in today’s workplace.

Rich access to data through mobile devices, networks, and secure remote connections completely severs the bands of time and place; this enables a radically reimagining of the workplace and work day.

Visualization is becoming prevalent with more and more information systems. This process is used to explain or summarize data making it necessary for workers to become competent in using visualization tools, the tools bring about a higher level of analysis to ensure that data extracted is correct and not misinterpreted. This challenges older workers who come from a different perspective of collecting information in the workplace. This poses a challenge to new workers that may not have developed the necessary skills to operate in this fashion.

There is a negative side to these automated, visual processes, disruptive complexity restricts the talent pool, increases specialization and isolation, creating perverse incentives. This can lead to some of the issues our country has faced with the large corporations that have been able to operate with transactions that are artificial causing a severe impact on society. The government has put a few acts of legislation to bring about transparency and legitimacy back to the entire corporate world. There is more to be done to ensure that the work place and workers are not lost in this complexity and lead to nefarious outcomes.

The new information systems are great for the workplace, but they require that they are designed, implemented and managed appropriately, “technology (like fire) is neither good or bad - its value depends on how we use it.” (Abelson 2008). Training is very critical and the hiring process has to seek out new potential employees that have a good
grasp of the way information systems function. As with any technology, it is only as good as the data it provides. Users have to ensure that they are putting the correct data, in the correct format, into the system so the information system can provide the necessary information to meet the goals of the corporation or institution. Workers have to understand the difference between structured data and unstructured data. The information systems are set up to handle each type in a very specific manner.

Databases are becoming quite “intelligent” with the use of object-oriented based database applications and utilities. Microsoft had an early entry in this field with FoxPro. The database is becoming the primary backbone of all business activity including Web based data storage, data/information delivery and data manipulation.

Infinite bandwidth has provided some companies to be ready to take advantage of new approaches to doing work. The increased bandwidth has prompted the development that provides any amount of info, in any form, at any time or place, at no cost. Some companies have successfully applied this process while others are still trying to leverage an efficient and effective system through these technologies. The success or failure usually has to do with the skills of the workers.

Some of these technologies have provided for the development of integrated information systems that are designed to allow entities to maintain their competitive advantage by increasing operational efficiencies, creating new business models, and establishing whole new businesses. Competitive networks will provide competitive advantage and making it difficult for competitors to duplicate and penetrate the new market or strategy.

Supply chain management has benefitted greatly from these new integrated information systems. In a historical perspective, supply-chain management has gone through a marked change to fit into the new technology. Non-integrated supply chains gather customer information but fluctuations are difficult to see, manage, and change. Inventory issues are not usually discovered until the retail level. This results in a very poor and rather unresponsive system to support the objectives and goals of businesses.

The semi-integrated supply chain gathers the customer information in a two step process. Fluctuations are more evident and better managed. Correcting issues requires more time than it should. This still isn’t the optimum solution for supply-chain management.

Integrated supply chains provide the ability for each step in the chain with a full view of the final customer demand. Companies are able to react to the immediate fluctuations. This improves customer relationship management, rapid response to supply issues, and helps provide data for improvement of products, thus improving the attainment of business goals and objectives.

Smart components are a reality in the form of machines that schedule their own maintenance, storage rooms that automatically re-order stock. Radio Frequency Identification (RFID) currently is the closest thing to pervasive computing (mobile Internet access, third-generation wireless communication, hand-held devices, wireless networks, and intelligent environments). This technology has provided a tremendous boost to productivity, security, and inventory movement. At the same time this technology has raised issues with privacy, as some clothing manufacturers are sewing RFID elements into their clothing which then can be used to track customer activity.
Another pervasive technology is “smart dust”, this is a technology that is about 1 centimeter in size (efforts to shrink it down further are being developed) that are fully self-sufficient computer systems that monitor environmental conditions in warehouses (such as temperature and moisture) to decrease damage to stored raw materials or storage of finished product. There are other areas that are being researched to apply this technology in other applications. This technology has been a boost to research efforts for new power sources. One application is to have the smart-dust devices networked and “share” power. This has resulted in other applications being considered, such as powering mobile devices through body “electricity”, eliminating the need for batteries.

Other future developments include eyephones that provide visual content delivered directly to the retina. (Sagan 2008)

E-ink technology and electronic paper displays are available, such as the Sony LIBRlé, an electronic reader. The display resembles the clarity and high-contrast of paper and has very low power consumption. The future of E-ink technology development is in the form of RadioPaper which can be read on paper but can electronically download newspaper headlines and best selling novels through a user command. This technology will be used to provide the ability to access information to anyone, anywhere, at any time through clothing, buildings, household objects and information appliances.

The Web 3.0 Smart Tagged Web will allow creation of new resources and links through managing data organically. This will bring Berners-Lee’s “semantic web” closer to his vision. The security will still prevent him from seeing his pure semantic web from being a reality.

The omnipresence of technology raises the bar for employers seeking skilled workers. Workers will need to have deep knowledge of software, computers, and communication devices, even in jobs and industries that traditionally did not require those skills.

While traditional workers, who have the experience that is needed for the new technologies, they tend to be less skilled at utilizing them. Digital natives are acquiring new skills to build, design, and create using new and efficient processes. These workers lack the necessary experience to bring the level of competence of their traditional counterparts. The scarcity of many other commodities will also decline, posing challenges to the companies that hire them. So many companies will have to provide a new vision for getting all workers to a skill level for productive work.

Another population that might benefit could be an individual who suffers from autism, they may fair better in the workplace in the future. Computers and autistics are very similar - precision, code, black and white. So in some instances they may be a natural fit to function productively in the workplace.

**Computer Forensics**

Zero day attacks that occur to exploit unknown or patch free vulnerabilities of computer applications are threatening many new technologies. Malware writers can exploit these zero-day exploits through several different vectors. They can be exploited through Black Hat websites that users visit, so that the rogue sites have code that can exploit the web browser being used by the user. Zero-day exploits also can be used to provide warez-
group (copyrighted materials traded in violation of copyright law) releases of pirated software on or before the public release of the software application.

The time frame of zero-day is the time between the discovery of vulnerability and the release of a patch to fix the vulnerability. A number of efforts are being undertaken by a wide variety of companies and utilities to help combat this time lag during an attack.

This increased presence is just one more example of the need for well trained computer forensic investigators. With zero-day attacks, child-pornography activity, abuses by company employees there is a growing demand for computer forensics investigators.

Network forensics investigation is also on the rise and becoming more in demand as new technologies, especially wireless technologies, become part of the infrastructure of the workplace. IT is a very viable field of employment even in our current economic crisis. IT professionals maintain good salaries and report very positively to their jobs. (Hiner 2009)

Education

The educational system must inspire students so they are prepared for tomorrow's workplace, must go beyond the teaching fundamentals and help students be more creative, communicate better, socialize better, problem solving skills improved.

The University of North Texas, a number of years ago, had a pilot program on teaching teachers effective teaching techniques. The result of this pilot program was certification in Master Teacher certification. The original purpose of this program was to respond to the critical shortages of teachers in some areas of study. It developed into a program to help teachers to be able to be retained in the educational system. Most of the participants were selected through a voluntary request, but some were placed in the program in order to save their jobs. The process used a very close knit learning community that provided experience in innovative and multifaceted curriculum development that could be applied across disciplines. The outcome of the pilot program was that it was rolled into the teacher certification program to help recruitment, preparation, and retention of prospective teachers.

Education must operate independently but manage collaboratively in order to compete collectively. Teachers need to understand that to be effective they need to work in a collaborative environment, away from the traditional “you’re on your own” concept of curriculum development. Administrators have to facilitate this process through efforts such as learning community development, teacher learning centers and other effective methods to promote collaboration in the development of curriculum.

Students will have to have basic comfort and understanding of technologies that are and will be used in the workplace. The simple understanding of how Internet technologies work will be a starting point for new workers. Online activity is controlled by the protocol hourglass:
Games and simulations seem to be a major focus in various levels of education. Simple games and simulations are good for helping develop eye and hand coordination. They help with basic computer skills. Using the method in higher education is a little trickier in that the method needs to actually have content related to the task at hand. If it is a business class, the activity needs to relate to business activity. Most serious students do not want non-essential games and simulations that are created for the sake of just creating them. The idea playing games electronically is not new one, the telegraph was used to play games at a distance almost from the day it came into being. (Ableson 2008) But planning and development needs to consider the actual skills or knowledge that are to be mastered without the distraction of non-essential input. This should be left up to a development team to ensure the quality and objectives to be achieved.

In conclusion, students will need to be able to analyze and synthesis on a much greater scale than ever before. Basic math skills will no longer suffice as the minimum requirements for the majority of jobs in the workplace. Students will have to understand visual presentations of data and need to be able to make solid decisions based on their interpretations. Software and hardware developments will still provide challenges to current employees and perspective hires.

Students will have to be comfortable with dealing with fellow workers without having to actually “see” them. They will need to be able to collaborate in many different formats and be ready to be productive from the first day on a project.

Students that have had proper preparation for the “new” workplace will have the advantage when applying for employment. Their preparation will allow them to have more choices in terms of what they wish to do in their careers.
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