Learning in 2010:
Instructional Challenges for Adult Career and Technical Education

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ABSTRACT

Decades of research into learning have demonstrated that learners are diverse, changing, and adaptable. In this regard, the practice as educators must become flexible and adaptive to meet the wide variation of learning needs. A general consensus exists among educators, businesses, and other stakeholders that there is a significant gap between the knowledge and skills needed for success in life and the current state of education in schools throughout the world (The Conference Board et al., 2006). The internet, social networking, and distance education have created learners with a different set of characteristics, incoming skills, needs, desires, and goals. To meet the learning challenges of the 21st century, instructors must serve as catalysts of change by encouraging classrooms of open dialogue and developing the ability to effectively and efficiently use online communications. Through the process of learning from one another through problem-based activities, students and instructors improve the student-instructor relationship, encounter challenges, and solve them collaboratively.

Keywords: *21st Century Learner, Adult Vocational Education and Technology, Career and Technical Education, Post-Secondary Education, Self-Learning*

INTRODUCTION

Educators in the first decade of this century have seen the classroom and instruction change before their eyes. The culture of the classroom, research, and social/professional networking has changed with the introduction of distance education. Yet, the primary goal of post-secondary education remains the same as 25 years ago -- to foster independent, self-motivated, self-regulated, self-directed thinkers who will become global citizens and specialists in a given field (Jacobson & Harris, n.d.; Magolda, 2007). Decades of research into learning have demonstrated that learners are diverse, changing, and adaptable. Thus, our practices as educators must become flexible and adaptive to meet the wide variation of learning needs. For example, current research expresses that self-regulated and self-directed skills are the basis of lifelong learning (Dyan, Cate, & Rhee, 2008). Distance education has grown substantially in higher education (Miller & Lu, 2003); thus,

DOI: 10.4018/javet.2010100104

self-regulation or self-direction is becoming a necessity of learning. Post-secondary education's goals will essentially remain the same for the next several decades; yet, the learner has changed. The internet, social networking, and distance education have created learners with a different set of characteristics, incoming skills, needs, desires, and goals. This article explores the new 21st century learner and challenges adult career and technical education to change to better facilitate these self-learners.

21ST CENTURY LEARNERS

Self-directed learning (SDL) has been strongly encouraged in the digital society (Siaw, 2002). Conrad and Donaldson (2004) asserted that success in distance education depends on the use of learning strategies that support the development of self-direction. It is critical to understand the importance of self-direction due to the increasing prevalence of distance education for university work, non-degree training, and skill enhancement intended to retool workers reentering — or transitioning into — the labor market. In order to benefit from these online courses, students should possess at least some minimal level of readiness for SDL (Dynan, Cate, & Rhee, 2008).

Although students vary in their desires for autonomy and guidance (Magolda, 2007), self-directed learning develops autonomous learners able to control and take responsibility for their own learning (Ng, 2008). Yet, the physical absence of an instructor and increased responsibility of learners to effectively engage in learning may present difficulties, particularly to those with low self-regulatory skills (Lee, Shen, & Tsai, 2008). With the development of new technologies, learners are gaining the resources to pursue their own learning agendas. This experience is much more powerful, and significantly benefits society when learners decide to learn for themselves (Collins, 2006).

Distance education should be student-centered, mainly moving learners from dependency toward self-directedness (Richards, Dooley, & Lindner, 2004). Shokar, Shokar, Romero, and Bulik (2002) found that a learner's level of self-directness increases as their level of education increases. Self-direction depends on one's levels of psychological and social maturity, as generated by the assumption of adult life roles, as well as one's internal or external locus of control (Knowles, Holton, & Swanson, 1998).

Piskurich (1996) suggests that the "self" in self-directed learning becomes more appropriate to human resource development with the advent of the learning-centered concept, since these concepts increase the importance of trainee choice in the training process—creating the need for greater "self-directedness" on part of the trainee. Research shows that the lack of self-directedness is not normally due to any genetic or psychological limitation, but seems to be an acquired response to a society in which learners are "spoon-fed" during the formative years of their learning (Piskurich, 1996). Self-directed learning begins with an incentive to learn plus an interest, leading to accessing resources; with systematic attention in learning (Roberson & Merriam, 2005). It is an attractive, complex, and ambiguous concept that emphasizes human capacity, the potential for behavior change, and self-evaluation (Danis, 1992). Hatcher (1997) correlates self-direction with "deep" learning, and Garrison (1997) views self-monitoring of cognitive and metacognitive processes as a prerequisite of self-directed learning.

SDL can also be described as intentional and self-planned (Tough, 1971) learning, where the individual is responsible for (Brockett & Hiemstra, 1991), and in control (Carre, 2000) of the learning. It is an awareness of alternative choices and ability to pursue a learning goal without being affected by external factors (Candy, 1991). Furthermore, Candy (2004) asserts that self-directed learning is a vital part of the digital revolution. Self-directed students are those who know what to do, and do it without having to be told (Biemiller & Meichenbaum, 1992).

Research has shown the link between self-regulated practices and academic achievement, including delineating differences between high

and low self-regulating students (Winne, 1995; Zimmerman & Bandura, 1994; Zimmerman & Martinez-Pons, 1986). The best possible academic performance relies on the degree of self-regulation the learner is able to implement (Winne, 1995). Large methodological challenges arise when researching self-regulated learning (SRL) because it includes multiple instances of studying (Perry & Winne, 2006). Research on self-regulated learning has targeted the knowledge, motivation, and volition that learners require to engage in self-regulated learning in relation to a wide variety of academic subjects, tasks, and learning environments (with respect to both classroom learning and studying) (Martin, 2004). One proposed solution was the introduction of self-regulated learning for students in upper secondary education (Oolbekkink-Marchand, van Driel, & Verloop, 2006). The assumption was that students are better prepared to study at university level if they have learned to control their own learning process, which means they are able to prepare for learning, monitor their learning process, and evaluate it (Zimmerman & Schunk, 2001). Lower levels of self-efficacy and higher levels of anxiety result in lower levels of cognitive and metacognitive strategy use and may even lead to self-regulatory failure (Steel, 2007).

As Zeidner, Boekaerts, and Pintrich (2000) and Puustinen and Pulkkinen (2001) noted, although there are several models of self-regulated learning that advance various constructs and mechanisms, common assumptions about learning and regulation are shared. First, all models assume that individuals actively construct their own meanings, goals, and strategies from the external context as well as the internal environment (their minds) when learning. Second, learners can potentially monitor, control, and regulate some features of their cognition, motivation, behavior and, in some cases, aspects of the learning environment. Third, standards or goals are set for various facets of the learning process and used as benchmarks for learning products.

From another perspective, self-directed learning can be defined as a training design in which trainees work at their own pace, without the aid of an instructor, to master predetermined material. The term encompasses activities from reading a book to using the newest multimedia program, and is used to describe a number of different concepts in the field ranging from instructional designs to learning styles, and from individualized programs to distributed learning. As a learning style, or perhaps a learning theory, SDL is the basis for concepts such as self-directed work teams and learning organizations (Piskurich, 1996).

MODELS OF LEARNING

Many models of self-regulation have been proposed; however, most have a fairly simple structure (Carver & Scheier, 1998, 2000). Self-regulation is depicted as a cyclic process which involves (1) goal setting, (2) monitoring process and strategies, (3) feedback and (4) self-evaluation (Steffens, 2006). In his model, Zimmerman (1998) describes how university students aiming to improve their performance self-regulate their learning. According to this model, a cycle consists of four steps: (1) self-evaluation and monitoring, (2) goal-setting and strategic planning (3) strategy implementation and monitoring, and (4) strategic outcome monitoring. Thus, self-regulation is achieved in cycles consisting of (1) forethought, (2) performance or volitional control, (3) and self-reflection.

While researching the terms self-directed learning and self-regulated learning, alternative terms were sometimes presented. Lamdin (1997) refers to self-directed learning as personal learning. Zeidner, Boekaerts, and Pintrich (2000) noted that it is sometimes difficult to distinguish between the term self-regulation and similar terms such as self-management, regulation of self, metacognition, and coping. Hattie, Biggs, and Purdie (1996) referred to self-regulation as learning skills interventions, stating that cognitive interventions focusing on task-related skills should be grouped together and taught as strategies. Other terms similar to

self-regulated learning and self-directed learning difficult to distinguish are: independent study, individual study, self-educated, self-guided learning, self-instruction, self-planned learning, and self-teaching (Freidrich & Mandl, 1997).

These prominent models of self-learning are numerous and research in this area is vast, yet the key to learning is "*self*" (e.g., self-directed, self-regulation, self-planned, self-teaching, self-educated, self-management, self-guided, self-instruction, self-reflection, self-evaluation). The emphasis should be on the learner's inherent needs, wants, and desires to learn. Today's learner is a technology native and information savvy. Technology allows learning in a manner never imagined in the 1950s, even in early 1990s. Further, it has allowed the learner to network and learn from other learners. Technology has marginalized the need for instructor-centered learning; rather it has allowed the instructor to most effectively facilitate "self-learning" through instructional design enhancements.

ENHANCING SELF-LEARNING

Developing self-regulated learning refers to student's growth toward proficiency in self-regulatory processes that underlie their learning (Jacobson & Harris, 2008). Student learning can be enhanced if students are encouraged to employ self-regulated learning processes as they go about acquiring new skills (Zimmerman, 2002). Methods used to promote student-regulation have included asking students to focus on process goals (Kitsantas & Zimmerman, 1998; Schunk & Schwartz, 1993) and encouraging students to evaluate their own work (Boekarts, Pintrich, & Zeidner, 2000; Zimmerman, 2000; Zimmerman & Kitsantas, 1997, 1999).

Instructors should encourage student self-regulation that is tied appropriately to student acquisition of relevant curricular knowledge and socially responsible conduct (Martin, 2004) to help foster the development of more constructivist epistemic beliefs. Students may need to become aware of the types of beliefs they hold about knowledge and knowing. This may, in turn, help foster self-regulated learning, which may lead to successful lifelong learning (Muis, 2007).

PREPARING LEARNERS FOR THE WORKPLACE

A general consensus exists among educators, businesses, and other stakeholders that there is a significant gap between the knowledge and skills needed for success in life and the current state of education in schools throughout the world (The Conference Board et al., 2006). The need to have individuals learn how to perform tasks by drill and practice in preparation for factory jobs has now been transformed into the need to empower workers to possess well-rounded perspectives (Blank & Harwell, 1997). It is also becoming increasingly important for employees to be able to think both independently and collaboratively in fast-paced working environments.

The global workforce does not only encompass the mobility of workers across national boundaries; it also includes the mobile work, which results in outsourcing and demands a "greater standardization of knowledge, greater coordination and control of supply chains, and tighter connections" (Farrell & Fenwick, 2007, p. 21) between communities and individuals. The 21st century workforce has to increase the flexibility of older workers and be competitive on a global level (Wang & King, 2009).

Work and college readiness reports from various national, state, and local organizations revealed that recently hired employees lacked basic writing, spelling, written communications skills, as well as mathematics skills, in addition to deficiencies in reading and comprehension (Olson, 2007). Moreover, both employers and postsecondary instructors identified teamwork and presentation skills as critical. Many new hires were deficient in basic employability skills (soft, applied) such as professionalism, punctuality, attendance, and lacked an overall work ethic. Casner-Lotto, Rosenblum, and

Wright (2009) summarized several studies examining the preparedness of the entering workforce and the training programs employers currently provide to newly hired graduates. The organizations involved offered training initiatives targeted towards enhancing the leadership, information technology, and teamwork skills of recent hires who lacked the skills necessary to complete their tasks. The training programs encompassed workforce readiness training (remedial training), job-specific training, and career development training, but no training was offered in the following critical areas requiring these applied skills: creativity/innovation, ethics/social responsibility, professionalism/work ethic, lifelong learning/self-direction, and critical thinking/problem-solving. In addition, over 75% of the companies specified that training in leadership, IT applications, and teamwork/collaboration skills was highly necessary and two thirds of the participating organizations identified training in oral communications, diversity, and written communications as highly necessary. Although the entering workforce lacked the necessary skills to perform its tasks successfully, it was also revealed that employers did not offer appropriate training to develop them. To combat this dilemma, workforce readiness must be fostered within the post-secondary learning environment.

Any occupational field requires the ability to access information quickly, process information, share it with others, and use it to solve problems (Paulson, 2005). Employability Skills 2000+ identified three categories of skills necessary for the workplace: fundamental skills, personal management skills, and teamwork skills (The Conference Board of Canada, 2010). Fundamental skills include the ability to communicate, manage information, use numbers, and think and solve problems. Personal management skills include the ability to demonstrate positive attitudes and behaviors, be responsible, be adaptable, learn continuously, and work safely. Teamwork skills require the ability to work with others and participate in projects and tasks. In addition, Trilling (2008) identified the following skills as critical in the 21st century:

- Critical thinking and problem-solving
- Creativity and innovation
- Collaboration, teamwork and leadership
- Cross-cultural understanding
- Communications and information fluency
- Computing and Information & Communication Technology fluency
- Career and learning self-reliance

To further examine the necessary 21st century workplace skills, the authors consulted O*NET (Occupational Information Network, 2010) sponsored by the U.S. Department of Labor/Employment and Training Administration (USDOL/ETA). O*NET, which provides occupational information and job projections, classifies relevant job skills under six groups: basic skills, complex problem solving skills, resource management skills, social skills, systems skills, and technical skills as listed in Table 1.

This table provides six major groups of skills, the description for each group, the specific skills necessary within each group, and a brief description outlining how these skills assist workers in performing their daily functions. Each job description features a combination of most relevant skills that represent critical 21st century competencies necessary for effective performance of workplace duties and demonstration of professional expertise. Many of these skills can be acquired and enhanced through problem-based learning activities designed with the diverse learner in mind.

Becoming a professional is not a process of substituting theory by experience, but a process of fusing theory and experience together (Bromme & Tillema, 1995). Dewey's classical notion of learning-by-doing also highlights the significance of concrete experiences and reflecting upon them as do theories of experiential learning (Kolb, 1984). Therefore, career and technical education instructors must strive to identify, explore, and utilize research-based methods available to support the process of de-

*Table 1. O*NET classification of workplace skills*

Skill Group	Description of Skill Group	Specific Skill	Skill Description
Basic Skills	Developed capacities that facilitate learning or the more rapid acquisition of knowledge	**Active Learning**	Understanding the implications of new information for both current and future problem-solving and decision-making.
		Active Listening	Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
		Critical Thinking	Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
		Learning Strategies	Selecting and using training/instructional methods and procedures appropriate for the situation when learning or teaching new things.
		Mathematics	Using mathematics to solve problems.
		Monitoring	Monitoring/Assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
		Reading Comprehension	Understanding written sentences and paragraphs in work related documents.
		Science	Using scientific rules and methods to solve problems.
		Speaking	Talking to others to convey information effectively.
		Writing	Communicating effectively in writing as appropriate for the needs of the audience.
Complex Problem Solving Skills	Developed capacities used to solve novel, ill-defined problems in complex, real-world settings	**Complex Problem Solving**	Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
Resource Management Skills	Developed capacities used to allocate resources efficiently	**Management of Financial Resources**	Determining how money will be spent to get the work done, and accounting for these expenditures.

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Table 1. continued

Skill Group	Description of Skill Group	Specific Skill	Skill Description
		Management of Material Resources	Obtaining and seeing to the appropriate use of equipment, facilities, and materials needed to do certain work.
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		Management of Personnel Resources	Motivating, developing, and directing people as they work, identifying the best people for the job.
		Time Management	Managing one's own time and the time of others.
Social Skills	Developed capacities used to work with people to achieve goals	**Coordination**	Adjusting actions in relation to others' actions.
		Instructing	Teaching others how to do something.
		Negotiation	Bringing others together and trying to reconcile differences.
		Persuasion	Persuading others to change their minds or behavior.
		Service Orientation	Actively looking for ways to help people.
		Social Perceptiveness	Being aware of others' reactions and understanding why they react as they do.
Systems Skills	Developed capacities used to understand, monitor, and improve socio-technical systems	**Judgment and Decision Making**	Considering the relative costs and benefits of potential actions to choose the most appropriate one.
		Systems Analysis	Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes.
		Systems Evaluation	Identifying measures or indicators of system performance and the actions needed to improve or correct performance, relative to the goals of the system.
Technical Skills	Developed capacities used to design, set-up, operate, and correct malfunctions involving application of machines or technological systems	**Equipment Maintenance**	Performing routine maintenance on equipment and determining when and what kind of maintenance is needed.

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Table 1. continued

Skill Group	Description of Skill Group	Specific Skill	Skill Description
		Equipment Selection	Determining the kind of tools and equipment needed to do a job.
		Installation	Installing equipment, machines, wiring, or programs to meet specifications.
		Operation and Control	Controlling operations of equipment or systems.
		Operation Monitoring	Watching gauges, dials, or other indicators to make sure a machine is working properly.
		Operations Analysis	Analyzing needs and product requirements to create a design.
		Programming	Writing computer programs for various purposes.
		Quality Control Analysis	Conducting tests and inspections of products, services, or processes to evaluate quality or performance.
		Repairing	Repairing machines or systems using the needed tools.
		Technology Design	Generating or adapting equipment and technology to serve user needs.
		Troubleshooting	Determining causes of operating errors and deciding what to do about it.

veloping the professional expertise of learners. A fundamental approach to address the challenge of fostering a well-prepared workforce in the 21st century and enhancing self-direction is through various forms of problem-based learning (Siaw, 2000).

PROBLEM-BASED LEARNING: OLD CONCEPT, NEW FRAMEWORK, GREATER DEMAND

Problem-based learning—which places responsibility on students to access information, to achieve goals, and to monitor understanding—can be used by instructors to support the development of self-regulated learning (Karabulut, 2002; Paris & Paris, 2001; Perry, Vandekamp, Mercer, & Nordby, 2002). Glaser (as cited in Karabulut, 2002) stated that students utilizing problem-based learning analyze and discuss problems so that they can (a) realize gaps in their knowledge base, (b) determine their strengths and weaknesses, (c) control their own learning, and (d) develop self-regulatory skills.

In problem-based learning, students are engaged problem solvers instructed to identify the root problem and the conditions needed for an ideal solution, while pursuing meaningful understanding, and becoming self-directed learners. Instructors simply serve as problem-solving colleagues who model interest and enthusiasm for learning. They should also be cognitive coaches who nurture an environment that supports open inquiry (Torp & Sage, 2002). Forms of problem-based learning that will be discussed in this article include: work-based

learning (WBL), service learning (SL), and project-based learning (PBL), which can be utilized to enhance 21st century learning.

Work-based (WBL) learning is simply problem-based learning in an industrial context (Kolmos, Flemming, & Krogh, 2004) that enhances a class. WBL provides opportunities to achieve employment-related competencies, and often takes place with classroom learning in the form of work experience or workplace mentoring. Examples include internships, cooperative education, or job-shadowing, among several others. Students involved in WBL experiences gain the opportunity to network with potential employers, develop 21st century career skills, and enhance their academic and professional knowledge base, while simultaneously determining a possible future career path.

Service learning (SL) is a teaching and learning strategy that encompasses the process of learning through the experience of rendering service to address problems within the school or community, and actively reflecting upon the experience. Service learning teaches civic responsibility and offers the opportunity to experience the benefits of combining learning objectives with service objectives in pursuit of strengthening the community. An example of service learning would consist of students (a) removing trash from a local streambed, (b) analyzing what they found, (c) sharing results with the public and offering suggestions to reduce pollution, and then (d) reflecting upon their experience (National Service Learning Center, 2010).

Service learning is generally unpaid, while work-based learning encourages paid opportunities for students. Yet, both of the aforementioned forms of learning offer students the opportunity to be responsible, caring, practicing members of society, while simultaneously establishing a network of contacts for future community involvement and career opportunities (Blank & Harwell, 1997). This union of cognitive and social constructivism, contextual, and socio-cultural approaches is a framework for developing expertise in the realm of education and work (Lasonen & Vesterinen, 2000). However, project-based learning (PBL) is the ultimate component of problem-based learning that challenges the tension between theoretical knowledge and constructed practice knowledge in attempt to turn ideals into practice (Allan, 2007).

Problem-based learning and project-based learning are sometimes used synonymously throughout career and technical education literature prior to the 21st century. However, the authors suggest that these terms are far from synonyms, although they are certainly closely related and should be implemented collectively. Project-based learning (PBL) is a constructivist learning pedagogy (Steffe & Gale, 1995), which places the emphasis on the students to 'learn by doing' through engagement in individual and team hands-on activities. Although PBL is generally, structured, and facilitated by the instructor, it is a student-driven approach to learning that teaches curriculum concepts through a project during which students enhance their own learning through inquiry and research (Bell, 2010). In PBL, students become personally attached, and take ownership of assignments because they are more relevant and meaningful to them (Wolk, 1994). In doing so, they build bridges to their own imagination and shift from memorized learning to memorable learning (Moylan, 2008; Marzano, 2003). While this approach is not new to the field of career and technical education, the demand for the skills enhanced by PBL has increased dramatically and must be reemphasized.

PBL is a way to help students realize the connection between academic content and the accomplishment of complex real-world (or simulated) tasks. Projects are the focus of learning in a real-world sense, and the academic and/or vocational content serves as a support structure for the successful completion of the project. In completing projects, students define a problem, evaluate solutions, collect information, seek assistance from experts in the community, locate needed resources, and work collaboratively (Blank & Harwell, 1997). This increases responsibility, independence, discipline, communication, negotiation, and

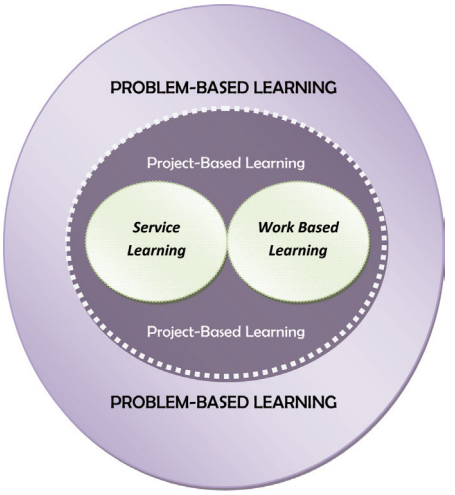
collaboration (Bell, 2010). Students also develop greater understanding of a topic, deeper learning, higher-level reading, and increased motivation to learn. The rigor, relevance, relationships, and reflection embodied by project-based learning are definitely vital additions to problem-based learning.

Work-based learning and service learning both place responsibility on students to access information, achieve goals, and monitor understanding. However, the infusion of project-based learning within both WBL and SL is the key to enhancing centrality to curriculum, probing intellectual inquiry, logic-based investigations, student autonomy and independence, along with realism and application of content (Thomas, 2000). According to the Project Management Institute (2007), project management needs to become a learned life-skill applicable to all ways of life, especially beyond the classroom. Hence, project-based learning must be incorporated into every aspect of problem-based learning in order to achieve ultimate effectiveness, as reflected in the framework graphically expressed in Figure 1.

The infusion displayed within this framework demonstrates the need for project-based learning to be at the core of all forms of problem-based learning to enhance effectiveness; especially service learning and work-based learning. All projects are formed based upon a problem; yet not all problems are solved with projects. SL and WBL meet in the center because they both represent problem-based learning strategies used within career and technical education, and have similar constructivist characteristics. However, they are not interconnected because they are two separate approaches that demand differing outcomes.

A broad spectrum of modern instructional strategies and platforms may be integrated within project-based curriculum (e.g., web based instruction, digital portfolios, electronic reports, videos, wikis, blogs, social networking sites, webquests, digital photographs, or multimedia presentations). Multiple forms of technology can be infused throughout projects to increase effectiveness. Within modern PBL practices, the usage of technology can be refocused from ancillary usage to a central and integral part of the process (Newell, 2003); hence, instructors must continue to embrace technological change, and allow technology to assist in capitalizing on the unique skills and learning needs of every student. PBL has been identified as a key methodology for closing the gap between current student learning and developing the necessary 21st century knowledge and skills

Figure 1. Problem-based learning framework for 21st century learning



(Andres, 2006). Therefore, instructors who supplement this valuable strategy, in addition to other diverse instructional techniques, will remain at the forefront of empowering tomorrow's global workforce to become confident, self-directed leaders.

CHALLENGES AND IMPLICATIONS

To meet the learning challenges of the 21st century, instructors must serve as catalysts of change by encouraging classrooms of open dialogue and developing the ability to effectively and efficiently use online communications. Through the process of learning from one another, students and instructors improve the student-instructor relationship, encounter challenges, and solve them collaboratively. Technology should be used to enhance all facets of the learning experience, and incorporated into problem-based learning activities such as those discussed in this article.

Career and technical educators must "harness the power of the new media to take advantage of its capacity to support flexibility, concurrency, and just-in-time design, instead of merely using the new media to deliver the same old stuff…" and "design a framework for group work, which requires the team to grapple with roles, protocols for working inter-dependently, and mutual accountability" (Harper, 2005, p. 368). Instructors must also know the curriculum and research the tools available to assist in meeting the needs of diverse students, promote problem-based learning, encourage communication, and support collaboration. Furthermore, as the price of technology continues to decrease, more classrooms should gain the opportunity to use technology on a routine basis.

Instruction is becoming more learner-centered, non-linear, and self-directed. Hence, there is also a growing emphasis on academic accountability and a global shift from course-completion to competency. Lifelong learning is now a competitive necessity and technological fluency is becoming a graduation requirement. More distance education programs are necessary because of increased enrollments, yet resources and qualified instructional designers are limited in some parts of the world. Mobile learning has emerged as a learning resource, and there is a trend towards more technology-facilitated mentoring, as well as flexibility in technology-based professional development. Together distance learning and problem-based learning engage students in a learner-centered interactive and collaborative environment that allows them to develop applied skills. "Problem–based learning online is the vocational training for the problem solvers of tomorrow" (Donnelly, 2005, p. 1409).

Instructors of 21st century learners must encourage learners to view knowledge as contextual, and see the value in working both individually and collectively to transform the world into what they envision it to become. They must also recognize personality types and learning styles in pursuit of helping learners develop positive attitudes towards learning. Another key factor to remember is that an atmosphere of openness and trust promotes better performance.

Administrators must provide staff training on self-directed learning, and constantly encourage its implementation, while instructors must establish rigorous standards and understand the importance of devoting more time, effort, and study to effectively implement project-based learning (PBL) in their classrooms. Planning is critical to ensure that the curriculum is appropriately incorporated. However, the ultimate goal should be to assist the learners of 21st century to understand how to utilize technology to assist with problem-solving, and appreciate the interconnectedness of subject area content knowledge, social and civic responsibility, career preparation, multicultural understanding, and personal growth. Career and technical education should assist learners in developing meaningful goals and provide them with the knowledge and skills to achieve these. The characteristics of the 21st century learner should be further investigated,

and more research should be conducted in the area of effective assessment of PBL activities.

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