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A Design Theory for Vigilant Online Learning Systems

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ABSTRACT

There is now a preponderance of evidence suggesting that the types of online course management software (OCMS) used in purely online undergraduate college courses, do not meet the needs of younger immature students. These students often lack the learning skills necessary to succeed in such courses, nor do the popular OCMS include the vigilance mechanisms to guide such students to successful course completion in the absence of face-to-face human instruction. This paper explores the literature relevant to design theory, learning theory, decision support, and vigilance, to develop a design theory as a guide to software developers and academics studying how to design future systems for the immature student in accordance with the latest research.

INTRODUCTION

Online courses are usually thought of as one form of distance education. They typically involve the use of the world-wide-web and online course management software (OCMS) such as Blackboard or Moodle. However, for many years now, evidence has shown that typical OCMS have fallen short of their educational potential (See Demirkan & Goul, 2010; Kim &Bonk. al, 2006, Ioannou & Hannafin, 2008, Chua, 2008). In spite of this, the emerging cyber-space culture, as well as the accelerating demand for college degrees, made online courses a global pop-culture phenomenon in the early 21st century (Pappano, 2012; Rosenthal, 2013). By 2002, over three-quarters of all U.S. colleges and universities offered at least one online course (Molenda & Bichelmeyer, 2005). As of 2006, a third of all college students (more than seven million) were enrolled in online courses (Jaggars, 2006); and there were more than 90,000 online college courses. By 2010, 89% of public, four-year colleges offered at least one course online. (AACSB, 2010).

The summer of 2011 saw the first widely known MOOC (Massive Open Online Course) which was taught by Sebastian Thruna, the famous Stanford professor (Pappano, 2012; Rosenthal, 2013). He and a colleague created a free online course, which featured their filmed lectures on artificial intelligence. Roughly 160,000 students from around the world enrolled. The popularity of that course touched off a wave of investment in MOOCs. To date, venture capitalists have poured more than $100 million into MOOC companies like Coursera and Udacity. In 2013, the University of Pennsylvania along with other elite schools, such as Stanford, Princeton, and the University of Michigan, partnered with Coursera, an educational technology startup. As of 2012, 2.6 % of higher education institutions had a MOOC, and another 9.4% reported MOOCs in the planning stages. The majority of institutions (55.4%) report they are undecided about MOOCs, while under one-third (32.7%) report they have no such plans (Seaman, 2013).

Starting in 2013, MOOCs came under fire in the popular press. A Baltimore Sun article reported that many MOOCs were poorly developed, and were merely,

"turning good teachers into mediocre filmmakers... Where the incoherence and mindlessness enter the picture is the current thinking among university officials and digital-minded faculty that delivering a degree or college-level courses to anyone with an Internet connection will revolutionize U.S. higher education institutions." (Grimmelmann, J. 2013, p.1).

Perhaps because of bad press, the growth rate of purely online courses began to decline in 2013. The 2013 annual College Board survey showed the annual enrollment growth rate of online courses to be only 9.3 %, the lowest in ten years (Seaman, 2013).

There is now much empirical evidence that purely online courses are not well suited for the average undergraduate online college student. For example, a University of Pennsylvania study, which examined the behavior of a million Coursera MOOC students from June 2012 to June 2013, found that only 4 % completed the classes, and that these students were disproportionally wealthy and well-educated (Perna et al, 2013). Furthermore, there is evidence that younger students just out of high school or community colleges are most at risk, in part because they lack effective learning skills. For example, the 2013 College Board survey found that the proportion of academic

leaders citing the need for more "discipline" on the part of online students increased from 80% in 2007 to 89%. (Seaman, 2013). In that study the majority of university chief academic officers reported that online undergraduate courses have a lower retention rate than do classroom courses. Many of those online students spend their first two years in community colleges, where according to a 2013 New York Times article, they are significantly more likely to fall behind, fail or withdraw than are classroom students (Rosenthal, 2013). Such students were found less likely to earn degrees or transfer to four-year colleges. Among the reasons cited were that students, looking for shortcuts, were attracted to online asynchronous courses, because of their lack of time-management and language skills (Rosenthal, 2013).

Today's typical online course management systems (OCMS), including Moogle, Blackboard, Coursera, Udacity, etc. are a poor fit for the needs of younger immature students. These students, whose undergraduate online college courses typically operate without day-to-day human instruction, simply log on to the OCMS, get their assignments, and try to complete and submit them, while isolated intellectually from classmates and course authors. These OCMS, were designed based primarily on how the system developers and administrators wanted to use the systems, rather than on what ordinary students need or want (Ioannou & Hannafin (2008)). As a result, these OCMS are simply rudimentary information systems, rather than vigilant learning systems: they do not well incorporate what is known about learning theory, expert systems, decision support, and vigilant information systems. To hasten the future development of the more vigilant OCMS that will be needed as we move into an age when many if not most college students will not be able to afford face-to-face college instruction, this paper presents a design theory of vigilant online learning systems (VOLS).

The paper is organized as follows. First, it reviews the literature surrounding design theory. A design theory is a composite theory derived from the underlying kernel theories (Walls, et. al. 1992). The remainder of this paper develops a VOLS design theory by reviewing its kernel theories, and generates hypotheses derived from these kernel theories. These include learning theory, expert systems theory, decision support theory, and the theory of vigilant information systems. To help clarify the ideas presented in this paper, it concludes by presenting one individual VOLS design derived from the design theory presented.

DESIGN THEORY

An information system design theory is a prescriptive composite theory that integrates theories from the natural sciences, social sciences, and mathematics (Walls et al, 1992; Dubin 1978; Simon (1981). It says how a design can be accomplished both feasibly and effectively. Furthermore, design theories are predictive social science theories, which, according to Dubin (1978), have the seven components shown in table 1.

Table 1
Examples of the Properties of a Predictive Theory of VOLS Development (Dubin, 1978)

	Properties	Examples
1	Units	students, teachers, course designers, administrators
2	Law of Interaction	Increased system vigilance leads to increase learning.
3	System Boundary	online course management system in a university
4	System State	the design accomplished according to principals of vigilant information systems
5	Proposition	Increased system vigilance leads to increased student learning.
6	Empirical indicators	results of summative assessments of student learning binary indicator of whether or not the system was designed in accordance with the principles of vigilant information systems design
7	Testable Hypothesis	The mean student performance on summative tests of learning is significantly higher for the group using a vigilant online learning system than for the group using a traditional online course management system.

First, design theories have units whose interactions are the subject of interest. Second, design theories have propositions, and the laws of interaction among units, which are a subset of the propositions. Design theories have boundaries within which the theory is expected to hold. They have system states, which affect how the units interact. They also have empirical indicators related to the terms in the propositions. Finally, design theories have testable research hypotheses incorporating empirical indicators.

As well as satisfying the characteristics of any theory, a design theory has several additional characterisstics. For example, Simon describes an information system design theory (ISDT) as, "a body of "intellectually tough, analytic, formalizable, partly empirical, and teachable doctrine about the design process" (Simon, 1982, pp 132.) Furthermore, an ISDT differs from a natural science theory in that a design theory involves goals achievement. For example, a natural science explanatory law is of the form "Y causes X". On the other hand, an analogous design theory law is of the form –"If you want to achieve goal X, then make Y happen" (Walls et al, 1992). Thus, a design theory prescribes what properties the design product should have, as well as the process of how the product should be built. Furthermore, Simon contended that design theories are composite theories, which integrate kernel theories from natural science, social science and mathematics. This integration is accomplished by the theory's prescriptions, which state how to perform a design and why to do it that way (Dubin, 1978).

In the tradition of Nagel (1961), design theories should be subject to empirical refutation. Accordingly, an assertion that possession of a particular set of attributes will enable a design product to meet its goals, can be verified only by building and testing the product. Furthermore, a hypothesis that a certain design process will result in a design product that meets its goals can be verified only by using that method to build the design product and testing to see if it satisfies its goals(Walls 92, pp. 41.)

Therefore, we see from examining the theory building ideas set forth by Dubin, Simon, Nagel, and Walls; any information systems design theory (ISDT) has two aspects—the design product and the design process. A design process is "to so plan and proportion the parts of a machine or structure such that all requirements will be satisfied" (Walls et al 1992, pp. 41). Further, the design product and the design process each produce a set of empirically testable hypotheses, which can be tested only after the object of the design product is built. However, the design process component of vigilant online learning system (VOLS) design theory,is beyond the scope of our paper.

Walls et.al. (1992) proposed the components of an information systems design theory (ISDT) as a set of meta-requirements, and a set of meta-designs. Meta-requirements are written statements of the requirements for an entire class of designs – hence the prefix, "meta". The meta-de-

Table 2
Example of Components of an IS Design Theory (ISDT)

Design Product	**1**	**Meta-requirements products**	Written description of the *class* (hence the prefix ("meta")) of goals to which the theory applies. (e.g. data base systems should remove update anomalies)
	2	**Meta-design products**	Describes a *class* of design products hypothesized to meet the meta requirements. (e.g. normalized tables)
	3	**Kernel theories**	Theories from natural or social sciences governing design requirements. (e.g. relational calculus)
	4	**Testable design product hypotheses**	Used to test whether the meta-design products satisfy the meta-requirements. (e.g. theorems of relational calculus)
Design Process	**1**	**Design process method**	A description of the procedure for design product construction. (The normal progression method: First, produce tables in first normal form, then second, third. etc.)
	2	**Kernel theories**	Theories from natural or social sciences governing the design process itself. (May be different from those associated with the design product.)
	3	**Testable design process hypotheses**	Used to verify whether the design process method results in a product consistent with the meta-design. (E.g., the normal progression method produces seven tables in third normal form.)

signs describe a class of design products hypothesized to meet the meta-requirements. Thus, meta-designs are general written descriptions of the data structures and algorithm types for that same class of designs. The third component of an ISDT is a set of kernel theories from natural or social sciences which govern the design products and the design processes. Table 2 summarizes the information design theory (ISDT) components set forth in Walls et.al (1992).

*Walls et al (1992) gives an example from relational database theory (Codd 1970) as the most fully developed ISDT.

LEARNING THEORY

Kernel theory pertinent to vigilant online learning system design theory (VOLSDT) can be divided into two broad areas--learning theory and decision support system (DSS) theory. Although there are many published papers on DSS software, there have been fewer in the area of vigilant computerized learning software. However, there are now computerized measurements of learning style. The roots of learning style research go back almost eighty years, in the three similar streams of Lewin, Dewey, and Piaget. The Lewin school believes that learning is best understood and facilitated as an integrated process that begins with immediate experience followed by collecting observations about that experience (Lewin,(Kolb, 1984)). The learner then analyzes the data to form conclusions which provide feedback from which learners use to modify their behavior and choose new experiences. Lewin and his followers believed that much individual and organizational ineffectiveness could be traced ultimately to a lack of adequate feedback processes. "This ineffectiveness results from an imbalance between observation and action, either from a tendency for individuals and organizations to emphasize decision and action at the expense of information gathering, or from a tendency to become bogged down by data collection and analysis". (Lewin (Kolb, 1984. pp 22)).

On the other hand, Dewey's model of learning is similar to the Lewin's, although Dewey makes more explicit the developmental nature of learning implied in Lewin's conception of it as a feedback process. Dewey described how learning transforms the impulses, feelings, and desires of concrete experience into higher order purposeful action (Lewin (Kolb, 1984)). Dewey believed in the emphasis on learning as a dialectic process integrating experience, concepts, observations, and action.

Piaget drew upon the work of Lewin and Dewy, as well as his own exhaustive study of child behavior, to create a learning model mirroring his conception of the process of scientific discovery (Piaget (Flavell, 1966). Piaget described mental maturization as it moves from the concrete phenomenal view of the world in infancy, to the adult's abstract constructionist view. For Piaget the key to learning lies in the mutual interaction of two processes, the accommodation of old concepts to new experience, and the assimilation of new experience into old concepts (Piaget (Flavell, 1966)). Cognitive growth from concrete to abstract and from active to reflective is based on continual transition between assimilation and accommodation, occurring in successive stages, each of which incorporates experience into a new, higher level of cognitive functioning.

Piaget is credited for what is now called the Constructivist Learning Approach. Constructivism encourages the student to create his or her own personal mental models, and encourages hands-on problem solving. Constructivism suggests that instruction should be accommodating of prior student experience, and that students should be encouraged to analyze, synthesize, and derive information (Piaget (Flavell, 1966)). It encourages frequent feedback and other teaching methods that enable self-directed learning. Constructivism draws upon two key learning paradigms in education: the cognitive and the situative. The cognitive approach simulates the way in which humans think and apply knowledge. Some psychologists believe that this approach is a requirement for high-quality online learning systems (Simmering & Posey, 2009). Cognitive learning approaches include scaffolding, fading, coaching, and meta-cognitive support. Scaffolding provides support to novice learners when concepts and skills are being introduced. Fading is the gradual removal of scaffolding as the learner becomes increasingly competent. Meta-cognitive support is information given to learners to improve awareness of their ability to understand, control, and manipulate how they learn (Peiris and Gallupe, 2012). The situative paradigm takes a social perspective--where help and guidance from peers and instructors are considered most important to learning. (See Ahmad & Lajoie, 2001; Greeno & Hall, 1997; Hall & Greeno, 2008; Alavi, 1994). Thus, there is reason to assert that a VOLS should provide multiple communication channels for different learning sources, including peers, instructors, subject matter experts and practitioners.

Further, constructionism implies that a VOLS, should continually explore students' prior experiences and assumptions, and then help them search for learning objects (IEEE, 2008; OEDb; 2007,) that will help connect new concepts to that experience. Effective classroom instructors do this as a matter of course. For example, experienced classroom computer science instructors know they may confuse students if they introduce object-oriented programming as a style of programming that uses inheritance and polymorphism. A vigilant instructor however

can easily determine a student's current cognitive frame of reference (CFOR) by asking about their prior experience. For example, if the student knows nothing of polymorphism and inheritance, the vigilant instructor searches for a more appropriate analogy. If the student has some programming background, then the vigilant instructor may choose to introduce object-oriented programming simply as a style of programming that can result in programs that are easier for the maintenance programmer to read, understand, and modify. We propose that a vigilant online learning system (VOLS) facilitate student learning in the same manner—by following a student's CFOR at each stage in the learning process.

By the end of the 20th century, researchers had synthesized and expanded the original works of Lewin, Dewey, and Piaget to what is now known as experiential learning theory (ELT) (Kolb, 1984). ELT hypothesizes that learners increase their knowledge in one or more of the four stages shown in table 3. Over the years, these four stages have come to be known as Kolb's learning cycle (Kolb, 1984). It was ELT that spawned Bloom's taxonomy of learning objectives (Bloom 1956), which divides educational objectives into three domains: cognitive, affective, and psychomotor. Within the domains, learning at the higher levels is dependent on having attained prerequisite knowledge and skills at lower levels. The goal of Bloom's taxonomy was to motivate educators to focus on all three domains.

Kolb (1984) proposed that individuals have a dominant learning style, which can be thought of as preferences for combinations of the various modes of experiential learning shown in table 3. Kolb argued that, although most of us have a dominant yet mostly unconscious learning style; to a certain extent, we can choose which style to use at any given time—resolving cognitive tension by suppressing one style while focusing on the other. There are now assessments of learning style; the most noted being the learning style inventory (Kolb, 84). This instrument has been used to identify four learning styles, Diverging, Assimilating, Converging and Accommodating.

We argue that a VOLS should support mechanisms to elicit the student's dominant learning style, make him aware of it, and support his or her conscious choice of learning objects matching the preferred real-time learning style. Consider the following examples of how a VOLS could leverage a student's learning style.

Suppose the student is faced with the following case related to the ethics of computer programming:

Assume you are a programmer on your last few days of a time-and-materials contract with your client. You have been asked to repair a major defect in one of the system modules you developed. Further, suppose that you have discovered the following possible repair options:

Option-1 will require little of your time, but the repair will last only until the next scheduled complete system restart, a month after you are to begin work for another more lucrative client.

Option-2 will require almost all your remaining current contract time, but the repair will be permanent.

However, you feel that your resulting lack of spare time will prevent you from taking on any new small assignments on your current contract, and may create the opinion amongst your peers that your technical skills are lacking.

Which option should you choose and why?

If the student prefers a diverging style, his dominant learning abilities are concrete experimentation (CE) and reflective observation (RO). He is best at viewing concrete situations from many different points of view. He performs well in situations that call for generation of ideas, perhaps in a brainstorming session. In formal learning sit-

Table 3
Experiential Learning Theory The Learning Cycle, Kolb (1984).

		Ability
1	(CE) *Concrete experience* engagement	The learner involves themselves fully, openly, and without bias in new experiences.
2	(RO) *Reflective observation*	The learner reflects on and observes their experiences from many perspectives.
3	(AC) *Abstract conceptualization*	The learner create concepts that integrate their observations into logically sound theories.
4	(AE) *Active experimentation*	The learner tests their theories by making decisions and solving problems.

uations, people with the diverging style prefer to work in groups, listening with an open mind to different points of view and receiving personalized feedback. A VOLS, upon discovering that a student prefers the diverging learning style, could facilitate the student's search for material supporting different points of view associated with the above type of ethical dilemma. Alternatively, the VOLS could provide the opinions of classmates, and /or project managers, maintenance programmers, project secretaries, end users, etc. – either virtual or real.

A student with a converging style has "abstract conceptualization (AC) and active experimentation (AE) as dominant learning abilities. He is best at finding practical uses for ideas and theories. These students have the ability to make decisions based on finding solutions to successions of problems, based on a question-answer dialog. Individuals with such a learning style prefer to deal with technical tasks and problems rather than with social and/or interpersonal issues. In formal learning situations, this student prefers to experiment with new ideas, simulations, laboratory assignments, and practical applications. In this case, the VOLS could assist the student by first allowing him to observe the possible effects of the computer flaw over time, and then providing the tools necessary to perform simulations of possible computer program repairs.

Finally, an individual with an accommodating style has concrete experiences (CE) and active experimentation (AE) as dominant learning abilities. These types of students learn primarily from hands-on experience. They act often on feelings rather than on logical analysis. In solving problems, they rely more on people for information than on their own technical analysis. In formal learning situations, people with the accommodating learning style prefer to work with others to get assignments done, to set goals, to do field work, and to test out different approaches to completing a project. A VOLS might assist this type of student by facilitating group collaboration on a project in a divide-and-conquer approach.

Recent research has indicated that, that for a complete learning experience, students should go through all four stages of the learning cycle. This approach has the advantage of ensuring that at least one stage will match a person's learning style preferences. Konak et al (2014) provided empirical research to support this claim, as well as specific constructs to operationalize the four stages. Their experiment involved students in an introductory cryptography class. The concrete experience activity was a set of step-by-step instructions demonstrating asymmetric encryption. The activity instructions were written so that students could complete the task with no previous cryptography experience. The Reflective observation activity included peer discussion and reflective questioning. After completing the concrete activity, students were asked to analyze the components of a digital certificate, and then to discuss questions such as why they have to export their private encryption keys. That research found that student-student interaction achieved a higher level of reflective observation. For example, instead of asking students to analyze their own digital certificate individually, better results were obtained when students were asked to compare their certificates with their teammates'. For the abstract conceptualization activity, students were asked to create a diagram of the asymmetric encryption activities they performed, and then to participate in an instructor led discussion about what they performed in the earlier exercise about symmetric encryption. Then they were asked to list the advantages and disadvantages of asymmetric encryption algorithms. For the active experimentation activity, they used two strategies. The first was to give students a new task, similar to that in the concrete experience stage, but without step-by-step instructions. For example, students were asked to send encrypted messages to students other than teammates. The second strategy was to combine a few related topics in the same activity such that the later topics built on the former ones.

The research found that students whose activities were based on Kolb's experiential learning cycle (ELC), perceived higher levels of interest and competency compared to the control group, whose activities were based on no theoretical learning model. Students given opportunities for conceptualization, experimentation, and reflection with other students performed better than students working alone and following systematic written instructions. Findings also indicated that the amount of group work was positively correlated with feelings of learning competency, and that group work facilitates the implementation of the reflection and conceptualization stages. The findings suggest that student learning outcomes can be enhanced by incorporating all stages of Kolb's Experiential Learning Cycle.

There has been other valuable empirical research suggesting how to improve online learning systems (OLS). For example, Carliner (2004) proposed that they should enable a learner to use the Internet to access learning materials; and to interact with the content, instructor, and other learners to construct personal meaning. For other similar research, see also Wang, 2007, Paulsen, 2003, Stephenson, 2001 and Peiris & Gallup (2012).

In review, the literature around learning theory contributes valuable meta-products to a vigilant online learning systems design theory (VOLSDT). Examples of these are shown in tables 4 and 5. Table 4 lists the proposed meta-requirements. Table 5 lists the proposed meta-designs, which are the data structures and algorithm types necessary to implement the meta-requirements. Table 6 lists examples of the testable hypotheses derivable from these design products.

. Table 4
Elements of a Design Theory of Vigilant Online Learning Systems Meta-requirements products Derived from Experiential Learning Theory

MR1	The system should provide the ability to detect student learning style.
MR2	The system should make student aware of this dominant learning style.
MR3	The system should support the conscious student choice of pedagogical material matching his dominant learning style.
MR4	System should facilitate the presentation of ordered sequences of the four activities in Kolb's learning style.
MR5	The system should facilitate collaborative learning with other students, professors, field experts, internet communities of interest, etc.
MR6	The systems should support scaffolding, fading, and coaching.
MR7	The system should periodically survey students to determine their up to date cognitive frames of reference.

Table 5
Elements of a Design Theory of Vigilant Online Learning Systems Meta-design products Derived from Experiential learning theory

MD1	index to web learning objects tagged according to learning style compatibility
MD2	Web crawler to search, index, and tag learning objects according to learning style compatibility
MD3	API to Kolb's learning style inventory
MD4	Knowledge management API
MD5	API to groupware for collaborative learning

VIGILANCE THEORY

To take full advantage of is known about the process of human learning, we contend that a VOLSDT should integrate a theory of vigilance. To this author's knowledge, what little is known about vigilance in information systems design is found primarily in the decision support systems literature (Sprague & Carlson, 1982; Klein & Methlie, 1995; Walls et al, 1992). In that literature, the concept of cognitive frames of reference is emphaaized. To our knowledge, the term cognitive frame of reference was first used in the decision support literature by Shrivastava and Mitroff (1983). However many variants of this term have appeared in the literatures of psychology, philosophy, linguistics, organization theory, strategic decision-making, political science, artificial intelligence and expert systems. For example, schemas were discussed in Bartlet (1932), internal images were studied by Boulding (1956), paradigms (Kuhn, 1970), frames (Minsky, 1975), socially defined frames (Goffman, 1974), cognitive maps (Axelrod, 1976), scripts (Schank and Abclson, 1977), assumptions (Mason and Mitroff, 1981), frames of reference

Table 6
Elements of a Design Theory of Vigilant Online Learning Systems Examples of Testable Design Product Hypotheses Derived from Experiential Learning Theory

H1	It is feasible to design system to accommodate detection of student learning style. etc.
H2	Students using a system that makes them aware of their dominant learning style will perform better on summative assessments than students using a system that does not make students aware of their learning style.
H3	Students using a system offering them the opportunity to perform activities using learning objects tailored for all four phases of Kolb's learning cycle will perform better on summative assessments than students using a system that does not offer them such activities.
H4	Students using a system supporting asynchronous collaborative learning will perform better on summative assessments than students using a system that does not facilitate asynchronous collaborative learning.
H5	Students using a system with scaffolding and fading will perform better on summative assessments than students using a systems without scaffolding and fading.
H6	Course authors using a system that associates students, learning style, and assessment performance will be more satisfied than course authors using a system not supporting this feature (because they will be able to better target their learning content to the course audience).

(Shrivastava and Mitroff, 1983) and templates (Pondy, 1984; Peiris and Gallupe, 2012).

An interesting study by El Sawy & Pauchant (1988) provides empirical research that operationalizes cognitive frames of references in the context of executive decision making, especially issues tracking and environmental scanning. That paper discusses environmental scanning as a form of organizational learning that involves changes in the cognitive frames of reference (CFOR) of groups of decision makers. The research contended that, in organizations, the issues tracking effort "involves the shift of decision makers' CFOR generated through the perception of new information or the occurrence of new learning and ideas". El Sawy & Pauchant (1988, pp. 457).

Piaget, as discussed earlier, identified two basic modes of learning, assimilation and accommodation (Piaget(Flavell, 1966) where assimilation occurs when new information is assimilated into old frames of reference, and accommodation is when old frames are modified if new data do not fit the old frames. Similarly, Norman identifies a three part learning process: accretion, when new knowledge is added to existing frames; structuring, the formation of new frames; and tuning which is the ongoing maintenance of existing frames that are better matched to the real-time task. Similarly, Boland (Pondy, 1984) argues that reasoning occurs through the interweaving of data with multiple frames of reference in a process of frame shifting. They argue that the cognitive tension engendered by dissonant competing frames underlie the dynamics of frame shifting. Piaget (Flavell, 1966) describes a dialectic of assimilation and accommodation based on mutual adjustment between cognitive structures and knowledge. Norman's "tuning" is based on the integration of dissonances (Norman, 1982).

As individuals scan the learning environment, the new information and interpretations they acquire change their cognitive frames of reference, which in turn affect how they will scan that environment. According to El Sawy & Pauchant, (1988) the key to understanding the role of cognitive frames of reference in learning was in studying their shifts. They operationalized this concept in data structures they called templates, which represented an organization's "cognitive frame of reference".

We contend that, like an executive information system (EIS), a VOLS should facilitate continuous environmental scanning in an environment considered turbulent (For discussions of organizational turbulence, See Teece, Pisano, & Shuen, 1997; Bourgeois & Eisenhardt, 1988; 1986; and Briggs and Peat, 1989; Demerkien & Ghoul (2010). In the context of vigilant online learning systems (VOLS), turbulence connotes the continuous stream of new information about the evolving state of each student's (or each class's) performance, plus the shifts in their cognitive frames of reference, as well as new learning opportunities appearing continuously cyber-space. We contend that a VOLS should facilitate user template shifting, which in turn should facilitate the identification and shaping of their related issues. A VOLS design, similar to what Walls et al (1992) proposed for a vigilant EIS, should model issues as attention organizers, where issues can be anything that could affect student learning interests, as well as the interests of all other types of system users (e.g. course authors, administrators, monitors).

We propose that a VOLS can model issues in a manner analogous to the environmental issues discussed in Dutton and Webster(1988), where issues were defined as events, developments, or trends which have a potential consequence for an organization, and which may be identified as either threats or opportunities (See also Jackson and Dutton 1988; Heath & Nelson, 1986; King, 1987). We contend that a vigilant online learning system (VOLS) should incorporate features of an executive information system, where the organization is the university, and the "executives" are the system users, including students. Furthermore, we contend that a VOLS should facilitate the management of each student's learning issues as well as strategic issues for the university, department, class, or course.

We argue that, in turbulent environments such as a large online undergraduate college classes, the decision-making process is appropriately viewed by the participants as a process of attention to issues with varying and shifting priorities. Issues are dynamic entities that evolve over time. They go through a life cycle from birth to death, which consists of four stages: discovery, emergence, maturity, and fading (Walls et al, pp. 49). According to King (1987), issue management involves identifying an issue, dealing with the way it affects stakeholder interests, and influencing its evolution to the maximum degree of cost/effectiveness. Facilitating and managing the issue life cycle has been suggested as a requirement of a vigilant information system (Walls et al, 1992).

El Sawy and Pauchant (1988) described how organizational issues tracking could be made operational via the concepts of templates, triggers, and twitches. It was said that decision makers perceive an issue through a cognitive frame of reference, which they termed template. The process of environmental scanning was represented by changes in these templates, which they termed twitch. That study concluded that the management process of environmental scanning (and hence decision-making) could be improved by stimulating and managing the process of template shifting. We contend that a VOLS should improve the learning of ordinary online undergraduate college students (and entire classes) by facilitating and managing the process of template shifting in regards to learning objectives. Similarly, we argue that a VOLS should improve the decision making of policy makers, course authors, and system administrators by facilitating and managing the process of template shifting in regards to policy formation.

In the El Sawy & Pauchant (1988) study, the organizational issue explored was the business potential posed by the (then emerging) cellular the telephone market. The decision maker's CFORs were elicited periodically from a group of decision makers. Template components included a set of verbal descriptions (constructs) of N bipolar dimensions that described the plot, or theme of the template. The template constructs were things like whether or not the market would perceive cell phones to be only toys; or if the phones would be reliable; or how much they would cost, etc. A trigger is a stimulus which impinges upon a template and which may cause it to twitch. A trigger was described by its information, source, and latency. For example, a trigger for a university administrator might be information suggesting that a Pascal programming class can no longer be competitive in the market. A trigger for a student might be the realization that his learning style suggests he join an internet community of interest, or new knowledge of which job skills are most in demand. Another student trigger might be the result of an exam score. A trigger's source denotes where the information was obtained. Its latency is the extent to which a trigger has interaction effects with future triggers. A highly negative latency means the trigger has stimulative effects on template shifting in the presence of future triggers. Positive latency means the trigger has a temporary inhibiting effect. In other words, a latent trigger may be one that shows its effect only in the future. A twitch is a change in a template caused by a trigger. A twitch contains a descriptor, a magnitude, and drivers. The El Sawy & Pauchant study identified the following three basic types of twitches:

- substitution twitches, which add a new construct to the template and/or drop an existing construct;
- articulation twitches, which combine two existing constructs to form a new construct and/or branch an existing construct into two new constructs; and
- tuning twitches, which change the orientation and/or magnitude of positioning on an existing construct.

The El Sawy paper concluded that, "given that the explicit operationalization of template twitching is possible in a form amenable to computer-based storage and processing, it would be a fruitful venture to build an expert system for group tracking of emerging issues"(El Sawy & Pauchant, pp. 461).

In summary, the decision support literature suggests the environmental tracking process, and hence decision-making, can be improved by helping decision makers manage the issue tracking process. We contend that a VOLS should incorporate theses features, and that doing so could improve student learning as well as the tactical decision making of all other types of VOLS users.

To help clarify the concepts of issues tracking and templates, below are some examples of templates that might be developed for a particular VOLS. Accordingly, each template construct describes a part of the paradigm through which an individual (or group) perceives the external environment. These constructs can be thought of as ideas that might influence that person's decision-making. Table 7 represents a possible template for an average undergraduate college student. It was derived from the model of e-learning success proposed by Holsapple & Lee-Post (2006, pp. 74.) Their student survey found the six constructs in table 7 to be the most important predictors of student satisfaction with online courses. On the other hand, table 8 shows a template representing perceptions of a student's dominant learning style. This perception could affect the choice of student learning content. These

Table 7
Elements of a Design Theory of Vigilant Online Learning Systems Meta-design product Derived from Vigilance theory

eLearning Readiness Template					
1	low	←	GPA	→	high
2	low	←	Course load	→	high
3	low	←	Prerequisite performance	→	high
4	low	←	Technical competence	→	high
5	low	←	Study habits	→	high
6	low	←	Life style compatibility	→	high
7	low	←	Online learning experience	→	high
8	low	←	Attitude towards online courses	→	high

Table 8
Meta-design product
Derived from Vigilance theory

Learning Styles Template				
1	low	←	Diverging	→ high
2	low	←	Assimilating	→ high
3	low	←	Accommodating	→ high
4	low	←	Converging	→ high

perceptions could be of a course monitor, course author, student, or the VOLS itself. Table 9 shows a template representing factors influencing how students might perceive their own academic performance. This kind of template could affect student decisions. Table 10 shows a template concerning an instructor's perception of a student's performance. Finally, table 11 depicts factors influencing a policy maker's perception of the issue of decreasing course enrollment. (Note that these particular templates are not part of a design theory. They are merely examples of one possible VOLS design that is consistent with VOLSDT.)

However, the concept of vigilance typifies a much more active, alert and action-directed capability than merely issues tracking. There must also be the capability for decision makers to act even when rapid feedback is not available. Thus, a vigilant online learning system should have both closed loop and open loop control mechanisms (Walls et al, 1992). We propose that open loop control can be achieved by a simple time-out heuristic that could be elicited from

system policy makers. Such a heuristic could simply state the maximum time that system action can be delayed due to a lack of environmental feedback. There should also be a template data structure that includes issue descriptor(s), directive(s) to other system users, response(s) to directives, and critical indicator(s). A critical indicator is an empirical parameter that helps describe and track an issue (El Sawy et al, 1988). A VOLS should also have the ability to add and delete templates as well as the ability to add delete, and modify critical indicators.

Tables 12 and 13 lists, the ideas discussed in the last few paragraphs as VOLS meta- requirements, and meta-designs. Note that, to allow investigation of critical indicator behavior over time, a VOLS should have a mechanism to link sources of information to critical indicators, as well as automatic maintenance of template history. For adequate

Table 9
Meta-design products
Derived from Vigilance theory

Psycho-social Template				
1	low	←	grade anxiety	→ high
2	low	←	confidence in studying ability	→ high
3	low	←	experience with subject matter	→ high
4	low	←	confident with [subject	→ high
5	low	←	Facility with language	→ high
6	low	←	Confidence in finances	→ high
7	low	←	Test anxiety	→ high

Table 10
Meta-design product
Derived from Vigilance Theory

Student Performance Template				
1	low	←	Formative assessment results	→ high
2	low	←	Summative test results	→ high
3	low	←	Assignment lag time*	→ high
4	low	←	Schedule compliance**	→ high
5	low	←	Study habits	→ high
6	low	←	Learning process cycle time***	→ high

*Assignment lag time is the time that elapses between when a particular assignment is given and the time when work begins.

**Schedule compliance is a measure of the extent to which a student tends to follow the course schedule.

***Learning process cycle time is the mean time a student takes from the start of a learning module to its successful completion

Table 11
Meta-design product
Derived from Vigilance Theory

Course Enrollment Template				
1	low	←	University enrollment	→ high
2	low	←	Local population	→ high
3	low	←	Course demand	→ high
4	low	←	Population income	→ high
5	low	←	Local area network bandwidth	→ high
6	low	←	University budget	→ high
7	low	←	Faculty quality	→ high
8	low	←	Student quality	→ high
9	low	←	Student job placement	→ high
10	low	←	Student retention	→ high
11	low	←	Facilities quality	→ high

system control, a senior decision maker (e.g. course author or administrator) should have the ability to pass on to his subordinate (e.g. student) information useful in taking action based upon the outcome of the issue tracking process. Thus, the VOLS should have a mechanism to add a subordinate directive to a template, and a mechanism to pass the template to the subordinate for his action. Furthermore, the VOLs should track of the resolution of a problem derived from an issue. Therefore, the VOLS should have a mechanism for a subordinate (e.g. student) to respond to a directive, and a mechanism to help the superior (e.g. course monitor) monitor the subordinate's progress on a directive.

ONE POSSIBLE VOLS DESIGN

In review, we have discussed the meta-requirements and meta-design products of a theory of design we call vigilant online learning systems design theory (VOLSDT). Because there a many possible individual designs consistent

Table 12
Elements of a Design Theory of Vigilant Online Learning Systems
Meta-requirement product
Derived from Vigilance Theory

MR8	A VOLS should support issue representation in the form of triggers, templates and twitches.
MR9	A VOLS should support both open and closed loop control.
MR10	A VOLS should support the issue management life cycle.
MR11	A VOLS should support elicitation and maintenance of heuristics from policy makers, course authors, system administrators, and students.
MR12	A VOLS should support the learning and decision making of different types of users including course administerators, system administrators, course monitors, and students.
MR13	A VOLS should derive traceable recommendations from inferences drawn from its evolving internal knowledge base.
MR14	A VOLS should use heuristics to take independent actions (such as course content selection) when necessary.
MR15	A VOLS should facilitate periodic monitoring of proposed actions in response to directives.
MR16	A VOLS should facilitate the tracking of the resolution of a problem derived from an issue.
MR17	A VOLS should facilitate the mandatory elicitation and maintenance of all template information.

with this design theory, perhaps it would be instructive at this point to sketch one possible design. (See figure 1.)

VOLSDT calls for systems with several types of users, including course authors, system administrators, course monitors, and students. Course monitors are agents that intervene in the learning process only sporadically on an exceptional basis. These agents could be course authors, course administrators, or organizational policy makers.

The system designed in figure 1 controls the learning process, and consists of at least three primary subsystems, the I/O) (input/output) processor, the inference engine, and the ETL (extract, transform, and load) module. This module extracts environment information from the I/O

Table 13
Elements of a Design Theory of Vigilant Online Learning Systems Meta-Design products* Derived from Vigilance Theory

MD6	template data structure including issue descriptor, multiple critical indicators, directives, and responses
MD7	expert system to monitor and facilitate student learning via alerts, directives, triggers
MD8	link of information sources to critical indicators**
MD9	data structure for template history
MD10	template sharing among stakeholders, including concurrent access, and atomic transactions
MD11	communication of responses to directives
MD12	directive status data structure
MD13	suggestion data structure
MD14	system command data structure
MD15	expert system engine, including expert knowledge extractor

*Data structures and algorithm types

**A critical indicator is a parameter that describes an issue, and can help track it.

process, then transforms, and stores it in the knowledge base according to the document object models (DOMs). The knowledge base evolves over time, and contains the complete histories of template elicitations, issues, twitches, triggers, learning objects, expert heuristics, and links to cyber-space learning objects.

The choice of DOMs should be configurable by the system administrator, and would include models such as the Sharable Content Object Reference Model (SCORM), which supports content portability via extensive cataloguing using metadata (Bohl, Schelhase, and Sengler & Winand 2002). Another possible DOM might be the IEEE Learning Technology Standard Committee (LTSC) reference model, IEEE P1484.1. This model has five layers that focus on reusability and portability, and specify structures for storing ratings of e-learning system sources. (O'Droma, M. S., Ganchev, I. & McDonnell, F. 2003). Another possible model could the IMS model from the Instructional Management Systems project (IMS, 2007). It is another approach to defining technical specifications to promote interoperability between e-learning systems.

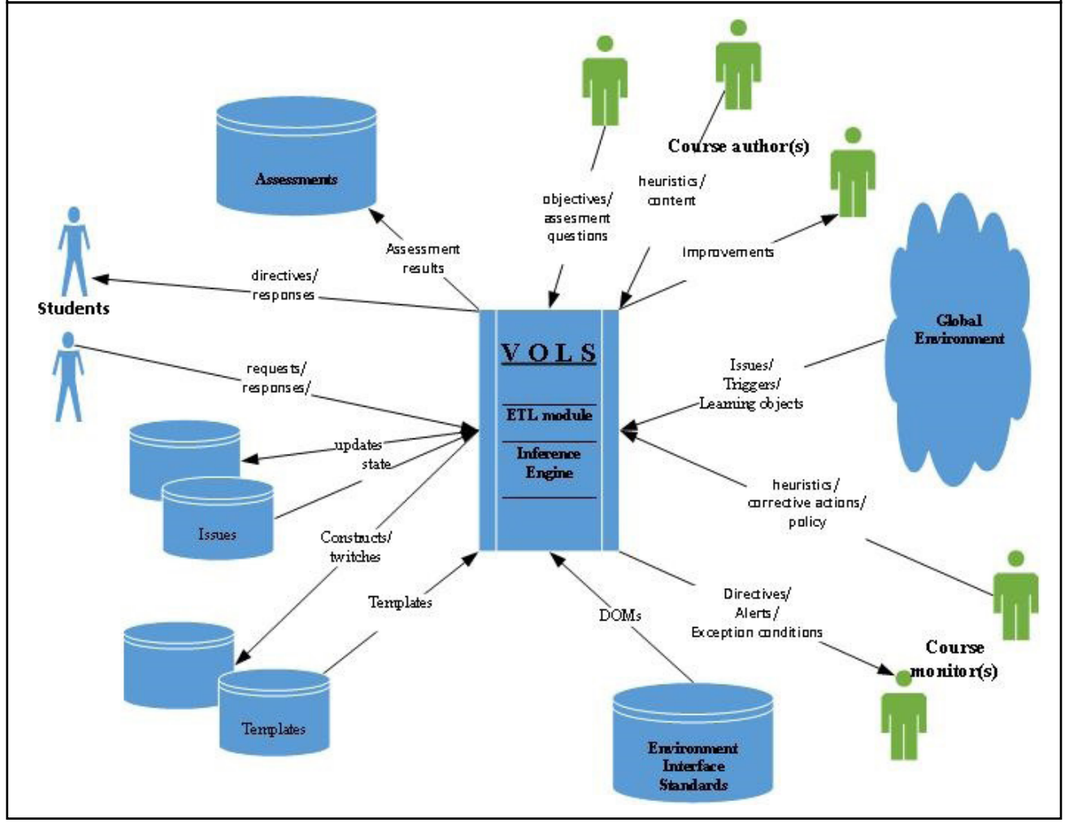
Table 14
Examples of Testable Design Product Hypothese Derived from Vigilance Theory

H1	It is feasible to design an online course management system to accommodate issue representation in the form of triggers, templates, and twitches.
H2	It is feasible to design an online course management system to accommodate environmental scanning techniques that have been proposed for EIS.
H3	Students using a VOLS will be more satisfied than students using a traditional course management system.
H4	It is feasible to design an expert system capable of monitoring and facilitating student learning.
H5	Students using a VOLS will perform better on summative assessments than students using a traditional course management system.
H6	Students using a system that accommodates the issue management life-cycle, will be more satisfied than students using a system that does not accommodate these features , etc.
H7	Course monitors using a system that supports the issue management life cycle will be more satisfied than course monitors using a system that does not support these features (because they will be able to more quickly and better target their responses to exception conditions).etc.

After The VOLS extracts and stores information from experts such as professors, practitioners, course authors, and administrators; the inference engine facilitates the learning process as follows. First, it adds reads real-time state information from the environment (including that from all users) to its knowledge base. Then it draws inferences, which it translates, into helpful recommendations, directives, instructions, etc. output to the appropriate users and knowledge bases. Triggers would impinge upon the VOLS, as it scans the environment. These triggers include student assessment results, internal policy directives, and templates obtained from user surveys.

Note that such surveys are of vital importance to a VOLS, which by definition, operates mostly without a human intervention. These surveys are transformed into templates that represent users' cognitive frames of reference. Thus, because a VOLS would be designed to replace many of the soft skills of effective human instructors, the user surveys should be mandatory. Over time, the VOLS, may find that a user's (or group's) cognitive frames of reference

Figure 1
One Possible Design of a Vigilant Online Learning Systems



have twitched, creating issues. The VOLS then tracks these, and if one becomes potentially counter-productive, then an alert directive would be issued to the appropriate user(s). Then these directives would be used to select a course of action, which in turn would affect the learning environment. If, in the opinion of the VOLS or of a course monitor, this action has the potential to affect other users negatively, an action authorization request would go to a human system administrator. This control architecture is similar to what was proposed for vigilant information systems in Walls et al (1992, pp. 52).

In review, this paper has thus far discussed examples of three of the four elements of the design meta- products portion of a complete theory of vigilant online learning system design. (Note that the design meta-process component is beyond the scope of this paper.) The first element was the kernel theory. The second element was the set of meta-requirements derived from the kernel theory. The third element discussed was the set of meta-design products (or simply meta-designs) which specify the types of algorithms and data structures needed for the class of designs.

The final design product to be discussed here is a set of examples of testable design hypotheses generated by the VOLSDT. As discussed earlier, any design theory, in the tradition of Nagel (1961) and Dubin (1978), should generate empirically testable hypotheses. These are tested when a system is physically constructed and acceptance tested. As you may recall, a design theory is a prescriptive synthesis of kernel theory, which says how a design process can be carried out in a feasible effective manner. Thus, these testable hypotheses are merely simple transformations of the meta-requirements. Table 14 shows a few examples.

SUMMARY

In summary, this paper began by reviewing the latest news concerning the state of online higher education in the U.S. The initial enthusiasm of administrators towards purely asynchronous online undergraduate education has begun to diminish in light of reports of high dropout rates and poor learning outcomes. The paper then argued that one reason for these unfortunate results is the limited capabilities of traditional course management systems such as Blackboard, Moogle, Udacity, and Coursersa. We argued that a vigilant online learning system (VOLS) would be more appropriate for younger immature online college students than would a traditional online course management system (OCMS) such as Blackboard or Udacity. A VOLS would learn about, and act upon student attributes that traditional OCMS ignore – attributes such as cognitive frames of reference, and learning style. In addition to functions of traditional systems, VOLS add the capability to facilitate (or eventually to replace) many of the soft skills of an effective undergraduate classroom instructor.

The paper then presented the classic definitions of design theory and vigilant information systems theory. These definitions revealed that design theories are composite theories based on kernel theories from the natural sciences, social sciences, and mathematics.

The paper then presented a theory of online course management systems design. This class of system designs was termed vigilant, to distinguish them from that of traditional course management systems. This theory consisted of a set of design meta-requirements, meta-design products, and testable design product hypotheses.

CONCLUSIONS AND CONTRIBUTIONS

In conclusion, it has become apparent that today's popular course management systems such as Blackboard, Moogle, Coursera, and Udacity are not appropriate for the ordinary young, immature college student. The author hopes that this paper will be a guide to software developers and academics who will study how to design and build the next generation of online course management systems, vigilant online learning systems. To our knowledge, this is the first paper to address this subject, and the first to use the term VOLS. In addition to functions of traditional system, a VOLS would learn about, and act upon student attributes that traditional online course management systems (OCMS) ignore – attributes such as cognitive frames of reference, and learning style. This paper extends the concept of recommender systems for higher education (Paulsen, M. F. (2003). (Peiris, D. & Gallupe, B).

In addition to recommending student actions, a VOLS would replace many of the soft skills of an effective undergraduate classroom instructor. Such instructors leverage their knowledge of human learning, via a dialectic process, to develop ideas about how individual students learn, and then communicate with them in a way that facilitates their individual learning process. The paper argued that, although there has been much study of the human learning process, it has not been leveraged by traditional online course management systems. Nor has there been a much work on a design theory to guide VOLS research. As suggested by Simon(1981), and Walls et al (1992), we feel that the development of rigorous information systems design theory is possible, and should include both meta-design products and meta-design process components—each traceable to the kernel theory.

Another contribution of this paper is its synthesis much of the relevant kernel theory—including decision support systems, organizational issues tracking, learning theory, and vigilant information systems.

This paper provides a starting point for a widely accepted VOLS design theory. Future research could complete the theory by expanding the meta requirements and meta design products so as to include the best ideas from experts in higher education, psychology, sociology, computer science, and information systems. It is hoped that this paper will provide a means for researchers to envision the possibilities of VOLS, and a means to study them systematically.

Especially important will be the integration of new learning objects in today's turbulent open education environment. This research will undoubtedly overlap with the study of knowledge management systems (Alavi & Leidner, 2001), and their interface to online learning systems and to the semantic web (Maedche & Staab, 2001). Also very important will be detailed descriptions of the design process component of a VOLSDT – a subject beyond the scope of this paper. Future research could also examine more precisely how to leverage the cognitive frames of references of all types of VOLS users, not just students. Another line of future research could be the expansion of VOLSDT to include the type of online learning design products other researchers have proposed (For one example see Peiris & Gallupe (2012)). Also needed will be longitudinal research involving building prototype VOLS and then testing them against online learning success criterion such as presented in Holsapple & Lee-Post, 2006).

We hope that this paper has molded existing literature into components of a well-constructed design theory of vigilant online learning systems. These kinds of systems would be designed for the ordinary undergraduate online college student – the student yet to mature into the self-taught learner that does well with purely online courses. This paper, to the author's knowledge, is the first to address the design of such systems. We hope that it will lead to the construction of systems that will fill some of the vacuum created by college courses absent human instructors.

We feel that purely online courses for the ordinary undergraduate college student will never be as effective as classroom courses led by excellent instructors. However, we think that today's OCMS can be greatly improved, given the right investment. We hope that this paper has contributed at least a small advancement in online course management systems design.

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Does Homework Really Matter for College Students in Quantitatively-based Courses?

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ABSTRACT

This investigation was initiated by two students in an Advanced Computer Applications course. They sought to examine the influence of graded homework on final grades in quantitatively-based business courses. They were provided with data from three quantitatively-based core business courses over a period of five years for a total of 10 semesters of data. The results indicated that graded homework grades were highly correlated with final course grades, but the paired t-test showed significant difference between the graded homework and final course grades. The R-squared value of .463 showed that graded homework accounted for a significant portion of the final course grade. This finding is important as instructors search for pedagogy that can positively impact final grades and facilitate necessary and timely progress toward graduation.

Keywords: homework, automaticity, practice, quantitatively-based courses, chunking

INTRODUCTION

This study was initiated by two students in an Advanced Computer Applications class who decided to study the influence of graded homework on final grades as their course research project. They had observed that students who completed their homework had better grades in their classes, but they wanted to statistically support this claim. And as the instructor, I concurred that the assumption was, in all likelihood, correct and provided them with several semesters of data. By investigating the data from multiple perspectives, they exposed some interesting results. As college students are entering higher education, increasingly unprepared or under-prepared, pedagogical techniques that can positively impact their learning, need to be carefully examined. It is imperative that faculty continually explore ways to promote student learning and their progress toward graduation. Student retention and higher education graduation rates have become an urgent issue for students, parents, politicians, employers, and instructors.

LITERATURE REVIEW

Importance of Practice

The importance of assigning homework as a tool for practice continues to be debated at many levels of education. Refer to the meta-analysis conducted by Cooper, Robinson, and Patall (2006) for synthesis of research on homework. However, whether it is a baby learning to walk or a professional athlete honing his or her talents, practice is essential for them to master their skills. To be an accomplished musician or athlete means hours of practice

for years. This situation is acknowledged and rarely questioned.

Although "how" an individual learns, acquires knowledge, and retrieves it are still unclear, cognitive scientists are developing frameworks to understand these processes. (Anderson & Lebiere, 1998; Bodie, Powers, & Fitch-Hauser, 2006; Buschke, 1976; Guoqi Li, 2013; Willingham 2009; & Zhang et al., 2012). Much of this research examines the importance of automaticity for acquiring increasing proficiency across disciplines and in specific courses. Rodgers (2011) investigated the role of automatization for learning language skills in college students studying Italian. He found the "...only significant difference was between the Beginner and Advanced groups for comprehension... comprehension of verbal morphology eventually becomes automatic at high levels of proficiency." (p. 313).

Learning by strategies or learning by drill, both involved practice to produce automaticity. (Delazer et al., 2005; Lassaline & Logan, 1993; Logan & Klapp, 1991). Delazer (2005) examined neurological changes in the various areas of the brain based on fMRI study. They found that training by strategy or training by drill "lead to significant improvements in terms of speed and accuracy. (p. 843). Logan and Klapp (1991) found that although extended practice produced automatization in "alphabet arithmetic," a single one-hour session of rote memorization produced the same level of automaticity. They suggested this finding had important implications for the practicality of achieving automaticity and significance of mastering every fact in developing specific skills. However, their contention is that in long-term development of a skill to the point of mastery, "there may be no substitute for extended practice." (p. 194). Lassaline and Logan (1993) used a counting task involving practice for 13 sessions to determine when performance reached asymptote when examining the slope of the function of response latency to numerosity. The asymptote was reached after session three. However, significant changes in the slope were apparent in the first session "which suggests that that automatization was taking place." (p. 565).

Burtis (1982), Buschke (1976), and Willingham (2009) attributes this automaticity to a process called chunking. They and others (Bodie, G.D., Powers, W.G., & Fitch-Hauser, M. 2006; Guoqi Li et al., 2013; Zhang, D et al., 2012) contend that significant chunking of individual pieces of information or data must be grouped together as one chunk of information that can be readily retrieved. This chunking is the result of repetitive practice. For example, learning the word "practice" as one chunk instead of eight individual items—p r a c t i c e. Individuals learn to use the word "practice" must more efficiently and effectively as one chunk instead of trying to put seven pieces of information together. The importance of this is that working memory is freed up which some contend is fixed. (Willingham, 2009). The result is more room for higher-order operations and problem-solving. (Bodie, G.D. al et., 2006; Buschke, 1976). Guoqi Li et al. (2013) found that "chunking can increase memory capacity in an unlimited manner through training." (p. 9). Zhang et al. (2012) found that chunking of visual information was effective in teaching students with math disabilities geometry. Other studies showed that chunking has resulted in successful learning of both verbal and quantitatively-based concepts, many times in conjunction with other strategies. (Bodie, G.D., Powers, W.G., & Fitch-Hauser, M., 2006; Zhang et al., 2012).

Homework and the College Student

Although there are numerous articles on the impact of homework on final course grades for college students, their methodologies are quite disparate. (Alsosary, 1995; Bembenutty & White, 2012; Brender, 1996; Cartledge & Sasser, 1981; Chulkov, 2008; D'Souza & Maheshwari, 2010; Durr, 1999; Galyon, Blondin, Gorbes, & Williams, 2013; Kitsantas & Zimmerman, 2009; & Lazarova, 2015) To further complicate the role that homework plays on final grades in college courses, faculty at higher educational institutions assume that college/university students are responsible for their own learning (Brender, 1996) and should no longer have to be "spoon-fed." And, certainly research schools have different priorities than "teaching" institutions. But with the increased democratization of higher education, students are entering colleges and universities ill-prepared to effectively complete their plan of study for graduation. A study conducted by the Educational Testing Service (Goodman, Sands, & Coley, 2015) found that of the 22 participating countries, American students scored near the bottom on every measure from literacy to problem solving to numeracy. As an example of the dismal showing of American students "nearly two-thirds (64%) failed to reach this minimum level in numeracy" (p. 12) which resulted in the United States placing last on this measure. The implications of these findings and our personal, everyday experiences in the classroom have resulted in faculty urgently exploring ways to help students successfully compete in college. The issue of the under-prepared college student is exacerbated by students not completing work outside of the classroom. Not only do students not study the recommended two hours outside of class for every hour in class, 63% spend less than 15 hours a week preparing for class. (Young, 2002) Yet, some faculty have become increasingly concerned about the impact of student mental health and stress because of assigned homework. (Kelley, 2011) An article in the Cornell Chronicle (Kelley, 2011) described how the Faculty Senate at Cornell University passed a resolution that students should not receive extra work over breaks. The resolution strongly discouraged homework and projects that "necessitate... academic work for students" over breaks as they should be allowed to pace themselves and have rest and relaxation. (Rae, 2011) Nevertheless, there is a general assumption that homework will assist students in successfully completing coursework and lead to graduation.

Investigations of the influence of homework on final college course grades have been conducted for such courses as elementary Spanish (Brender, 1996), no course specified (Bembenutty & White, 2012), introductory physics (Lazarova, 2015), educational psychology (Galyon, Blondin, Gorbes, & Williams, 2013; Kitsantas & Zimmerman, 2009), mathematics (Cartledge & Sasser, 1981), economics (Chulkov, 2008; Durr, 1999), introductory management science (D'Souza & Maheshwari, 2010), and courses in the College of Environmental Design (Alsosary, 1995). There were no standardized measure of homework in these studies which makes comparisons of the studies difficult. Some of the studies contained self-reported information (Barkley, 2006; Kitsantas & Zimmerman, 2008), maintaining unsupervised logs (Bembenutty & White, 2013), no description (Aldosary, 1995), graded paper and online homework (Lazarova, 2015), earned extra points by just handing homework in (Brender, 1996), offered homework opportunities (Durr, 1999), and graded homework (Cartlege & Sasser, 2081; D'Souza & Maheshwari, 2010; Galyon, Blondin, Forbes, Williams, 2013). In addition, factors other than homework were included in many of the investigations.

In several of the studies, self-reported homework behavior was the method used to study the influence of homework on final grades. In the Barkley (2006) investigation, homework was self-reported and based on hours of study time. His other variables included assignment, quizzes, midterm exam and final exams. One of his findings was that "[f]inal examination grades appear to have not been influenced by assignment grades..." (p. 14) Instructors found that the average assignment grade of 83% was lower than they had expected, but higher than the mean grade for the course at 78.93. (Barkley, 2006). In the study conducted by Kitsantas and Zimmerman (2008), students in an introductory educational psychology course completed a survey of self-reported information including hours studied and study habits. They found that there were "important psychological benefits on college students' development...and greater self-efficacy benefits" (p. 107). Nevertheless, the authors noted that over the long-term any causality between homework and other factors such as self-regulating beliefs become increasingly complex when examining the desired outcomes. The study conducted by Bemnutty and White (2013) focused on many of the same factors as Kitsantas and Zimmerman (2008) with self-efficacy and self-regulation playing a significant role on a major project grade. Homework logs were maintained, collected weekly, and recorded after they were submitted to an instructor. If they were not filled out or filled out incorrectly, students were allowed to turn them in late. "On average, students returned four of the six logs." (Bemnutty & White, 2013, p. 84). Their conclusion was that homework can be an important method for increasing student self-regulation and as a result improved final grades.

The investigations that included graded homework as a variable found that graded homework and final grades were positively correlated. D'Souza and Kelwyn (2010) studied the factors that influenced student performance in a management science course. Six variables, including graded homework, were identified. They ranged from student demographics to course structure to student motivation (which included homework). "All homework were collected, graded by the instructor, and returned back to the students." (p. 7). Although much of the homework was not of high quality, it still accounted for approximately 10% of the overall grade. (D'Souza & Kelwyn, 2010). Galyon, Blondin, Forbes, and Williams (2013) examined the influence of critical thinking and accuracy as well completion of homework on final grades. Ten questions were selected from each chapter assigned in the text. Students completed the assignments and earned one point for each correct answer. Their findings were: "Overall, accurate homework completion showed promise as an intervention target for improving student performance and, at times, rivaled critical-thinking ability as the primary predictor of exam performance" (p. 96). The study conducted by Cartledge and Sasser (1981) compared pretest and posttest grades based on students having no homework versus having weekly homework assignments in a college algebra course. The homework assignments were graded and returned to the students. Pretest and posttest were given to determine if students receiving homework assignments learn more than those not receiving assignments. "The findings of the t-test for the posttest results were significant only at the .10 level ($t = 1.744$, $df = 28$, $p < .10$) indicating that students receiving homework assignments are likely to learn more than those not receiving homework assignments" (p. 8).

METHODOLOGY

Many of the studies included in the literature review did not provide their definition of homework as used in their investigations. The definition of homework for this study is: work assigned to be completed outside of class that provides an opportunity for students to practice and master the concepts under study. As noted in the litera-

ture review, the practice component is important to facilitate "embedding" the knowledge in working memory by becoming comfortable and familiar with it resulting in quick retrieval of chunks of information.

Limitations and Characteristics of the Study

As with all studies, this one has limitations and specific characteristics that define it. These are identified below for the purpose of placing the investigations into a clearer context.

1. All courses comprising the data set were taught by same instructor.
2. The instructional method was similar for all the courses, e.g. problem-solving approach.
3. The homework was graded by the instructor.
4. Students repeating the course would be exposed to the same homework.
5. Students may complete homework and not submit it for a grade.
6. Students may receive assistance with homework from professor or other students.
7. Graded homework accounted for 5 – 10% of the final grade.
8. Five years of data for fall and spring semesters from three quantitatively-based courses (Bus 313 Managerial Finance, Bus 330 Quantitative Methods of Management Science, and Bus 325 Advanced Computer Applications) were collected for a total of 554 cases.
9. The attendance rate, for the courses in the study, was very high and it was unusual for students to be absent. Most of the absences are considered "excused" and include such events as athletics and college-sanctioned activities.
10. The homework assignments were paper generated versus online homework.
11. Homework was emphasized and, on occasion, students were dismissed from class if homework was incomplete.
12. Data Set and Variables

The data set consisted of 10 semesters of grades for three quantitatively-based courses from fall 2010 until spring 2014. The three courses (listed above) were taught every semester by the same instructor. The number of cases was 554.

Dependent variable: Final course grade: scale (ratio)

Independent variable: Homework grade: scale (ratio)

Statistical Procedures and Results

Several statistical methods were used to analyze the influence of graded homework on final course grade. The results are provided below with a brief explanation of each.

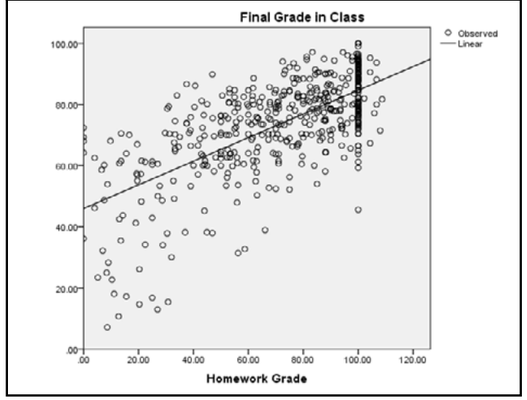
Pearson r

A correlation test was performed to determine if there was a significant relationship between homework grade and final course grade. With a correlation of .680, the relationship between graded homework and final course grade was significant at $p < .000$.

Scatterplot

A scatterplot visually shows the relationship between the independent variable (graded homework grade) and the dependent variable (final course grade). It can be noted there is considerable variability around the regression line. Refer to Figure 1.

Figure 1



Linear Regression

Linear regression was conducted to determine the proportion of the final course grade that is influenced by homework grade. The regression model was: $Y = 48.289 + .370x$ where Y represented the final course grade and x represents the homework grade. R-squared of .463 indicated that graded homework accounts for a significant portion of the final course grade.

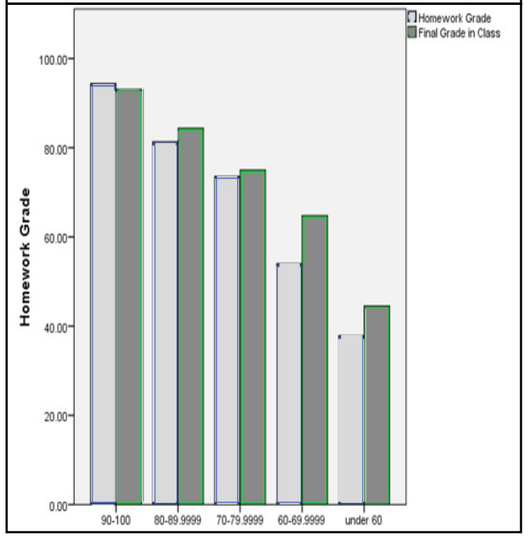
Paired t-test

A paired t-test was conducted to compare the independent variable (homework grade) and the dependent variable (final course grade). It was assumed that there would be no statistical difference. However, the mean for the homework grade was 69.4041 and for final course grade was 73.3423. With a $t = 4.382$, the difference between their means were significant at $p < .000$.

Bar chart

This comparison by letter grade is displayed in a bar chart. Refer to Figure 2. With the exception of a letter grade of A (final course grade between 90%–100%), the homework grade was less than the final course grade.

Figure 2



DISCUSSION

Although not just one factor contributes to a student's final course grade, this study clearly indicates that graded homework plays a significant role in a student's final course grade with an R-squared of .463. As shown in the results, homework grade and final course grade were highly correlated. This is consistent with extended practice via graded homework facilitating the chunking of new information, thereby, freeing up resources for other activities, such as critical thinking for test taking, completing a high quality, comprehensive projects, and improved decision-making. This positive impact of satisfactorily completing homework on final course grade is also shown in the scatterplot of homework grade in relation to final course grade. Refer to Table 1. However, those who did not earn a homework grade of at least 60% saw a major negative impact of their final course grade (final course grade of less than 60%). Refer to Table 2 for the bar chart that compares homework grade to final course grade. This chart shows that final course grade was higher than homework grade with the exception of the letter grade of A.

The paired t-test showed that the means of the homework grades and the final course grades were statistically significant with the final course grade being the higher of the two. The authors noted from the results of the paired t-test that not only was increased accuracy of graded homework correlated with a higher final course grade, there was a greater than a 1.058 increase in the final course grade for every point scored on the homework grade. This finding implies that completing homework at a high level of quality is an efficient and effective tool for student learning as the correlation value of .662—the higher the homework grade, higher the final course grade.

A key to graded homework having a positive impact on the final course grade is for students to understand the importance of homework. It must be stressed by the faculty or graduate assistants responsible for the course. Recommendations for emphasizing the importance of homework include such activities as:

1. grade homework and return to the students,
2. make homework a proportion of the overall final course grade,
3. check homework at the beginning of class with appropriate consequences for uncompleted homework,
4. encourage students to see instructor for assistance with homework as needed,
5. schedule office hours to maximize the time that faculty are available for student assistance,
6. place a statement in the syllabus about the importance of homework,
7. explain the impact of homework on final course grade,

8. collaborate with the academic resource center to find qualified tutors, and
9. have some type of homework assignment after every class period that corresponds to the concepts being taught.

With the democratization of higher education and the current state of inadequate, academic preparation at the elementary and secondary level, college faculty are exploring ways to facilitate the development of automaticity of skills and abilities. Research strongly suggests that this is achieved through chunking which is the result of repetition. This is where graded homework plays an important role. However, repetition should be of the sort that prompts automatic retrieval of the concepts under study by allowing working memory to be freed up for resources to be used for high-order abilities.

The completion of homework at a high level is not only an efficient tool for facilitating mastery of the concepts, but may promote confidence in students that encourages them to tackle what they view as difficult material, especially quantitatively-based subjects. For many of our students, this would be a major step in performing satisfactorily in their classes. Although grading homework does consume resources—faculty grading time—the return on this investment may result in a substantial payoff—student retention and graduation. As software continues to be developed to grade assignments, this task will consume less of the faculty's time while providing an efficient and effective tool for student learning.

FUTURE RESEARCH

As Lehner, (2008) expressed in her study, students must have confidence to fully understand concepts of algebra. Certainly, the role of graded homework in developing confidence in students needs to be further explored. This is especially true in quantitatively-based courses. Math anxiety is real and destructive for student learning and by the time they arrive at college it has become difficult to address. A document from the Math Center at Texas A&M (n.d.) states: "Math anxiety has become so prevalent on college campus that many schools have designed special counseling programs to help math anxious students." (para. 2). Any pedagogical technique that can improve their confidence will positively impact their journey to graduation. Studying the impact of completing graded homework for specific groups needs to be considered. As more and more of students with "special needs" and inadequate math skills (Goodman, Sands, & Coley, 2015) enter in our classes, there is an obligation to them to find ways to advance their learning. Students must have a positive return on their investment (cost of college and opportunity costs) to continue to remain until graduation. Implementing a system of graded homework with a strong emphasis by the instructor may aid in this endeavor.

CONCLUSION

The results of this study are consistent with Galyon, Blondin, Forbes, and Williams (2013) findings that graded homework was a significant predictor of grades. As students continue to enter higher education under-prepared in quantitatively-based skills and standards must be maintained to advance toward graduation, experimentation with the impact of graded homework on final grades provides a viable option for improvement of final course grades. This state of a lack of math proficiency with our current students relates closely with students struggling with math disabilities. (Zhang, et al., 2012). If chunking, as the result of repetitive homework, has a positive effect on students who have developed a disdain for or anxiety of math, can efficiently overcome these conflicts, the solution may be relatively simple. As was indicated from the ETS report (Goodman, Sands, & Coley, 2015), it is imperative that American regain its educational strength for continued success professionally and personally for individuals and as a collective.

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Developing a Creativity and Problem Solving Course In Support of the Information Systems Curriculum

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ABSTRACT

This paper looks at and assesses the development and implementation of a problem solving and creativity class for the purpose of providing a basis for a Business Informatics curriculum. The development was fueled by the desire to create a broad based class that 1.) Familiarized students to the underlying concepts of problem solving; 2. Introduced students to problem solving and creativity techniques; and, 3. Could act as a foundational basis for the 2010 AIS Information Systems curriculum (Topi et al., 2010). One student learning goal of the class is to have students be able to describe at least five problem solving methods or activities. Results show students satisfied this short term goal and provide support for a claim of more long term learning. The paper ends with a discussion concerning the potential for integration of problem solving and creativity into a business information systems curriculum.

OVERVIEW

The 21st century workplace needs employees with critical thinking and problem solving skills. (Partnerships for 21st Century Skills, 2008a, 2008b). In fact, 2,115 managers rated "critical thinking" as the second most desirable skill set when it comes to employee development, talent management, and succession planning (AMA 2010). In addition, three out of four of these same managers surveyed in 2010, believed the skill set would become more important 3 to 5 years in the future – targeting 2015.

Isaksen and Akkermans (2011) point out that as the world has changed through innovation and technological progress, the ability to be creative and adapt has become an essential "survival" skill. In this sense, the ability to solve problems is becoming as foundational of a skill as written communication, math skills, and teamwork for employers (Boyer Commission, 1995). As organizations value these characteristics more and more, this valuation creates a new set of requirements for educational programs. At least two studies, "Principles for Good Practice in Undergraduate Education" (Chickering and Gamson, 1987) and "What Research Says About Improving Undergraduate Education" (AAHE, 1996), discuss the problem solving and creativity characteristics as components of a student learning environment. Specifically, these position papers point to characteristics desirable for quality instruction including: more active learning as well as integrating education with experience.

Business programs are not exempt from this change. In fact, the environment in which business schools operate has changed dramatically. Influential stakeholders such as accrediting bodies, employers, and students are generating new stresses on business schools to be more responsive to their needs; some of which are in conflict with each other. In a key 1988 report to the American Assembly of

Collegiate Schools of Business (AACSB) report, Porter and McKibbin (1988) indicated that there was too little emphasis in the following areas: people skills; communication skills; creative problem-solving; the importance of the external environment; the global aspects of business; and business ethics. The results of another study, entitled *Five Years Out*, (Louis, 1990) paralleled those of the AACSB study wherein MBA students felt that their degree had been deficient in some of these same areas. Further, some "visionists" make the case that schools and curriculum actually are "educating [students] out of creativity" work against the factors that foster creativity (TED Conferences, 2006).

The gap between between academia's "espoused theory" and academia's "theory in use" is real. (Trauth, Farwell, & Lee, 1993; Barr and Tagg, 1995; Bailey and Mitchell, 2007; Clinebell and Clinebell, 2008) Essentially, when evaluated, the idea of teaching more real-world business concepts, the "espoused theory" promised, was not being delivered, ("the theory in use") by business schools. Business interviews (Fletcher, 2007), trade publications, (*ComputerWorld* Ouellette, 1998; *Strategy and Business*, Doria et al. 2003), and recent research Barrett and Tolbert (2014) continuously confirm that these concerns for business school educations linger.

Addressing this gap is important. Businesses must get employees with the needed skills and students need to have adequate skills for the employers to rely on. The business world remains an environment where employers explicitly express this desire for employees with well-rounded, broad-based technical skills complemented with soft skills (Bailey and Stefaniak, 2002; Kung, Tang, & Zang, 2006; Martz and Cata, 2008). The business world also explicitly rewards the problem solving skill set. A 2011 Canadian study (Ottawa, 2011) which looked at problem solving and the labor force found that "individuals with high scores in problem solving are more likely to be in the labour force and are even more likely to be employed than persons with low skills."

Many business schools have responded to these complaints and concerns by changing their curricula to provide more active, experiential learning opportunities for their students (Greising, 1989). This trend in business schools toward participatory, collaborative methods of instruction parallels a pervasive trend in higher education. The changes may be in part a reaction to recent reports indicating that students must be actively involved and engaged to facilitate the learning process (Goodsell, Maher, & Tinto, 1992; Johnson, Johnson, & Smith et al, 1991; Light, 1992; Nicastro and Jones, 1994). In turn, instructors are now trying (Argelagos and Pifarre, 2012) and being encouraged to adopt new teaching methods (ALA, 2000; Fulbright, 2014).

Stipulating that creativity and problem solving activities have been identified as desirable characteristics in the workplace by a very broad base of employers across multiple industries, the remainder of this paper presents the results of one attempt to develop a class that helps induce these characteristics and suggests the classes role in foundational core values of business information systems education.

Problem Solving & Creativity

When educators look for core curricular items, mathematics, written communication, verbal communication, teamwork, etc. receive attention as foundational skills. Lately, problem solving and creativity have risen to a higher level of interest as the activities of innovation and entrepreneurship are seen as growing drivers for jobs and careers. Lewis (2009) laments the need for more creativity in the high school curriculum. Couger (1996) argues for more creativity in the college curriculum and corresponding management training courses. Schank (1995) channels 1916 educational reformer, James Dewey, when he argues for more "learn by doing" in the classroom. Clearly, these skills and activities can be seen as highly interdependent. It is this interdependence that supports treating problem solving and creativity as part of the foundational skills necessary for a 21st century curriculum. If a curriculum is to make itself available for this change, there must be a way to expose students to the underlying concepts and usage early in the curriculum.

The stated purpose of the class used in this study was to provide students an introduction to general problem solving and creativity techniques. As a college-level course, this class was to be more than a simple inventory process for learning and parroting techniques. When proposed, its design included lectures, readings, and presentations included to the conceptual underpinnings of creativity and problem solving. Exemplar conceptual models for problem solving such as Churchman's Systems Approach (1968), Kepner Tregoe's Situation Analysis (1965), Adam's Conceptual Blockbusting (2001), deBono's Lateral Thinking (1970), and Jonassen's "structuredness" continuum (2004) were outlined and presented. Classical views of how the mind works and decisions are made such as Minsky's Society of the Mind (1988), Saaty's (2000), Newell and Simon's discussions on thinking (1972), Buzan's Radiant Thinking (1996), and Piaget's (1929) and Papert's observations (1980) on early childhood learning contributed to the background readings and lectures.

Themes and activities in problem solving were also reviewed. For example, the basic steps of gathering facts, sorting facts, and "illumination" provided one such theme (Whiting, 1961). Other authors provided more background on the steps for gathering and sorting facts. Examples abound. Cowan's (1986) clarification and categorization; Polya's (1957) decomposing and recombining operations of the mind; DeBono's (1970) "lumpers and splitters"; Churchman's alternative assessment (1968); Warfield's pi-sigma process (1976); are base examples. The course included discussion of problems (dysfunctions) in problem solving such as those documented by Kahneman, Slovic, & Tversky (1982) and problems with decision making such as GroupThink (Whyte, 1952, Janis, 1972). An attempt was made to have the classroom demonstrate the ideas suggested for a creative environment. Most lectures started with the class working an ice breaker question or problem. (Poundstone 2003, Wuzzles, 2013). These provided the opportunity to have students practice some of the techniques being discussed. Table 1 identifies some of the techniques embedded in the course by review, covered in a lecture or reading on the technique; demonstration (demo), hands-on use of the technique by student in class or homework; or, testing, the explicit request for recall through graded test question or homework.

Table 1
Problem Solving & Creativity Techniques

Technique	Review	Demo	Testing
6 Hats Thinking	x	x	x
Algorithms	x	x	x
Analytical Hierarchy Process	x	x	
Blockbusting	x		
Boundary Examination	x	x	
Brainstorming	x	x	
Bug List	x	x	
Causal Diagrams	x	x	
Crawford Blue Slip	x	x	
Critical Success Factors	x		
Decision Matrix	x	x	
Decision Tree	x	x	x
Duncker Diagrams	x	x	x
Expected Value Table	x	x	
Fishbone Technique	x	x	
Five P's (Blanchard & Peale)	x		
Flowcharting	x	x	x
Force Field Analysis	x	x	
Goal / Wish	x	x	
Interrogatories	x	x	
Kepner-Tregoe Situation Analysis	x	x	x
Lotus Blossom	x	x	
Mind Mapping	x	x	x
Nominal Group Technique	x	x	
PERT /CPM	x	x	x
Problem Reversal	x	x	
Statement Restatement	x		
SOLVE	x	x	x
SWOT	x		
Random Stimulation (Whack on the Side of the Head)	x	x	
Wildest Idea	x	x	
Wishful Thinking	x	x	
Z-Scores	x	x	

Hiam 1990; Couger 1995; Adams 2001; Von Oech 1983; Van deVen & Delbecq 1974; Whiting 1961; Buzan 1996; Rockart 1982; Blanchard & Peale; 1988.

Problem Based Learning

Originating from medical school practices, Problem Based Learning (PBL) has been adjusted and configured to many other areas of education including business (Martz and Shepherd 2005), K-12 education (Hunt, Lockewood-Cooke, & Kelly, 2010; Hmelo-Silver, 2004), and STEM programs (e.g., Cooper & Heaverlo, 2013; Davis, Lockewood-Cooke, & Hunt, 2011; Hunt et al., 2010). Simply, PBL at its core is "...an instructional tool that uses problems as the context for students to acquire knowledge..." Gijselaers (1995). The key components in this technique are the problem and the context; the problem provides the stimulus and the context provides the environment for understanding. Piaget (1929) argued that the learning process and what is learned becomes a collective unit. At the physiological level, Saaty (2000) contends that memory is stored according to meaning. The class activities then become the way for students to assign meaning.

Cognitive researchers believe that the brain may combine related memories into more efficient structures in order to optimize recall and processing. The concept of scripts (Schank and Abelson 1977), schemata (Thorndyke and Hayes-Roth, 1979), templates (Sanderlands, Ashford, & Dutton, 1983), and self-enacting response sequences (Roby 1966) exemplify this area of thinking. Once stored,

scientists believe we tap into these structures with thought processing techniques such as analogies and metaphors. Schank (1995) suggests a process called analogical mappings wherein the inquirer asks how the current problem is similar to other problems known by the subject. Couger's (1995) Analogy / Metaphor technique uses analogy as a structured creativity inducing technique. Minsky (1988) reduces the definition of a metaphor to "that which allows us to replace one kind of thought with another." The potential for this strategy has not been lost on real world problem solving groups. 3M's "strategic stories" (Shaw, Brown, & Bromiley, 1998) and Shell Oil Company's (Hiam, 1990) scenario planning methodologies originate from the concept that problem solving groups can learn from analogies.

In Seymour Papert's problem solving world in *Mindstorms*, subjects developed models for problem solving from applying their current skills to the surrounding environment. The subject would then adapt their skills to enhance his or her solutions thereby acquiring new skills. This process of using current skills within a problem environment to develop new skills is what Papert (1980) termed appropriation. For our purposes, a PBL environment must encourage and enable its participants to "appropriate" new knowledge by using their current knowledge and skills.

In summary, Problem Based Learning works by providing the student with an environment in which that student can create and store associated memories and meanings. Ideally, these experiences evolve into behaviors or decision making processes that can be recalled and used when needed. Ultimately, to create an effective Problem Based Learning situation, we are charged with 1.) Introducing tools to students for new skills and techniques 2.) Creating a problem environment whereby the student can appropriate the skills and 3.) Helping students effectively store and retrieve their new appropriated skills.

DATA COLLECTION

The study was planned as part of piloting a new class – Introduction to Problem Solving and Creativity – in the General Education program at Northern Kentucky University. While the home department is Business Informatics, the course was proposed as a generic, freshman level class with no other college-level course prerequisites. No courses were prerequisites. The general idea for this lower level, freshman course had synthesized from the general needs for problem solving techniques and creativity that seemed deficient in students' later coursework. The specific idea of the course was to provide students exposure to problem solving and creativity techniques that could be tools for future use in his or her college career and beyond. The course was proposed in summer 2012; accepted as a pilot course by the University Curriculum Committee; and implemented in Spring 2013.

The course format was two day per week for 75 minutes classes. Three tests, 10 homework assignments and one group presentation were designed into the format. A book, readings, in-class exercises, and PowerPoint presentations represented the materials for the course. The evaluation activities for the course included, three tests, 10 homework assignments, and one group presentation. Twenty students enrolled in the class in January; seventeen completed the course and received a grade in May.

Research Methodology

The methodology undertaken here combines action science (Argyris et al. 1985) with the field and case study approaches (McGrath, Martin, & Kukla, 1984; Eisenhardt, 1989; Yin, 1991). The ultimate goal of this methodology, as with other action inquiry strategies, is to gather data and information for critical reflection (Ellis and Kiely, 2000). According to McGrath (1994), the field study "works within an ongoing natural system as unobtrusively as possible" (p. 157) to observe and gather its information. This compromise method is appropriate for this study because it 1.) Allows the system (class) to operate as it would naturally; 2.) Gathers the data as part of the class; and 3.) Recognizes that the active participation of the researcher may provide unique opportunities for observation and insights.

Instruments

Treffinger, Sleby, and Isaksen (2008) reviewed 50 years of research and development on problem solving tools and processes. Based on that review, they argue that one of the keys to learning creative problem solving starts with the understanding of one's own problem solving style. This idea was incorporated into the assessment of the class by looking for changes in problem solving style that may be attributable to the class. Two problem solving style instruments with extensive supporting research were adopted as pre and post-test measures: CREAX profile (CREAX 2014) and Rowe and Mason's Decision Style Inventory (Rowe & Mason, 1987).

Creativity self-assessment

CREAX is an innovation consulting firm with a worldwide presence. They have developed, and offer for free, a Creativity Self-Assessment questionnaire (CREAX 2014). The web assessment asks participants for some categorization data (age, country, level of schooling, industry, administrative role, years worked) and takes the subject through 40 questions in an effort to ultimately map a personal score compared to others – globally – that have taken the survey. For our purposes, the students in the class were asked to complete the questionnaire and provide their scores as one of three self-assessments in the first class. We asked all students to use the same parameters for qualifications (other), industry (other), and administrative role (other) when filling in the questionnaire to assure comparability. At the end of the semester, the students completed the survey again with the same parameters and provided their scores.

Decision style inventory

The Decision Style Inventory (DSI) was based upon a stream of research by Alan Rowe and Richard Mason (1987). The DSI uses a 20 question, forced-choice questionnaire. Each question has four answers which the subject rates exclusively as an 8, 4, 2, or 1; each rating can be used only once across the four answers to the question. The answers are in columns that when added up create a rating for the subject across four decision making styles; Analytical, Behavioral, Conceptual, and Directive. Each of these styles has a short anecdotal description that summarizes it. The subjects are able to compare their own results with Rowe and Mason's results, collected and compiled from over 2000 people, which provides the basis for their book entitled: *Managing with Style*. Comparing one's results to the averages, the subject can identify his or her dominant decision style and possibly a backup style. Rowe and Mason's work goes much deeper as they work to combine and categorize the decision styles. In the end, no single decision style is declared superior to the others, but the DSI as a whole is used as a means of self-awareness for each student. The DSI assessment was completed by the students at the beginning of the class and again at the end. Any changes in decision style ratings could then be evaluated.

RESULTS

As described above, students were requested to take the CREAX creativity self-assessment both at the beginning and at the end of the course. This web-based profile tool provides a score and radar chart as an attempt to quantify "creativity". Sixteen students took the survey at the beginning of class and 12 took it at the end. CREAX.com publishes the average of all people taking the survey (with the assigned characteristics) as 62.44. For our class, the pre-class average was 57.18 and the post class average was 63.55. The differences imply that the student's creativity profiles increased over the semester from below the average to above the average. Further analysis was available since the students labeled their profiles when they sub-

Table 2
CREAX Results

Pre		Post		Sign.
N	Avg.	N	Avg.	
16	57.176	12	63.559	
POST minus PRE			6.383	0.17138
11 Pairs	58.777	11 Paired	64.580	
			5.81	.005038*
Significant at the .05 level (Paired t-Test)				

TABLE 3
DSI RESULTS

Pre					Post					Sign
N	D	A	C	B	N	D	A	C	B	
16	64.8	80.87	83.40	70.93	11	70.91	87.73	84.55	56.55	
16	145.67		154.33		11	158.64		141.10		
POST minus PRE						6.11	6.86	1.15	-14.38	.345 (1)
						12.97		-13.23		.408 (1)
(1) No significant difference found (Mann-Whitney) on change in Behavioral only or on Conceptual + Behavioral										

mitted. Eleven students completed both the pre-class and post-class questionnaire; their pre-class average was 58.77 and this subgroup's post class average was 64.58, an average increase of 5.81. Interestingly, when a paired t-Test on this subset is calculated, the difference proves significant at the .01 level.

The Decision Style Inventory (DSI) results show that both the directive and analytical styles gained with a marked decrease in the behavioral style when the pre and post averages are compared. These shifts seem a reasonable result if the students did actually learn problem solving and creativity techniques because Rowe and Mason identified the analytical and directive styles as "left brain" or analytical thinking. Further paired analysis was hampered as the instruments were not all consistently labeled by the students.

An end of semester class questionnaire provided additional data for analysis. A preliminary analysis shows a fairly high overall rating for the class structure (4.53) and usefulness (4.29). A high percentage, 70% (12/17) of the students reported using the techniques and ideas from this class in other classes and situations outside of school. Another key data point from the questionnaire is the number of problem solving techniques the students reported "learning about," (11.12) and being "able to apply," (7.53).

Last, a final exam question adds additional data. The question required students to list and to identify 5 techniques and provided bonus points for up to 5 additional techniques. The student learning outcome for the course was met as eighty-eight percent (88%) (15/17) successfully identified five or more techniques for the final. Further analysis showed that six students were able to identify 10 techniques while only 2 students were not able to identify the required 5 techniques.

In the aggregate, the results show that students were able to recall – list and describe – the targeted number of techniques. There are some additional indicators that the learning is more long term and substantial. Independently developed instruments, CREAX and DSI, showed some indication of long term change in creativity or decision making characteristics. Over 70% of the students completing the class reported appropriating and using a technique from the class in other classes or other non-class situations. While more formal data collection and analysis is necessary, these initial results are promising.

DISCUSSION AND CRITICAL REFLECTION

In the end, we have multiple data points leaning toward a successful class; defined as students learning 5 of more problem solving and creativity techniques. The pre and post measures for the CREAX self-assessment and DSI instruments all point toward improvement in the measure of creativity or decision making style between the beginning and the of the semester. The DSI showed a marked tradeoff for the students toward the analytical side of the measurement. The CREAX self-assessment tool's change was also consistent with the students become "more creative." Interestingly, with a test for those students providing both pre and post assessments (N=11), a significant change in their score can be observed. This result is further supported as most, (88%), of the students met or exceeded the final exam question targeting this student learning outcome specifically. In summary, the results position the course as a viable course in problem solving and creativity (Martz, Hughes, & Braun, under review). The crux of this current discussion is to position the course in support of a business informatics curriculum.

Remembering one stated advantage of the case study methodology deployed here is that the active participation of the researchers may provide unique opportunities for observation and insights, we end this paper with just such a discussion concerning the applicability of this class as supporting, at the core, the AIS 2010 information systems curriculum.

Tying the Course to 2010 IS Curriculum

While this study concentrates its analysis at the course level, the course is positioned to be a foundation for higher level courses. For example, problem solving concepts can be and, based upon the early literature review, should be applied to upper division courses in a business information systems curriculum. In fact, critical thinking and creativity are listed as recommended "high level capabilities" in the 2010 IS Curriculum Guidelines (Topi et al., 2010). Table 4 shows examples of how the problem solving and creativity techniques from Table 1 can map to the seven core courses recommended for an Information Systems curriculum.

This study discusses the development and testing of a problem solving and creativity class which is based on the premises around Problem Based Learning (PBL) and active learning. The course design concentrated on introducing students to techniques for problem solving. The goal was to introduce students to the techniques in such a way that ultimately, he or she could list and identify at least five techniques. In total, the results suggest the active learning design accomplished the goal to better engage students to "appropriate" basic problem solving. In the end, 88% of the students satisfied this goal. In addition, there are indicators of long term learning based upon

Table 4
IS 2010 Curriculum Core Courses
(Topi, et al., 2010)

Core Course	Problem Solving & Creativity Appropriation
Foundations of Information Systems	The broad concepts of Information as a Resource and Systems Thinking taught in the course map well to the underpinnings called for in the guidelines "general model of domain." (Topi, et al. 2010, p22). The more specific techniques enter the picture, in context, as the traditional survey course proceeds through its introduction of systems and development concepts, technology acquisition, types of application software, etc.
Data and Information Management	Algorithms and the fundamental graphical techniques used in flowcharting data and information flows will help prepare students for the conceptual data modeling outlined in the guidelines (p. 40). Many of the techniques such as the Analytical Hierarchy Process will help build the basis for and facilitate the discussion of decision support systems.
Enterprise Architecture	Structured interrogation techniques such as critical success factors or structured interrogatories help students explore key interdependencies and issues during information system implementation with a business perspective. Evaluation techniques such the Kepner-Tregoe situation analysis or goal/wish to identify selection of enterprise solutions.
IT Infrastructure	Many of the problem solving techniques lend themselves to quality assurance and risk management topics. Bug List, Brainstorming, and statement restatement, are techniques that help expose root problems. Decision Trees, expected value tables, and decision matrices, all help structure and quantify the root problems for decision making.
IS Project Management	PERT/CPM, Gantt Charts, z-values, are all key quantitative foundations critical to the topic of project management; the understanding and use of these is fundamental to passing the Project Management Professional (PMP) certification exam. In addition, problem solving and creativity techniques geared to encourage team work such as Nominal Group Technique, Analytical Hierarchy Process, blockbusting, etc. provide students tools to work in teams on class projects.
Systems Analysis and Design	The underlying problem solving premise of decomposing and recomposing to solve a problem is central to the area of requirement definition. Analysis techniques such as the wishful thinking, wildest idea, six hat thinking, provide building blocks for synthesis tools and techniques such as causal diagrams, force field analysis, mind mapping, etc. prepare students to specify the requirements for information systems solutions (p. 51)
IS Strategy, Management, and Acquisition	The high level evaluation techniques (SWOT, SOLVE, CSF, Lotus Blossom, Fishbone, Kepner-Tregoe) that start analyzing problems at high levels and drill down provide a set of tools for critically assessing information systems with varying perspectives. Again the systems approach and the underlying characteristics taught from a problem solving approach can prepare students to provide detailed, thoughtful analysis and synthesis.

decision style inventories and creativity indices. As an exploratory field study, this research suggests that the model can provide both explicit and implicit learning of problem solving and creativity techniques (Martz et al., under review). Finally, this paper offers a mapping of the course to the 2010 IS Curriculum core showing how the problem solving techniques within the course can support the suggested curriculum.

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Non-classroom Use of "Presentation Software" in Accelerated Classes: Student Use and Perceptions of Value

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ABSTRACT

Numerous articles found in education literature discuss the advantages and disadvantages of using "presentation" software to deliver critical course content to students. Frequently the perceived value of the use of software such as PowerPoint is dependent upon how it is used, for instance, the extent to which bells and whistles are incorporated into the presentation. Extensive use of color, animation and variety can keep students interested and engaged, which, it is sometimes claimed, results in expanded student learning. However, these same techniques have been criticized for taking away from the significance of the content and resulting in students who become passive learners at best. This article summarizes the results of a study designed to assess the value of using "presentation" software outside of the classroom where the course is offered face-to-face but in an accelerated (i.e., abbreviated time) format. Specifically, results of a survey taken of accounting students completing a required federal individual income course over eight weeks are reported, where instructor-prepared PowerPoint slides were made available to students but not covered in class.

INTRODUCTION

Higher education places considerable emphasis today on student learning specifically as it pertains to assessment. As a result, a significant number of educators, in the context of both teaching and research, seem transfixed with the desire and perhaps the need to focus attention on appropriate pedagogy. Since much rides on the instructor's performance in the classroom, this focus is generally justified. As discussed later in the review of relevant literature, there is considerable research on what constitutes quality teaching and the role that technology, including presentation software, plays in its composition. Yet as one might expect, there is little consensus as to either of these focal points. Of significance, however, is that none of the prior research found has directly considered the intersection of the two related themes within the context of an accelerated course, i.e., one that is taught over roughly one-half of a standard (i.e., 16 week) semester, which serves as the motivation for this particular study. As a further twist to this study, the "presentation" software was only made available to students outside of the classroom and not as a tool to present material in class.

Thus, before embarking on a review of the prior research, it may be useful to describe the circumstances serving as the impetus for the study and which is the basis for this article. At the university where the authors work, several senior level and graduate courses in accounting are "blocked," meaning they are offered during the first or second (more typical) half of the spring semester in order

to facilitate internships taken by students, usually for academic credit and usually with public accounting firms. It is common at the university to place thirty or more students annually with firms within the geographical region and beyond from early January through mid-March to help with the busy audit and, to a lesser degree, tax seasons. When students return from their internships, they will take one or more classes (often for financial aid purposes) over the second half of the semester; a three credit hour "block" course will meet six hours a week, double the weekly coverage of a standard full-semester class. This by itself adds considerably to the burden imposed on students to keep current, and if they are enrolled in multiple block classes which is frequently the case, the workload is compounded. Students who do not register for an internship during the semester in question must also take the block class or classes as no other option for these classes is usually available; if they are registered for full-semester classes as well, they often must contend with the reality of having a majority of the work (term papers or presentations, for example) in these classes being assigned closer to the end of the academic term. Thus, regardless of whether a student has an internship or not, there is a workload imbalance which is typically not well received by all of them, and raises a concern amongst faculty members that student learning is being compromised due to information overload. Student evaluations of these courses and the instructors also tend to suffer, which can later cause related issues for them when they are considered for salary adjustment, contract renewal, promotion and/or tenure.

PRIOR RESEARCH

While assessment is concerned with student learning, its measurement can be somewhat subjective in nature given what is being assessed, and efforts to be more objective frequently result in rigidity with no added insightfulness in terms of outcome or useful information. Similarly, what constitutes good teaching is also open to multiple definitions and subject to individual bias. However, teaching prowess is often used as a proxy for learning. Specifically, good teaching is sometimes assumed to lead to enhanced student mastery of the material. This potential connection is convenient since what constitutes good teaching has been a favorite of researchers for many years. In 1953, Guthrie reported that students most frequently associated five features with good teaching: clear and understandable explanations; an active, personal interest in the progress of the class; a friendly and sympathetic manner, an interest and enthusiasm in the subject, and the ability to get students interested in the subject. Fifty years later, Witcher et al (2003) reported that students found teachers possessing the following characteristics to be the most effective: student-centered, knowledgeable about the subject matter, professional, enthusiastic about teaching, effective at communication, accessible, competent at instruction, fair and respectful, and being a provider of adequate performance feedback. The findings of Korte, Lavin and Davies (2013) were similar; content expertise was identified as having the greatest perceived contribution to good teaching, followed by strong communication skills, class preparedness, approachability, fairness, and respectfulness. On the opposite end of the scale, the following characteristics were found by Korte et al (2013) as contributing the least to good teaching: rank/title, professional attire, established research record, strict adherence to course material, and rigor. Of note, technological proficiency was ranked 27th out of the 35 traits examined in this 2013 study in terms of its contribution to good teaching.

Technology today is widely used in all aspects of life and has reached the point where its absence is conspicuous. This is true in academia as well and has been the case for years; Christensen (1999) found that students and their parents expect technology to be used. Some believe this phenomenon has been positive, and possesses the potential to make the learning environment more active and more subject to the control of the learner (Lowerison, Sclater, Schmid & Abrami, 2006). Likewise, computer technology can support diverse student capacities by offering alternative methods to process information (McCombs, 2000). But the overall value of technology is dependent upon how it is used, by whom, and for what purpose (Burbules & Callister, 2000).

PowerPoint, an example of presentation software, was originally developed for use in business and industry, but is also now firmly entrenched in academia and is viewed as a tool to deliver content (Szabo & Hastings, 2000). Its use in the classroom has been credited with adding order and pace to a lecture (Hlynka & Mason, 1998) and being helpful to the instructor in presenting clear summaries (Lowry, 1999). Korte, Davies and Lavin (2008) found that students believe they learn more when technology is used, have greater appreciation for the importance of the material being covered as well as for the instructor's effort in teaching the course. According to Clark (2008), weaknesses associated with boring lectures can also be overcome by using technology.

> The creative use of information and communication technology (ICT), especially presentation software such as PowerPoint, can bring renewed energy and changed direction to the lecture format. Better learning outcomes can be achieved in the process by stimulating interest, improving note-taking and promoting higher-order learning. ICT can creatively enhance the lecture and help bridge the divide between direct and constructivist learning models. The key element in the use of PowerPoint as a presentation tool is its potential to increase and maintain student interest and attention to the lecture when combined with active teaching and student involvement. (Clark, 2008)

Reinhardt (1999) reported that a majority of her students indicated that the PowerPoint presentations helped them remember the material, made the lectures more interesting and helped them pay attention.

But reliance on technology in education has not been viewed positively by everyone. Coursey (2003) believes technology such as PowerPoint has replaced "clear thought with unnecessary animations, serious ideas with ten-word bullet points, substance with tacky, confusing style." Likewise, Cyphert (2004) was critical of PowerPoint for its detrimental impact on dialogue, interaction and thoughtful consideration of ideas. Reinhardt (1999) expressed concern that the lecture outlines served as a substitute for taking notes and for attending class, weren't stimulating, and caused some students to become spectators rather than participants. Given this divergence of opinion, it can perhaps only be said that many would agree with Laurillard (2002) that technology-based tools must be accompanied by appropriate pedagogy to be effective. Or, in other words, PowerPoint must "support effective teaching" (Walsh & Frontczak, 2003).

PRESENT STUDY

In spring 2014, 46 students taking an accelerated (i.e., eight week) senior-level federal individual income tax course at a mid-sized Midwest university were provided access to 165 PowerPoint slides as part of the course materials by the instructor for the very first time. All of the slides were accessible at the start of the course, covered content considered the most important by the instructor, and spanned 12 chapters and 80 topics. While these slides were not covered during class times, the students were told that the slides were available to be used however they wanted, including not at all. Class sessions were organized by having the instructor cover assigned homework problems along with participation from the students, the same way the instructor had generally taught the course for over 20 years. Lectures, when provided, were made part of the discussion of homework problem being analyzed. Students were expected to come to class prepared to discuss the day's assignment; while they were not specifically called on, the instructor asked for volunteers to answer the questions. No points were given for the completion of homework or for participation, although the syllabus provided that participation would be an important determination of borderline final grades. Students were allowed to prepare a one page crib sheet that they could use for the midterm and final examinations. Students, in teams of three, were also required to complete a tax return based on hypothetical information found as part of a problem in the text. At the end of the eight weeks but prior to the final exam, students were given the opportunity to complete a "PowerPoint Slide Usage/Value Survey" in exchange for five bonus points (on top of the 270 points possible, coming from the two exams and tax return project). All 46 of the students completed the questionnaire. Twenty-eight of the students were female, while 18 were male. Thirty-two of the students considered themselves traditional students, while 14 classified themselves as being nontraditional. With respect to grade point average, 13 students reported having a GPA between 3.7 and 4.0, 13 reported a GPA of 3.4 to 3.69, seven indicated they had a GPA of 3.1 to 3.39, nine reported a GPA of 2.8 to 3.09, three responded that their GPA was within the range of 2.4 to 2.79, and one did not answer. At the time they completed the survey, 12 students anticipated receiving an A for the course, while 27 expected to receive a B and seven thought they would receive a C. With respect to these grades, eight of the students reported that they were expecting to earn a higher grade than what they had anticipated prior to the start of the class, while 24 acknowledged their anticipated grade was the same as expected; the remaining 14 indicated they believed their grade would turn out lower than what they had anticipated. In addition to several demographic questions referred to above, students were asked a number of questions with respect to their use of the PowerPoint slides and their perception of their value. The responses to these substantive questions are reported below. However, it should be noted that as a precursor to discussing the results of the survey, 25 (54%) of the students had indicated early in the questionnaire that the use of technology in classes generally "significantly increased" their own learning, while 20 (44%) reported that technology usage "somewhat increased" their learning. Only one student (2%) reported that the use of technology somewhat decreased his or her learning as a general rule. In addition, 11 (24%) of the students indicated that the use of technology generally "significantly positively impacted" their perception of the instructor, while 25 (54%) reported that it had a "somewhat positive impact" on their perception of the instructor, while 10 (22%) reported that technology usage had no impact. The reader again is reminded that while the PowerPoint slides were always accessible to students in the course being studied, they were not used during class time by the instructor.

RESULTS

Students were first asked whether they used the slides during the course of the semester, and 100% replied affirmatively. Most of these students (70%) printed them

off, including 46% who printed off all the slides, 13% who printed off most of them, and 11% who printed about half of them. Most of the students (20) printed off the slides right before a chapter was covered. Of the 30% who did not print them off, almost all of them (93%) indicated that they looked at all of the slides. To provide additional context, the slides were prepared by the instructor and followed the organization of the material found in the text as well as the assigned homework problems. Further, typically 12 to 14 slides were created for each of the covered chapters.

Students were then asked how and when they used the slides, with Table One summarizing the results in percentage terms.

Students were instructed to mark all of the specified uses that applied to them. As can be seen, respondents indicated the most common uses of the provided PowerPoint slides came as they prepared for exams, both with respect to studying for a test and as help in preparing their crib sheet. It also appeared that the survey respondents considered the slides useful during class meetings as a means to organize their class notes and in following the instructor's discussions of the homework problems, as well as to solve homework problems prior to a class session. However, the slides were used less frequently by the students in preparation for covering new material, i.e., prior to or while reading a chapter initially, even though this is when the slides were most frequently accessed for the first time based on the responses received.

Table One
When and How Used
(Percentage Responses by Survey participants)

Prior to reading a chapter, to gain a general understanding of the material	28.26
While reading a chapter, to help identify the most important parts of the material	32.61
After reading a chapter, to help answer homework questions	56.52
During class, as a way to take notes	56.52
During class, as a way to follow along with the instructor's presentation of the material	54.35
After class, as a way to review the material just covered	50.00
Right before a test as a way to study for an exam	82.61
Right before the test to help prepare the crib sheet	76.09
To help complete the tax return project	34.78

As a follow-up, students were then asked how helpful the slides were with respect to their various uses, with Table Two summarizing the results. The percentages shown represent the responses of only those who had previously marked a particular use (as reported in the first table).

Overall, the majority of students who reported a particular use found that the slides were at least somewhat helpful, and often extremely useful. At least 70% of the students acknowledging a specific use found the slides extremely helpful when it came to taking or supplementing their notes, following along in class, reviewing the material after class, studying for the exams and preparing a crib sheet. The value attributed to latter two (helping with tests) are especially noteworthy given the high number of students who used the slides for those purposes as reported in Table One. The slides were less helpful with respect to assisting students with answering homework problems prior to coming to class and in completing the tax return project.

Table Three reports how students perceived the value of the slides in more general terms. Students were asked whether they agreed or disagreed with the following statements, and the extent of their agreement or disagreement.

Overall, students generally perceived that the slides, even though not used during class, made studying for the course and exams more efficient. Likewise, the slides were viewed positively in terms of helping identify the most important concepts. Of significance, most students (97%) considered the slides a beneficial learning tool to at least some extent, and a large percentage (85%) thought they also somewhat contributed to helping them achieve a higher grade. Also of interest although not mentioned in the table, when students were asked whether the instructor should spend more class time reviewing the slides given the nature and pace of the class, the results were as follows: strongly agree, 11%; somewhat agree, 28%; neither agree nor disagree, 37%; somewhat disagree, 22%, and strongly disagree 2%. Thus while almost 40% of the class would have liked the slides to be emphasized more in class, the rest were indifferent or against their increased usage during class time.

Finally, students were asked how helpful the slides were in a block class as compared to in a typical full-semester course. Exactly half of the class reported that the slides were "much more helpful" in the accelerated class, while 28% found them to be somewhat more helpful and 22% found them to be equally as helpful. So although the

Table Two
Helpfulness of Slides
(Percentage Responses by Survey Participants)

	Helpful		
	Extremely	Somewhat	Not
Prior to reading a chapter, to gain a general understanding of the material	55.00	35.00	10.00
While reading a chapter, to help identify the most important parts of the material	50.00	37.50	12.50
After reading a chapter, to help answer homework questions	44.83	55.17	0.00
During class, as a way to take/supplement notes	76.66	16.67	6.67
During class, as a way to follow along with the instructor's presentation of the material	77.42	16.13	6.45
After class, as a way to review the material just covered	70.00	20.00	10.00
Right before test as a way to help study for an exam	72.10	25.58	2.32
Right before the test to help prepare the crib sheet	76.31	18.42	5.27
To help complete the tax return project	19.23	61.54	19.23

Table Three
General Value of Slides
(Percentage Responses by Survey Participants)

	Agree		Neither	Disagree	
	Strongly	Somewhat		Somewhat	Strongly
The slides made studying for the class more efficient	58.70	30.43	8.70	2.17	0.00
The slides made studying for exams more efficient	67.39	26.09	2.17	4.35	0.00
The slides helped identify what content was the most important in this class	60.87	34.78	4.35	0.00	0.00
Overall the slides were a beneficial learning tool	71.74	26.09	0.00	0.00	2.17
The slides helped me achieve a better course grade	43.48	41.30	13.04	2.17	0.00

slides were not used in the accelerated class as a presentation tool, most students found them to be more helpful than when they are used in a full-semester class. Perhaps because of this, all 46 students indicated that the instructor should continue to make the slides available to future classes.

CONCLUSION

Prior research has revealed that presentation software such as PowerPoint has both its supporters and opponents. When used effectively, it can make a class more organized and can help communicate the relative importance of the content. Yet it can also have a detrimental effect on the students' participation in their own learning, causing some to stop taking notes or attending class. In this study, the instructor made self-created PowerPoint slides available to students in an accelerated class as a study aid, but did not utilize them in class. It was hoped that the usage of the slides would focus students' attention on the content the instructor thought was the most important, but would not detract from their engagement in classroom discussions or provide an excuse not to attend or pay attention. The slides were not used to facilitate lectures, which were seldom used due to the problem-oriented nature of the class, i.e., class time was used to solve homework problems assigned in the syllabus. Of note, eight of the students indicated in the questionnaire (administered after the last class but before the final exam) that they always came to class prepared, while 32 reported that they usually came

to class prepared; on the other hand, five students indicated they seldom came to class prepared, while one reported he or she was never prepared before class. Also, one-third (15) of the students (45 of 46) who reported that they took notes during class indicated theirs closely followed the PowerPoint slides, while 20 and 10 students, respectively, indicated that their notes somewhat followed or did not follow the slides. Thus it appears that most of disadvantages normally associated with using presentation software were minimized by not using the slides in class as a way to present the material. Students still took notes and came to class prepared as a general rule.

The results of the questionnaire as reported above suggest that students used the slides in a variety of ways, including preparing for class, taking notes and following along in class, as well as studying for the exams. In fact, reviewing the slides was identified by the respondents as being the third most relied on method to study for the test, only following re-doing homework and reviewing instructor-provided homework answers. In addition, while the slides were generally found to be helpful with respect to all of these uses, their greatest value related to studying for the exam and preparing exam crib sheets; they were also found to be of less help in answering homework problems and completing the tax return project. This wasn't surprising to the instructor, as the slides included a more conceptual discussion of the topics covered and did not offer hints on how to solve particular problems or on how to navigate tax forms.

Students also found the slides to be a beneficial learning tool even though they were not utilized in class, and helped students achieve a better grade in the course, based on their own perceptions. The slides also resulted in students rating both the course and instructor higher in general, as shown in Table Four. Six students (13%) did indicate, however, that they rated the course lower than they otherwise would have due to the instructor's usage of the slides. It is unclear whether this reaction was because the slides were made available at all or because they were used in a way that was less advantageous then they perhaps could have been, for example, as a way to facilitate the presentation of the material.

Table Four
Slide Availability's Impact on Course and Instructor Evaluations (Percentage Responses by Survey Participants)

	Course	Instructor
Higher rating	50.00	58.70
Lower rating	13.04	0.00
No impact on rating	36.96	41.30

There are limitations associated with this study. It involved only one class, i.e., one data point, and did not provide options as to how the slides were used. In other words, the slides were made available to all students outside of the classroom and were not covered by the instructor in the only section of the courses offered. Further, the study was undertaken at an institution where accelerated classes have been offered frequently for a number of years; such offerings may not be common at other institutions. There was also a prior bias amongst the students that technology improved their learning. However, it is believed that the project still contributes to the body of research related to the use of technology in the classroom even if accelerated classes are not commonplace, and it should be noted that a majority of students found the "technology" to be even more helpful than when used in a regular class.

The results of this study provide opportunities for future research. Given differences in how students believe technology generally impacts their learning, further analysis will be undertaken to see how these beliefs impacted their usage of the slide in this particular situation. In addition, the authors are exploring how demographic differences among the respondents have impacted their usage and perceptions of the value of slides, such as gender and grade point average.

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The Relationship between Growth Scores and the Overall Observation Ratings for Teachers in a Public School System in Tennessee

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ABSTRACT

The purpose of this study was to investigate the relationship between the TVAAS growth score given by the Tennessee Department of Education and the overall Tennessee Educator Assessment Model (TEAM) observation rating for teachers in grades 3 through 8. The participating county public school system for this study is located in Northeast Tennessee. Participants were teachers in the school system teaching Math, English/Language Arts, Science, and Social Studies in grades 3 through 8 in 10 elementary schools, 6 middle schools, and 2 K-8 schools. Specifically, this research examined the relationship between the TEAM observation scores and overall TVAAS growth score given to the teacher from the Tennessee Department of Education based upon yearly-standardized test scores. Research reinforced mixed views about the validity and purpose of teacher evaluation systems and the use of Tennessee Value-Added Assessment System. Five research questions guided this study and quantitative data were analyzed using a Pearson correlation, one-way MANOVAs and a one-way ANOVA. Results indicated a moderate positive relationship between a teacher's TEAM observation score and the TVAAS growth score given by the Tennessee Department of Education.

INTRODUCTION

The Tenth Amendment to the United States Constitution states: "The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people." (Tenth Amendment, 1791, para. 1). Because education is not mentioned in the Constitution, it is one of those powers reserved to the states. However the Federal Government has increasingly become involved in public education. The Elementary & Secondary Education Act of 1965 (ESEA) was a Great Society program enacted by the U.S. Congress. The ESEA allocated federal funds for primary and secondary school education. This Act also provided a vehicle to hold schools and states accountable for student achievement (Elementary and Secondary Education Act, 1965).

Public Law 107-110, also known as the No Child Left Behind Act of 2001 (NCLB), was a revision and reauthorization of the ESEA (Public Law 107-110, 2002). The stated purpose of NCLB was a fair, equal, and significant opportunity to obtain a high-quality education. The NCLB law called for children to obtain proficiency on challenging state achievement measures.

The American Reinvestment and Recovery Act (ARRA) of 2009 was enacted by the U.S. Congress to stimulate the economy, support job creation, and invest in critical sectors including education. The ARRA created a platform for educational reform by calling for adoption of standards and assessments, measurement of growth and success, measures to improve teacher quality, and improvement of low-achieving schools (U.S. Department of Education, 2009). The ARRA provided 4.35 billion dollars in a Federal grant program known as Race to the Top. Tennessee was announced as one of the first states to receive Race to the Top grant funds. Tennessee's application, titled First to the Top, included reforms to cur-

riculum standards, new assessment measures, and a new teacher evaluation system (Tennessee Consortium, 2013).

After passage of the First to the Top legislation, Tennessee adopted the Tennessee Educator Assessment Model (TEAM) for teacher evaluations. The TEAM model was different from previous models because it called for an increase in frequency of observations and indicators for teacher performance (Tennessee Educator, 2014). Teachers are also linked to student performance to determine teacher effectiveness through the Tennessee Value-Added Assessment System (TVAAS) and the Tennessee Comprehensive Assessment Program (TCAP). For the first time, Tennessee teachers were given an effectiveness rating determined by observation scores (TEAM), student effect data derived by state assessments for achievement (TCAP), and academic growth (TVAAS).

STATEMENT OF THE PROBLEM

The Tennessee Department of Education now links TEAM observation scores and student achievement data (TVAAS and TCAP). At the conclusion of the 2012-2013 school year, the Department of Education released data for every public school in the state with a number, 0-5, stating how closely TEAM observation scores related to student achievement and growth data according to the Tennessee Value-Added Assessment System. Additional research is needed to assess the relationship between teacher growth scores and teacher observation scores. The purpose of this study is to determine if there is a relationship between the TVAAS growth score given by the Tennessee Department of education and the overall TEAM observation rating for teachers given by system administrators in grades 3 through 8 in a Tennessee school system.

RELATED LITERATURE

Teacher Evaluation in Tennessee

Tennessee's new performance-based teacher evaluation model (TEAM) requires administrators to rate a teacher's performance on lesson planning, classroom environment, lesson standards and objectives, student motivation, lesson structure and pacing, teacher questioning, teacher content knowledge, teacher knowledge of students, the grouping and arrangement of students, academic feedback, activities and materials, student thinking, and student problem solving. The evaluation system requires 50% of the evaluation to be comprised of student achievement data that includes 35% based on student growth measures represented by the Tennessee Value-Added Assessment System (TVAAS) and 15% based upon additional student achievement measures selected by the teacher (Tennessee Department of Education, 2012). Observation scores through the state's TEAM model comprise the other 50% of the evaluation.

Beginning in the summer of 2011 Tennessee provided training for principals and system administrators who would be evaluating teachers. These administrators were required to pass an inter-rater reliability exam in which administrators viewed a video of lessons being delivered by teachers and rated teachers on the TEAM rubrics to ensure that administrators understood the different rating levels of rubric (Tennessee Department of Education, 2012).

Implementation of the evaluation system began with the start of the 2011-2012 school year. As implementation continued through the first semester of the 2011-2012 school year, it became clear that satisfaction with the evaluation system varied considerably from district to district (Tennessee Department of Education, 2012). As a result of negative public reaction to the teacher evaluation system, Tennessee's Governor assigned a panel, the State Collaborative on Reforming Education (SCORE), with the task of conducting an independent review of the evaluation system, including collecting feedback from every school district across the state (Tennessee Department of Education, 2012). As a result of the SCORE report, there were several changes made in the second year of the TEAM evaluation system in Tennessee. Additionally, there was increased district flexibility through the approval of more than 40 plans to further customize the overall evaluation system to fit the needs of individual districts (Tennessee Department of Education, 2013).

Tennessee Value-Added Assessment System

The Tennessee Value-Added Assessment System (TVAAS) was created in 1992 as a component of the Education Improvement Act (Tennessee Department of Education, 2014). TVAAS is based on SAS's Education Value-Added Assessment System. TVAAS is a statistical method that is designed to measure the impact schools and teachers have on their students' academic progress. The TVAAS method uses previous test data to plot a growth pattern for every student in grades three through 12 in Tennessee. Growth is measured by how much gain or progress an individual student or group of students make over time. Under Tennessee's teacher evaluation legislation, value-added scores count for a portion of teachers' overall evaluation scores (Tennessee Department of Education, 2015). Sanders and Horne (1998) stated that the TVAAS model, along with other measures including promotion, attendance, and dropout rates of individual schools, would provide information to create a new system of accountability for Tennessee schools.

Supporters of the value-added models emphasize potential for improving student achievement. Jerald (2009) stated "value-added data provides principals, teachers, and parents with valuable information about students' past and predicted performance and give teachers feedback about the effectiveness of their own classroom instruction" (p.2). Value-added proponents assert that tracking of student achievement and the use of value-added data can help teachers and administrators to meet the individual needs of students.

Some researchers have argued that the TVAAS model does not control for socioeconomic status (SES) and demographic factors that can affect the starting point in student achievement and the rate at which a student learns (Darling-Hammond, 1997; Kupermintz, 2002; Linn, 2001; University of Florida, 2000a; University of Florida, 2000b). Additional criticism has surfaced indicating concern over the use of value-added data to determine teacher tenure, pay, and decisions relating to the continuation of employment (Berliner, 2013; Konstantopoulos, 2014; Yettick, 2014).

In Tennessee a teacher's growth score is calculated by the Tennessee Department of Education. The TVAAS or growth score indicates the amount of growth students assigned to the teacher have demonstrated on state TCAP tests during that testing cycle. Teachers receive ratings of 1 through 5 based upon the percentage of students demonstrating at least 1 year of growth. A teacher whose students have demonstrated 1 year of growth received a score of 3 indicating that the teacher has met the standard. Scores less than a 3 are considered below the standard and scores greater than a 3 are considered exceeding standards.

SAMPLE AND DATA COLLECTION

Two hundred forty teachers in grades three through eight were selected for inclusion in this study. These teachers were selected because they receive teacher effect data based upon courses they are directly responsible for teaching. The teachers were assessed and observed during the 2012-2013 school year with data being reported in September 2013. The participating school system is comprised of 23 schools and serves over 10,000 students in grades Pre-K through 12.

Teacher observation scores and teacher growth scores are reported to school systems by the Tennessee Department of Education annually. After obtaining approval of the Director of Schools from the participating school system, the data were coded by the school system to protect the anonymity of the teachers prior to releasing information. No indentifying information was associated with the growth or observation scores used in this study.

METHOD

This nonexperimental, quantitative study was conducted using a secondary data analysis design. Inferential statistical analyses (Pearson correlation coefficient, ANOVA, MANOVA) were used to answer 5 research questions (Green & Salkind, 2011). IBM-SPSS statistical software was used for the analysis of the data and an alpha level of .05 was used to determine statistical significance.

LIMITATIONS AND DELIMITATIONS

It was assumed that the data that were collected from the state's databases were valid and reliable. It was also assumed that the methodology adequately addressed the research questions. In addition, it was assumed that the statistical tests were appropriate and possessed the necessary power to detect, if present, differences in the variables. This study was delimited to teachers who teach in grades three through eight in the participating school system in Tennessee. Teachers who met all other qualifications but did not had both a TVAAS growth score and a TEAM observation score were excluded from the study. This study was further delimited by the theoretical framework that was selected for the research. The results may not be generalizable to other school systems or other states.

FINDINGS

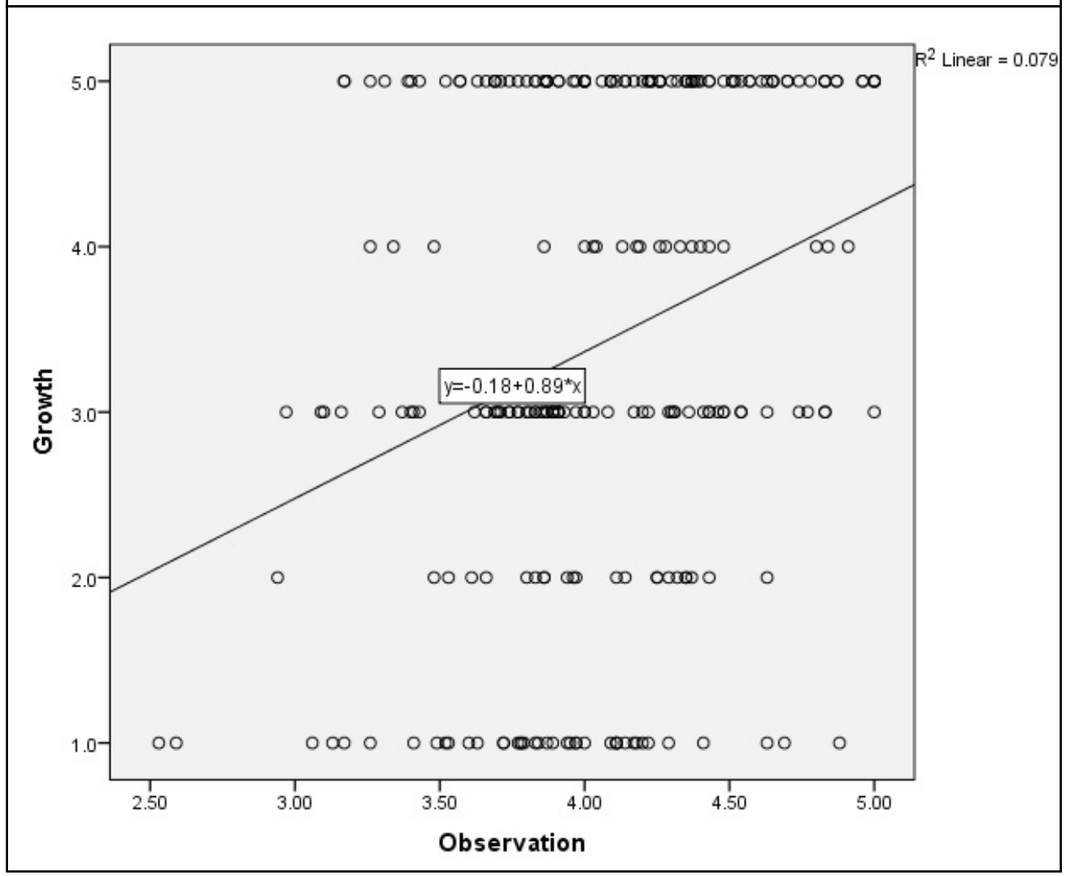
> Research Question 1: Is there a significant relationship between overall TEAM observations scores and TVAAS growth scores given by the Tennessee Department of Education for teachers in grades 3 through 8 in the participating school system?

A Pearson correlation coefficient was computed to test the relationship between TEAM observation scores and TVAAS growth scores. The results of the correlational analysis revealed a moderate positive relationship between TEAM observation scores (M = 4.05, SD = .47) and TVAAS growth scores (M = 3.41, SD = 1.49) scores and a statistically significant correlation [$r(238) = .28$, $p < .010$]. In general, the results suggest that teachers with high TVAAS growth scores tended to have high TEAM observation scores. Figure 1 displays the bivariate scatterplot.

> Research Question 2: Is there a significant difference in teachers' TVAAS growth scores and teachers' TEAM observation scores by gender for teachers in grades 3 through 8 in the participating school system?

A one-way multivariate analysis of variance (MANOVA) was conducted to determine the relationship of the gen-

Figure 1
Scatterplot for TEAM observation scores and TVAAS growth scores



der (male or female) of the teacher to the two dependent variables, TVAAS growth scores and TEAM observation scores. There was no significant difference in TVAAS growth scores or TEAM observation scores between male teachers and female teachers, Wilks' Λ = .98, $F(2, 476)$ = 2.40, p =.090. The multivariate η^2 based on Wilks' Λ was .02. Male and female teachers tended to have similar TVAAS growth scores and TEAM observation scores. Table 1 contains the means and standard deviations on the dependent variables and the gender of the teacher.

Table 1
Means and Standard Deviations on the Dependent Variables for Gender

		TEAM_ Observation		TVAAS_ Growth	
Gender	N	M	SD	M	SD
Male	42	3.91	.07	3.35	.23
Female	198	4.08	.03	3.42	.10

Research Question 3: Is there a significant difference in teachers' TVAAS growth scores and teachers' TEAM observation scores by license type for teachers in grades 3 through 8 in the participating school system?

A one-way multivariate analysis of variance (MANOVA) was conducted to determine the relationship of license types (apprentice or professional) to the two dependent variables, TVAAS growth scores and TEAM observation scores. A significant difference was found for license type and the dependent variables, Wilks' Λ = .94, $F(2, 237)$ = 7.56, p =.001. The multivariate η2 based on Wilks' Λ was .06. Table 2 contains the means and standard deviations on the dependent variables of license type.

An analysis of variance (ANOVA) was conducted on each of the dependent variables (observation and growth) as follow-up tests to the MANOVA. Using the Bonferroni method, each ANOVA was tested at the .025 level (.05/2). The ANOVA for license type and observation scores was found to be statistically significant, $F(1, 202)$ = 9.72, p =.002, η2 = .04, and the ANOVA for license type and growth scores was also statistically significant, $F(1, 34)$ = 9.35, p =.002, η2 < .038. Teachers holding professional licenses tended to have higher TVAAS growth scores and higher TEAM observation scores than teachers holding apprentice licenses.

Table 2
Means and Standard Deviations on the Dependent Variables for License Type

		TEAM Observation		TVAAS Growth	
Type of License	N	M	SD	M	SD
Professional	204	4.09	.46	3.53	1.43
Apprentice	36	3.83	.51	2.72	1.67

Research Question 4: Is there a significant difference in teachers' TVAAS growth scores and teachers' TEAM observation scores by socioeconomic status of the school in grades 3 through 8 in the participating school system?

A one-way multivariate analysis of variance (MANOVA) was conducted to determine the relationship of the school's socioeconomic status (Title I or Non-Title I) to the two dependent variables, TVAAS growth scores and TEAM observation scores. There was no significant difference in TVAAS growth scores or TEAM observation scores between Title I schools and Non-Title I schools, Wilks' Λ = .99, $F(2, 476)$ = .58, p =.557. The multivariate η2 based on Wilks' Λ was .01. Teachers in Title I and non-Title I schools tends to have similar TVASS growth scores and TEAM observations scores. Table 3 contains the means and standard deviations on the dependent variables of socioeconomic status of the school.

Table 3
Means and Standard Deviations on the Dependent Variables for Socioeconomic Status

		TEAM Observation		TVAAS Growth	
Socioeconomic Status	N	M	SD	M	SD
Title I	186	4.06	.51	3.47	1.49
Non-Title I	54	4.05	.31	3.22	1.53

Research Question 5: Is there a significant difference in teachers' TEAM observation scores among the 4 levels of experience of the evaluating administrator (0-1 year experience, 2 to 4 years experience, 5 to 10 years experience, 11 or more years experience)?

A one-way analysis of variance (ANOVA) was conducted to evaluate the relationship between the evaluating administrator's experience and the overall TEAM observation rating. The factor variable, years of experience, included four levels (0-1 year of experience, 2 to 4 years of experience, 5 to 10 years of experience, 11 or more years of experience). The dependent variable was the overall TEAM observation rating. The ANOVA for experience of administrator in observation scores was significant, $F(1, 238)$ = 11.96, p < .001. The strength of the relationship between the experience of the administrator and the observation rating, as assessed by h2, was large (.13).

Because the overall F test was significant, post hoc multiple comparisons were conducted to evaluate pairwise difference among the means of the four groups. A Dunnett's C procedure was selected for the multiple comparisons because equal variances were not assumed (p = .006). There was a significant difference in the means between administrators with 11 or more years of experience and all three of the other groups. However, there was not a significant difference between the means of any of the other pairs. It appears that administrators with more experience award higher observation scores. The 95% confidence intervals for the pairwise differences, as well as, the means and standard deviations for the four groups are reported in Table 4.

SUMMARY

Important findings for this study included a moderate positive correlation between teachers' TEAM observation scores and their TVAAS growth scores, no significant difference on TEAM observation scores or TVAAS growth scores by gender of the teacher, a significant differ-

Table 4
Means and Standard Deviations with 95% Confidence Intervals of Pairwise Differences

Administrator's Years of Experience	N	M	SD	2-4 Years	5-10 Years	11 or more Years
0 – 1	24	4.04	.28	-.31 to .08	-.26 to .15	.13 to .61
2 – 4	71	3.93	.38		-.11 to .24	.27 to .71
5 – 10	102	3.99	.51			.20 to .65
11 or more	43	4.14	.46			

ence on TEAM observation scores and TVAAS growth scores between teachers holding a professional license and those holding an apprentice license (teachers with professional licenses scored higher), no significant difference in TEAM observation scores and TVAAS growth scores between Title I and non-Title I schools and, and a significant difference in TEAM observation scores among the levels of experience of the observing administrator (more experienced administrators tended to award higher observation scores).

CONCLUSION

The state of Tennessee has made changes over the past several years in the way schools and teachers are evaluated. These changes are in response to legislation that has led to an increased emphasis on testing and accountability. Changes to Tennessee's teacher evaluation model include the adoption of the Tennessee Educator Accelerator Model (TEAM) and the incorporation of student achievement and growth data (TVAAS) for teachers' overall annual evaluations. Further research is suggested to examine other public school systems in Tennessee to determine if the results are specific to the participating public school system. There was also concern noted regarding the Tennessee Value-Added model and the validity of producing student growth scores from state achievement measures with a formula that is unknown to the public. The data set for this study was important because it was produced prior to the announcement by the Tennessee Department of Education that it would report a correlation score for the teacher TEAM observation scores and student TVAAS growth scores for each school. The Tennessee Department of Education's expectation is that a school's TEAM observation scores should be positively correlated with the school's TVAAS growth scores. A numerical score is now given by the Department of Education to every school noting this correlation. The most important question may be whether or not these state generated correlation scores will produce an artificial alignment of TEAM observation scores and TVAAS growth scores by influencing future TEAM observation scores.

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Engaging Business Students with Data Mining

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ABSTRACT

The Economist calls it "a golden vein", and many business experts now say it is the new science of winning. Business and technologists have many names for this new science, "business intelligence" (BI), "data analytics," and "data mining" are among the most common.

The job market for people skilled in this area is growing rapidly. ComputerWorld's Survey of its 100 IT leaders ranked it as their top file priority for 2014, and a Gartner survey of 1,400 chief information officers suggests that business intelligence is the number one technology priority for IT organizations.

For these reasons, colleges are rushing to develop curriculums, courses, and teaching methods to prepare students for this field. Teaching business students this new science is challenging for a number of reasons including the fact that it uses a variety of disciplines, many traditionally outside of the business school including sophisticated computer algorithms. Thus "engaging" business students with lessons about data mining can be challenging. In this paper, a method of such teaching engagement is discussed and illustrated.

BACKGROUND

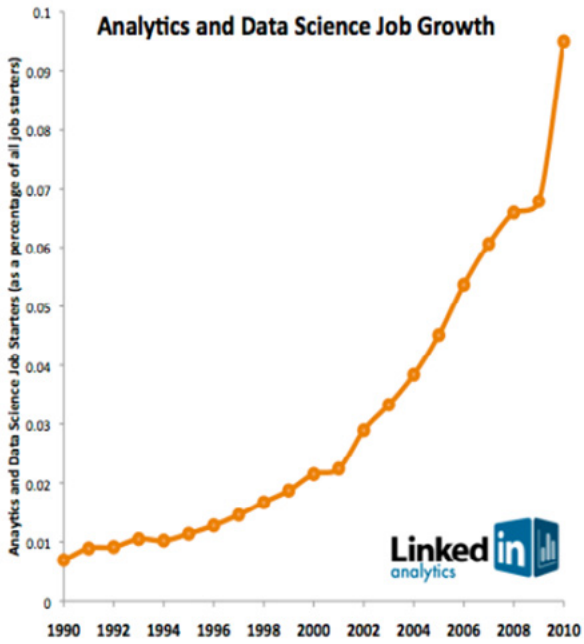
In earlier times businesses had a close physical relationship with their customers and had much first-hand knowledge about their customers such as whom they were, were they lived, what were their needs, and so on. However, as businesses became larger and more global in scope, it became harder for them to understand who their customers are, how to best serve them, and how to maximize their own profits.

To make such decisions in today's fast paced global marketplace, companies make extensive use of something called "business intelligence". This approach relies on large data warehouses and complex computer algorithms to sift through endless amounts of data. Business technologists have many names for this revolutionary technology; "business intelligence" (BI), "data analytics," and "data mining" are among the most common

The Economist says it's "a golden vein", and many business experts now call it "the new science of winning". It's been adopted by nearly every Fortune 500 company. Even many professional sports franchises are using use this new technology. A Gartner survey of 1,400 chief information officers suggests that business intelligence is the number one technology priority for IT organizations".

Most companies are not short on data. Large businesses store hundreds of terabytes just from their daily transactions. This tells them who is buying what, and also where and when. But today business also needs to know why, or why not.

Traditionally this was done with classical business research such as surveys, focus groups, etc. But today it also comes from web and social media such as tweets, videos, likes, and "clickstream data". This is typically called "Big



Data". The average large company now has more data stored than the Library of Congress.

Job growth in this area is very strong as illustrated in the figure below. InformationWeek's 2012 State of IT Staffing Survey reveals that 40% of those employers who cite big data and analytics as a top hiring priority say they'll increase staffing in these areas by 11% or more during the next two years. At the same time, 53% of these companies say it will be hard to find big-data-savvy analytics experts. A Gartner survey of 1,400 chief information officers suggests that business intelligence is the number one technology priority for IT organizations.

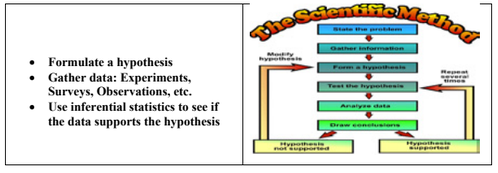
ComputerWorld's Survey of its 100 IT leaders ranked their top five priorities for 2014:

- Business intelligence
- Mobility (tablets, apps, etc)
- Application development
- Cloud computing
- Security

BUSINESS INTELLIGENCE AND DATA MINING

Wikipedia defines business intelligence (BI) is a set of theories, methodologies, architectures, and technologies that transform raw data into meaningful and useful information for business purposes.

Business intelligence, particularly via data mining, reverses the traditional "scientific method" which has these sequential steps:



Wikipedia defines data mining is the computational process of discovering patterns in large data sets involving methods at the intersection of artificial intelligence, machine learning, statistics, and database systems. With data mining, one starts with the data and then applies mathematical and computational algorithms to determine the supported hypotheses. Essentially one is "mining" for hypotheses or rules. There are a number of applications of data mining including:

- Association or affinity analysis – looking for statistical rules among data items
- Nearest-neighbor and clustering method – looking for concentrations of data in n-dimensional space
- Text mining and context analysis–deriving quality information and patterns from text

AFFINITY ANALYSIS

Perhaps most used and most successful of the data mining applications is affinity analysis which uses a specialized set of algorithms that sort through large data sets and expresses statistical rules among items. A typical usage is for analyzing purchase patterns of customers via transaction data which contain a huge wealth of information that can be used for a variety of purposes as:

- Marketing
- Up selling
- Cross selling
- Recommendations
- Inventory & logistics
- Product placement
- Store management

Affinity analysis is also called "market basket analysis" since it essentially determines what products people purchase together. Stores can use this information to place these products in the same area (particularly preferred brands), direct marketers can use this information to determine which new products to offer to their current customers, and inventory policies can be improved if reorder points reflect the demand for the complementary product.

Affinity analysis finds rules which are derived in the form "left-hand side implies right-hand side". An example is:

Yellow Peppers IMPLIES Red Peppers, Bananas

The rules are unidirectional, and the following is an "obvious" rule:

Caviar IMPLIES Vodka

But the reverse is not true:

Vodka IMPLIES Caviar

The key measures of mining predictive ability of a rule are:

- Support (prevalence) refers to the percentage of baskets where both left and right side products were present
- Confidence measures what percentage of baskets that contained the left-hand product also contained the right
- Lift measures how much more frequently the left-hand item is found with the right than pure chance (the product of their individual probabilities of occurrence)

For affinity analysis, we first need a list of transactions of what was purchased–this is readily available with modern electronic cash registers. A transaction is the purchase of one or more items by a customer at one point in time and space – a "shopping cart" or "market basket".

Next, we choose a list of products to analyze (perhaps all our products), and tabulate in a table how many times each was purchased with the others. The diagonals of the table shows how often a product is purchased in any combination, and the off-diagonals show which combinations were bought.

Consider the following simple example of five transactions at a convenience store:

- Transaction 1: Frozen pizza, cola, milk
- Transaction 2: Milk, potato chips
- Transaction 3: Cola, frozen pizza
- Transaction 4: Milk, pretzels
- Transaction 5: Cola, pretzels

Below is the resulting "affinity table". We notice that Pizza and Cola sell together more often than any other combo (perhaps a cross-marketing opportunity), and also notice that Milk sells well with everything (perhaps people probably come here specifically to buy it).

Product Bought	Also bought:				
	Pizza	Milk	Cola	Chips	Pretzels
Pizza	2	1	2	0	0
Milk	1	3	1	1	1
Cola	2	1	3	0	1
Chips	0	1	0	1	0
Pretzel	0	1	1	0	2

From the affinity table we want to find association rules which suggest a relationship between items in the transaction. The rules are written as for single items A and B:

A IMPLIES B (or A → B)

Support is calculated as the % of transactions (baskets) where an association rule applies, that is where we see both item A and B in the same basket. For example, if 500 baskets contain both A and B out of a total of 1000 baskets, then the support is 50%. A implies B and B implies A both have the same support. The support measure for Cola IMPLIES Pizza is 40% (2/5); of the 5 transactions 2 have both cola and pizza. Note support does not consider direction (Pizza IMPLIES Cola is also 40%).

Confidence measures the predictive accuracy of a rule, and it is defined as the probability that item B is in the basket if item A is in the basket ("conditional probability")

$$\mathbf{P(B|A) = P(AB)/P(A)}$$

It is calculated as the support (A & B)/P(A) where support (A) is the % of baskets containing A. For example, if 500 baskets contain both A and B out of a total of 1000 baskets, then the support of A & B is 50%. If A is in 75% of baskets, the confidence is 50/75 or 67%. Milk IMPLIES Chips has a confidence of 33%, since the support of "Milk plus Chips" is 20% (1/5) and Milk is in 60% of baskets (3/5). Thus 20%/60% is 33. Confidence is unidirectional.

Lift is calculated as the ratio of support to a product to the individual probabilities of both sides:

$$\mathbf{P(AB)/(P(A) * P(B))}$$

For example, if 500 baskets contain both A and B out of a total of 1000 baskets, then the support of A & B is 50%. If A is in 75% of baskets and B is in 20% of the baskets, then the lift is: .50/(.75*.20) = 3.33. Computing Lift: TABLE: Lift is the ratio of support of a product to the individual joint probabilities of both sides. Cola IMPLIES Pizza lift is .40/(.60 * .40) = 1.67.

The rules can be formulated for each pair of products, and the three measures calculated. Only the rules that have significant measures are going to be accepted – this is the mining portion of the process. Some rules are going to be trivial (hot dogs and buns sell together), and some rules may be far from obvious.

Engaging Students via Interactive Web Teaching Tools

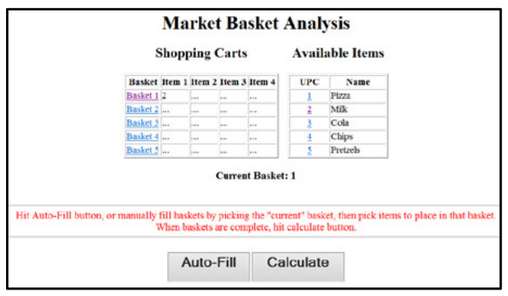
Due to the business need for data mining and the resulting strong job market, colleges are rushing to develop curriculums, courses, and teaching methods to prepare students for this field. It is a field that requires both understanding of the business need and application of data mining but also the underlying technology. Thus teaching business students this new science is challenging for a number of reasons including the fact that it uses a variety of disciplines, many traditionally outside of the business school including database design, programming, and sophisticated computer algorithms.

Our teaching approach is to first describe the data analytics method and its business purpose. Next the student is provided with a basic interactive and intuitive tool that "engages" him. The tool is programmed in HTML5 and JavaScript. The engagement tool for affinity analysis al-

lows the student to interactively fill shopping baskets with available items. The first screen shot below shows the starting screen where the student can manually place items into the baskets, or hit the "auto-fill" button to fill the carts.

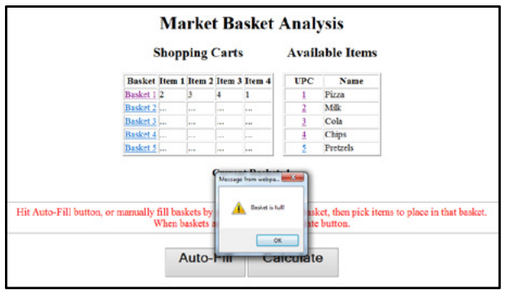
The screen shot below shows the screen after basket selection. The basket is highlighted and the "current basket" number is set.

The next screen shot below shows the placing of item2 in basket 1, simply by clicking on the UPC code.

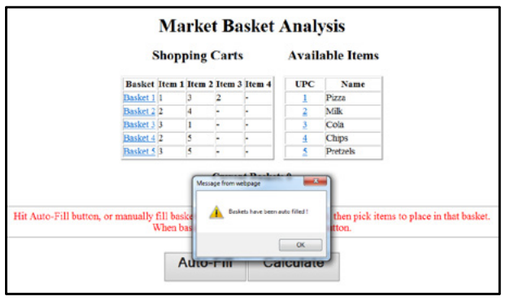


Placing item 2 in basket 1, when item 2 is already in that basket produces the error shown in the screen below.

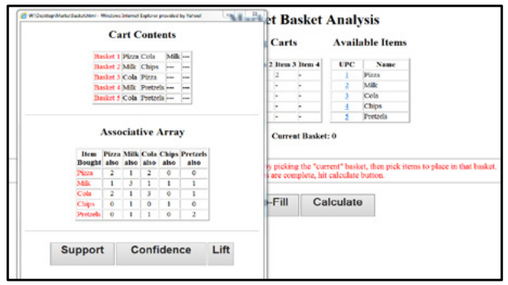
Similarly, exceeding the capacity of a basket gives the error shown in the screen shot below.



As well as manually selecting baskets and items (with the mouse), there is an "auto-fill" option to fill the baskets with items matching the "example case" previous described. The screen shot shows the results of hitting the "auto-fill" button.

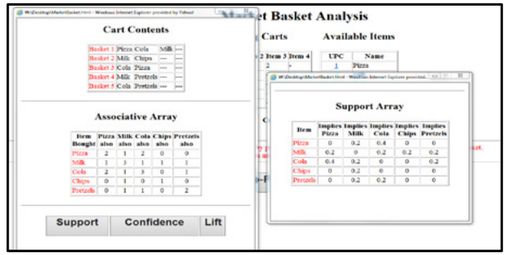


The following window opens after the student has hit the calculate button. The windows shows the shopping cart contents (in words) and the calculated associative array.

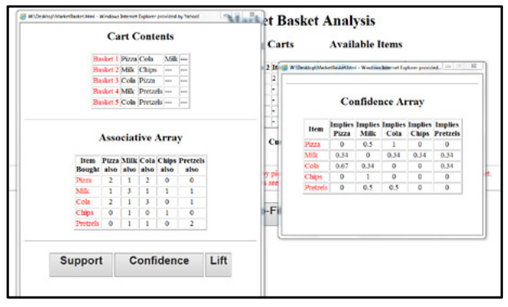


Next the students can hit buttons to calculate and display the lift, confidence, and support arrays, and this is illustrated in the following screen shots.

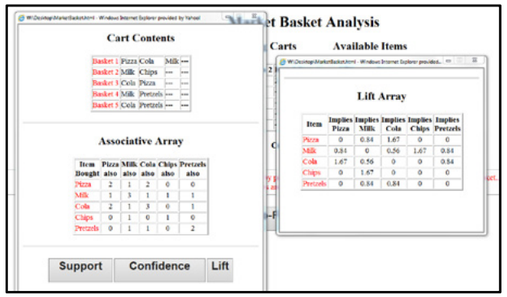
Support



Confidence



Lift



One effective way to use the tool in the classroom is to ask several students to place several items in their basket based upon what they commonly buy at a convenience store. After one has those answers from several students, then the tool is used to perform and display the results. One often get interesting and unexpected results.

CONCLUSION

This paper has described a general approach that was developed to provide intuitive and interactive learning of data analytics core principles. This has proven very useful in practice, particularly for the student's understanding of the application, and being able to engage the student with the topic.

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Thinking Outside the Box Office: Using Movies to Build Shared Experiences and Student Engagement in Online or Hybrid Learning

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ABSTRACT

Movies and films are widely recognized as valuable pedagogical tools. Motion pictures provide concrete and illustrative examples of important concepts and can improve students' understanding of course material as well as increase their satisfaction with courses.

Online learning is becoming an increasing dominant facet of higher education. Online learning is preferred by many students for various reasons, many related to the flexibility and format of the course work; students can engage in learning when it is convenient for them.

While the flexibility of time and format is a major appeal of online learning, it also serves as a major impediment. Student retention is a significant challenge in the online learning environment. Research shows that students in online courses are more likely to feel a sense of "disconnectedness" and miss having a common shared experience with other students. As a result, students in online courses are more likely to withdraw from the course because they miss the opportunities for shared experiences.

This paper explores the use of movies in online and hybrid business courses for the purpose of providing a shared experience around which students can discuss course content. This paper describes the process for creating a shared student experience and creating the related discussions among students centering on particular concepts illustrated in the selected films. The students view the particular movies, and then, with either a lens of management and leadership strategies, or of business ethics concepts, discuss specific questions within their team, the whole class, and then again with their team. This paper discusses the value of that shared movie experience and discusses the need for additional pedagogical strategies to establish and promote online opportunities for student interactions.

MOVIES AND FILM IN HIGHER EDUCATION

Movies and film clips have been widely used as a teaching tool in college classes for decades (Champoux 1999) and are considered a valuable pedagogical tool. Viewing movies or film clips have been linked to increasing students' interest in the topic, integration of course material, and improving students' perceptions of the course experience (Badura 2002). A shared film or video clip can improve the substance of students' learning (Brinkley 1999). Généreux and Thompson (2008) found that utilizing movies in college classes increased opportunities for student reflection and involvement.

While movies are an effective tool for enhancing student learning, there are challenges and barriers in using the tool. Many faculty choose not to use this medium due to logistical issues of ensuring copies of the movie are available for the students; additionally there may be problems associated with obtaining copyright clearances (Clemens & Curt 2010). Further, selecting the appropriate movies or film clips, and deciding exactly how to use them, can be daunting. According to Clemens and Curt (2010), it is im-

perative to identify movies that will capture the students' attention and resonate with them. At the same time, the movie must clearly support the specific learning objectives of the course. However, by using prompts, questions or a survey to focus the students on specific behaviors or outcomes, or by requiring the students to evaluate or reflect on the situation within the movie, the use of cinema is likely to have a positive impact on the learning objectives (McKeachie & Svinicki 2006).

Holbrook (2007) shared that there are many articles and books to assist faculty in identifying movies or film clips that may be suitable for their particular course content. While movies are widely available across the disciplines, it is especially true for leadership and management content (Holbrook 2009) and for business ethics content (Kester, Cooper, Dean, Peter & Goldsby 2009), where the contextual applications are so important. Bartunek (2013) cautioned faculty to be strategic in selecting any movies for use in courses. When identifying supplemental research or content for their students, Bartunek found that faculty are frequently drawn to information that disconfirms current beliefs and understandings. This may be because faculty are interested in information that may provoke debate. However, information that may be considered more of a positive example or illustration, or information that may provide clarity, elicit inspiration or be considered moving to the students, may be equally, if not more, valuable (Bartunek 2013). Bartunek (2013) further argued that students prefer concrete and illustrative examples to hypothetical situations to learn more about a concept. Students seek balanced information that both supports and provides positive examples of the concepts that they are learning (Bartunek 2013).

ONLINE LEARNING AND SHARED LEARNING EXPERIENCES

Online learning is experiencing significant growth, and the number of students selecting online or hybrid classes continues to increase. According to the Integrated Postsecondary Educational Data System (IPEDS), more than 70% of all degree-granting institutions offer online or hybrid learning opportunities (Allen & Seaman 2014). Although there is a surge of interest in enrolling in online courses, student retention is a challenge in the online environment. Without special and specific considerations and experiences, students are much more likely to withdraw from online courses than from courses meeting in-person (Boston & Ice 2011). According to Zydney, deNoyelles, and Seo (2012) much of the research suggests that students frequently withdraw from online learning because of feelings related to "disconnectedness" and a lack of shared experiences and interactions with the other learners. Without shared experiences and purposeful interactions, students are less likely to experience cohesion within their groups (Boston & Ice 2011).

Knowles (1975) argued for the importance of strategically planning group activities into any course, but especially those for adult learners. In addition to the importance of learning in group activities, Stephens, Robinson, and McGrath (2013) described the importance of using a shared learning experience as the foundation for increasing collaboration and student engagement in groups in the online environment. They recommended incorporating opportunities for students to review, respond to, and build on each other's work. Hansen and Erdley (2009) found that student learning can be enhanced in the online environment, but special consideration may be necessary to build group cohesion. Groups are more cohesive and active when all students are engaged (Heafner 2004).

McKeachie and Svinicki (2006) have recommended beginning all student discussions with a common or shared experience as this promotes student engagement. They suggested that movies or film clips are especially valuable for this purpose. Because all of the students have viewed the movie or film clip, every student now knows something about the topic through the movie. Each student is in an equal position to participate. Further, students feel much freer to point out issues and problems within the movie because they do not have a personal connection to the people or the organization depicted in the movie.

INCREASING ONLINE OFFERINGS AND ENSURING STUDENT ENGAGEMENT

Saint Xavier University is a nationally recognized mid-sized private institution serving more than 5,000 students. Saint Xavier University's mission is to educate men and women to search for truth, to think critically, to communicate effectively and to serve wisely and compassionately in support of human dignity and the common good. Effective communication and serving wisely and compassionately are at the core of successful teamwork. Like many institutions of higher learning, Saint Xavier University is offering an increasing number of courses online.

While Saint Xavier University is providing additional courses in the online and/or hybrid format, Saint Xavier faculty remain committed to ensuring that students have the opportunity to engage with the faculty, with the content, and especially with other learners. Consulting the literature on student engagement, faculty identified some pedagogical practices that would provide shared experiences to promote student engagement while also advancing the class content. Faculty first used the shared experience of viewing selected movies within the Masters of Business Administration program.

Most of the students in Saint Xavier University's Graham School of Management Masters of Business Administration (MBA) program are working professionals. Students generally complete the MBA program in two or three years, depending on a student's course load. Management Theory and Application is one of the first required courses that Saint Xavier graduate students take as part of the MBA program. Graduate students must also take the business ethics course Business, Ethics and Governance (or the predecessor course Government, Business and Society) as part of the MBA core curriculum.

MANAGEMENT THEORY AND APPLICATION

The purpose of the Management Theory and Application course is to explore the effective management practices and leadership skills. The students in the Management Theory and Application course have varying degrees of management experience. Some students are current managers, while others may be aspiring managers. Most of the students are hoping to improve their managerial and leadership skills. Within this course, one of the pedagogical strategies involves identifying and discussing key leadership and management practices in selected movies. In an online environment, it is especially important for students to have visual models of management and leadership behaviors (Boston & Ice 2011).

Within the first week of the course, students introduce themselves in a Discussion area of the online course environment and respond to a few short questions about their opinions on the challenges of leading others, as well as questions about their professional aspirations. Also within the first week, students self-select into learning groups. These groups or teams remain their permanent learning group for the entire term.

On the course syllabus, the students are immediately alerted that by the third and fourth week of the term, they will need to view the two selected movies. We refer to this assignment as "A Night at the Movies" and the information the students receive on the syllabus is below:

> "Required videos:
>
> **Week Three**
>
> *Hoosiers* (1986) Directed by David Anspaugh and actors include Gene Hackman and Barbara Hershey. This video is widely available on cable. It can be rented from many sources including iTunes and Netflix. It is available for purchase from Amazon.com and Barnes and Noble.
>
> Week Four
>
> *Apollo 13* (1995) Directed by Ron Howard and actors include Tom Hanks, Bill Paxton, and Kevin Bacon. This video is widely available on cable. It can be rented from many sources including Netflix. It is available for purchase from Amazon.com and Barnes and Noble.
>
> In addition to your popcorn and Junior Mints, please have a copy of the "A Night at the Movies" questions in front of you when you view each of the videos."

While other popular movies could easily be used in place of *Hoosiers* and *Apollo 13*, these movies are selected for specific reasons. The students are likely to have already viewed these movies at some point prior to the class, so they have some familiarity with the story, but are not likely to have viewed it with the lens of analyzing and evaluating management practices. Building on information or experiences students already have, yet looking at them in an innovative way, can facilitate learning and engagement (McKeachie & Svinicki 2006).

Hoosiers and *Apollo 13* are widely available through many sources but do require some planning to view the movie by the due dates. Choosing movies widely available and usually available at no cost is less of financial burden on the students. Perhaps most importantly, these movies provide many examples that positively illustrate concepts studied in the class related to managing performance, culture, and leadership.

BUSINESS, ETHICS AND GOVERNANCE

The purpose of Business, Ethics and Governance is to have the students critically examine the major social, political, and economic forces that impact business organizations. The course places an emphasis on management's response to societal issues as the corporation attains its mission and goals. Further, the course is designed to increase the students' awareness of ethical problems and corporate management's responsibility to individuals and to society.

Similar to the Management Theory and Application course, some sections of the Business, Ethics and Governance course (or the predecessor Government, Business and Society course) are conducted using an online or hybrid format and have used motion pictures to reinforce key concepts. Additionally, this exercise allows the students to have the common experience of viewing a motion picture in which some of the course objectives are illustrated. Opportunities are then provided for the students to discuss each movie both within their study groups and in the full

class. Also in line with the Management Theory and Application course, students are supplied with guidelines for watching the films.

The students are instructed to watch three movies:

The Fountainhead (1949). Directed by King Vidor and starring Gary Cooper and Patricia Neal, it is based on the novel of the same name by Ayn Rand.

Wall Street (1987). Directed by Oliver Stone and starring Charlie Sheen and Michael Douglas who won a Best Actor Oscar for his role as Gordon Gekko.

Other People's Money (1991). Directed by Norman Jewison and starring Danny DeVito and Gregory Peck, it is based on the play of the same name by Jerry Sterner.

Much like the movies assigned in the Management Theory and Application course, the films assigned in the Business, Ethics and Governance course are widely and inexpensively available through various sources and in various media formats.

SETTING THE STAGE FOR "A NIGHT AT THE MOVIES"

The purpose of the "A Night at the Movies" project is to have students' initial collaboration focus on a common and straightforward task. The students' first group assignment is to determine how they will access the movie. Assigning the task of accessing the film as a *student group* responsibility rather than a *faculty* responsibility has two immediate benefits. The first benefit is that very early in the term, each student group must quickly communicate within their group to share ideas on how they can access the movie. Because these early communications are focused on a very clear task, the students are quick to make suggestions to each other to ensure everyone has access to the film. While all of the students need to view the movie in the same week, they do not need to view it at the same location. Working together to share ideas, students quickly identify several options for accessing the film and share their ideas, even, at times, with students in different groups. The second benefit to the "A Night at the Movies Project" is that it removes the logistical and copyright challenges for the faculty member, a move that ultimately makes utilizing a movie a more attractive teaching tool. As stated earlier, faculty frequently experience many logistical challenges in utilizing videos as a teaching tool (Clemens & Curt 2010), making them less likely to incorporate films into their courses.

The actual assignment for each of the motion pictures is the same. Within their respective groups, students have the shared responsibility to ensure that each group member views the assigned movie and prepares preliminary responses to the questions that are posted in the online course environment. Using a separate small group Discussion area or "chat" feature in the online course environment, students share their preliminary responses only within their own groups. The "best" responses from each group are then entered into the whole-class Discussion area. The "best" responses that move into the whole-class Discussion area are frequently a composite of several group members' responses rather than from one individual student. This tactic works particularly well because the students feel an ownership with their respective portions of the responses and frequently engage in adding additional insights and information supporting why their responses are accurate and complete. Lastly, each group, working in the small group Discussion area or "chat" area, identifies which responses from a group *other than their own* best reflects and advances the topics being discussed that week. Additionally, students also provide a rationale to substantiate their choice of responses.

The particular questions for each movie may vary from term to term, but the question structure and intent remain constant. For example, students are asked to identify specific situations and behaviors in the movie that correspond with a theory or concept from the course reading materials. The questions focus not only on explicit behavior but also on motivational, environmental, or cultural factors that may be influencing the situation in a more subtle way. Students analyze the situation according to concepts and theories discussed in the course and then evaluate if the behavior in the movie was effective. If the behavior is viewed as effective, students share why they believe it to be effective and support their view from course materials and other experts. If there is a better management, leadership or business ethics alternative, students share their perspectives on what approach may have been more effective, and they provide supporting information on that view, as well. The instructor's vital responsibility in formulating the questions almost cannot be overemphasized. As Brookfield (1987) argued, developing purposeful and insightful questions that require students to analyze and evaluate options is possibly the most important step in preparing for student discussions.

STUDENT REACTIONS AND LESSONS LEARNED

Students' reactions and comments across each of the facets of the assignments have been extremely positive. It is particularly heartening to observe the online "chat" area as the students guide each other in accessing the videos, navigating the different cable providers, streaming options, rental and lending alternatives and other services. By having the students interacting and providing support for each other very early in the term, it is likely that the students feel more connected to each other (Badura 2002).

One behavior that was observed while monitoring the online chat sessions was that if a particular student was not participating in the discussion, the other students would intentionally ask the non-participating student for his or her thoughts. It became apparent that the groups wanted to gather as many views as possible with which to work for creating their group's response for the whole-class discussion. Because the first round of response sharing is only among members of the respective groups, each student's response mattered. Student non-participation, a frequent problem in the online learning environment, is minimized because in the small group structure, each student's response matters. Students demonstrated responsibility not only for their individual engagement in their group, but also for the collective engagement of their group. This sense of accountability to each other may lead to improved student retention (Zydney, deNoyelles, & Seo 2012).

It was also observed that students carefully edited and modified each group member's responses before sharing them in the whole-class discussion. Building on each other's work, the students collaborate to confirm and create knowledge while at the same time constructing a shared concept that they will explain to the class. This student-to-student collaboration can deepen students' understanding of the course content because the students must provide responses and be prepared to share their reasoning for those responses.

Questions prepared by the instructor played a significant role in the success of this assignment. Encouraging students to have meaningful discussions requires preparing good questions before the discussion. Socratic or probing questions can be mixed with open-ended questions in order to delve for more information and explore or challenge assumptions. Occasionally, thought-provoking or bold statements can encourage students to take a strong position and require them to share the rationale for their opinions. It is important for the instructor to choose questions that elicit differing views (Brookfield 1987).

The fact that none of the selected movies was of a recent vintage produced another interesting finding. Many of the students observed that while they had viewed the movies previously, they had not "viewed it with the lens of management" or through the perspective of business ethics. Many students commented they "saw behaviors in a new light" and that the movies made some of the course concepts "more like real life than theories from a book." One student commented, "It was much more fun to watch the behaviors in a movie than just to read about them." Others shared that they were "surprised by all the differing views about the same movie" and that considering the diverse perspectives "may be helpful in understanding and managing others in the workplace." Some students have enthusiastically shared the titles of additional movies for faculty to consider for use in future classes.

GOING FORWARD

As universities continue to move additional classroom-based course offerings to the online or hybrid environment, we believe that utilizing movies as a shared experience will be an effective teaching tool in these other courses. From our experience, students enjoyed the experience of viewing the films through their newly discovered lens of the course content, discussing the movies with their classmates, and applying this experience to reinforce the course objectives. Further, by placing both the responsibility for determining the means for accessing the movies and the initial gathering of student responses at the group level, students seemed to be more engaged in the entire process. Regarding the use of the groups for eliciting the first level of response, one student observed, "If you don't post your response in a discussion for the whole class, the only person ... [who] notices is the faculty [member]. When you don't post your responses in the small group area, the group will get after you!" Perhaps most importantly, students were able to view and respond to course concepts and theories in context while contemporaneously having the opportunities to gain insight on diverse perspectives.

Further exploration and research is necessary to know if this type of shared experience is linked to student engagement in the online or hybrid course environment. For example, additional exploration will be needed to determine whether this model would be as successful if applied to undergraduate business courses and undergraduate students. Furthermore, as budget constraints and other reasons push universities to increase their online and hybrid course offerings, research should be conducted to test the success of this shared movie experience model in other business courses. Currently movies are utilized in a number of classroom-based business courses with courses as diverse as Business Law, Legal Environment of Business, Auditing, Forensic Accounting, Fraud Examination,

and Corporate Taxation. Using movies as a means to create a shared experience, coupled with the opportunity for small-group and whole-class discussion may prove to be an effective and enjoyable approach to engage a diverse set of students involved in online and hybrid courses across the business curricula. As discussed by Tyler, Anderson, and Tyler (2009) including movies, television, film clips or other popular media in classes fosters real-life connections to the course content and is likely to continue to be a successful approach as universities work with multiple generations of learners. As faculty, we must continue to ask what teaching practices will engage learners in the burgeoning online and hybrid course environment.

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Metacognition Lab at Miles College Takes Peer Mentoring to a Higher Level

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ABSTRACT

Albert Einstein famously said, "I never teach my students. I only attempt to provide the conditions in which they can learn." At the Miles College Metacognition Lab, we follow a similar philosophy. In the Metacognition Lab, we teach our students to think about how they are thinking. We have created a system of student interactions that monitors and assesses student progress and concurrently teaches our students how to monitor and assess their own progress. To this end, we have four main focuses: 1) Creating meaningful relationships of trust based on honest communication 2) Emphasizing the importance of short term and long term goals 3) Teaching students the Study Cycle and how to do Intense Study Sessions and 3) Creating Action Plans that outline simple steps for the students to follow on their own.

STUDENT ACADEMIC COACHES MAKING A DIFFERENCE

Our Academic Coaches are students who not only excel in academics, but also excel in communicating and building relationships with their peers who come to the Lab for academic support. When students initially come in for help, our first focus is building connections with them. During that first meeting, after introductions and small talk, we address their problems and find out why they have come for help. We also establish each student's goals and dreams and emphasize that it all ties into what the student is doing now in school and why academic success is a stepping stone toward the ultimate goals.

Also during that first meeting, we ask the students what expectations they have of the Lab and ask them if they have any concerns or apprehensions. We also share our own expectations for our students and what we hope they get out of this experience. The goal of this Lab is to teach students to take control of their learning and learn how to fine-tune the way they study to achieve the best results. The students will learn about Bloom's Taxonomy (the different levels of learning) and reflect on what level of learning they are currently using. Students also learn about the Study Cycle and how using the Study Cycle helps them climb up the higher levels of learning. Finally, we go over the Intense Study Session and how that allows the mind to work at higher levels of learning.

As we work with students and review and teach them the substantive material they are learning in their classes, we try to remind the students to use metacognition and be mindful of which learning and study strategies are working for them and which are not working. Our one-on-one meetings with students model the Intense Study Session format so that students become comfortable with it and begin to use it when they study on their own. At every session, we set specific goals so that when the student is ready to leave, the student and coach are ready to create an action plan for the student to accomplish on their own. This system allows our Coaches as well the students to continually assess the students' progress and whether the current strategies for learning are working. The Metacognition Lab has now been operating for 4 years, growing from serving 38 students the first year to now getting more than 1800 student visits per semester with over 200 students each semester coming regularly for one on one study sessions. Considering that our student population is around 1750, we are serving a large percentage of our student body.

METACOGNITION LAB CONTINUES TO MAKE A DIFFERENCE

The Metacognition Lab continues to increase services and performances of students every single semester. During the Fall 2014 semester, the Lab had over 1,884 student visits. Over 800 students attended presentations and workshops given by the Lab. Academic Coaches performed approximately 1,100 one on one study sessions to 287 students. Out of those students, 89% ended the semester with over a 2.0 GPA and 54% ended with over a 3.0 GPA. The average semester GPA for students served by the lab was a 2.9. The Lab saw a retention rate of 89% of the students who received one on one help. The true retention rate was probably even higher because many of those who did not return had GPA's over 3.5 and it seems likely that they transferred schools.

So far, during the spring 2015 semester, we have already had over 2,023 student visits. We have presented 13 workshops, which include workshops on Test Anxiety, Learning Styles, Motivation and Study Strategies, How to Study for Math, and Passing the English Proficiency Exam. Over 381 students have attended these workshops. Generally, fewer students attend our Spring workshops because most of these workshops are presented to new, incoming students and we have less students enrolling for the first time in the spring semesters. Since the Metacognition Lab collaborates with First Year Enrichment Orientation and Freshman Year Academy, all freshmen, at the very least, attend both the Learning Styles and Study Strategies workshops. There are over 190 students who are coming in for one-on-one sessions with Coaches so far this semester. The Coaches have completed over 500 of these one-on-one sessions. Since we have not hit our busiest time of the semester (right before finals) yet, we predict that the number of students we serve will substantially increase by the time the semester is over.

This spring 2015 semester, the Lab initiated a Pre-Midterm Push where we collaborated with the Retention Assistants to contact the 470 students who had been flagged by their instructors as "at-risk" in February. Of these students, 43 students came to the Lab to receive academic coaching. The Lab also continues to collaborate with the Quality Enhancement Plan (QEP) to provide academic help to students during the QEP Intense Study Sessions held the week before midterms each semester.

OTHER ACTIVITIES OF THE METACOGNITION LAB

This semester, we had the privilege of coordinating the Miles College submission to First Lady Michelle Obama's #ReachHigher initiative. We compiled photographs, videos and narratives of Miles College's efforts to reach out to high school students and encourage them to strive to attend college. We were able to produce a compelling 4 minutes video to submit for the contest to have Michelle Obama speak at a Miles College graduation.

The Lab also recruited and submitted 3 high school students to the Coca Cola Pay It Forward contest to win. Winners have the chance to attend a 3 day Leadership Academy with Steve Harvey and a $5000 scholarship. We helped the teenagers explain why they deserve to attend this Academy and what they will do to pay it forward.

We also continue to coordinate Miles College's collaboration with Dr. Condoleezza Rice's initiative, The Center for a New Generation. Last year, the students that we selected and worked with on their interviewing and resume building skills were able to gain employment as CNG mentors to Hayes Elementary School students. As mentors, they build work experience teaching and working with children and also network with the non-profit and education communities. Miles College students compose the backbone of the CNG and have helped this initiative become very successful. Miles mentors are building excellent reputations within the school and the AG Gaston Boys and Girls Club. This year, we will again recruit students and work with them so that they are prepared to submit resumes and interview with CNG for summer and fall positions.

For the second year, we coordinated Dr. Hattie Myles' visit to Miles College. She is the Assistant Dean of the University of South Alabama's Medical School and is also on the Board of Trustees for Alabama A&M. Every year, she promotes the University of South Alabama Medical School's DREAM program which is an all expenses paid two year summer enrichment and MCAT preparation program for aspiring medical school students. The program has rigorous criteria that require students to apply by March of their sophomore year so we are trying to recruit freshman students early enough that they can plan their classes accordingly. One of our Miles graduates who attended the DREAM program went on to attend the Mayo Clinic and is a now on her way to receiving not only her MD but also her PhD.

The mission of the Metacognition Lab continues to be centered on teaching students how to study and how to become lifelong learners. We focus on building relationships of trust with our students so that they can build the skills and the confidence to achieve academic success on their own. The is an old adage that adeptly describes our approach: "Feed a man a fish and he will eat for a day. Teach a man to fish and he will eat for a lifetime." We strive to fill our students with the desire to become lifelong learners. Our coaches have compiled a few stories on our most compelling students to provide a glimpse of the kind of work that occurs daily in the Lab. These stories are presented below:

TESTIMONIES SHARED BY THE ACADEMIC PEER COACHES

Student A is a bright young man, originally from La Banda, Argentina, who migrated to the United States in 2011 not knowing a single word of English. Now he is not only proficient in his second language, but he is an aspiring writer. His official major is Computer Information Systems (CIS); he hopes to become a successful programmer utilizing the skills and knowledge he acquires here at Miles College. During this semester I have had the pleasure of helping A navigate through his CIS, American Government and Pre-Calculus II courses. I also met with him regularly last semester to work on English and Pre-Cal I, which allowed us to build upon the knowledge base we both gained last semester to ensure his success this semester. Because I speak Spanish, I was able to communicate very effectively with A and broaden his comprehension of difficult concepts in a way that none of the other coaches in the lab could. Because of this, I think A and I were able to build a stable coach-student relationship, which I am convinced encouraged him to come in regularly to work not only with me, but individually as well (which shows immense discipline, especially since he is also a student athlete—with basketball taking up much of his time outside of his studies). A has been able to maintain a 4.0 GPA during his enrollment at Miles, and plans to continue making straight A's during the remainder of his matriculation. While I'm sure A has learned many things during his tutoring sessions with me, I too have learned an incredible amount from him as well, about myself—my diligence, goals and my willingness to work to achieve them.

Though Student B is not a "traditional student" in the sense that she did not come to Miles College straight from high school like the majority of the students that visit the Metacognition Lab, her story is just as relevant and impressive as that of any other student. B has battled through some tough life experiences which have made her a stronger woman and more adept to taking her classes and her time at Miles in general, more seriously. Because of this, at the first sign of having difficulty with writing for a communications class, she came right into the lab to receive assistance. During her first visit, I did not formally instruct her, but more so guided her brainstorming and planning steps of her paper; that day we discussed social issues and how they related to many of the things we found we have in common, ultimately leading to the connection we now have and what I feel made our working together a success. B struggled at first to articulate her thoughts on paper, though her ideas, once polished were magnificent. We worked on her sentence structure, thesis placement and composition, and overall context of her writing until her improvement was not only reflected in her Flesh Kinkaid scores, but directly from her instructor's praises as well. Though helping B proved challenging at times, I feel that the bond we established the first day we met and seeing her improvement was well worth it.

Student C is also a non-traditional student who has persevered to achieve her president's list status here at Miles College. C and I worked diligently over the course of the semester on Math, allowing her to complete her only remaining math credit, and what she saw as her biggest obstacle in her journey here at Miles College (so far). C faced the challenge of working as a Nurse and balancing her stressful, busy schedule with not only attending all of her classes and also doing well in them, but also finding time to come in to the lab for extra help on a regular basis. Since it had been so long since C had received a formal math education we had to go back and review the basics before we could move on and concentrate on the content of her coursework. Slowly but surely, we moved from working on the rules of computing with negative numbers, to finding the GCF, to factoring polynomial equations. I enjoyed taking a slow approach with her, and her grateful, dedicated approach made my sessions with her, though long, seem to fly by. After a turbulent beginning to her semester, filled with grief after the death of a loved one, it was good to see C smile after she received her first exam back with a big red "A" at the top of it. Even after she began to do consistently well on her exams, C did not frequent the lab less often; she would come in to solidify her skills and review what she had learned in class, following our Study Cycle model to a tee.

Student D was one of the first students I had helped since I began working in the lab. He sought help in Intermediate Algebra and Biology 101. He is only a freshman and was trying to maintain a C average because he was working as well as going to school. I saw more potential than just C's from this young man though. D was very polite and patient when he came in the lab. He always understood when I was working with multiple students and never once complained. His willing attitude made me want to work harder to help him more. A major milestone this semester was when he made a B on his Intermediate Algebra Midterm. I saw how much he was improving and I think he began to believe in his ability to study and see that he should have never underestimated himself in the beginning. Student D began to see that he could do his work on his own. In his Biology class, he shared that he felt completely overwhelmed. I showed him how to pace himself and to take his papers one step at a time. I watched

D come in almost every day to work on his paper. He was working on it himself and I was proud of that achievement. I was able to monitor him and answer his questions. In the end, it was his grade and he earned it. I was very proud of how far he came.

Student E is a freshman and is also a part of the Purple Marching Machine Band. I have helped him in English 101 for the fall semester and currently English 102 for the spring. He is very enthusiastic when it comes to drafting an essay. I would always help him in his prewriting and drafting stages. He would always come to me with well written paragraphs and his work was pretty good. In fact, he would always let me read his instructor notes on some of the things he would write in class. His instructor always told him his work was good, but E must have wanted to do great. I admired his zeal to be a great writer. E would come to the Metacognition Lab after his English class to begin working on his papers. He asked questions and made sure he understood what I was saying before I could even ask him any questions. Currently, E is excelling in his English 102 class and is able to write a draft on his own. I am personally proud of E because he has not let the band affect his academics and he works hard to maintain a good academic average.

Student F is a junior and a classmate of mine. I personally saw him struggling in our classes that we had together. He is on the football team and suffered from a knee injury. His physical therapy caused him to miss a couple of class meetings and he fell behind. I insisted he come to the Metacognition Lab to work on his assignments. He resisted at first and then he finally came in. He expressed to me that he felt lost in class and overwhelmed because of his football schedule. I gradually brought F up to speed in the class. At the end of the fall semester, F raised his grades in those classes to an A and B. He was so excited he got through the semester. He personally thanked me for getting him through the most difficult semester he has experienced at Miles College. This filled my heart with joy knowing I was not just an academic coach for him but a mentor as well.

Student G is a freshman non-traditional student who visits the lab regularly to get help with his math assignments. I have been working with him over the past semester so I have gotten to know a little about his personal life. He resides in Birmingham, AL where he was raised on west side. He describes the struggles that he faced while growing up such as drug abuse, gang violence, and dealing drugs. He finally decided to get his life on the right path by enrolling into Miles College. He has explained numerous times that he is not the strongest in math so I have to go slow with him. G is a challenging individual to work with because of his strong personality and street mentality. At times he would forget that I was here to help him and he would attack me because he felt like I was judging him. However, we persevered and I have seen his math skills greatly improve.

Student H is from Chicago, IL and a junior majoring in communications. H at times believed that he didn't need help form the academic coaches in the Metacognition Lab and refused to get help until this semester when he decided to come into the lab for the first time to work on a writing assignment. I was able to show him the correct way to complete an essay in the APA format. Since then, H has been coming in the lab for writing help and Spanish tutoring. He has told me that his skills in writing a paper in APA format have increased dramatically.

Student I came into the lab one day for help with calculus. I have not taken calculus since my fall semester of my junior year but I decided that I would be up to the challenge. He and I spent four hardworking hours tackling 15 problems with me breaking down each step. About a week later he came back in the lab to show me the grade he received on his math grade and it was an A. He was so ecstatic that I was able to help him accomplish that letter grade.

Student J is a second semester sophomore, from Sebring, Florida, majoring in Political Science. J has not always loved English, though he often excels when it comes to academic. When he got to English 201, he had difficulty when it came to physically writing the assignment. Often times J would get frustrated because he knew what he was trying to say, but could not put his thoughts on paper. We sat down together numerous times until he finally began to grasp the concept of writing down everything that comes to mind then editing the paper at the end. He has come a long way, because like many of us he struggled with writing anxiety. Now instead of panicking, he just edits his thoughts later.

Student K is a sophomore from Georgia majoring in Education. K is a bright individual, but his thoughts are not always cohesive. We worked together on editing some of his writing assignments for his education class. A simple issue that K had to deal with was not using colloquial terms in his paper. We had to work on using proper grammar but still keeping the terms the way he wanted to say it. He would use terms that he was used to saying verbally, but could not always explain himself so that others may comprehend what he was talking about. As we worked together, he began to understand how to put what he wanted to say on paper while still retaining his original meaning. As time went on, I had to correct him less, because he was able to correct himself. K made immense progress from the beginning of the semester to now.

Student L is a non-traditional freshman from Alabama, majoring in Criminal Justice. L is very open to learning, though at times has a hard time focusing, and simply does not always grasp the material clearly. I help him with Ms. Bray's Math class, because he does not understand the material that has been given to him in class. When we work together, he often understands the material after the first few times, though when it comes to retaining the information, he usually has a problem. Throughout the semester, we worked on retention and fully understanding what has been taught in class. He takes initiative to come in daily and attempt to grasp the material. He has shown great improvement in the subject material, because he is starting to retain the information and equations necessary to be successful in math.

Student M is a freshman that began coming in the Lab during the fall of 2014. M came in seeking help with intermediate algebra. During his first visit I could really see that he was struggling in the subject. After our first session he immediately demonstrated that he was committed to making it to his appointments. If I was unable to help him he would receive help from one of the other coaches. By coming into the lab regularly M began to improve his test scores in his class. I enjoy working with M because he recognizes his weaknesses and doesn't mind asking for help. After receiving help in math, he began to ask for help in his other subjects. Not only M a full time student, but he works as well. It means a lot to me to know that he doesn't let his busy schedule be an excuse for not coming into the lab. He always makes time for what is important and I truly respect him for that.

Student N is a nontraditional freshman. He began coming into the lab during this semester. After graduating high school he decided to take a year off and now he has decided to continue his education. N came in seeking help with Math 099. During his first session he admitted that he was in serious need of help because he had taken a break from school. When we began working with fractions, our interactions became strained. I quickly learned that N has a problem with admitting that he is wrong. Our sessions started off great, but then he developed an attitude. I believe that he wants to improve academically, but I also believe that there are outside factors that are holding him back that he needs to free himself from. I will continue to try my best when working with N and hopefully we will see improvement soon. He has already made progress by coming in the Lab continuously.

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The Use of Simulation and Cases to Teach Real World Decision Making: Applied Example for Health Care Management Graduate Programs

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ABSTRACT

Many pedagogy experts suggest the use of real world scenarios and simulations as a means of teaching students to apply decision analysis concepts to their field of study. These methods allow students an opportunity to synthesize knowledge, skills, and abilities by presenting a field-based dilemma. The use of real world scenarios and simulations has also proven to be an effective method for training healthcare professionals not only in the classroom, but also in the workplace (Galloway, 2009). The article examines the use of real world scenarios and simulations in graduate learning to enhance students' decision-making and leadership skills. The article will present two case examples involving the use of a real world scenario and a simulation to facilitate higher learning at the graduate level for healthcare management students.

In the first case example, students in a graduate healthcare management course, Healthcare Operations Management, participated in a simulation presented by the quality team of a local hospital system. Students were asked to evaluate a given scenario and make decisions about how to best improve patient flow and efficiency, while ensuring healthcare quality and safety. In the second case example, graduate students in Strategic Planning and Marketing in Healthcare, participated in consulting projects involving two different real world clients: a national non-for-profit healthcare service organization and a local non-for-profit healthcare clinic. The students in this class conducted research, analyzed data, and ultimately developed marketing and strategy recommendations that may be implemented by the clients.

BACKGROUND

According to Bloom's taxonomy of educational objectives, a common tool for assessing and defining learning outcomes, there are six higher learning knowledge-based goals. The goals are presented in order of expertise: 1.) knowledge, 2.) comprehension, 3.) application, 4.) analysis, 5.) synthesis, and 6.) evaluation (University of North Carolina at Charlotte, Center of Teaching and Learning, 2015). In the hierarchy of the taxonomy, these six components appear in order of difficulty to master. Thus, of the six, knowledge and comprehension are considered to be lower level learning objectives. For any graduate student to be well prepared for success in his/her field of study, higher levels of learning must be achieved. As professors of higher education, we strive to facilitate this type of learning by utilizing the four remaining knowledge-based objectives that are more difficult to master. Bloom's defines these objectives as follows:

- Application–Apply abstractions, general principles, or methods to specific concrete situation.
- Analysis –Separation of a complex idea into its constituent parts and an understanding of organization and relationships between parts
- Synthesis – Creative, mental construction of ideas and concepts from multiple sources to form complex ideas into a new integrated, and meaningful pattern subject given constraints.
- Evaluation- To make a judgment of ideas or methods using external evidence or self-selected

criteria substantiated by observations or informed rationalizations. (University of North Carolina at Charlotte, 2015, Benefits to Students).

Although, there are several pedagogical methods that are employed to facilitate the achievement of application, analysis, synthesis, and evaluation, real world scenario and the use simulation are extremely effective. These methods are categorized as problem-based learning.

PROBLEM BASED CASE LEARNING

Problem based learning (PBL) is defined as "an instructional (and curricular) learner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem" (Savery, 2006, p.9). It is an active learning approach in which students, working in small groups, try to solve a problem. (University of Delaware, Institute for Transforming Undergraduate Education, n.d.). This active approach engages and motivates students not, only to solve a problem, but also to find and apply the knowledge. (University of Delaware, n.d.).

The role of the instructor in problem-based learning is "to facilitate group process and learning—not to provide easy answers" (University of Delaware, Faculty, n.d.). The challenge facing instructors who use a PBL model is ensuring the development of strong problems that can be resolved by students. (University of Delaware, n.d.). These problems "must be ill-structured and allow for free inquiry. Problems in the real world are ill-structured (or they would not be problems)." (Savery, 2006, p.13).

Problem based case learning (PBCL) is similar to PBL since both approaches are learner centered and problem based. However, PBCL "enables educators to design scenario-based learning situations based on current and authentic problematic situations encountered at local businesses." (Nashville State Technical Community College, & WGBH Educational Foundation, (What is PBCL?, 2009-2011). PBCL benefits not only the students but also the instructors and the business community. (Nashville State Technical Community College, 2009-2011).

According to the University of Delaware, Nashville State Technical Community College and the WGBH Educational Foundation, for students, PBCL

- Improves problem solving, research, and social skills
- Increases motivation to learn
- Develops critical thinking, communication and team working skills
- Enhances retention
- Develops true sense of the challenges facing real world in chosen field
- Able to apply new competencies to real situations
- Increases professional networking
- Better transfer knowledge, skills, and attitudes to new environments and situations (University of Delaware, Students, n.d.); Nashville State Technical Community College, Benefits to Students, 2009-2011).

Problem based learning facilitates the group process and brings students into the real world and allows them to react and resolve issues that are presented beyond the limitations of the classroom (University of Delaware, n.d.). In addition, the instructors:

- Are better able to create and manage a highly effective classroom environment, regardless of their experience level
- Are better able to prepare their students for subsequent STEM education and for the workplace
- Find their work more enjoyable and stimulating (Nashville State Technical Community College, Benefits to Instructors, 2009-2011).

Through PBCL, the business partner, with little or no additional costs, gains an opportunity to:

- recruit talent
- acquire research and exploration of new ideas,
- market the organization
- assist in developing future workforce (Nashville State Technical Community College, 2011).

A reciprocal relationship exists among all parties. See Figure 1.

APPLIED EXAMPLES

Types of problem based learning models include: the use of scenarios, simulations (live or computer-based), case studies, consulting projects and community based research. Many of the models may incorporate an interdisciplinary approach. This article presents and examines the use of an in-class simulation as well as the use of real world consulting projects in graduate learning to effectively teach appropriate decision-making and evaluation. In one graduate level course, students participated in an in-class simulation presented by a local hospital quality team. In another course, two different scenario-based learning situations were used to allow students to apply

core competencies and enhance learning outcomes. The students worked closely with local healthcare organizations to solve strategy and marketing issues. The applied use of the simulation and the real world consulting projects are evaluated and discussed in detail throughout the proceeding pages.

FIRST EXAMPLE: OPERATIONS SIMULATION EXPLORED

Students enrolled in a graduate level healthcare operations course participated in a simulation presented by the quality team of a local hospital system. Students were asked to evaluate the scenario and make decisions about improving patient flow, patient quality and wait times. At the time the scenario took place, students in this class had completed several readings and assignments pertaining to the following related topics including: wait-times, delays, medical errors, and process flow within a variety of healthcare settings. The purpose of the in-class simulation was to track the time and error rates in order to determine if the process could be streamlined. Students accomplished this task successfully. The scenario was played out in several steps, as outlined and discussed below.

Step One

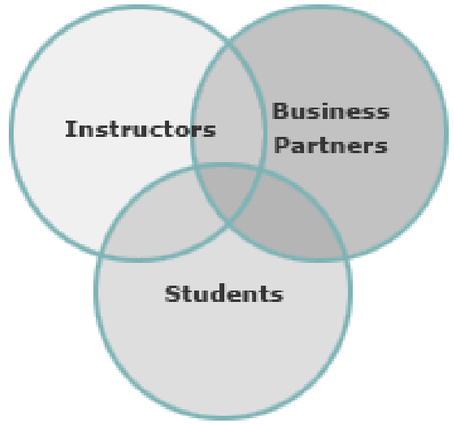
The quality team from a local hospital system provided an in-class lecture concerning patient flow, errors rates, and quality in the hospital setting. The team presented a scenario discussion involving a current/typical process of patient throughput (the total time through the system/process).

Step Two

The classroom was arranged using separate tables for the following hospital process points: Registration, Emergency Department (ED) waiting room, Radiology, Lab, Vital Signs Room, and Exam Room. Students were assigned to specific roles (i.e., doctor, nurse, medical technician, registration clerk, etc.) and specific tables/departments to conduct an assigned medical task pertaining to that department. The other assigned student roles were patients and observers. There were a total of thirteen (13) students participating in this class. The students, as a group, were asked to determine the most efficient ED set-up and process. Based on their judgments they assigned staff to particular departments. (Note: the students were given a specific number of doctors, nurses, and clerical staff to assign).

Students were provided a spreadsheet to calculate the total throughput time, error rates, rates per step in the process, and wait times. Students were also provided a Lego® board. The premise for the simulation was to begin with a "patient" at the start of the process, which was symbolized as blank Lego® board, and then add to the board as the "patient" went through the process of an ED visit. Each department was assigned a certain Lego® color-shaped piece (red block rectangle for ER, blue square for registration, etc.), a Lego® board, and a sticker, to be initialed. As the "patient" went through the process, the Lego® pieces were each attached accordingly. An error was tallied if the students skipped a step in the process, did not attach the Lego® piece correctly, did not place the sticker correctly or at all, or did not sign/initial the sticker piece.

FIGURE 1
NASHVILLE STATE TECHNICAL COMMUNITY COLLEGE, PBCL BASICS, 2009-2011



Problem-Based Case Learning transpires in the overlapping concerns of students, instructors, and business partners.

Step Three:

Once the "patient" was through the entire process, students then analyzed their error rates, rates per process step, wait times, and total throughput time. Students were given an opportunity to make changes to the staffing, set-up of the ED simulation, and overall adjustments to the process to minimize steps and potentially minimize errors.

Step Four:

Students ran through the simulation a total of four times. Prior to each time, they analyzed their outcomes, made changes accordingly, and discussed the impact of their changes. Based on the analysis of outcomes, the students ultimately chose the best ED set-up and staffing assignments out of the four simulations. Students based their choice on the most efficient and quality outcomes with the least amount of error.

Outcomes

The above-described simulation is based on a very common problem encountered by hospital emergency departments. In fact, the local hospital, which partnered to implement this classroom simulation, actually uses the same simulation to train its hospital staff about efficiency and flow. Students were able to work together as a team to streamline an ED patient flow and adequately assign resources, as well as ensure proper patient safety. Students collectively achieved learning outcomes, which were based on real world healthcare operations.

In addition to making appropriate decisions to improve patient flow, the ED simulation was focused on two other learning objectives. First, the students were to gain competencies in operations planning and efficiency to include all major resources: staffing, equipment and scheduling. Secondly, students were to apply operations management and process improvement skills to ensure the most efficient and safe patient outcome through patient throughput (total time through the system or process) exercise/simulation. All students in this course reported an increase in their ability to evaluate and choose appropriate process improvement techniques in a variety of healthcare settings. Thus, learning objectives were successfully accomplished in a creative and real world simulation!

Furthermore, students were later given a team based assignment to prepare a process improvement project based on their analysis of a case study. The participation of this simulation positioned students to accomplish the case study analysis successfully. It is the belief of the professor that the simulation also provided a solid foundation in decision making analysis and evaluation, such that when presented with similar scenarios in the field, graduates of the program will rely on what they have learned in the classroom and be able to apply it to multiple situations that they may face as practitioners in the field.

SECOND EXAMPLE: STRATEGIC PLANNING & MARKETING CONSULTING PROJECT

Graduate students enrolled in *Strategic Planning and Marketing in Healthcare,* participated in consulting projects involving real world clients seeking to overcome current strategic challenges. The clients were both non-profit healthcare organizations: one national and one local. The students, working in teams, conducted research, analyzed data and developed marketing and strategy recommendations, which were presented to the clients for consideration and use.

A total of twenty-three (23) students were assigned in teams. The team assumed the role of a consulting group and prepared an analysis report for the chosen organization. The initial team assignments were based on group interviews conducted by the course professors, which assessed the student's individual strengths and weakness, along with interests and experiences. Teams were assigned according to the information provided during the interview phase. Four teams were assigned to one of the two clients, who each presented two critical strategy issues.

The national non-profit healthcare service organization projects involved the following: 1.) an organizational culture shift/change management scenario, and 2.) reducing the physical footprint while maintaining and building upon the current community presence. The other client, a local non-profit healthcare clinic, presented the following issues: 1.) the exploration of marketing methods to reach donors and other key stakeholders, and 2.) the development of a functional website as a marketing and social media tool.

The student consulting teams were asked to work with the clients throughout the semester. The teams were responsible for ongoing communication with the clients and professors, resolving team conflict issues, and providing work-plan reports periodically. Each team chose a team leader. The role of the leader was to facilitate key meetings and keep the on target for meeting key milestones.

In general, the teams prepared an in-depth assessment of the outlook, potential, and strategic viability as it pertained to each of the assigned projects. Each team presented a final presentation outlining their recommendations to the clients. Each client along with the course professors evaluated the student projects based on the application and synthesis of marketing and strategic planning knowledge and skills. Students were also evaluated on the ability to demonstrate critical analysis skills, business communication, and professional organizational recommendations.

Outcomes and Results

Each team presented to an audience consisting of: classmates, the clients, and the professors. The teams fielded questions from the entire audience. Both professors and clients judged the projects. The results were as follows: 1.) All teams scored a satisfactory or above on the ability to create an original analysis throughout the project by going beyond merely summarizing or paraphrasing key points. 2.) All teams scored above a satisfactory on the ability to show insight into the meaning of the content discussed and explored. 3.) All teams scored above a satisfactory on the ability to tie together disparate parties of the analysis (synthesis) to make a strong case for their position taken.

Throughout the semester, students had an opportunity to develop an ongoing relationship with their client. Students were responsible for developing and implementing an approved work plan that would meet the client's needs and monitor major project milestones. All teams had at least one client site visit as well as a minimum of two conference calls. These activities and responsibilities, not only ensured that the students were meeting the course deliverables and objectives as well as the client's demands, but also helped to create a real-world professional relationship between the students, as consultants, and the organizations, as real clients.

Students working with the larger non-profit client on the project involving the premise of organizational change, made several appropriate strategy recommendations. Their ideas included: developing lead volunteer positions, developing a volunteer liaison position, recruiting interns from local universities, and conducting a team building workshop for volunteers and employees. The strategies presented by the students working on the project involved lessening the physical footprint of the organization while maintaining/expanding the target market included: enhancing community partnerships, implementing a digital campaign, and adding annual events. Students working with the non-profit clinic made strategy recommendations for: methods to reach donors and other stakeholders, website engineering, the use of social media, and the implementation of a crowd-sourcing website.

Both clients were able to use the students' analysis and research to the benefit of the organization. Furthermore, several of the strategy recommendations made by the student teams were implemented by the organizations. Students received initial feedback during the presentation session and were able to hear directly from the clients about the viability of the strategies presented and whether or not these would be implemented.

Real world projects and simulations are highly beneficial to promote higher learning objectives. In addition to accomplishing the learning objectives, as discussed, the use of the real world scenarios and simulation described in this article offered students and professors many additional unforeseen benefits. To name a few, the professors were able to: develop and enhance professional relationships with community partners, expand their students' professional network, allow students a field based forum to demonstrate project management skills, and allow students an intimate view of client's changing needs. Student feedback supported the need to keep the real world scenarios as part of both the Operations course, as well as the Strategic Planning and Marketing course in the future.

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JOINT CONFERENCE
May 24th, 25th and 26th 2017 in Nashville, TN

International Conference on Learning and Administration in Higher Education (ICLAHE.org)

All too often learning takes a back seat to discipline related research. The International Conference on Learning and Administration in Higher Education seeks to focus exclusively on all aspects of learning and administration in higher education. We wish to bring together, a wide variety of individuals from all countries and all disciplines, for the purpose of exchanging experiences, ideas, and research findings in the processes involved in learning and administration in the academic environment of higher education.

We encourage the submission of manuscripts, presentation outlines, and abstracts in either of the following areas:

Learning

We encourage the submission of manuscripts pertaining to pedagogical topics. We believe that much of the learning process is not discipline specific and that we can all benefit from looking at research and practices outside our own discipline. The ideal submission would take a general focus on learning rather than a discipline-specific perspective. For example, instead of focusing on "Motivating Students in Group Projects in Marketing Management", you might broaden the perspective to "Motivating Students in Group Projects in Upper Division Courses" or simply "Motivating Students in Group Projects" The objective here is to share your work with the larger audience.

Academic Administration

We encourage the submission of manuscripts pertaining to the administration of academic units in colleges and universities. We believe that many of the challenges facing academic departments are not discipline specific and that learning how different departments address these challenges will be beneficial. The ideal paper would provide information that many administrators would find useful, regardless of their own disciplines

Academic Business World International Conference (ABWIC.org)

The aim of Academic Business World is to promote inclusiveness in research by offering a forum for the discussion of research in early stages as well as research that may differ from 'traditional' paradigms. We wish our conferences to have a reputation for providing a peer-reviewed venue that is open to the full range of researchers in business as well as reference disciplines within the social sciences.

Business Disciplines

We encourage the submission of manuscripts, presentation outlines, and abstracts pertaining to any business or related discipline topic. We believe that all disciplines are interrelated and that looking at our disciplines and how they relate to each other is preferable to focusing only on our individual 'silos of knowledge'. The ideal presentation would cross discipline. borders so as to be more relevant than a topic only of interest to a small subset of a single discipline. Of course, single domain topics are needed as well.

Conferences

Academic Business World (ABW) sponsors an annual international conference for the exchange of research ideas and practices within the traditional business disciplines. The aim of each Academic Business World conference is to provide a forum for the discussion of research within business and reference disciplines in the social sciences. A secondary but important objective of the conference is to encourage the cross pollination of disciplines by bringing together professors, from multiple countries and disciplines, for social and intellectual interaction.