INTERNATIONAL JOURNAL OF INSTRUCTIONAL TECHNOLOGY AND DISTANCE LEARNING

January 2014
Volume 11 Number 1

ISSN 1550-6908

PUBLISHER'S DECLARATION

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International Journal of
Instructional Technology & Distance Learning

Vol. 11. No. 1.

ISSN 1550-6908

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Editorial

Networks

Donald G. Perrin

Networks make us more efficient ... They make more things possible... They are more than the sum of the parts. They are essential to advancement of civilizations, technologies, health, wealth, and quality of life. There are very few areas of human endeavor that are not enhanced by networking of some kind. We take them for granted, until we find some greater need they do not fulfill, at which point we invariably adapt an old network or develop a new one.

Starting with *homo sapiens* and before, the development of modern civilization reads like a history of development of networks. Food, water, transportation, exploration, commerce, language, knowledge, communication, education, trades, arts, sciences, economics, social development, politics, nation building… the list seems endless. Education began with transportation networks to transmit knowledge throughout the known world. These networks have origins and destinations with many intermediate points. They grow in one direction from the source, like the branches of a tree. As they mature, they intertwine with other networks. Ultimately the education networks become bidirectional as lecture becomes discussion and discussion becomes dialog.

Technology accelerates communication with its ability to replicate messages faster, in larger numbers, and lower cost. Hand written manuscripts were replaced by the printing press, the copy machine, and through electronic communications like telephone, radio, television, recordings, and the internet. The media for recording and transmission have developed from cave paintings and clay tablets to papyrus to disc, film and magnetic recordings of analog and digital information transmitted on glass fibers. Portability, instant transmission, and low cost of replication launched the information age where computers store, process and distribute incredible volumes of data at the speed of light and smart phones provide interactive connectivity for almost every individual.

The tools of communication have advanced faster than our ability to manage them. Patent and copyright laws designed to protect invention and creative work have been distorted by privatization of knowledge (to increase profit) and knowledge has become a commodity that can be sold, stolen or litigated like any other property. This is a detriment to the growth of knowledge and economic development. The counter culture advocates free access for research and education though the creative commons copyright and collaborative development as with open source programming.

Alternative standards, trade wars and litigation have stymied development in many industries. In June 2014, Tesla CEO Elon Musk recognized the value of open source when he offered most of his company's patents to rivals in hopes of cultivating a bigger electric car market.

When we collaborate to build networks, the opportunities are limitless. Education and training are a major contributor to research and innovation, and ultimately to economic growth and stability. Investment in education and training fuels the economic machine so all may benefit. Our educational systems should emphasize cooperation rather than competition, reward rather than punishment, dialog rather than discussion, and compromise and coexistence in sensitive areas so they can be resolved in the future. In this way we can avoid instability leading to personal and economic loss.

As we build and participate in our networks of choice, we need techniques for collaboration and problem resolution to provide stability and reassurance that the future for all will be better than the past – more stable, more loving, and more positive.

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Editor's Note: Critical thinking and creativity are the focus of intensive research in business and in education. Innovation has become a driver of successful businesses and companies search globally to add creative genius to their research, design, development, marketing and business plan. This paper breaks new ground in showing ways in which creativity can be unleashed and applied through innovative education and training programs.

Leveraging Educational Synergy: Powered-Creativity©, Student Co-Creation, and Industry-Application[1]

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Abstract

The focus of this article is concentrated on the new approach to enhancing creativity, with special consideration for integration of student empowerment along with critical thinking within industry course-related pedagogies. It discusses leveraging educational synergy created from a new concept of *powered-creativity*©2014 Perlman, combined with student co-creation of learning, and industry-application. A new model is proposed: The *Educational Synergy Model*©2014 Perlman, DeNigris, Muirhead, Bagdady-Asal (All rights reserved) is illustrated in Figure 1. Details of the model components are shown in Table 1. This information may be useful to course-developers in understanding how to optimize industry-application coursework. In turn, students may benefit by being prepared for "real world" industry challenges and opportunities.

Keywords: online learning technology, creativity, innovation, powered-creativity, student outcomes, student empowerment, educational synergy, student co-creation, graduate business, industry learning outcomes, student motivation, consumers of education, pedagogy.

Introduction

Understanding how to enhance student learning and creativity is an ongoing concern of academicians (Friedman & Friedman, 2013). Equally important is the need to empower students with the expertise required by 21st Century organization leaders (Treleaven & Voola, 2008). Additionally, 21st century students are increasingly technologically savvy. These issues create technological and pedagogical challenges.

This article begins with an overview of the connections between creativity, innovation, and pedagogy. An example industry (business) of this application is then examined.

Next, an analysis is given on student creativity and critical thinking as co-creators of real-world learning (i.e. industry application). Integration of online learning is also discussed.

This is followed with reflections on leveraging the educational synergy created from a proposed new concept of *powered-creativity*©2014 Perlman, student co-creation, and industry-application.

This article concludes with recommendations for research on this proposed new model (illustrated in Figure 1): *Educational Synergy Model*©2014 Perlman, DeNigris, Muirhead, Bagdady-Asal (All rights reserved.). Details of these model components are presented in Table 1.

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1. Citation: Perlman, J., DeNigris, J., Muirhead, B., &Bagdady-Asal, H. (2014). Leveraging educational synergy: Powered-creativity©, student co-creation, and industry-application. *International Journal of Instructional Technology and Distance Learning*. Vol 11:1.

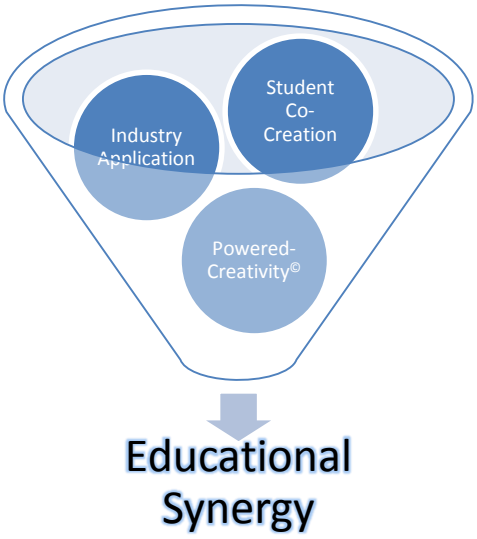

Figure 1 Educational Synergy Model

See Table 1 for model component details.

Table 1
Educational Synergy Model©Components

Industry Application[1] ***(Real-world integration)***	**Student Co-Creation[2]** ***(Activities)***	**Powered-Creativity©[3]** ***(Development Activities)***	**Educational Synergy[4]** ***(Outcomes)***
Application to contemporary industry issues	Self-development of end-project goals and objectives	Multisensory approaches using online technology	Customized student-learning
Development of innovation expertise	Self-development of cognitive processes	Innovative challenges	Contemporary innovative-pedagogy
Development of creativity expertise	Self-development of creative techniques	Affective thinking	Contemporary creative-methodology
Development of the ability to work in both teams and autonomously	Collaborative partnering with peers and faculty	Active engagement and active inquiry	Unique Idea generation to meet class learning objectives
Development of good work ethic and self-esteem	Self-actualization	Motivational goals	Inspiration for original student thoughts

In-text citations

1. (Bowers & Khorakian, 2014; Kaufman, 2013; Muirhead, 2014; Sinfield, Gustafson, & Hindo, 2014)
2. (Bandura, 1986; Johnson, Becker, Estrada & Freedman, 2014; Johnson, Becker, Estrada & Freedman, 2014; Lusas, 2014)
3. (Dewett & Gruys, 2007; Lusas, 2014; Merriam, Caffarella & Baumgartner, 2007; Muirhead, DeNigris & Perlman, 2012)
4. (Feldman, 1999; Johnson, Becker, Estrada & Freedman; 2014; Muirhead, DeNigris & Perlman, 2012; Peppler, & Solomou, 2011; Scott, Leritz, & Mumford, 2004)

Creativity, innovation, and pedagogy

Interest in what and how, in regards to enhancing students' creative process and innovativeness, are not new ideas. Germinal research in this topic is reflected in Dewey's (1934) argument that creativity is not limited to great works of art and scientific breakthroughs. Creativity, is defined as the ability to develop new and novel ideas; finding better ways of doing things and discovering new solutions for old problems (Boden, 1998; Clinton & Hokanson, 2012).

Boden (1998) clarified that "[c]reativity is not a special 'faculty' nor a psychological property confined to a tiny elite. Rather, it is a feature of human intelligence in general. It is grounded in everyday capacity such as association of ideas, reminding, perception, analogical thinking, searching a structured problem-space, and reflective self-criticism. It involves not only a cognitive dimension (the generation of new ideas) but also motivation and emotion, and is closely linked to cultural context and personality factors" (p.347).

Traditionally, individuals were viewed as being the source of creativity. In comparison, contemporary thought leaders view creativity as a system (Feldman, 1999; Peppler & Solomou, 2011, p. 13). Three foundational domains are included within this system: content experts, individuals, and knowledge (p. 13). In this viewpoint, creativity is also interconnected with peer interaction and social collaboration. This interconnectedness is viewed as a requirement for creativity to develop. Reflected within this system, is the creative process from three student actions. They are as follows: (1) socializing through cultural constructs; (2) affective thinking through appreciation and support of peers, and; (3) cognitive thinking through inquiry-based and sense-making dialogue (Peppler & Solomou, 2011).

This creativity-interconnectedness concept is incorporated into course content-delivery. The underlying creative pedagogical-innovative process begins with the methodology faculty use to present a problem. A creative methodology is used to identify conceptual boundaries and creative engagement techniques with students. Subsequent creativity steps involve faculty identification of learning-content and domain-specific desired outcomes (Muirhead, DeNigris & Perlman, 2012). Online technology is a necessary tool for student engagement. The overall creative result improves student learning (Scott, Leritz, & Mumford, 2004). An example of this creative pedagogy is reflected in the development of 21st Century graduate-business education.

Industry-application: business

Creativity pedagogical-innovation example: graduate business-education

Creativity and innovation continue to be a high priority for 21st Century business leaders and executives (Bowers & Khorakian, 2014; Sinfield, Gustafson, & Hindo, 2014). In response to this need, graduate-business program-designers have incorporated course activities to help students develop these skills (Alstete, 2013; Treleaven & Voola, 2008). Foundational assignments include contemporary academic and business-periodical reading assignments along with examination of core business concepts.

Another suggested activity (Treleavan & Voola, 2008) to develop business creativity and innovation are journal reflections on personal workplace learning and applications. Benefits of journaling include self-expression, improved critical-thinking, better understanding of one self, active learning, and creativity. Overall, the process of reflection on concepts discussed is more likely to lead to synthesis of knowledge, breakthrough and new insight. These creativity pedagogical-Innovation approaches share a common foundation: the germinal research done by Kolb and Fry (1975). Kolb and Fry's experiential-learning model incorporated four elements of engagement in concrete experience, observation and reflection, formation of abstract concepts, and testing in new environments. Collectively, these activities reflect "real world" business situations.

In contrast, Dewett & Gruys (2007) argued that additional activities were needed to help students develop the creativity needed in business. Activities which go beyond discussion questions, class dialogue about readings and concepts, and actively involve students in experiential learning; are more effective in fostering creative thinking. Dewett & Gruys measured ideational fluency, the findings; based on analysis of pre and post course scores; indicated significant improvement in student creativity, willingness to take risk, and creative self-efficacy. The results suggest a correlation between unusual use, creative self-efficacy and willingness to take risks. Also, a correlation between managerial experience and valuing creativity suggested that students with managerial experience viewed creativity as more important than others with none or less managerial experience.

An example of this connection between creativity development and experiential student techniques is reflected in the use of multisensory approaches (Dewett & Gruys, 2007; Muirhead, DeNigris & Perlman, 2012). For example, through online technology, students have been able to utilize case studies and other real-world interactive activities. Through these kinds of experiences, students are challenged beyond their comfort zone. This encourages an exploration of risk-taking; and stimulates abstract and conceptual thinking. In turn, these activities build student self-efficacy, which is fundamental in experiential learning. Additionally, when self-efficacy is high, people will engage in behaviors that foster skill development (Bandura, 1986).

Creativity, motivation, and effective student work ethics

The literature highlights that individuals need relevant opportunities to explore and experiment; these are essential to identify and affirm creative abilities. Therefore, teachers must provide a supportive environment to reinforce and reward original thinking by offering class lectures and activities that honor creative endeavors. A common theme among writers has been the absence of creative opportunities for students. This has played a role in students feeling conflicted about their creative skills (Robinson, 2011).

Educators can promote novel thinking and products within their courses by establishing a set of relevant principles that can be integrated into lectures, online discussions and assignments. For instance, teachers can help students understand the relationship between hard work and being creative. A good work ethic enables individuals to have the patience and determination essential to produce solutions. Even those who are characterized as geniuses (such as Mozart) had an exceptional work ethic. Also, passion is a valuable trait.

Kaufman (2013) in *Ungifted: Intelligence redefined* made a vital distinction between obsessive passion and harmonious passion. Obsessive passion compels individuals who struggle with internal issues such as feelings of inferiority and doubts about their abilities. This negative emotional disposition can cause people to become easily distracted and hinder their efforts at problem-solving. Obsessive passion is externally driven by the need to please others and to acquire status with peers. It is a shaky foundation based on the need for constant validation by family, friends and work colleagues. Eventually, illness or injury could interfere with the ability to practice or complete tasks. This can trigger a loss of self-esteem, when the individual can no longer control their schedule of activities. Obsessive passion, when left unchecked over time, will rob people of the ability to enjoy their relationships; because they are always worrying about competing with others for attention and recognition. Life satisfaction then takes a downward spiral, and their mind can become plagued by self-doubt which will cast a cloud over their achievements (Muirhead, 2014).

There is a different and much more promising type of passion. Kaufman (2013) shared the benefits of having a *harmonious passion* where individuals freely choose activities based on their personal interests and maintain a productive mindset characterized by determination and flexibility. They enjoy their work and take time to develop authentic relationships, which gives them the freedom to

engage in a variety of life pursuits. Harmonious passion creates a sustainable and creative lifestyle fueled by intrinsic motivation based on affirming core values, beliefs and goals. Cultivating autonomy has a positive impact on creativity because it enables the individual to find bold and unique perspectives to problems, to generate new ideas and experiment with unconventional thinking (Muirhead, 2014).

Motivation is a key factor in being able to face and endure the challenges associated with difficult endeavors. Lucas (2014) shared three key elements that support personal motivation and these are: autonomy, value and competence. Autonomy involves giving students opportunities to make choices about their work, such as the topic for a term paper. This approach can empower individuals by making them a genuine partner in creating assignments. Increasing personal value requires making relevant connections between the student and the subject matter. Therefore, teachers need to devote attention to developing instructional strategies that affirm both the course objectives and meet student needs. Also, it involves helping students believe that accomplishments are based on diligence and focused work. Lucas (2014) related "Believing that effort fosters excellence can inspire you to keep learning" (p. 19).

The literature highlights a variety of educational strategies to promote creativity. Dewett and Gruys (2007) encouraged student journaling as a practical tool that promotes growth by fostering "a positive feeling of self-expression, stress reduction, improved critical thinking, better self-understanding, an increased ownership of learning, and creativity" (p. 89). As discussed earlier, journaling is an example of how non-graded activities can encourage reflective and original thinking. Wang (2012) investigated the influence of reading and writing on creative thinking with 196 university students who shared their reading and writing habits, with one another, for one school year of course work. The study found that students who devote more time to reading and writing scored higher on creativity evaluations. They also demonstrated greater ability to provide contextual information to their ideas. Therefore, supporting creativity should include strategies that foster effective study habits.

Creativity and critical thinking: co-creation of learning

Thinking as a integrative process

Creative thinking and critical thinking may be linked because of their importance to learning when considering the extension of association among, within and beyond threshold ideas, concepts, processes and applications (Gryskiewicz & Epstein, 2000). Consider for a moment the variations of learning and cognition that might be engaged when a person is confronted with an issue or emotion that is unfamiliar or seemingly unique in nature. A unique concept, once surfaced, which is unfamiliar or foreign to a learner might possibly be avoided, dismissed, researched or abstracted by the observer; that is, the unfamiliar is reduced to data or information that has relevance to the topic of study or unfamiliar event or idea (Kegan, 1982; Jarvis, 2006). Variations exist for the reactions and responses people will employ when encountering unique issues, and they are abundant and relevant to interpretations that might require action to be taken or new processes to be employed (Merriam, Caffarella & Baumgartner, 2007). Applying only inductive or deductive reasoning without creative reflection might only provide limited answers to a person's ideas and concepts that are intangible or invisible to discovery.

In an NMC Horizon Report: 2014 Edition, a Delphi study by Johnson, Becker, Estrada and Freedman (2014) identified trends in education that were projected to gain momentum and application within learning institutions and businesses. One of the salient trend outcomes of their study is now proposed by Johnson et al. for consideration by academic and business leaders is that informed institutional leaders are redefining their constituents as "creators rather than consumers of education"(p. 7). To make the shift from pedagogy to the co-creation of knowledge by instructors and learners requires an agility of thinking and the breaking of antecedent learning

paradigms whose basis in thinking are solely derived through deductive and inductive logic. When applied, co-creation of learning might have the potential to influence idea generation.

Using the lens of co-creation of learning, shifts solution providing from a singular expert use rule driven logical models, toward collaborative shared reasoning, experiential learning and creative thinking. *Co-creation reveals the promise of a learning architecture where learners in collaboration with their instructors will consider not only what is practiced but also what might be possible (Johnson et al., 2014).* Educational leaders will be tasked with designing a learning space that has plasticity and flexible of thinking at its core; under such a learning model, learning might become more self-regulated, personalized, collaborative and creative in origin.

Consumers of education and online learning

Content consumption is a part of a pedagogical archetype used by universities (Merriam, Caffarella & Baumgartner, 2007). Learners look toward their instructors as content experts who will explicitly convey their knowledge to a learner. In the pedagogical model, a learner's conceptual orientation is somewhat in a *neutral* state of learning where lecture, memorization and fact recitals might dominate the learning environment and learning outcomes. Although teaching based on pedagogical foundations has merit, *learning based on narrow or unitary prescriptive communication also has limitations in activating learners to think independently or abductively (innovatively)* .

Research on online learning and the fabric of online learning as a channel for education delivery, shows trend lines that are shifting away from expert-to-learner models (Brookfield, 2010). *A growing academic concept is to recast and redefine those who can and should contribute to the learning environment* (Brookfield, 2010). *The new trend made operational would allow for those providing learning contributions to germinate from all participants in a learning space and not just the instructor.* Consumption of education is moving from passive to active engagement and initiatives for those within the virtual learning platforms. Monolithic online learning practices are beginning to be supplanted by robust ranges of thought, production and educational content which shift consumers of education to creators of education (Merriam, Caffarella & Baumgartner, 2007).

Creators of education, knowledge and emergent technologies

The concept of creation of education provides recognition that online consumers of education need not be passive thinkers who are silent in their reasoning. To the contrary, encouraging open expressions of our normal routines (Simpson, 2002), advances the form and function of our thoughts. Being a co-creator of thought has the potential to move us from thinking stasis, based in part on traditional reasoning as consumers of education, to a new education vista of a creator of knowledge. Engaging in the co-creation of reasoning moves us from passive to active thinking spaces that reflect informed reasoning based on diversity of experience, peer collaboration and personal choice. In effect, being a creator of education rather than pure consumer of education, moves learners from academic prescription to academic inquiry. In a new educational model of informed reasoning, questions replace answers, choices replace decisions and movement replaces stillness as a mode or reasoning.

In part, the concept of constructivism is grounded in the research of Seymour Papert and Jean Piaget's (Papert, 1980; Piaget & Inhelder, 1967). Piaget was concerned with children and how their thinking unfolded over time, whereas Papert was concerned with the craft of learning or "making things" when learning (Blake, Smeyers, & Standish, 2002). It is Papert's (1980) ideas, however, that articulated the need to convert educational learning to the workplace or work space existing in "real world" applications. Under Papert's (1980) doctrine, when consciously crafting what is learned with what is done, explicit, implicit and sometimes tacit knowledge can be

transparent, conveyed and realized by instructors and learners who utilize a blend of creative thinking and constructivism as a basis for learning.

Papert's (1980) germinal works on constructivism resulted in new concepts which bring together the generation of creative ideas and applications in learning. One related concept that emerged from constructivism is the concept of *Makerspace* (Johnson et al.). Makerspace is currently an emergent educational technology which brings opportunity for learners to employ active inquiry, physical and intellectually shared design tools and knowledge using collaborate co-creation among cohorts and the instructor in a specific learning space platform. Within the Makerspace environment, learners and faculty become equal participants in the design of creative outcomes. They are free to development new tangible and intangible outputs which represent instructional efforts that embrace a process of curiosity, exploration, inspiration and creative thinking. In a designed learning environment (hence… a maker's space), knowledge can be democratized, and creative ideas are not limited to an instructor's knowledge, but is shared and makes participative practices visible.

Creativity as an innovative learning technology

Although creativity has been researched for decades (Xiaoqing & Hongxin, 2007), the horizon for the reframing of creativity within online dialogue is taking on new purpose and intellectual presence. In part, the attraction of creatively and constructive designing thought participation for learners is driven by the rapidly changing communication structures based on societal practices. For example, during 2013, *massively open online courses* (MOOCs) gained popularity and experienced rapid growth and educational deployment. In a similar manner, the use of tablet (mobile) computing has changed the utility and practices of the tools, platforms and processes for engagement in online courses (Johnson, Becker, Cummins, Estrada & Freeman, 2013).

The extension of innovative technologies and creative practices within societal behaviors is a tangible harbinger of creative-constructive possibilities. The need for customization of an online learning space for learners, and possibly the segmentation of multiple online learning modalities that accommodate learner needs and contemporary learning styles requires purposeful deliberation (Peppler, & Solomou, 2011). Creativity, reframed as technology, can be a form of thinking expertise that might bridge linear reasoning with abstracted, deductive and inductive reasoning. Importantly, creative thinking might inspire an original voice for learners seeking online engagement and for instructors seeking advent to learner critical thinking development and workplace advancement.

Leveraging educational synergy: powered-creativity, student co-creation, and industry-application

In the 21st Century, creativity is more than the development of new approaches for problems. Increasingly, individual creativity is viewed as a required employee skill; critical for organizational success (Bowers & Khorakian, 2014; Gustafson, & Hindo, 2014). Coupled with creativity, is the need for employee empowerment for organization excellence (Sanchez & Cralle, 2012). Additionally, productivity focus is no longer on one person. Instead, organizational leaders rely on teams for development of core competencies, sustainability, and successful product/service launches. Therefore, what is needed in contemporary (i.e. 2014 and beyond) industry is to understand how to develop both creativity and empowerment in work teams. Reflection on the importance and application of both empowerment and creativity in industry yields a new concept: *powered-creativity*[©2014 Perlman]. The activities which define the powered-creativity© concept are detailed in Table 1.

Developing powered-creativity

Team-creativity begins with the individual members. The challenge is *how* to empower individuals (Marlow & Al-Dajani, 2013); and therefore teams, to be creative in the workplace. Empowerment is grounded on knowledge (Pardo del Val & Lloyd, 2003). There are different ways to teach creative knowledge. Techniques range from case analysis to technology interaction (Johnson, Becker, Cummins, Estrada and Freeman, 2013). Technology changes at a rapid rate. Along with these changes, is the need to teach new technology platform applications to faculty.

Along with the software and hardware technology challenges, is the need for customized creative-learning approaches for 21st Century students. Additionally, as discussed above, creativity is not enough for learning to occur. Critical thinking is a co-creator of knowledge (Johnson *et al.,* 2014). As 21st Century technology-savvy consumers of education, students have a unique opportunity to actively participate with teachers, to use creative knowledge and critical thinking to build new knowledge utilizing contemporary technology (for example, multisensory applications). Students can then apply their understanding of how to power creativity to resolve real-world organization issues. Presented in Table 1 are key factors of Industry Application, Student Co-Creation, and Powered-Creativity© domains with the related potential Educational Synergy outcomes.

Conclusions and recommendations

Research is needed on the proposed relationships of the factors both within and between the different model components. Specifically, research is needed on how educators can effectively leverage the educational synergistic outcomes generated from the integration of real-world industry applications, student co-creation activities, and powered-creativity development activities, (see Table 1). Research is also needed on the effectiveness of the coursework relative to organizational employment-success.

The focus of recommended research questions is a study of the strength of correlations for different creative and critical thinking techniques to retained post-graduate knowledge. Other recommended research questions are on what online technologies, course work, and teaching techniques result in optimal team-member empowered-creativity. Findings from these proposed research areas; might be used by industry-application course developers. Additionally, human-resource trainers may use the potential findings to develop employee and team innovation and creativity training. Finally, industry-specific goal achievements may be relative to different online technologies, powered-creativity trainings, and/or across different industry segments.

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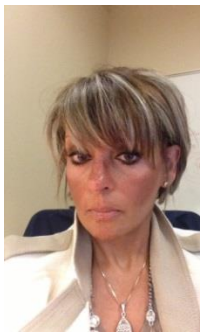

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Editor's Note: This study finds a significant difference in satisfaction for students in open education compared to the traditional education system. It also gives clues to aspects of pedagogy and support that students considered to be important.

Issues of Academic Satisfaction in Higher Education:
a study on students of conventional and open education system

Shashi Singh and Ajay Singh
India

Abstract

Higher education effects productivity and growth through several channels. A better-educated person absorbs new information faster, and applies new inputs and new processes more effectively. Thus, the quality of higher education assumes the utmost importance as the system provides human resources to all areas that are crucial for national development. Satisfaction and dissatisfaction levels are individual influences that affect motivational performances on people throughout their lives. When an individual is satisfied with his/her work, he/she gets pleasure and feels motivated. This paper aims to find out the effectiveness of the Open Education System (OES) by comparing it with the Traditional/Conventional Education System (CES). The study tries to compare academic satisfaction between the two education systems. This paper also evaluates the academic satisfaction between male and female students of the two systems. Self-developed questionnaires (namely Academic Satisfaction Scale) were used to test the hypothesis on 351 students belonging to CES (n=200) and OES (n=151). It is proposed in this paper that there is a significant difference in the academic satisfaction of students of the two systems. Satisfaction of students in OES is greater than CES, but there exists no significant difference between male and female students in their respective education systems.

Keywords: higher education, open education system, conventional education system.

Introduction

Satisfaction is a complex emotion and cannot be defined explicitly. In the context of education, student satisfaction refers to the favorability of a student's subjective evaluations of the various outcomes and experiences associated with education (Oliver & DeSarbo, 1989). Since satisfaction is based on experience, student satisfaction is constantly being influenced by the students' overall experiences (Oliver, 1980). Dewey (1922) considered satisfaction as the fulfillment of a specific demand. Morse (1953) said, "the greater the amount the individual gets, the greater is his/her satisfaction, and, at the same time, the more the individual still desires, the less is his/her satisfaction." Thus, individuals' satisfaction seems to be a function not only of how much they receive from the environment, but also their standing with respect to their level of aspiration.

The conflicting results of different research studies support the fact that satisfaction and motivation are complex phenomena and are dependent on circumstances and individual traits. Different research studies on satisfaction, pertaining to the conventional education system have shown varied results. Students differ significantly in their satisfaction scores belonging to different colleges (Clifford, 1955) and scores also vary according to personal factors (Odell, 1957), personality characteristics (Drennan, Kennedy & Pisarski, 2005), and learners' thinking that their interpersonal communication needs are met (Dennen, Darabi & Smith, 2007). Some researchers argue that there is a positive relationship between satisfaction and academic achievement (Broodie, 1964; Mishra, 1993; Perez, 1981), while others have not found any noteworthy relationship between satisfaction and achievements (Bryan, 1978; Diedrich & Jackson, 1969; Modu, 1976). Other studies (Field, Halley & Armenakis, 1974) conclude that administration of the college,

academic environment; rules and regulations, teacher-student interaction, open decision-making, infrastructure and discussions, etc. affect students' satisfaction levels.

Similarly, academic satisfaction in an open education system has been associated with a degree of structure in the course (Stein, 2004), positive perceptions towards technology (Drennan et al, 2005) and interaction between instructor-student and between student-student (Carr, 2000). Biner et al. (1996) in his work concluded that age, personal income, and socioeconomic status were unrelated to satisfaction in a telecourse. In another study, Kanuka and Nocente (2003) found no relationship between personality types and satisfaction while using Web-based instruction. While Frederickson, Pickett, and Shea (2006) reported that interaction with the teacher is the most significant contributor to perceive learning and to feel satisfied. Jung, Choi, Lim, and Leem (2002) found student-student interaction more important in satisfying distance learners than the interaction with the instructor.

A variety of studies are available in the literature on the identification of different factors associated with academic satisfaction. But, these studies are primarily catering to the conventional education system and open education system separately. An effort has been made here to compare the two systems of education at one place, in order to highlight the similarity and dissimilarity between the two. It is expected that the findings of this research will provide better understanding and comparison about the two education systems, when conducted on same plane, and will be helpful in policy formulation and management.

Objectives of this study

The objectives of the study are to:

Examine the academic satisfaction of students of the Conventional Education System (CES) and Open Education System (OES).

Compare the levels of academic satisfaction of students studying in the CES and OES.

Examine the various factors that guide and shape the satisfaction level of students from their respective education system.

Hypotheses

H 1: There is no significant difference in the academic satisfaction of students studying in the CES or OES models.

H 2: There is no significant difference in the academic satisfaction of male and female students studying in CES or the OES model.

This hypothesis has been further divided into four sub-hypotheses:

H 2 (a): There is no significant difference in the academic satisfaction of male and female students studying in the Conventional Education System.

H 2 (b): There is no significant difference in the academic satisfaction of male and female students studying in the Open Education System.

H 2 (c): There is no significant difference in the academic satisfaction of male students studying in the Conventional Education System and the Open Education System.

H 2 (d): There is no significant difference in the academic satisfaction of female students studying in the Conventional Education System and the Open Education System.

Assumptions and limitations

The present study has the following delimitation:

It is confined to undergraduate students only.

It is confined to two faculties only, namely students of arts and students of science.

The population, under study is limited to the municipal limits of Allahabad Municipal Area (Uttar Pradesh, India).

The sample size of the present study is limited to 351 students.

The present study is limited in its design, method, measuring devices and statistical techniques.

Research process

Sample

Population for the Conventional Education System has been taken from a number of students, studying in degree colleges, enrolled in B.S. and B.A. courses in Allahabad city region, and these degree colleges are affiliated with the University of Allahabad. Only second and third year undergraduate students from the research population have gone through the examination and evaluation process for their education system. At the time of this study, the total student population of 13748 was eligible to participate in this study from nine different colleges.

On the other hand, students enrolled in the study centers, which were based in the Allahabad region of Uttar Pradesh Rajarshi Tandon Open University, Allahabad constitute population for the Open Education System. Only those students belonging to either Art or Sciences programs were taken. This university conducts semester long examinations on Arts and Sciences programs. That is why the population constitutes all the students studying in I (Second semester), II, and III year of their respective programs (N=305 from five study centers). Second semester students have been considered to be part of the population because they have cleared the first semester examination, thus fulfilling the criteria of "going through the examination and evaluation process at least once." The sample design for this study is given in Table 1.

Table 1
Sample design

Undergraduate Students		Conventional Education System	Open Education System	Total
Art Programs	Male	50	50	100
	Female	50	50	100
Science Programs	Male	50	37	87
	Female	50	14	64
TOTAL		200	151	351

Tool

Academic Satisfaction Scale (ASS)

In the present study, academic satisfaction has been taken as the feeling of contentment and happiness with the overall academic environment of the college or the system in general. It is essentially the attitudes of students toward the overall academic environment of the college/study centers such as examination systems, evaluation process, library facilities, instructional materials,

infrastructure, administration etc. Based upon different studies and taking guidance from various researchers and academicians, the following dimensions have been used to structure the questionnaire:

1. Admission procedure, Courses and curriculum
2. Facilities provided at the College/Study center
3. Teachers/Academic Counselors
4. Classroom teaching/Study center counseling
5. Study Material and Students' Learning Activities
6. Examination, Evaluation and Administration

Final form of questionnaire

Initially there were 58 items in the questionnaire. Some items were rejected; 13 items due to t-value, 3 items due to item validity and difficulty in item incorporation. Therefore 42 items remained in the final form of the test. These 42 items or statements (7 items for each dimension) can be said completely fit and appropriate for further use. The tool was standardized by judging the reliability by using the split half method (correlation coefficient was found to be 0.81 and when corrected it was 0.89) and test-reset method (Moment Product Correlation Coefficient is 0.895) and incorporating suggestions from students, educators and psychologists

Statistical technique used

The t-test (Garrett 1981: 243-245) statistical technique was used to test various hypotheses.

Data analysis and interpretation

Hypothesis 1

To test this hypothesis, the Academic Satisfaction Scale was administered to 200 students of the Conventional Education System and 151 students from the Open Education System. The details of the data are as shown in Table No. 2.

Table2

Comparison of academic satisfaction of students studying in CES and OES

Education System	Mean 'M'	Standard Deviation 'SD'	Degree of Freedom	*t*-value
Conventional (n=200)	121.46	21.73	349	-3.85
Open (n=151)	129.03	15.04		

t critical two tail: 1.97 (at 0.05 significant level)

The value of t is found to be -3.85 that is significant. Thus the hypothesis is rejected and can be said that there is a significant difference in the academic satisfaction of students studying in the two systems of education. It is seen that students of OES have a higher mean compared to the mean of CES (resulting in negative t value). Dimension-wise observations suggest that students belonging to OES feel more favorably towards their education system (Table 3 and Figure 1).

Table 3
Comparison of academic satisfaction of students studying in CES and OES-dimension wise

S.No.	Dimension	Total Student				*t*-value	Significant/ Insignificant
		Conventional Education System (n= 200)		Open Education System (n= 151)			
		M	SD	M	SD		
Dim. A	Admission Procedure, curriculum and courses	20.40	4.81	23.74	3.8	-7.28	Significant
Dim. B	Facilities provided at College/Study Centers	21.31	4.9	21.01	4.73	0.59	Insignificant
Dim. C	Teachers/Academic Counselors	20.25	4.42	20.66	4.55	-0.85	Insignificant
Dim. D	Class Teaching/ Study Centers counseling	20.31	4.5	20.68	4.3	-0.78	Insignificant
Dim. E	Study Materials & Students' Learning Supports	19.34	4.3	22.48	3.71	-7.34	Significant
Dim. F	Examination, Evaluation and Administration	19.85	4.52	20.45	3.70	-1.35	Insignificant

t-value for two tail: 1.97 (at 0.05 significant level)

The above table shows that there is a significant difference between the two systems of dimensions A & E (in the other dimensions there are no significant differences). On all the dimensions (except dimension B) the mean score of OES is better than CES (negative *t* values). Students of OES have responded favorably to the admission policies of their education system. Since the admission procedure is simple under OES, and there are generally no malpractices involved, students feel more satisfied. Another characteristic of OES is the availability of a wide range of courses and subjects to pursue. Students find it easier to get enrolled in such courses.

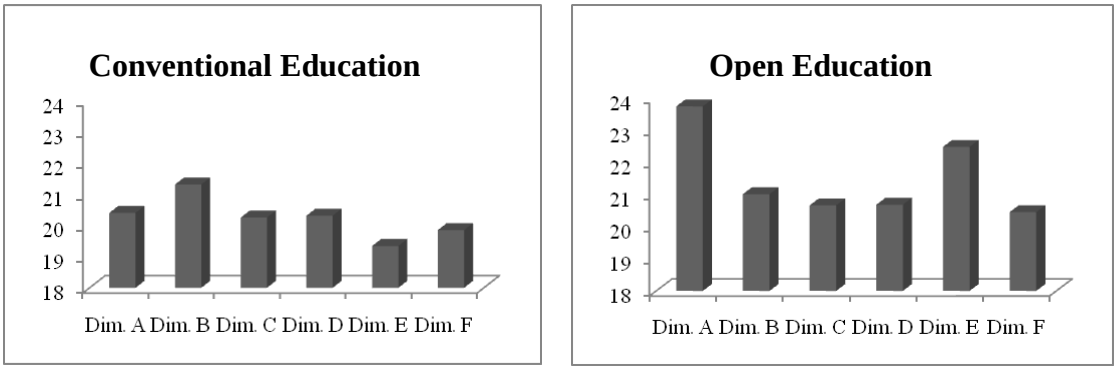

Figure 1. Comparison between CES and OES on ASS: Dimension Wise

The dimension study material and students' learning support shows higher mean, suggesting that the course content of the study material provided in OES is perceived better by respondents.

Thus it can be concluded that dimension A and dimension E namely, 'admission, courses & curriculum' and 'study material & student learning supports', have more influence on the overall academic satisfaction level of the OES model (Figure 1).

Hypotheses 2 (a) and 2 (b)

To test hypothesis 2 (a) and 2 (b), the Academic Satisfaction Scale was administered to students of CES (100 males and 100 females) and OES (87 males and 64 females). Means and standard deviations (SD) for academic satisfaction of male and female students studying in the CES and OES were calculated separately and the t-test was used for comparison of the two means. The details of the data are as shown in Table 4.

Table 4

t-test analysis of academic satisfaction of male & female students studying in CES & OES

Conventional Education System	Mean	Std. Dev.	Degree of Freedom	*t*- value
Male (n=100)	123.33	22.54	198	1.22 Insignificant
Female (n=100)	119.58	20.84		
Open Education System				
Male (n=87)	129.16	15.16	149	0.13 Insignificant
Female (n=64)	128.84	15.01		

t-value for two-tail: 1.97 (at 0.05 significant levels)

The value of *t* i.e.1.22 for CES and 0.13 for OES are insignificant. Thus the hypotheses-2(a) and 2 (b) are accepted and can be said that there is no significant difference in the academic satisfaction of male and female students studying in the Conventional Education System as well as in the Open Education System.

As Table 4 suggests, male and female students of CES do not show any significant difference between their satisfaction levels. But, if seen overall, male students have scored higher means as compared to female students (positive t-value). Thus, it seems that male students are comparatively more satisfied with their education system than female students. Female students seem more critical towards their system as compared to male students. Similarly, Table 4 once again suggests that male and female students of OES do not show any significant difference between their satisfaction levels. But, if seen overall, male students have scored slightly higher means as compared to female students. Thus, it is observed that male students are a bit more satisfied with their education system than female students.

Hypothesis 2 (c):

To test hypothesis 2 (c), the Academic Satisfaction Scale was administered to students belonging to Conventional and to the Open Education Systems and then data was consolidated for male students only. Then, means and standard deviations (SD) for academic satisfaction of male students studying in the CES and OES were calculated separately and the t-test has been used for comparison of the two means. The details of the data are as shown in Table 5.

Table 5

t-test analysis of academic satisfaction of male students studying in CES and OES

Male Students	Mean'M'	Std. Dev. 'SD'	Degree of Freedom	*t* value
CES (n=100)	123.33	22.54	185	-2.10
OES (n=87)	129.16	15.16		

t-value for two tail: 1.97 (at 0.05 significant level)

The value of *t* was found to be –2.10 that is significant. Thus hypothesis 2 (c) is rejected and it can be deduced that there is a significant difference in the academic satisfaction of male students studying in Conventional and Open Education System. The evaluation of this hypothesis reveals that the male students of the two education systems in the present study differ significantly in their satisfaction levels. Overall, averages of the scores were obtained by male students of OES are higher than CES (negative *t* value). Those are male students studying in the OES model seem to be more satisfied from their education system as compared to male students studying in CES.

Dimension-wise analysis of the data is shown in Table 6 and drawn in Figure 2.

Table 6

t-test analysis of academic satisfaction of males studying in CES and OES- dimension wise

S.No.	Dimension	Male Students				*t*-value	Significant/ Insignificant
		Conventional Education System (n= 100)		Open Education System (n= 87)			
		M	SD	M	SD		
Dim. A	Admission Procedure, Curriculum and Courses	21.64	4.93	23.79	4.07	-4.79	Significant
Dim. B	Facilities provided at College/Study Centers	21.88	5.02	21.01	4.78	1.21	Insignificant
Dim. C	Teachers/Academic Counselors	20.25	4.53	20.32	4.42	-0.11	Insignificant
Dim. D	Class Teaching/ Study Centers Counseling	20.59	4.63	21.16	4.17	-0.89	Insignificant
Dim. E	Study Materials & Students' Learning Supports	19.66	4.48	22.44	3.48	-4.25	Significant
Dim. F	Examination, Evaluation and Administration	20.31	4.72	20.74	3.70	-0.69	Insignificant

t-value for two tail: 1.97 (at 0.05 significant level)

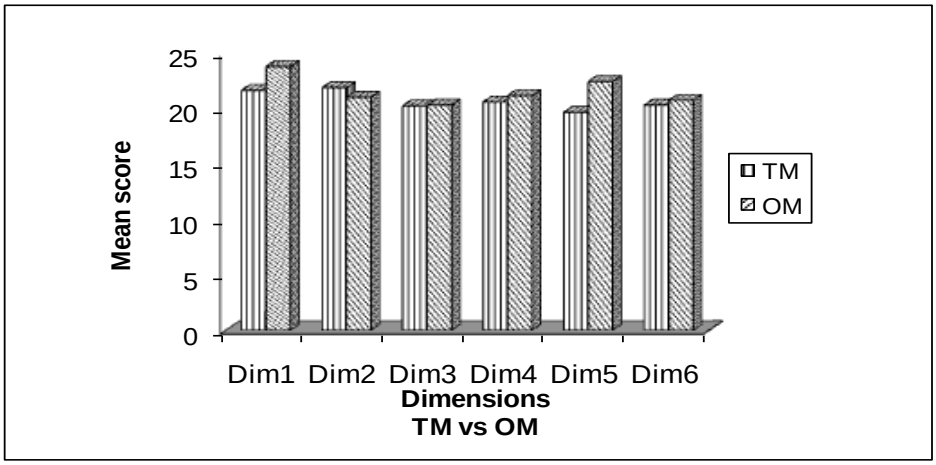

Figure 2. Dimension-wise comparison of mean scores of male students (Conventional Male Vs Open Male)

Table 6 shows that there is no significant difference of dimensions B, C, D and F. On dimension B (i.e. 'facilities given at college/study center'), male students of OES have scored low as compared to CES male students, suggesting that the facilities provided in OES are not adequate. Apart from that, male students of OES have supported their system of 'teachers/academic counselors' facility', 'class teaching/study center counseling' and 'administration, examination and evaluation' dimensions more so than male students under CES.

Conversely, a significant difference is found in the satisfaction levels of male students studying in the CES and OES dimensions, namely, 'admission procedure, curriculum & courses' and 'study materials & students learning supports.' The male students of OES have higher mean scores than the male students of CES. Taking admissions in different courses under OES is generally perceived easy and hassle free by the students. Students of OES have also shown their satisfaction with respect to the course material provided. On the other hand, item analysis of Academic Satisfaction Scale shows below-par satisfaction levels of the CES students from the aspects of 'learning activities & supports.' So, it can be concluded that the influence of dimensions A and E are relatively higher on satisfaction levels than the other four dimensions.

Hypothesis 2 (d)

To test hypothesis-2 (d), the Academic Satisfaction Scale was administered to students belonging to Conventional and Open Education Systems, and then data was consolidated for female students only. Then, means and standard deviations (SD) for academic satisfaction of female students studying in the CES and OES were calculated separately and the t-test has been used for comparison of the two means. The details of the data are as shown in Table No.7.

Table 7
t-test analysis of academic satisfaction of female students studying in CES and OES

Female Students	Mean'M'	Std. Dev. 'SD'	Degree of Freedom	*t*-value
CES (n=100)	119.58	20.83	162	-3.30
OES (n=64)	128.84	15.01		

t-value for two tail: 1.97 (at 0.05 significant level)

The value of *t* was found to be –3.30 which is significant. Thus hypothesis 2 (d) is rejected and it can be deduced that there is a significant difference in the academic satisfaction of female students studying in the Conventional and Open Education Systems. This result reveals that the female students of two education systems in the present study differ significantly in their satisfaction level. The overall average of the scores obtained by the female students of OES is higher than that of CES (negative *t* value). Female students studying in OES seem to be more satisfied from their education system as compared to female students studying in CES. This may be again due to the fact, that for female students of OES, studies come after family and job considerations, and while attending their families as well as job or other duties, they find themselves unable to concentrate well. Thus, they generally wish not to devote much time at study centers. The fact that they may be able to continue their studies beyond other duties gives them immense satisfaction. Dimension-wise analysis of data is shown in Table No.8 and compared in Figure 3.

Table 8
t-test analysis of academic satisfaction of female students studying in CES and OES dimension-wise

S.No.	Dimension	Female Students				*t*-value	Significant/ Insignificant
		Conventional Education System (n=100)		Open Education System (n=64)			
		M	SD	M	SD		
Dim. A	Admission Procedure, Curriculum and Courses	20.15	4.70	23.67	3.43	-5.53	Significant
Dim. B	Facilities provided at College/Study Centers	20.74	4.71	21.00	4.70	-0.35	Insignificant
Dim. C	Teachers/Academic Counselors	20.25	4.34	21.13	4.70	-1.20	Insignificant
Dim. D	Class Teaching/Study Centers Counseling	20.03	4.59	20.03	4.42	0.00	Insignificant
Dim. E	Study Materials & Students' Learning Activities	19.02	4.10	22.95	3.97	-6.11	Significant
Dim. F	Examination, Evaluation and Administration	19.39	4.50	20.06	3.67	-1.05	Insignificant

t-value for two tail: 1.97 (at 0.05 significant level)

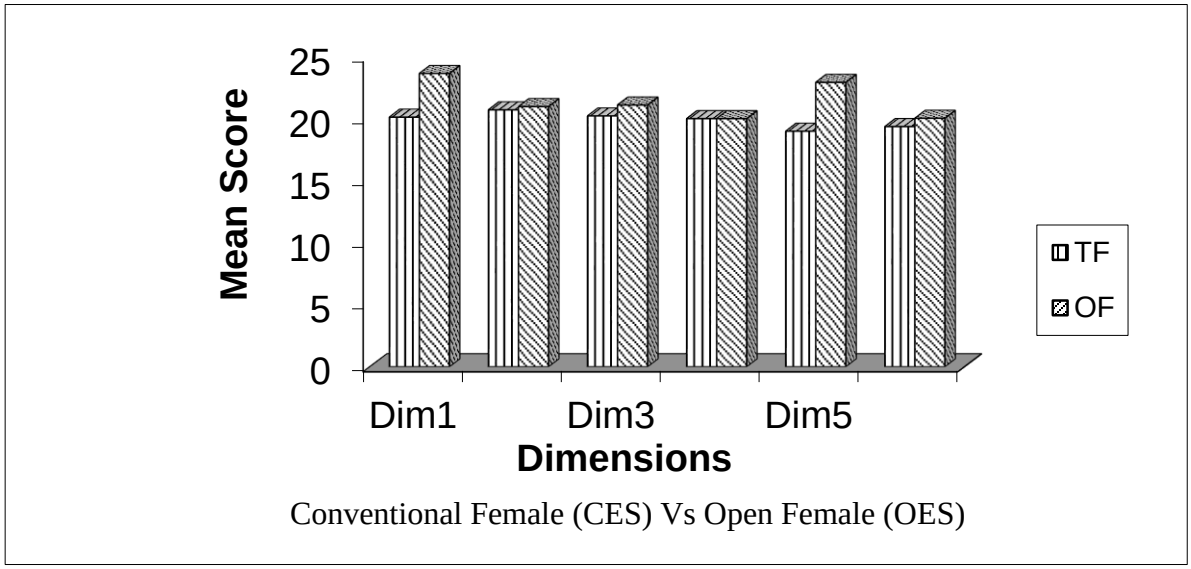

Figure 3. Dimension-wise comparison of mean scores of female students (Conventional Female Vs Open Female)

Table 8 shows that there is no significant difference of dimensions B, C, D and F. Female students of OES have supported their system of dimensions, namely, 'facilities given at college/study center,' 'teachers/academic counselors,' 'class teaching /study center counseling' and 'administration, examination and evaluation' dimensions. As in the case of male students, female students have also responded in a way that suggests that they are highly satisfied with the admission procedure, course and curriculum of the OES. They are also satisfied with the examination and evaluation systems adopted by OES i.e. on dimensions A and E. So overall, we see that female students of OES are more satisfied with their education system as compared to female students studying under CES. Female students of CES are more critical evaluators of their system, and that is why on all dimensions the values of satisfaction score are low compared to students of OES.

Discussion

Comparison between CES and OES:

The present study has concluded that the two systems, namely the Conventional Education System and the Open Education System, differ significantly on satisfaction levels. Observations reveal that students of the Open Education System seem to be more satisfied with their education system. Higher expectations from the students studying under CES may be cited as one of the reasons. Expectations can also influence how students respond to their academic surroundings and impact their decision on whether or not to remain in certain fields of study, or college in general (Bosch, Hester, MacEntee, MacKenzie, Morey & Nichols, 2008; Kuh, Gonyea & Williams, 2005). Expectations of students studying under CES are much higher than the students studying under OES because the stakes are higher and if these expectations are not fulfilled, they feel disenchanted with their education system. On the other hand, students of OES do not attach many expectations with this system, and hence they are easily satisfied. The simple reason for most of the students who opted for open education is largely due to the characteristics of flexibility in pursuing the syllabus and taking examinations (Gautam, 1990; Indradevi, 1985). Other than flexibility, job related goals (Wanieweicz, 1982) and improvement of social status (McIntosh, 1978) are the main motivation for joining open education system. These features of OES make their pupils easily satisfied. Moreover, students of the OES are more dependent upon personal concept (Gibson, 1996), capacity for self-management (Atman, 1988) and familiarity with technology (Schifter & Monolescu, 2000) for the successful completion of the course.

In case of CES, it is not easy for the administrator to manage the facilities of college in proper shape. The availability of essential facilities like qualified faculty members, good infrastructure facilities, secure environment, etc. generally remains unfulfilled because of ineffective implementation of policies. The problem of proper maintenance becomes more burgeoning if students do not behave in a disciplined manner in the CES model. The problem becomes grave, owing to the unavailability of facilities in accordance with the growing strengths and demands of the students. Dimension-wise observation shows that on all dimensions, students of CES have scored lower means, suggesting their dissatisfaction with the system except 'facilities at college/study centers' dimension where students of OES scored lower. This illustrates that students of OES hardly get access to necessary facilities at study centers. Students of CES find shortcomings in the admission process, teachers, teaching style, examination and evaluation system etc. It seems that the

administration of CES fails to provide the right academic environment. Students of CES have been found complaining about the lack of good teachers and unavailability of effective learning support facilities, which may shape their career in a better way. Item analysis of ASS questionnaire also suggests that the students of CES have grievances towards the indifferent attitudes of supporting college staff about problems students face. Change in dates of examination, errors in result, corruption in the evaluation system, etc. instill dissatisfaction among students. Overall, it seems that students of CES believe that their system is not able to delegate their tasks and responsibilities towards students effectively. Findings can be pointed as follows:

Students of CES expect more from their education system, as their investment very high as compared to students studying under OES.

More expectations lead to higher dissatisfaction in the case of students of CES, the opposite is true for students of OES, which are, less expectation levels lead to higher satisfaction.

Students of OES have not responded favorably on dimensions namely, 'Facilities at Study Centers.' It means that either they are not impressed with the facilities provided at study center, or they are not a regular visitor to their study center.

Results show that administrators of the CES model are not able to provide effective academic and learning environment. The reasons maybe cited as poor accountability on the part of teachers, less control over teachers and students, poor maintenance and slow upgrades of college facilities, faulty examination system, etc.

Comparison of male and female students studying under CES:

When the satisfaction levels of male and female students studying under CES were analyzed, it was found that there is no significant difference between the genders. This finding is in agreement with the findings of Perrucci and Hu (1995); Freeman (1994) and Erdle et al. (1985), where they conclude that students' gender, grades, aspirations, and financial situation had no relation on satisfaction levels. Further observations suggest that overall, on all dimensions; male students have scored slightly higher on the mean. This may suggest that male students under CES are slightly more satisfied as compared to female students studying under the CES model. This result of slight dissatisfaction in female students is in conformity with the findings of Asmar (1999) where it is reported that no explicitly 'gendered agenda' exists in academia, female students are more likely than their male colleagues to report dissatisfaction on a number of levels

Male students generally avoid classes and want to remain outside to be indulged more in social activities. Female students, on the other hand, make the most of the college facilities as their presence in the classroom and college is relatively more. They remain more dependent on their college facilities, compared to male students who tend to be dependent on themselves or their friends. Hence, female students are more critical evaluators about their education system. The greater difference in the values of means on the dimensions, namely, 'facilities at college and administration,' 'examination and evaluation' support these conclusions. Male and female students have rated merit of teachers equally. Female students have found problems with 'admission procedure, admission' and 'classroom teaching.'

Comparison of male and female Students studying under OES:

The same trend has also been observed with male and female students studying under the Open Education System. Treatment of data found no significant difference between male and female students studying under OES. This result is contradictory to the result of (Biner et al., 1996) where they conclude that male students reported being significantly more satisfied than female students with telecourse aspects of college courses. But, that may be due to the fact that male students are more technology oriented. Here in this study, it is observed that the differences in the magnitude of satisfaction levels between the two genders lessen from CES to OES. The present study also finds that female students have shown slightly more satisfaction on the dimension, namely, 'study materials.' As female students use study material more regularly as compared to male students of OES, and they find it helpful in their busy schedules. Content of Study materials have lived up to the expectations of female students, and hence they received a favorable response. Similarly, female students have appreciated the presence of teacher/counselors at study centers. These findings are in conformity with the findings of (Jung, 2012) where she concluded that gender differences are found in the perceived importance of 10 quality dimensions, barriers to DE, important supporters, and types of support received.

Comparison of male students studying under CES and OES:

Comparisons of satisfaction levels of male students studying under CES and male students studying under OES have shown that there is a significant difference. Male students of OES seem to be more satisfied as compared to male students of CES. On all the dimensions, male students of OES have scored high values of means except on the dimension 'facilities at the study centers.' On this dimension, OES students have scored lower. Since the difference is significant on dimensions 'admission, course and curriculum' and 'study material & student learning supports;' overall satisfaction level among students of OES is very high compared to the male students of CES. Study material is a very important feature of OES and students under present-day study programs; are satisfied with the quality and content of study materials.

Comparison of female students studying under CES and OES:

Significant differences in the satisfaction levels exist among female students of CES and OES. As is the case with the male students, female students also have a significant difference in the dimensions, namely, 'admission, courses and curriculum' and 'study material & students learning support.' On all dimensions, female students of OES have scored higher values on the mean except 'classroom teaching/study center counseling,' where it is nearly equal as that of CES. The important thing that comes out in the analysis is the magnitude of the difference between the satisfaction levels of males and females in the CES model is greater than the magnitude in the difference between the satisfaction levels of males and females of OES. It can be deduced that female students tend to be more critical evaluators of their system and other aspects of the education system.

Conclusions

The findings from the above discussion can be summarized as:

There is no significant difference in the academic satisfaction of male and female students studying in the Conventional Education System.

There is no significant difference in the academic satisfaction of male and female students studying in the Open Education System.

There is a significant difference in the academic satisfaction levels male students studying in the Conventional Education System versus the Open Education System.

There is a significant difference in the academic satisfaction of female students studying in the Conventional Education System versus the Open Education System.

Overall male students of the two systems are more satisfied with their education systems compared to female students.

Female students of the two systems are more critical evaluators of their system. They are more dependent on the college/system for their studies and attach higher expectations from their system.

Students of CES (male and female) have found problems with the academic and learning environment, admission procedure, courses and curriculum, etc. Students of OES find a wide range of courses available for them to pursue which act as a satisfaction booster.

Availability of good study material has proved to be very important in satisfying characteristics of OES.

Overall, it can be seen that the magnitude in the difference in the satisfaction levels of male students of the two systems are less than the magnitude of the satisfaction level of female students of the two systems. This suggests that male students of both systems are more satisfied with their respective education systems as compared to female students.

As the sizes of the colleges continue to grow because of the large number of admissions every year, difficulty in managing and providing infrastructure in accordance with strategic planning, is becoming more momentous. Analysis of the responses of questionnaire suggests that, commitment on the part of teachers and administrators are dropping fast due to uninterested and lack of innovation on their behalf, and to make improvements at class level, teaching and providing/maintaining infrastructural facilities. Government, in general and universities and colleges in particular may use these findings to formulate policies that can improve the academic environment of the college. Students have responded that classroom teaching should adopt new methodologies and aids to make teaching effective and interesting. The overall majority of respondents under CES under this study have complained about the apathetic attitude of the administration and teachers. Under OES, study centers have to play a more responsible role by providing more facilities to students. New policies have to be designed to increase the attendance of students at study centers. Importance of tutor and student-student interactions has also been felt by these students who may guide them in their difficulties in subject matters.

Thus this study concludes that students of the OES are better satisfied people. They are satisfied with the presence of good admissions possibilities and availability of readymade study materials to pursue their courses. It can be concluded here that better satisfaction among students of OES is primarily due to the easiness which this system provides to the students, and the quality of education that they should be getting. The Respondents, primarily, have been neutral on the quality issues of their education system.

The Open Education System is able to meet the expectations and needs of students by giving them a chance to obtain requisite qualification and degrees to pursue better job prospects and promotion opportunities in their career and thus students of OES feel satisfied. Scope in quality improvement, nevertheless, exists in the admission process, delivery of knowledge material and evaluation parts of the education process of OES so that the expectations, skills and knowledge of these students can be on par and synchronized with the students of CES.

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Editor's Note: This paper asks questions about stress that technology places on students. Is technostress, like the boiled frog syndrome, having a negative impact on student behavior?

The impact of Computerized Devices on College Students Behavior

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Abstract

This paper examines the rapidly growing interconnectedness between our communication, technology and human behavior generally. Smartphones, tablets, computers, and social media platforms like YouTube and Facebook are now wholly integrated into our culture. An operationalized form of media effects research, this study recognizes that our technologies of communication have become so advanced so rapidly that their places in society, and their systemic effect on our lives, are often taken for granted. After a review of the recent literature on theories of human-computer interaction and the concept of technostress, the researcher tests with a case-study analysis of media uses the effects of computerized devices on undergraduate students at Indiana University of Pennsylvania.

Introduction

A large segment of American society uses technology on a daily basis. What was once a luxury is now a part of our lives. Two decades ago, computers were a novelty, but today it seems that we have been consumed by their use (Cameron & Dwyer, 2005; Rosen & Weil, 1998); we breathe technology, as do our communities and universities.

We use our gadgets as alarm clocks to wake us up. We eat breakfast while answering emails or surfing the Internet with our smartphones. It is not uncommon for Americans to eat while updating Facebook or other social networking site statuses (Faulkner & Zafiroglu, 2010). We drive modern cars with an abundance of technology, often enabling us to transform our modes of transportation into a dynamic technological hub. In fact, contemporary automobiles are an extension of iPads and Smatphones serving as a hub for extending learning (Carter & Hightower, 2009) Weil and Rosen (1997) stated, "The proliferation of increasingly sophisticated technology at home and in the workplace has spawned unprecedented use of machines" (p. 2). Technology is a part of us and perhaps, our communities are being affected by its proliferation.

After parking our cars, we shift our eyes and send text messages (Perea, Acha, & Carreiras, 2009) to announce we are arriving, or touch a screen to accept another friend request on Facebook, sometimes ignoring longtime friends passing by. Yet we do not see technology as a disease (Weil and Rosen, 1997). As soon as we open our office door, we log onto our computers to check our email messages, to quickly reply to the unanswered emails from the night before. It is not unusual for us to log onto Facebook a second time prior to starting out our working days (Skeels & Grudin, 2009). Technology is everywhere. This vicious cycle is part of our daily lives. Our personal boundaries seem to have been totally invaded by modern technology (Weil & Rosen, 1997). Our private life, as stated by the Soviet comrade in the movie *Dr. Zhivago*, is dead. Worst of all is that organizations now expect employees to have measures of productivity, efficiency, timeliness, connectivity, and feedback (Ayyagari, 2007); perhaps modeled after the computer which is a phenomenon never seen in human history, despite the overwhelming evidence that stress reduces productivity (Brod, 1984), which seems to be having an impact in our college classrooms.

In the mid-1990s, the cost of burnout was as much as five percent of the gross national product (GNP) (Vernon, 1998). In the beginning of the new millennium, the cost of burnout jumped an

additional five percent to 10% in just two years (McKenna, 2000), which has resulted in healthcare costs accounting for more than 17% of our gross domestic product (GDP) in 2009 (Endonurse, 2012). This is perhaps why employers and employees spend more on health insurance every year, reducing spendable time and income, which impacts college enrollment.

The high cost of stress is not a new phenomenon as well as its ties to lower levels of productivity. In a study by Cooper, Liukkonen, and Cartwright (1996), the researchers found that stress in the workplace contributed to lower productivity per-employee and higher health costs (p. 2) impacting corporate profit. Advances in technology and its impact on unproductive days isn't a new phenomenon either. According to McGee (1996), advances in technology contribute to increased burnouts, leading to sickness and more unproductive days. In a more recent study, Kinman and Jones (2005) found that computers are linked to higher levels of stress among employees. According to Hillman (2011), increased workloads in different environments and the pressure required to perform tasks too quickly (Ayyagari, 2007) has reduced work productivity. Clearly, excessive use of technology results in stress and unproductive days.

In a recent article presented by cable network giant CNN, there are concerns that modern technology, e.g., smart-phones and alike things, are leading users to technological addiction (CNN, 2006). A possible reason for this madness is because we have interacted with computers to such a high level that we are acquiring computer-like behavior without realizing and becoming dependent on it (McLuhan, 1967). The computer does not take time to think critically and reflect on alternatives after the first answer is given. It is constantly producing at all costs, ignoring the evidence of a possible break down. Machines are always performing at fast paces, with persistence, diligence, and engaging in multiple tasks simultaneously (Almeida, 2013). To a large degree, we are now expected to do the former yet we have only one brain without the capacity to upgrade our neurons. Computers, on the other hand, might have four brains, with the capacity to be upgraded (Menascé & Ngo, 2009). No wonder why we spend a large portion of our GDP on health related costs. We are now being expected to work like a machine yet we are humans, this behavior can have a significant side effect on humans.

To contribute to the problem, Western nations have created the illusion that productivity should be primarily measured by the number of hours an employee is at work, how connected they are to their email accounts and Smartphones, and how quickly they respond to a message (Ayyagari, 2007). These assumptions pose problems as watching movies, answering threads on Facebook, and reading the newspaper online while at work isn't necessarily productive. Perhaps, we are living in a new Rome under an old Caesar. We are to be good and "appear" to be good in order to be accepted. In the current state of affairs, individuals who make remarks last are sometimes seen as inefficient and slow.This is particularly problematic as creative thoughts require time (Blythe & Sweet, 2011) and reflection is a pre-requisite for creativity.

Since the mid-1980s, cognitive psychologists have been arguing that that our minds could work like computers (Driscoll, 2000). At the superficial level, this might be true. The differences between brain function and computers are staggering, however. First of all, our brains are incredibly complex, performing functions we can't even understand. Computers are simple devices when compared to our brains (Von Neumann, 2012) . When a computer breaks a fuse, the computer stops working. When a person has a stroke, although impaired, the brain still functions and the person lives on (Brod, 1984). The computer performs tasks in a logical manner. Sometimes, human beings are illogical which can be assumed then that our brains perform tasks illogically. Our brains have the capacity to reflect and act within emotion (MacLean, 1949). Computers don't have this capacity. I find the argument that brains are like computers to be problematic, as colloquial evidence is too strong to argue otherwise. Machines might be the main cause for why we are living a robotic life, making us less emotional and more rigid with our own decisions. Discourse, once perceived as a skill and an indication of intellectual capacity is

sometimes seen as annoying, especially when interrupting one's work on the computer. Computers might have infiltrated our psyche and changed our behaviors but in the end, the brain is a complex grey mass and computers are perishable machinery.

If there is evidence that computers might not be good for us, why are we spending so much time on them and allowing the computer to stress us out? Is there any evidence that the IUP college student community is experiencing high levels of technostress without realizing it?

The Almeida computer behavior conceptual framework

The Almeida Computer Behavior conceptual framework starts with McLuhan's thought that the more a subject interacts with a computerized device, the more a subject acts like a computer over time without realizing it (McLuhan, 1967). In essence, the more a subject interacts with a Smartphone (for example), the more the subject expresses and behaves like a machine unconsciously. Almeida adds to McLuhan's scholarship by stating that it is only through mental exhaustion and fatigue that subjects stop their "computer-like" neurotic behaviors (Almeida, 2013). Almeida recognizes that some machine-like behaviors in subjects are expected and considered normal behavior, as the machine is a human invention. However, the neurotic "computer-like" behavior expressed by subjects is directly related to computerized device exposure and frequency of use. The conceptual framework has a number of assumptions. This first assumption is that computerized machines serve as transforming mechanisms capable of altering human behavior into machine behavior by reinforcing responses to stimuli directly or indirectly. The second is that the more a subject uses computerized devices, the quicker the subject will acquire machine-like behaviors. The third assumption is that extended exposure and frequency of use of computerized machines induces extreme neurotic levels of persistency, task completion, urgency of data processing, organization, time of response, activity levels, control, accuracy and multi-tasking. Finally, the last is that extended exposure and frequency of use of computerized devices induces extreme neurotic levels of versatility, diligence; upgrade consciousness, reliability, efficiency, strength, language use, and productivity (Almeida, 2013).

Behavioral change isn't instantaneous and occurs in three stages. The first stage is called the *process of transformation.* The subject needs to pass through this stage in order for the change in behavior to occur. Almeida hypothesizes that a process of transformation must occur for a subject to express himself/herself in a "computer-like" behavioral manner. Subjects don't behave like computers when they are born. Computer Behavior is learned and reinforced with the use of computerized devices over time. The higher the frequency and exposure, the quicker the transformation occurs. The process of transformation is a precursor to the second stage referred as the *Human Robot Syndrome.* Almeida states that after the period of transformation, subjects behave with high levels of logic, attention, and are quick to react in a rarely empathetic manner. Once subjects move into the second stage, computer behavior is more dominant than their own human behavior (Almeida, 2013).

He also states that when a subject suffers from *Human Robot Syndrome*, repulsive behaviors towards anybody who stops them from working on a machine (computer) will occur. Subjects will perceive computer interruption as annoying and insensitive to their machinelike demands. It is only through mental exhaustion and fatigue that subjects stop their "computer like" neurotic behaviors and leave the "Human robot syndrome" phase and enter phase number three. It is imperative that subjects experience these former conditions, as mental exhaustion and fatigue serve as reverse awakening mechanisms capable of turning subjects into conscious beings overtime. Subjects are then reversed back to being human again by experiencing the psychological and physiological side effects of computerized devices making subjects realize that the machine makes them more human than before by exposing subjects to their inability to cope with their own limitations (Almeida, 2013).

Brief literature review

A review of recent literature helps to underscore the systemic nature and impact of human-computer interaction within society. Scholarship in the field has only cracked the surface of study into technological developments in human interaction, and this work provides a contextual foundation for the effects of computers on human behavior (Almeida, 2013). Much of the literature has shown that computer technology has helped millions of Americans in the areas of production, education, and medicine. The technological advances in medicine, for example, have helped our communities to live longer and with a better quality of life (Nye, 2006). Mobile technologies have even been well received by remote communities in Nepal (Hoadley, 2009) and is still a driving force in education today (Parry, 2011).

Computer technology has assisted people around the globe with becoming information literate, which can be argued that it might have revolutionized modern life (Tiemo & Ofua, 2010). However, these advancements aren't free of side effects. Technostress and techno-related conditions are a clear example of how technology has caused negative effects in our communities and society.

Technostress

Technostress is a modern disease of adaptation caused by one's incapacity to cope with technological advancement in a healthy way (Tiemo & Ofua, 2010). Brod (1984) sees technostress as an illness caused by one's inability to cope with technology. It is a condition that has its roots in technology, essentially. Causes include inexperience with computers (or computer programs), performance anxiety, lack of training or clear job expectations, insufficient staffing, information overload, and fast pace of change (Clute, 1998). Excessive workloads and resource challenges are also causes of technostress (Gorman, 2001; Kupersmith, 2003).Tiemo and Ofua, (2010) argue that the Internet itself is becoming a major cause of technostress because there is a lack of standard on how information is designed, maintained and updated. Information overload is a real problem that American communities can't ignore (Eppler & Mengis, 2004).

In addition to the causes, there are signs and symptoms, as well.The signs and symptoms of technostress are real and can be observed in a variety of physiological, psychological and behavioral responses (Tiemo & Ofua, 2010). Some of them include physical and emotional exhaustion, negative self-concept, negative attitudes and lack of concern for the feelings of others (Tiemo & Ofua, 2010). The inability to relax, difficulty sleeping, sore muscles, feeling of fear and intimidation are all symptoms of technostress (Champion, 1988; Weil & Rosen, 1997). Panic and anxiety, along with anger, irritability, low morale, rapid heartbeat, and absenteeism are additional signs and symptoms of technostress, which overtime lead to severe burnout behaviors (Clute, 1998). The evidence for the signs and symptoms of technostress are alarming as fear, negative self-concept, and lack of concern for others are serious diseases that affect communities in the United States and abroad. In an article published by Tu, Wang, and Shu (2005), computer-related technostress is now a major problem for workers in China. In fact, these researchers said, "The Internet is having a profound sociological and psychological effect on traditional Chinese employees" (p. 78). According to a 2004 health survey conducted by a Beijing medical center, 46% of the respondents said they have a slight mental health problem, 53.2% reported experiencing mental anxiety, and 37% having difficulties with interpersonal relations. In addition, 84.2% reported they felt very high job stress. Migraine headaches, job dissatisfaction, and intention to quit are real issues related to technostress among good employees (Tu et al., 2005) and shouldn't be ignored. Modern computer technology has allowed a number of negative behaviors to emerge, which makes it clear that technology isn't a panacea to our community life problems and in some instances, can be more negative than positive. What remains to be investigated is why computer technology and devices affect humans negatively and if they do, how is it happening?

Techno related conditions

Technostress isn't the only computer based negative condition human adults experienced in our communities. Techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty are additional negative conditions associated with modern technology (Tu et al., 2005).

Techno-overload is a condition by which employees increase overload and are asked to work at a faster rate of speed, and change habits because of rapid computer speeds (Tu et al., 2005, p. 78). The problem with the former is that a computer can be replaced with a new model without causing severe human hardships. Machines can be upgraded to keep with work demands. We don't have the luxury to replace our brains or update our neurons like the machine. Clearly, such expectations and conditions will eventually cause technostress in humans (Brod, 1984).

Techno-invasion can be understood as technology, like smartphones and pads, invading our personal spaces, resulting in a major change in privacy boundaries, causing significant impact on family time allocation (Tu et al., 2005, p. 78). Computer technology in our homes and schools has helped us to be more connected (Meyer & Rakotonirainy, 2003) but it wasn't done without consequences. In today's world, everyone else is reachable through a cell phone and therefore, everyone expects you to be reachable (Ayyagari, 2007, p.6) even though work-home conflict and invasion of privacy are seen as stressors (Ayyagari, 2007). Therefore, technology itself is now a stressor.

Techno-complexity, or the inability to learn or cope with technological difficulty is also a problem (Tu et al., 2005, p. 79) in today's society. Since the introduction of the Blackberry, cell-phones have become incredibly complex. Cars have been mass produced since the introduction of the Ford's Model T in the 30s. Therefore, the concept of technological breakthrough is not a novelty. However, available technology seen in cars today is so complex that it has changed our definition of driving. Engineering has become so complex that cars can now fly (O' Brien, 2013), which in the near future, I predict to be another source of stress. Complexity advances society but is not free of consequences.

Techno-insecurity, or the fear of losing a job because of the machine or the fear of being replaced by a more skilled employee, is a major concern in today's world of economic recession (Tu et al., 2005, p. 79). Scholars (Atkinson, Castro, & Ezell, 2009) argue that technology generates more jobs than are lost as a result. If this is absolutely the case, why didn't Ford hire more employees after automation? In the 60s, most albums were recorded in a professional studio often recorded by its own musicians. Why don't we have more entry-level job openings in recording industry today? Technology can clearly cause insecurity, especially for community adults who need to provide to their families. It should not be a surprise that our society today is so stressed about technology takeover since job insecurity is a stressor (Ayyagari, 2007).

Techno-uncertainty is a condition related to the rapid pace of computer hardware and software changes (Tu et al., 2005, p.79). As the pace of technology increases, so does the change in software and hardware. One of the best examples of this phenomenon can be illustrated by the number of software versions Adobe, and other software companies, introduce into the market. A new software version is launched almost every year which can be a major cause of *technostress* with instructors whose primary responsibility is to teach with these products. It also seems that phone companies are now introducing a new phone yearly which tends to be faster and more complex.Technology can indeed be seen as a stressor which over time can cause strain and other negative outcomes (Ayyagari, 2007) in our communities.

Other conditions

The negative conditions presented above are not the only ones experienced by American communities. They are just a small representation of conditions experienced by workers living in America communities today. The constant state of arousal, muscle tension, and respiration problems have been identified since the 1980s as threats to long-term health (Cooper & Cartwright, 1994; Cooper, Dewe, & O'Driscoll, 2001; Davidson & Veno, 1980). Despite 30 years of research, management practices are still blind to human affairs, not because management is evil or employees are lazy or unproductive. Perhaps, it is because of the infiltration of technology into our psyche making us behave like a machine.

It is certainly possible to work under intense pressure and deadlines. However, working under tight pressure and deadlines is a major source of quantitative overload (Cooper et al., 2001) which, over time causes a decrease in productivity. Overload, contrary to current practices, is strongly related to high levels of anxiety, strain, depression, and lower job performance (Arrington, 2008; Kinman & Jones, 2005). Therefore, constantly pushing Americans to their limits demanding machine-like behavior and using computer speed as the criteria might be the reason why there are increasing numbers of stress-related physician's visits in America. Excessive amounts of work makes us stressed out and can kill us. Machines might be the root of our problems (McLuhan, 1967).

Research design

This study's participants were full-time and part-time undergraduate students at Indiana University of Pennsylvania (IUP) ranging from the ages of 18-25. IUP is a mid-size national university located in western Pennsylvania one hour northeast of the city of Pittsburgh, where the majority of its population falls under the millenniums category. Due to the overwhelming number of millenniums, the researcher decided to create the questionnaire using an online tool. Qualtrics was the tool used to produce the instrument.

96 random participants took a self-administered and anonymous questionnaire. Students were primarily Caucasian citizens of the United States residing in the commonwealth of Pennsylvania. It took approximately 30 minutes for participants to complete the questionnaire. Each participant had to sign a consent form prior to starting the study. The students who decided to participate in the study were given a hyperlink to the instrument in a college classroom.

The instrument used in this research study was developed by the researcher and revised by an expert in the field of psychology. The measure consisted of 91 items describing aspects of technostress. Examples of questions were, "People ignore their own limits these days" and "Do you feel mentally strained after being on the computer?" The items were rated on a Likert scale from one to five, one representing "strongly agree" and five representing "strongly disagree." Descriptive statistics were used to calculate the results of this study. Means and standard deviations were calculated to assist the researcher in presenting the results. The researcher used Qualtrics to generate the results and this study's tables.

This study's research question was:

RQ1: Is there any evidence that the IUP college student community is experiencing high levels of technostress without realizing it?

Results

It seems reasonable to state that the IUP student community is experiencing technostress and that computers might be stressing us out. In fact, a number of participants indicated that they experienced degrees of stress with the use of computer technology in a number of occasions

throughout the questionnaire. For example, when students were asked, "Do you feel mentally strained after spending too many hours on the computer?" 54% of the population reported mental strain after spending several hours on the computer. Only 32% reported they would disagree (Table 1).

Table 1

Question: *Do you feel mentally strained after spending several hours on the computer?*

Frequency Distribution of Participant Responses			
Answer Categories	Code Number	Number of Participant Responses	%
Strongly Agree	6	17	18%
Agree	7	35	36%
Neutral	8	13	14%
Disagree	9	23	24%
Strongly Disagree	10	8	8%
Total		96	100%

Note: Of the 96 participants, more than half (54%) reported a feeling of mental strain after spending hours of time on the computer. Only 32% reported disagreement with feeling mental strain.

Perhaps, IUP students felt mentally strained due to pressure required to perform tasks too quickly (Ayyagari, 2007) and because computers are linked to higher levels of stress (Kinman & Jones, 2005). Another interesting finding arose after an additional variable was added to the former question. When the participants were asked the question, "Do you feel mentally strained after typing a paper for school (or doing an assignment) for (blank) hours on the computer?" scores on either agree or strongly agreed (or both) increased by 17 points (Table 2).

Table 2

Question: *Do you feel mentally strained after typing a paper for school (or doing an assignment) for hours on in on the computer?*

Frequency Distribution of Participant Responses			
Answer Categories	Code Number	Number of Participant Responses	%
Strongly Agree	6	33	33%
Agree	7	36	38%
Neutral	8	10	10%
Disagree	9	13	14%
Strongly Disagree	10	5	5%
Total		96	100%

Note: When asked about mental strain while typing a paper (or completing an assignment), roughly 7 out of 10 (compared with the 54% represented in Table 1) agreed or strongly agreed with the question of mental strain. Only 19% (compared with 32% from the question in Table 1) disagreed with the question of mental strain while typing a paper or doing an assignment.

Participants disagreed only 19% and strongly disagreed a mere 5%. The scores for agree or strongly disagree were 71% or 7 out of 10 participants.Clearly, when an activity is added as a variable to the existing question, participants felt even more mentally strained.

It is difficult to discern whether the results above are due to one's incapacity to cope with technological advancement in a healthy way (Tiemo & Ofua, 2010), or if it is a negative condition

associated with technostress (Tu et al., 2005) or if we as a society are so overloaded that it clearly creates a problem that Americans can't ignore. One could even argue that the reason for such results could be due to being uncomfortable with how fast technology moves or due to the assignment alone. It is difficult to believe, however, that 70% of the population would be mentally strained after typing a paper or assignment for school using a computer, especially due to the bell curve concept. Perhaps, typing a paper or an assignment for school on the computer results in technostress because, as the Almeida Computer Behavior (Human Robot) conceptual framework states, mental exhaustion and fatigue often occur during prolonged computer use.

One could argue that this new generation would be uncomfortable with the rapid changes in society as it seems to cause technostress, especially when an assignment is added as a variable. However, the results of this study showed otherwise. Slightly more than 50% of the participants either agreed or strongly agreed when asked the question, "Are you comfortable with rapid changes in society?" Only 15% were opposed to it (Table 3).

Table 3

Question: *Are you comfortable with rapid changes in society?*

Frequency Distribution of Participant Responses			
Answer Categories	Code Number	Number of Participant Responses	%
Strongly Agree	6	15	16%
Agree	7	35	36%
Neutral	8	32	33%
Disagree	9	14	15%
Strongly Disagree	10	0	0%
Total		96	100%

Note: 85% of the participants said they were very comfortable with, comfortable with, or neutral towards (that is, not *adversely* affected by) rapid changes in society. 0% of participants said they "strongly disagree."

Table 4 shows the results of whether students agreed or disagreed with this concept: "When working with the computer, the limit is mental exhaustion."

Table 4

Question: *When working with the computer, the limit is mental exhaustion?*

Frequency Distribution of Participant Responses			
Answer Categories	Code Number	Number of Participant Responses	%
Strongly Agree	6	16	17%
Agree	7	26	27%
Neutral	8	17	18%
Disagree	9	27	28%
Strongly Disagree	10	10	10%
Total		96	100%

Note: The study's research question (RQ1) is, *"Is there any evidence that the IUP college student community is experiencing high levels of technostress without realizing it?"*

The question above seems to advance, at least with preliminary results, part of the Almeida Computer Behavior (Human Robot) conceptual framework as it states that computerized machines serve as mechanisms capable of transforming human behavior into machine-like behavior by

reinforcing responses to stimuli either directly or indirectly. Computers are constantly producing, processing information through multiple processors in order to achieve quantifiable results. Perhaps, the overuse of computers has infiltrated human behavior to a degree that humans are now exhibiting actions/behaviors like that of a computer. Perhaps the high healthcare costs, which accounts for 17% of our gross domestic product (Endonurse, 2012) are a consequence of the infiltration of computer behavior into society, making self-control an independent variable and impacting our communities in unpredictable ways.

Another interesting finding that relates to the former is the following, "Do you lose track of time when using the computer?" 6 out of 10 participants answered “agree” or “strongly agree” (Table 5). This is remarkable in the context of determinist belief, which states that the faster the machine, the less one would use and lose control of the technology.

Table 5
Question: Do you lose track of time when using the computer?

Frequency Distribution of Participant Responses			
Answer Categories	Code Number	Number of Participant Responses	%
Strongly Agree	6	21	22%
Agree	7	37	39%
Neutral	8	22	23%
Disagree	9	9	9%
Strongly Disagree	10	6	6%
Total		96	100%

Note: Roughly 6 out of 10 participants agreed or strongly agreed with the question of losing track of time when using the computer.

It appears that computers are infiltrating human behavior, leading users to technological addiction (CNN, 2006) without realizing it (McLuhan, 1967). It can also be argued that losing control of time when at the computer relates to the Almeida Computer Behavior (Human Robot) Conceptual framework, specifically the *process of transformation.* Almeida hypothesizes that a process of transformation must occur for a subject to express himself/herself in a “computer like” behavioral manner. Perhaps, losing control of time due to the excessive "productivity" behavior, to a point of losing track of how many hours one is at the computer, is beginning evidence of the *process of transformation* might be occurring in the IUP community. The infiltration of technological behavior is evident to a point of participants ignoring their own limits as reported in Table 6.

Table 6
Question: *People ignore their own limits these days?*

Frequency Distribution of Participant Responses			
Answer Categories	Code Number	Number of Participant Responses	%
Strongly Agree	6	15	16%
Agree	7	49	51%
Neutral	8	21	22%
Disagree	9	11	11%
Strongly Disagree	10	0	0%
Total		96	100%

Note: Roughly 7 out of 10 participants (67%) agreed or strongly agreed that people ignore their own limits in today's world of technology. This data suggests an operationalized use of McLuhan's (1967) concept of "numbness," to be further explored by Almeida's Computer Behavior Hypothesis.

67% of the respondents indicated that "people ignore their own limits these days." This is a remarkable result that perhaps, indicates that technology is infiltrating human behavior and that perhaps, The Almeida Computer Behavior (Human Robot) conceptual framework might have operationalized McLuhan's concept of numbness (McLuhan, 1967). Also that technology is starting to invade our privacies to a point of alienating our limits. *Techno-invasion* can be understood as technology, like Smartphones and tablets, invading our personal spaces, resulting in a major change in privacy boundaries (Tu et al., 2005, p. 78) to a point of making our thoughts move to somewhere else. In fact, participants indicated that their thoughts are often somewhere else (77% of the time), or almost 8 out of 10 times (Table 7).

Table 7

Question: *My thoughts are often somewhere else?*

Frequency Distribution of Participant Responses			
Answer Categories	Code Number	Number of Participant Responses	%
Strongly Agree	6	27	28%
Agree	7	47	49%
Neutral	8	13	14%
Disagree	9	9	9%
Strongly Disagree	10	0	0%
Total		96	100%

Note: Nearly 8 out of 10 participants indicated that their thoughts are often somewhere else (77%). Additionally, 0% responded "strongly disagree." This data supports Almeida's Computer Behavior Conceptual Framework (Almeida, 2013).

Although it appears that the participants were mentally strained, they lose track of their own work pace, ignore their own limits and only stop working after mental exhaustion, they still get tired after long hours of work which perhaps is the reason that IUP community students are not in the "human robot syndrome stage" of the conceptual framework. Yet, 56% of the participants indicated that they get tired after long hours of work (Table 8).

Table 8

Question: *I don't get tired even after long hours of work?*

Frequency Distribution of Participant Responses			
Answer Categories	Code Number	Number of Participant Responses	%
Strongly Agree	6	9	9%
Agree	7	17	18%
Neutral	8	17	18%
Disagree	9	40	42%
Strongly Disagree	10	13	14%
Total		96	100%

Note: Although more than half of the population sample (56%) indicated that they *did* feel tired after long hours of work, it is interesting (and inspiring) that almost 3 in 10 participants reported *not* getting tired, even after long hours of work

However, 27% of the participants indicated that they don't get tired and 18% were neutral. Could it be that potentially a small portion of our population is now losing track of their own productivity or that "being productive at all times" is the norm?

Discussion

Marshall McLuhan once stated that we are numb to the effects that the media has on us, making it difficult for most to realize its unintended effects (McLuhan, 1967) resulting in potentially negative societal outcomes. If there is evidence that computers might not be good for our communities and schools, why are we spending so much time on them and allowing computers to stress us out and impact our classroom activities? Which long-term impact can the side effects of technology have on our communities and schools?

Based on the findings of this research study, one possible answer is that, like computers, we only stop working when we exhaust ourselves or get a virus. Perhaps, we are becoming half-robots temporarily, making us behave less critically in regards to our health, for example. It won't be until we mentally exhaust ourselves and experience fatigue that we will realize how human we actually are and how our communities might be affected by our inability to observe our own machine-like behaviors (Almeida, 2013). Could it be that IUP students are indeed experiencing high levels of stress without realizing it (McLuhan, 1967), much like the computers? Only time will tell.

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About the author

Dr. Luis C. Almeida is an educational technologist by training, college professor by choice, who brings public awareness about the responsible use of computing for instruction and productivity by speaking and writing about the need for techno-moderation in education and society. Upon delving into the technology field, he has discovered many positives and negatives. The negatives effects have sparked his interest in relaxation and led to the co-ownership of "I Do Therapy." He is currently an Associate Professor of Communications Media at Indiana University of Pennsylvania.

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Editor's Note: Teacher training goes beyond curriculum content and methods of teaching. A positive attitude and enthusiasm for their work may play a significant role in producing effective teachers.

Attitude of student teachers towards the teaching profession

Anupama Bhargava and M. K. Pathy
India

Abstract:

Teaching, being a dynamic activity, requires a favorable attitude and certain specific competencies from its practitioners. Teacher's proficiency depends on the attitudes they possess within the profession. A positive attitude helps teachers to develop a productive, learner friendly environment for the classroom. This also casts a fruitful effect on learning for the students. Attitude, being a social construct, is influenced by many factors like gender social strata, age, experience from education and previous work experience. The bearings which gender and type of education have on the attitude of student teachers towards the teaching profession overall, will shed light on this a study and it was conducted using a ready-made tool. Study on different categories like: Non-tribal male and female science streams, non-tribal male and female social science stream; tribal male and female science stream, tribal male and female social science stream was undertaken. In a sample of one hundred students, ninety six students responded. The mean scores were considered and t-value was calculated to find the difference in the attitude of different categories towards the teaching profession.

Keywords: attitude, behavior, teaching proficiency, student teachers.

Introduction:

Teachers' roles and responsibilities have found extension outside the classroom. The implementation of educational policies; transaction of curricula and spreading awareness, are the main areas which keep teachers in the forefront. Changing times have added new dimensions to this profession, which requires specified competencies and proper attitude. Behavior, attitude and interest of teachers, helps in shaping the personality of the student. Attitude is a tendency to react in a particular manner towards the stimuli (Anastasi, 1957). It is a dynamic entity, which is subject to change. It is a deciding factor for the teacher's performance. Attitude is defined as a state of readiness shaped through the experience and influences, and the response of individuals towards the stimuli. It is precursor of behavior and varies from favorable to unfavorable through neutral processes of the mind. Attitude is made up of three components: affective, behavioral and cognitive, which all act as a yardstick for individual behavior (Feldman, 1985). Factors which bear influence on the attitude of the teacher are: the domestic environment, family background, socioeconomic background, beliefs and educational institutes etc. School status, school infrastructure, safety conditions in the school, social and professional status, all of these are vital in casting impressions on the teachers' attitudes (Barros & Ela 2008). Another factor which casts influence on the attitude is the experience. This holds true for the teaching profession also. Teaching experience of the teacher contributes significantly in forming attitudes (Suja, 2007). The teacher's attitude towards the subject and student is significant in creating the desire to learn in the students. Gender and type of training are the paramount factors influencing the attitude of the teacher (Oral, 2004; Bozdogen et al .2007). It is found that female teachers have positive attitudes towards the teaching profession (Capa & Cil; 2007).

Inadequate financial remuneration and delay in payment of salaries; are the causes of teacher's having low attitudes towards the teaching profession (Osunde & Izevbigie, 2006). These negative

factors when minimized can encourage teachers to be more conscious and responsible towards their duties. Initial teacher training helps in shaping the attitude of student teachers towards the teaching profession. Development of positive attitudes towards the profession; helps in developing creative thinking and motivating students (Celikoz &Cetin; 2004). The different learning environments, instructional materials and strategies adopted in initial teacher training program are also responsible for the difference in attitudes of student teachers towards the teaching profession (Mckeachie, 1994; Mordi; 1991; Schibeci & Riley, 1986). The type of attitude possessed by the teacher influences the quality of the work accomplished and teaching. Attitude of the teacher has the imprint of competencies which they can possess.

The background

A number of studies have been conducted to assess the influence of attitudes towards the teaching profession, and on the teacher's performance inside and outside the classroom, and other factors which have bearing on this topic.

Devi (2005) found that success in the teaching field depends upon two primary factors: attitude towards the profession, and job satisfaction. Suja (2007) also confirmed similar findings. According to him, attitude towards the profession, interest in the profession and teaching experience, influence the level of job commitment of the teacher. Mathai (1992) emphasized that attitudes towards the profession and success in teaching are correlated to one another. In another study, Cornelius (2000) revealed that intelligence, attitude towards teaching and academic achievement of the teacher trainee, cast impressions on their competence.

Gynanduruand Kumar (2007) established that over-achievers and average achievers possess more favorable attitudes towards teaching, in comparison to under-achievers. Pushpam (2003) confirmed a positive relationship between female teachers' attitudes towards teaching and their job environment generally.

Studies on attitude reveal that teacher's efficiency and classroom performance are based on their attitude towards the profession to an extent. Most of the studies have highlighted the gender of teacher, academic achievement and job satisfaction as the factors influencing attitude towards profession. The present study is an effort to find out the bearing of factors like gender (Male/ Female), Category (Tribal/ Non-tribal) and stream of education (Science/Social science) on the attitude of student teachers of Jharkhand.

Objectives of the study:

- To determine the attitude of male and female (non-tribal) science stream student teachers towards the teaching profession.
- To find out the attitude of male and female (non-tribal) social science stream student teachers towards the teaching profession.
- To determine the attitude of male and female (Tribal) science stream student teachers towards the teaching profession.
- To determine the attitude of male and female (Tribal) social science stream student teachers towards the teaching profession.
- To bring into light the difference in attitudes of non-tribal and tribal students with respect to their stream of education.

Hypotheses:

There is no difference in the attitude of male and female (non-tribal) science stream student teachers towards the teaching profession.

There is no difference in the attitude of male and female (non-tribal) social science stream student teachers towards the teaching profession.

There is no difference in the attitude of male and female (Tribal) science stream student teachers towards the teaching profession.

There is no difference in the attitude of male and female (Tribal) social science stream student teachers towards the teaching profession.

There is no difference in attitude of tribal and non-tribal (female) student teachers of science stream towards the teaching profession.

There is no difference in attitude of tribal and nontribal (male) student teachers of the science stream towards the teaching profession.

There is no difference in attitude of tribal and nontribal (male) student teachers of the social science stream towards the teaching profession.

There is no difference in attitude of tribal and nontribal (female) student teachers of social science stream towards the teaching profession.

Methodology:

To assess the attitude of student teachers towards the teaching profession, the teacher attitude inventory developed by Dr. S.P. Ahluwaliahas, has been employed.

Population: All student teachers in B. Ed. Programs.

Sample size: For the present study the sample size remains restricted to one hundred. Four students were absent, so only ninety six students responded. All student teachers belonged to the same college, purposive stratified sampling was done by the researcher. Samples, categorized for the study are: Non-tribal (male & female) science stream, Non-tribal (male and female) social science stream, Tribal (male & female) science stream, Tribal (male & female) social science stream, Female (tribal& nontribal) science stream, male (tribal & nontribal) science stream, Female (tribal& nontribal) social science stream, Male (tribal & nontribal) social science stream.

Tool used: The teacher attitude inventory is a ninety item instrument consisting of six subscales. Each subscale has fifteen statements that pertain to a particular aspect or prospective and practicing teacher's professional attitudes. The six aspects dealt with in the inventory are: attitudes towards the teaching profession, class room teaching, children centered practices, educational process and pupils and teachers. Out of ninety items, fifty six are in positive declarative form and thirty four of them are in negative form. Forty three items are meant to assess attitude in a favorable direction and forty six in an unfavorable direction. Likert continuum strongly agrees, undecided, disagree and strongly disagree has been provided for each item. The subjects responded by putting tick marks in the chosen alternative against the serial number of the attitude statement in the answer sheet. Though no time limit was assigned for recording responses on the answering performance, student teachers were asked to complete it as soon as possible. Once the exercise was over, the different categories were sorted out male/female, tribal/non- tribal, science/arts.

Scoring: each item alternative has been assigned a score ranging from 4 (strongly agree) to 0 (strongly disagree) for favorable items. In case of unfavorable items, the scoring range is reversed

i.e. from 0 (strongly agree) to 4 (strongly disagree). The attitude score of a subject is the sum total of the item scores of the entire six different sub -scales. The theoretical ranges of the scores are from 0 to 360. Higher score indicates more favorable attitudes towards the teaching profession.

Data analysis:

Table 1

Aggregate score of non-tribal student teachers (Science Stream)

	Female	Male
Mean	263.00	272.57
Variance	203.143	380.53
SD	14.64	21.07
Observations	21	7
t-Stat	-1.196 (NS)	
NS: Non significant		

Analysis: Set 1 shows the scores of non-tribal (science group). In this group, twenty one females and seven males are present. The attitudes of both groups towards the teaching profession were analyzed using a t-test to study significant difference between both of the groups. The results show no significant difference between both of the groups.

Table2

Aggregate score of non-tribal student teachers (Social Science Stream)

	Female	Male
Mean	278.74	270
Variance	131.878	347
SD	11.80	20.41
Observations	19	6
t-Stat	-1.0856 (NS)	
NS ; Non Significant		

Analysis: t-score is non-significant at the 5% level. It shows no difference in attitude towards the teaching profession is present between non-tribal males & females in Social Science groups

Table3

Aggregate score of Tribal student teachers (Science Stream)

	Female	Male
Mean	276.50	262.667
Variance	133.25	17.556
SD	12.65	5.13
Observations	6	3
t-Stat	2.61145*	
*significant at 5% level		

Analysis: There is a significant difference in attitudes towards the teaching profession between male and female students in the Science group.

Table4

Aggregate score of Tribal student teachers (Social Science Stream)

	Female	Male
Mean	277.862	244.75
Variance	374.188	607.688
SD	19.49	26.35
Observations	30	8
t-Stat	3.51256**	
** significant at 1% level		

Analysis: It is evident that there is difference in attitude towards the teaching profession and this is most present among tribal male and female students of the Social Science stream.

Table5

Science Stream Student teachers (Female)

	Tribal	Non-Tribal
Mean	276.50	263.00
Variance	133.25	203.43
SD	12.65	14.60
Observations	6	21
t-Stat	2.3909 *	
* significant at 5% level		

Analysis: t-score is significant at 5% level which implies that a difference in attitude towards the teaching profession is present and tribal female and non- tribal female student teachers of the Science stream.

Table6
Science Stream Student teachers (Male)

	Tribal	Non-Tribal
Mean	262.67	272.571
Variance	17.556	380.531
SD	5.132	21.07
Observations	3	7
t-Stat	-1.2764(NS)	
NS: Non-significant		

Analysis: t-score shows that there is no significant difference between the tribal and non-tribal male students' attitudes towards the teaching profession.

Table 7
Social Science Stream Student teachers (Female)

	Tribal	Non-Tribal
Mean	277.724	278.737
Variance	377.165	131.878
SD	19.26	11.80
Observations	30	19
t-Stat	-0.22675 (NS)	
NS: Non-significant		

Analysis: there is no significant difference in the attitudes of Female tribal & non- tribal (social science) student teachers towards the teaching profession.

Table 8
Social Science Stream Student teachers (Male)

	Tribal	Non-Tribal
Mean	244.75	270.00
Variance	607.688	347
SD	26.35	20.41
Observations	8	6
t-Stat	-2.18294 (NS)	
NS: Non-significant		

Analysis: There is no significant difference in the attitude of male tribal & non- tribal student teachers of the social science stream towards the teaching profession.

Discussion

Studies reviewed on attitudes towards the teaching profession reveal that attitudes towards the teaching profession act as a significant predictor of teaching efficiency. Some studies indicate that female teachers possess a slightly higher degree of attitude than male teachers and teachers with positive attitudes tend to encourage their students slightly more.

The analysis of data, in this study, depicts that attitudes towards the teaching profession of non-tribal (male & female) student teachers of Science as well as Social science streams, do not show significant difference (Tables1&2). However, studies conducted by Rawat and Sreevastava (1984) found significant difference between male and female teacher trainees' attitudes towards the teaching profession. Balan (1996) reported no significant gender difference in attitude towards teaching conducted by student teachers.

Naik and Pathy (1997) reiterated that female science teachers have more positive attitude towards teaching than their male counterparts. Poozhikuth (1989) also stressed that female teachers have more favorable attitudes towards teaching than male teachers. Ghosh and Bairagya (2010) in their study; concluded that female secondary teachers possess more favorable attitudes towards the teaching profession than male teachers. Benjamin et al. (2011) also supported this view that female student teachers had more favorable attitudes towards the teaching profession than male student teachers.

The study undertaken also depicts that in the tribal categories, significant difference at 5% level is observed between male and female student teachers of science and the social science streams. Females possess more favorable attitudes in comparison to male tribal students in both the academic streams (Table 3& 4).

While comparison of non-tribal (female) and tribal (Female) students of science stream shows that tribal (female) have more favorable attitudes towards teaching profession (Table - 5), while no significant difference in attitude towards the profession were observed among tribal and non-tribal (Male) students of the science stream (Table 6).

Table 7 shows that female student teachers of social science stream (Tribal & Non-tribal) show no significant difference in their attitudes towards the teaching profession. Same is the case with male student teachers (Tribal & Nontribal) of social science (Table 8).

Theresal and Benjamin (2011) also found that male student-teachers and female-students teachers have no significant difference in their attitude towards the teaching profession as well as self-esteem.

Most of the researches and present study conclude that student teachers (female) possess more favorable attitudes towards teaching than their male counterparts.

Difference in attitude towards the teaching profession can be observed between male & female (Tribal) student teachers of the science stream, social science stream and tribal & non- tribal (female) student teachers of the science stream. In all the three groups, tribal (female) student teachers show favorable attitude towards the teaching profession.

Hence hypotheses (iii), (iv) and (v) get rejected as to the difference in attitudes towards the teaching profession is found in tribal (male & female) student teachers of the science stream and the social science stream. Differences of attitude towards the profession are also significant in female student teachers (tribal & non-tribal) of science groups. Hypotheses i, ii, vi, vii, viii, ix are accepted as no difference of attitudes towards the teaching profession were observed in non-tribal (male & female) student teachers of the science and social science streams; male (tribal & non-tribal) student teachers of the science stream; female (tribal &non-tribal) student teachers of the social science stream; male (tribal, non-tribal) student teachers of the social science stream.

Conclusion

Attitude, being a dynamic entity, is influenced by variables such as age, previous experiences, beliefs, gender and stream of education. New teachers enter teacher training programs with already established beliefs, but pre-service teacher training programs help in shaping the attitude of teacher trainees by providing a series of experiences incorporated in their curriculum. Srivastava (1989) opined that favorable attitude of student teachers are formed at the end of teacher training program. Yadav (1992) revealed that training had a significant influence on their self-concept, social maturity and attitude towards the teaching profession.

A positive attitude towards the teaching profession can bring the desired quality in the education sector by developing a sense of duty, professional competence and by giving them an insight of the students' needs and problems. This area can be further explored by the researchers.

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Editor's Note: Convenience and ease of access have promoted widespread of interactive technologies for social networking. These same technologies play an increasing role in instruction but are they effective?

Podcasting in the curriculum: implications on achievement and satisfaction

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Abstract

Podcasting is a relatively inexpensive medium that is believed to have the quality to deliver meaningful digital content to students, keeping them connected to course activities and information. Although the adoption of any new technology is prone to user acceptance or rejection, there is little research on student acceptance of podcasting as a learning tool. The aim of this study was to examine the impact of video podcast use on student achievement and satisfaction. Two groups of entering freshmen majoring in computer science were compared based on the use or non-use of video podcasts. Results indicated no significant difference in correct responses on the test questions related to the podcasts' content. On the other hand, feedback from students showed that they were very satisfied with their podcasting experience in terms of ease of use, flexibility and usefulness.

Keywords: Podcasting, educational technology, achievement, satisfaction.

Introduction

The advent and maturity of emerging web technologies such as blogs, wikis, podcasts, web-based feeds and social tagging, has transformed the web into an open, collaborative environment where students can interact and learn without time or location limitations. Taking advantage of these new tools for learning, many higher education institutions offer web-based teaching recourses that can be used independently or as a supplement to the lecture material. The provision of such material is likely to encourage a deeper exploration of selected topics out of the classroom, allowing thus for more class time to be spent on practicing key concepts.

Podcasting is a new way of publishing digital audio and video content streams over the web as a series of episodes sharing a common theme. Each of these digital broadcasts is called a podcast - the term is derived from combining Apple's portable player iPod (Pod) and broadcasting (cast) - and can be played on computers and handheld devices, such as iPods, Smart Phones and other digital audio or video players. By using standard web feed formats such as Really Simple Syndication (RSS) or Atom syndication, the podcasts' producers can create a channel and post audio or video content that is automatically downloaded to a subscribers' computer or media player (Zacharis, 2012).

The subscription component of podcasting is one of the most appealing aspects of this technology for today's multitasking students, enabling them to remain up-to-date with ongoing class activities without having continually to search for and download files. The students simply subscribe to the podcast feed once by entering the permanent feed location into an aggregator program that reads RSS or Atom, such as Apple iTunes (Gribbins, 2007). As new podcast episodes become available, they are automatically downloaded to their computer or media player waiting to be watched whenever the student wants them.

Using podcasting in higher education

Today's tech-savvy students, which grew up with the Internet, video-games and iPods, are eager to learn and quick to embrace new technology. They take technology for granted outside the classroom and, consequently, they expect their learning to be adaptable to their mobile reality and flexible in time and space. The tremendous popularity of iPod and other MP3 players and the opportunities they offer for schools to deliver both review and supplementary materials to students, increasingly attracting the attention of higher education professionals (McLaughlin, 2006). The research efforts of universities like Purdue, Stanford, and Duke, which have established home-grown technologies that simplify podcast sharing, and the widespread usage of Apple's iTunes University (a website with downloadable educational podcasts) among college campuses, highlight the learning affordances of podcasting in the higher education setting (University of Leeds, 2009; Apple Inc. 2010).

The most common use of podcasting in higher education, so far, has been in the recording and distribution of class lectures. By making lecture podcasts available at any time, instructors provide students, who either missed class or needed additional review, the opportunity to study conveniently and think more creatively and critically. The practice of replaying past lectures several times, aids revision of key points and comprehension (Williams and Fardon, 2007). Moving beyond the use of lecture recordings as a substitute to the face-to-face lecture, educational podcasting involves also the delivery of supplemental course materials. Supplementary materials might include summaries of lectures that can be accessed in advance of class time, syntheses of core readings highlighting important information, additional lecture content to be used in individual projects or student-created content such as interviews (Deal, 2007; McGarr, 2009).

McCarr (2009) argues that much of the interest surrounding the use of podcasts in academia relates to their ability to enable more mobile access to the material. Thanks to mobile phones and MP3 players, podcasts are always available wherever and whenever students want them. Students readily adopt audio and video recordings as supplementary study tools and consider podcasts as helpful in improving the study environment (Heilesen, 2010). While it is widely accepted that storing and replaying digital copies of lectures is more engaging, compared with text-based methods, there is much disagreement about whether using podcasts actually increase learning. For example, Evans (2008) argues that podcasts are perceived by students as more effective and efficient revision tools than their own notes or textbook, while Hurtz, Fenwick, and Ellsworth (2007) found that students perform better when using podcasts and tablet PCs.

On the other hand, Lazzari (2009) found that podcasting does not have a positive effect on students' grades and McKinney, Dyck and Luber (2009) argue that students can only derive benefit from podcasts when they take notes, listen to the recorded lecture more than once and generally do the same things they already do during the actual lecture. Since podcasting is a new, cost-free, but yet unproven, technology with the potential to change the current teaching model, more research needs to be done in order to determine its impact on student learning. This study aimed to compare the use of podcasts to traditional delivery of information in classrooms. Video podcasts were used as an alternative to lectures and as a revision tool for students enrolled in an introductory programming course, while scores on exams and responses on an attitude questionnaire were used to decide on academic achievement and student satisfaction.

Participants and design

This study used a quantitative, post-test only quasi-experimental design to assess the effectiveness of podcasting to aid students in reviewing for exams. A series of eight video podcasts were created to be used by students as a revision tool before their final examination for an introductory Visual Basic Programming course. Two groups, one experimental and one control, of total 96 freshmen

majoring in computer science were involved in this study. Fifty-two were female and 44 were male. Their ages ranged from 18 to 19.4, with a mode of 18.3 and mean of 18.5. All students in this sample already owned laptops, personal digital assistants (PDAs) or mobile phones with video processing abilities and self-selected into the experimental or the control group.

The experimental group consisted of 68 students who were given access to the series of podcasts released during the first half of the two week interval between end of the course and the final examination. The control group consisted of 28 students who did not have any access to the podcasts. To address the issue of whether the two groups were different before the study began, students in each group were compared based on their scores in the midterm written examination. Using an alpha of .05, the independent samples *t*-test indicated the average midterm scores for the experimental group members ($M = 8.12$, $SD = 1.24$, $n = 68$) was not significantly different than the average midterm scores for the control group members ($M = 8.45$, $SD = 1.52$, $n = 28$), $t(94) = 1.018$, $p = 0.318$.

Materials and procedures

Students in the control group attended two review sessions during the revision week at the end of a 13-week teaching block (Spring semester 2013), covering 3 main syllabus topics: 1) Basic programming elements (i.e. exceptions, loops, functions), 2) Multiple-document interfaces (i.e. menus, forms, dialog boxes), 3) Mouse input and timers. Both lectures were recorded on an Olympus WS-500M digital voice recorder, using a tie-clip style Olympus ME-52W noise cancelling microphone. Two files, encoded in MP3 format, with almost four hours of audio lecture were created and then transferred to a PC by just plugging directly the audio devise into its USB port. The PowerPoint slides used in the in-class presentations were exported as PNG format image files, using the PowerPoint export function.

Both the image files and the corresponding audio files were then imported to Windows Media Maker video editing program, synchronized manually on the movie timeline and divided into shorter segments of around 30 minutes in length, with each segment focusing on a particular sub-topic. Eight video files in WMV format were produced and converted into iPod (MP4) format (at 320 x 240 pixels, bitrate 500 kbps and 30 frames per second), using the online tool from online-convert.com. The day after the first in-class lecture, the video podcasts began to be published on podomatic.com, at a rate of one or two every day. Students in the experimental group could then view the files online through a web browser, or they could click the “Subscribe with iTunes” button to subscribe once to the RSS feed and have each new podcast episode automatically downloaded to their machines.

The final examination consisted of 30 questions – in three sets of ten – of different types (multiple choice, fill-in-the-blank, true or false, find the error/correct the code) and varying degree of difficulty. Each question set was based on one of the three main topics covered in the revision lectures. Examination items required students to combine knowledge of course content from throughout the semester and demonstrate their ability to handle more complex topics such as making decisions and control objects in form interfaces. In order to assess students’ perceptions of and satisfaction with the video podcasting experience, a brief questionnaire was developed and administered online through the class’ Moodle webpage before final course grades were released. Ten Likert-type statements (from 1 to 5, where 5 is ‘strongly agree’, 3 is ‘neither agree nor disagree’ and 1 is ‘strongly disagree’) and two qualitative, open-ended questions intended to elicit participants’ views about usefulness, ease of use and attitudes towards podcasting.

Research questions and results

RQ1: The first research question that this study aimed to answer was whether video podcasts improved students' scores in the final examination. Three one-way ANOVA were performed, one for each of the three question sets examined in the final test, to identify any significant difference between the scores of experimental and control group. From the results shown in Table 1, it is apparent that, although the experimental group outperformed the control group on each of the examined topics, the difference between the users and non-users of revision podcasts was not statistically significant ($p > 0.05$).

Table 1
ANOVA tests for the 3 examined main topics

Main topic/group	Experimental n = 68 (received podcasts)		Control n = 28 (no podcasts)			
	M	SD	M	SD	t-value	p-value
Basic programming elements	84,2	5,6	82,4	7,2	1,184	0,244
Multiple-document interfaces	82,1	7,3	79,9	7,4	1,329	0,189
Mouse input and timers	78,8	6,9	77,8	5,8	0,725	0,469

RQ2: The second research question that guided the research was, "Do students believe there's value in using video podcasts as a revision tool to facilitate learning?" All 68 students in the experimental group responded anonymously to the online survey, providing information (Table 2) about the perceived usefulness and usability of video podcasting as well as their intentions towards future use.

Table 2
Students' perceptions of video podcasts

Perceived usefulness of video podcasts	SA*	A	N/D/SD
1) Video podcasts help focusing on key topics and taking accurate notes.	47	19	2
2) Receiving automatically new content via RSS feed helps studying.	26	41	1
3) The use of revision podcasts has improved my performance.	42	23	3
4) I think that video podcasting is a useful revision tool.	49	19	0
Ease of use of podcasting software			
5) Installing Apple's iTunes is a simple, straightforward process.	56	12	0
6) Subscribing to the podcast feed is an easy point-and-click process.	64	4	0
7) It was easy to watch the podcasts episodes online or download them.	62	6	0

Attitudes towards the use of podcasting			
8) I would like podcasts to supplement all in-class lectures.	36	27	5
9) I fill that podcasts could replace personal interaction with the lecturer.	9	10	49
10) I believe that podcasting should be integrated into college curriculum.	44	22	2

* SA – Strongly Agree, A – Agree, N/D/SD – Neutral, Disagree, Strongly Disagree.

As can be seen from Table 2, the vast majority of the respondents agreed that the video podcasts enhanced the learning process, improved individual performance and were certainly a valuable tool for revision purposes. The overall feeling among students was that podcasting software was easy to install and use, and that podcasts were easily accessible for viewing online or on mobile devices. They also reported highly positive attitudes about the use of podcasts across the whole curriculum, but only as a supplement to, and not as a replacement for regular lectures.

The final two survey questions were qualitative in nature and open ended. Question 11 invited students to offer general feedback on what is good about video podcasts, while question 12 asked for suggestions on possible alternative uses for video podcasts. Table 3 shows some representative excerpts from students' written comments, illustrating their main arguments and propositions.

Table 3
Responses from open-ended questions

What is good about using video podcasts?
Video podcasts can be used anytime and anywhere.
I like vidcasts for their simplicity and convenience.
Using video podcasts is the best way to review material and fill gaps in understanding.
By replaying video recordings, you can review only what you actually need.
I found that being able to pause and rewind podcasts helps to review and edit notes.
In what ways could the video podcasts be used more broadly in the curriculum?
Video podcasts could be used to prepare students for a lecture and free up teaching time to run additional activities.
I think that small packages of self-directed learning in video ipod format could accommodate individual learning needs and studying habits.
They can be used as a knowledge repository for those who wish to review materials covered during lectures.
Selected segments of recorded lectures can be used as assignment tips or subject guides.
It would be really cool to get personal feedback via video podcasts.

As can be seen from the responses set out in Table 3, participants were overwhelming in favour of using the iPod lecture recordings as a revision/tutorial tool. Students appreciate the simplicity and convenience of the medium, which has the inherent ability to provide anytime and anywhere learning. The availability of video recordings motivated students to review confusing material, edit their notes and concentrate on only those topics they needed. Based on the general comments, students consider video podcasting as a valuable additional resource which the teacher can use to

create a knowledge repository and provide self-directed learning opportunities and individual support.

Conclusion

Among the various emerging tools that allow for more student control and participation, podcasting holds great potential for providing enriched learning experiences without increasing faculty workloads. Video podcasts could help teachers to create and distribute timely educational materials to their busy students, who can then study them at times and places convenient to them. Although promising, there is a need for assessing the likely impacts of video podcasting on the target audience before its routine use can be promoted. Using as subjects students who already owned the required equipment and were willing to participate in the experimental group, this research ensured unbiased results by comparing two groups of the same intellectual capacity over the same material.

Although this study does not establish a clear link between video podcasting and learning achievement, its results are uncomplicated and would perhaps provide useful evidence for instructors planning to use podcasting in their courses. Students reported a variety of reasons for using video podcasts, including flexibility, web accessibility and usability (i,e, ease of use and learnability). They appear to be eager to use this modality for all general learning activities, as another supplementary tool that enhances engagement, critical thinking and student support. Teachers in higher education need to be aware of prevailing trends and learning preferences and not hesitate to invest labour and time in free, lightweight and popular technologies such as video podcasts, which are perceived by their students as an additive and not a substitute for traditional classroom lectures.

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