INTERNATIONAL JOURNAL OF INSTRUCTIONAL TECHNOLOGY AND DISTANCE LEARNING

November 2013
Volume 10 Number 11

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ISSN 1550-6908

PUBLISHER'S DECLARATION

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International Journal of
Instructional Technology & Distance Learning

Vol. 10. No. 11.

ISSN 1550-6908

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Editorial

Changes and Paradigm Shifts in Education

Donald G. Perrin

Note these changing trends in education. What terminology would you change? What additional items would you add?

Paradigm Shift 1 – Audiovisual 900-1960

Old	New
Lecture-Demonstration-Discussion-Textbook	Slides, audiotapes, motion picture, videos
Abstract and verbal	Real or simulated (Dale Cone of Experience)
One-way communication	Dialog - interaction and feedback
Rote-learning	Exploration and participation
Emphasis on knowledge	Build to higher levels of learning
Group learning - same size fits all	Opportunities for group and individual learning

Paradigm Shift 2 – Instructional Technology 1961-2000

Old	New
Focus on teaching	Focus on learning
Whole class teaching	Diagnostic/prescriptive learning
Instruction is a constant - Learning is a variable	Learning is a constant - Instruction is a variable
Fixed curriculum	Flexible curriculum
Teacher control	Learner responsibility
Grade on Bell curve	Score on rubric or criterion
Measure seat time	Measure performance

Paradigm Shift 3 – Distance Learning 1980 to present

Old	New
Classroom based	Anywhere
Fixed schedule	Anytime – Flexible schedule
Traditional (manual) management	Learning Management System
Fixed curriculum limited resources	Diagnostic/prescriptive/interactive. Learning objects. Access to global resources and Internet
Obsolete curriculum materials Slow and expensive to update	Computer based learning. Dynamic updates based on resource changes and student responses
Major construction/ production update cost/time	Minimal construction/ continual update, lower cost/time
High transportation /dissemination cost	Low cost internet access – virtual environments

Paradigm shifts - Learning Psychology

Rote learning – operant conditioning	Learning by doing - interactive
Imposed discipline	Intrinsic motivation
Competitive	Collaborative
Punishment for failure	Active participation and rewards
Passive learner	Active learner – explore – interact - create

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Editor's Note: There are different levels of support for educational software. Glossaries, dictionaries, example problems, and Frequently Asked Questions (FAQs) are derived from printed literature. In early stages of development, software manufactures have user groups to support each other in finding solutions to problems. From this data, context specific information is linked as Help text which provides the user with an instantly accessible resource that is less expensive than online assistance from a human operator. Indeed, the cost of a single inquiry might negate profit from one or more copies of software. Applications such as Word and Excel have gone further by providing step-by-step tutorials for items that require detailed explanation. Educational courseware can benefit from user groups (collaboration), help text, tutorials, screen sharing, interactive design, advanced organizers, and other forms of user support.

Embedding learner support in online course design: perspectives and directives from literature

Charity Ndeya-Ndereya
South Africa

Abstract

Information communication technologies enable universities to offer online courses as well as blended learning courses. In the context of web-based learning, students work in distributed locations, separated from their lecturers or learning facilitators. Consequently, learner support should be integrated into the course design to promote engaged learning and to ensure maximum learning experience. Information communication technologies have support tools and strategies that enable scaffolding, metacognition and collaborative participation in a community of learners as well as provision for feedback mechanisms. Therefore, embedding learner support into online course designs empowers online students to be self-directed in their learning, affords learning access to diverse students, including those with disabilities through universal course design, and humanises the online learning environment.

Keywords: learner support, embedding, integrating, online course design, perspectives, directives, higher education, successful learning experience

Introduction

Information communication technologies (ICTs) enable universities to offer online courses. In this context, students have very limited or no face-to-face learning support from their learning facilitators. Thus, learner support should be integrated into the course design to ensure maximum learning development. Traditionally, learner support supplements the study package in order to enhance learning. In online courses, added-on learner support is not ideal due to the immediacy required by online learners. In order to achieve an effective teaching and learning process, online course designs need support tools and strategies that ensure scaffolding, metacognition, and collaborative participation in a community of learners, social presence and provision for feedback mechanisms. In addition, online course designs need to be enriched with accessible and enabling technologies to create equitable opportunities for successful online learning for a diverse range of students, including those with disabilities.

This article was inspired by the author's everyday experiences and observations of needs regarding the design of online learning environments. Some online learning support issues seem to emanate from inadequate course designs that lack the supportive aspect, hence, the author's discussion of how learner support may be integrated into online course design. In this discussion, perspectives and directives from selected literature are elucidated.

During the last two decades, technological forces have impacted on education systems in an unprecedented manner. The introduction of e-learning into higher education has transformed teaching and learning at the university level. For instance, the use of the internet and web-based

technologies has paved the way for universities to offer online courses. Furthermore, availability of technological tools, such as personal digital assistants (PDAs), smartphones, iPods, tablets, e-notebooks, e-readers and wireless internet connections, has increased opportunities to study from locations of the student's choice and convenience.

Since online courses are designed for distributed learning, students in this context do not have the privilege of the physical presence of a lecturer and peers with whom to interact and engage intellectually. This void may lead to isolation, confusion, stress and ultimately to the student dropping out of the academic programme. High failure rates of online students have been reported by Frankola (2001); Herbert (2006) and Levy (2007). In fact, Frankola (2001, p. 53) alleges that "High dropout rates are e-learning's embarrassing secret". Some of the reasons cited for the high rates of attrition of online learners are a lack of motivation, problems with access to technology, individual learning preferences, poorly designed courses and a lack of learner support (Frankola, 2001). Wheeler (2006) asserts that student support is the most important factor affecting the success of online learning, while Ludwig-Hardman and Dunlap (2003) recommend that, in order to address the challenges of online student retention proactively, online students should be empowered with strategies that will promote academic success. Consequently, I suggest that learner support should be integrated into online course design to ensure maximum student learning development, sustained learning and the achievement of learning outcomes.

Learner support

There seems to be no commonly accepted definition of the concept of learner support. Instead, most authors describe learner support in terms of its function, and "assumptions about the nature of support" are made (Harrington, Laster, Stennet, & Carnwell, 2001, p. 3). For instance, the University of South Africa (Unisa), on the one hand, describes learner support as the range of activities that complement mass-produced materials ("Unisa Online - About us," n.d.). These activities may include tutoring, counselling, telephone or electronic communication, access to academic information, interaction with course facilitators and with colleagues, development of study skills, time management skills or online learning skills; all aimed at the promotion of effective learning and the enhancement of retention and the through-put rates of learners ("Unisa Online - About us," n.d.). Kehrwald (2007, p. 37), on the other hand, defines learner support as, "the process, by which learners' needs are recognised, responded to and met in a learning environment". One may thus conclude that learner support is about ensuring that learners are provided with the tools, skills, attitudes and the learning environments they need and that are conducive to successful and effective learning. For example, students in higher education often have to develop critical skills such as communication skills, critical thinking skills, time management skills, academic survival skills and online-technology skills. They need support in developing these critical skills. It is important that these skills are embedded in online course design, where opportunities to practise these skills are accessible. Bloom's domains of learning (in Forehand, 2005), namely, the cognitive, affective, and the psychomotor domains, are useful for illuminating the broad areas that need support during the online learning process, i.e. academic support, social and emotional support, and technical support (Wheeler, 2006).

Why incorporate learner support into online course design?

When we adopt a learner-centred approach to online teaching, our course design strategies should endeavour to include a supportive element at all levels. The intention thereof is to meet the learning needs of students by creating an environment that stimulates learning. Shelton and Saltsman (2004, p. 6) explain that, when learner support is integrated into course design, it sets a "tone of excellence" by "sowing the seed" that will stimulate development of a learning community, which, in turn, will support and nurture the student's progress to maturity. In

Heydenrych's (2004) view, the learning development process should be continuously innovative and inclusive of facilitation and support, in order to encompass a holistic approach to the learning experience. Therefore, online course design not only indicates the elements inherent in the downloading of course content and assessment activities, but also those elements relating to learning support.

Generally, learner support is about ensuring that learners are provided with the tools, skills and attitudes they need to complete their study programmes successfully. Kehrwald (2007) explains that learner support is about recognising and responding to the needs of learners. Thus, we should endeavour to address the needs of online students in the most effective and enabling ways. For instance, the use of principles of universal design removes the barriers that online courses sometimes erect for students with disabilities, such as sight, hearing or mobility impairments. Text embedded in graphics is inaccessible to blind students unless text descriptions are provided, and captions on video and other multimedia materials make content accessible to deaf students (Burgstahler, Corrigan, & McCarter, 2004). In addition, Gibbons and Wentworth (2001) argue that online learners value time, productivity and measurable results, which should be addressed in the course design by engaging students in authentic learning activities that require students to collaboratively construct knowledge to solve real problems. Therefore, for students to experience meaningful learning and produce the desired outcomes, the online course facilitator's responsibility of modeling and coaching throughout the online course is critical.

The traditional approach to distance education, where learner support was supplementary to learning materials, is no longer relevant to today's online students. In contemporary learning, instant delivery modes that contain a comprehensive learning development package are more desirable to and preferred by online learners. Thorpe (2002) boldly advocates for the reversal of the traditional model of course design first and learner support later. She perceives interaction as being central to effective online course delivery; thus drawing course design and learner support together.

Students in online learning environments need learner support more than their counterparts in traditional classrooms do, due to the isolated nature of online learners' contexts, which usually lack opportunities for interaction. However, learner support for online students has to take cognisance of students' learning environments and the students' characteristics. Primarily, academic support has to be built into the course design through facilitative and collaborative systems. Secondly, socio-psychological support in the form of social presence has to be blended into the online course design in order to stimulate and sustain academic interaction. Social presence is defined by Garrison, Anderson and Archer (2000, p. 94) as, "The ability of participants in a community of inquiry to project themselves socially and emotionally, as 'real people', through the medium of communication being used". Social presence in online environments is recognised as being supportive to cognitive and affective objectives (L. Rourke, Anderson, Garrison, & Archer, 2001).

How to make learner support an integral part of online course design

Constructing learning aligned to teaching

One of the constructivist principles that guide online learning designers in constructing their course design frameworks is constructive alignment, proposed by Biggs (2003). In this approach, the learning developer's efforts are aimed at aligning teaching with learning. As learners construct their own learning, they are assisted to achieve their learning outcomes by means of facilitation techniques, relevant learning activities and formative assessment approaches that are congruent with the learning outcomes. In this equation, learning support may be visible in learning activities while, in essence, it touches on all the elements of the teaching and learning process. The California State University Rubric for Online Instruction (California State

University (CSU), 2011) spells out exemplary online designs as those that clearly define and align course goals to learning objectives. Furthermore, it indicates that, in exemplary online designs, learning objectives and instructional and assessment activities are closely aligned. When learning objectives are identified and matching learning activities are integrated (California State University (CSU), 2011), achievement of learning outcomes is facilitated. Biggs (2003) claims that it is difficult for a student not to learn in constructively aligned learning circumstances; thus, such a teaching and learning environment may be described as supportive. Furthermore, in Heydenrych's (2004, p. 18) view, this contemporary instructional design approach has "a built-in tutorial support."

Offering tutorial support

Tutorial support can be embedded in online course design in several ways, but the process needs to be planned and carefully and systematically. A course facilitator needs to utilise proactive facilitation techniques (Cochran, 2013; Scollins-Mantha, 2008) that allow for advance planning of tutorial activities reflected in the course design. For instance, the clarification of course objectives in the course orientation material (Northcote, 2008) and modeling of the desirable learning behaviour should be supported by examples and illustrations.

The facilitator's role in discussion forums is also supportive in nature. It includes teaching presence in the form of an introduction; provision of guidelines; posing of questions that stimulate thinking; and redirecting the discussion, when necessary, without controlling and dominating it (Shelton & Saltsman, 2004). Herrington and Oliver (2002) advise that a learning designer should not concentrate on the content, but on how students will deal with the content. Therefore, support should be incorporated into learning activities, with opportunities for student interaction, facilitation activities, formative assessment and feedback (Heydenrych, 2004).

Providing constructive feedback

A plan for constructive feedback as a means of learner support for each activity of the online course can be incorporated into the course design (Cochran, 2013). Giving prompt feedback is a good practice that has been emphasised by many educationists, such as Chickering and Ehrmann (1996); Tu and McIsaac (2002); Aragon (2003); CSU (2009) and Cochran (2013). Provision of feedback that is timely and constructive is a critical academic support service expected by online students because they value immediacy (Tu & McIsaac, 2002). In this regard, Aragon (2003) recommends the shortening of e-mail turnaround time. Such immediacy also promotes social presence, which online learners always need. It is also possible to incorporate a plan for constructive feedback after learning activities and after formative assessment activities. In such contexts, constructive feedback may be provided in different media and in different ways. For instance, after an assessment activity, the course facilitator may provide either a video with captions or an audio file to accompany the text file. In this text file she/he can point out the common errors made by students in the specific assessment activity, indicate possible ways of correcting these errors, and redirect students to more appropriate approaches, references and examples (Aragon, 2003). Alternatively, a text file with feedback may be posted on the course site. In addition, individual feedback may be given to each student separately in the marked assignment. It should be noted that the choice of medium to use in the provision of constructive feedback is also dependent on the nature of the assessment activity and the nature of the learning discipline.

Planning for feedback through peer assessment in students' collaborative tasks may be an opportunity for students to learn from their peers, not only with regard to contributions in discussions, but also through constructive criticism (Cochran, 2013; So & Brush, 2008), as well as the verification and affirmation of knowledge. Cochran (2013) recommends scheduling of office hours during which the facilitator is available to students on the telephone in order to give

them feedback on their academic progress, as well as to respond to any course-related questions students might ask. This could be extended to a virtual office, which may be helpful in some learning environments. In other environments, discussions over Skype or satellite connections, where screen sharing is possible, might be even more effective, resources permitting. During the process of feedback, the facilitator may, as a way of advice, provide heuristics for independent learning and self-regulated learning**.**

Integrating metacognitive skills

Metacognitive skills include some essential skills for independent learning, such as planning and organising one's work, monitoring one's progress by means of the processes of self-regulation and self-evaluation through reflection strategies. Learning how to learn is a vital process for every student if he or she is to be successful in higher education. Thus, the development of students' metacognitive skills in online learning becomes a critical area of online learner support (Boote 1998 in Choy, McNickle, & Clayton, 2002). Online course design should thus include an aspect of guidance on how to learn about the culture and norms of the specific field of study in which the student is engaged. Vovides, Sanchez-Alonso, Mitropoulou and Nickmans (2007, p. 64) agree on the importance of designing e-learning environments that encourage the application of learners' metacognitive skills "by prompting learners to plan, attend to relevant content, as well as monitor and evaluate their learning". This is essential, especially in online and distributed learning environments, where online students should be able to regulate their own learning processes, because in such contexts, students do not have the benefit of physical contact with a lecturer who is constantly monitoring their progress and encouraging them to perform their learning activities in order to achieve the set learning outcomes; then, it becomes the learning designer's responsibility to "foster the ability of students to self-direct intentional learning projects in distributed settings" (Väljataga & Fiedler, 2009, p. 68). This skill is not automatic, especially in the online learning of digital immigrants and digital strangers and, therefore, it needs to be cultivated in online learners.

Thus, online students need to be supported in developing skills for self-directed learning. McLoughlin and Hollingworth (2002) suggest that, because many students lack even the essential metacognitive skills, learning designers should create student-centred learning environments that call for metacognitive control. They further suggest examples of learning scenarios that require metacognitive skills, namely, anchored instruction, open-ended learning environment, project-based learning and problem-based learning.

Another key factor in metacognitive support is reflective thinking. This means that online learning environments have to be designed in such a way that they motivate students to reflect on their learning experiences in order to transform their experiences, values and attitudes. Reflective practice involves an integration of activities, where one becomes aware of who and what one is reflecting on and thinking critically about (Beatson & Larkin, 2010). As students become exposed to new perspectives about "real-world problems" and engage in critical thinking about these problems through actively engaging in online activities, such as discussion forums, wikis, reflective summaries and reflective journals, transformation takes place (Meyers, 2008, p. 221). Beatson and Larkin (2010) agree that students, in their reflective blogs, can describe a situation, reflect or analyse it and, after making meaning of the experience, plan for future action, or change their approach for future practice. Thus the utilisation of learning management system (LMS) tools helps students gain heuristics for self-regulating their learning; thus it becomes a form of scaffolding.

Providing scaffolds for learning

Lipscomb, Swanson and West (2004) clarify scaffolding in learning as a metaphor created by Vygotsky (1978, cited by Lipscomb et al., 2004) to denote learning support. In addition, they

describe scaffolding as temporary assistance offered by a teacher, a more knowledgeable peer or an adult to support learning until the learner is able to work independently. In online learning design, the first scaffold to be provided to students is course structure and a clear map of activities. The use of advance organisers is more important in online learning than in conventional teaching and learning environments, where the facilitator is constantly involved in face-to-face interaction with students and may redirect the course whenever it is necessary. Advance organisers may include a study guide containing course objectives, course outline, policies and procedures (on submission of assignments, acceptable ways of communication during discussions, netiquette, etc.), pertinent information, such as orientation aids and assessment rubrics (Shelton & Saltsman, 2004), as well as guidance on how to learn in a specific course.

Digital scaffolding has been found to increase the cognitive growth of students in online teaching and learning environments, as well as to promote self-directed learning (A. Rourke & Coleman, 2010). Thus, Ngokha and Heydenrych (2004) advise facilitators of online courses to provide sufficient support or to at least direct learners (in the course design) to sources of support. This should reduce the anxiety of studying in isolation and promote a feeling of independence in online students. Scaffolding techniques assist students to reach their next level of potential development and to expand their knowledge. This level of potential development was first described by Vygotsky (1978, as cited by Lipscomb et al., 2004: online) as "the zone of proximal development". In online course design, several scaffolding strategies may be incorporated. These may include the use of communication tools, such as electronic reflective journals and reflective summaries that serve to consolidate the learned content and prepare the student for transition into the next unit or module (Shelton & Saltsman, 2004). In addition, group activities for collaboration, e.g. wikis, group blogs and group assignments, can provide scaffolding from peers. This is where team members provide support to one another as they share information, analyse, plan and design learning products, as well as correct and even instruct one another. Collaboration, therefore, becomes an important support tool in online learning, which needs to be utilised by course designers to promote engaged learning.

Rourke & Coleman (2010) describe a learner support system that incorporates scaffolding to enhance digital learning. The system uses a pedagogical model for online collaborative learning (OCL) and computer-mediated peer review (CMPR).

Creating "REAL" learning activities

Opportunities for active learning that also involve interaction should be integrated into the course design to promote meaningful learning. Grabinger and Dunlap (1995, p. 19) caution that it is paramount for designers to create "Rich Environments for Active Learning" (REAL), which are authentic situations or simulated situations where students can experience real-life conditions firsthand. Learning in such environments is often referred to as experiential learning, a theory associated with David Kolb (1984, in Kelly, 1997). In order to create REAL, course design may include among others, a team project to be conducted at actual sites of the phenomenon to be learned, and a task to create a model, a case study analysis and the production of collaborative reports. In addition, wikis may be prescribed to develop an idea, or solve an authentic problem (Zastrocky et al., 2007). These may also serve as REAL, since the knowledge and skills acquired in such learning environments are transferrable or adapted easily to new and related situations.

In line with REAL, Meyers (2008) recommends the use of transformative pedagogy when teaching online. Among other strategies, he advocates posing real-world problems

that address societal inequalities and help students implement action-oriented solutions. Embedding such learning activities in online course design promotes deep and engaged learning in students.

Creating opportunities for interaction

Before online interaction can take place, a non-threatening and inviting environment must be created, where all members of the community of learning will feel free to participate. In order to acquire such a supportive environment, online learning designers may design an orientation discussion forum, where everyone introduces themselves in a friendly atmosphere to promote cohesion, which can later develop into mutual trust (Meyers, 2008).

Jolivette (2006, p. 536) explains online student interaction as follows: "having the ability to interact with others provides numerous opportunities for students to share ideas, knowledge and social support (social presence), thereby working together to enhance their knowledge (cognitive learning) and ultimately their overall satisfaction (affective learning) with the course". This interpretation of the Community of Inquiry (COI) model, which was earlier described by L. Rourke et al. (2001), who stress that learning occurs through interaction when students are provided with a conducive environment for constructing knowledge through sustained communication. In order to engage students in online learning activities, and to offer supportive learning, internet-based interaction tools such as discussion forums, blogs, online chat sessions, wikis, and web-based applications, e.g. Google documents, Google applications and social network websites, e.g. Twitter and Facebook, are recommended (Revere & Kovach, 2011). The use of these tools promotes interaction.

Enabling access to diverse students, including those with disabilities

Effective e-learning support benefits all students, irrespective of their abilities or disabilities (Orsini-Jones, Courtney, & Dickinson, 2005; Burgstahler, 2007; Callahan, 2010; "Seven principles of universal design," 2013). This understanding should be shared by all parties involved in e-learning, including teaching staff, learning resource services and IT staff (O'Connor, 2000). O'Connor recommends that disability expertise be shared and embedded throughout the institution through accessible web design requirements and assistive technologies. He emphasises, "They need to be aware of the potential barriers presented by multimedia and graphics-based information and how to deal with these challenges" (O'Connor, 2000, p. 7).

Based on the literature reviewed above, it can be deduced that students with disabilities can be accommodated in e-learning through the use of universal design of learning experiences, as illustrated in the seven principles of universal design (CANnect, 2013B). Online course designers need to understand the online needs of students with disabilities (SWDs) and ensure that their course designs do not pose barriers to any students. In addition, awareness of the characteristics of SWDs implies that online learning designers need to accommodate these students while designing learning; for instance, a student who is blind ought to be accommodated so that he/she can access learning material containing graphics. An alternative way should therefore be found to represent the graphics. According to the Americans with Disabilities Act (ADA) of 1990 of the United States, an online student who is completely deaf is entitled to access the same audio information that is available to non-disabled students. Thus, Crow (2008) advises that online learning designers provide real-time text captioning for all audio, video and multimedia presentations posted on the web. Therefore, in order to make online learning accessible to all

students, a variety of presentation techniques is necessary. In addition, simplicity and rules of accessibility are crucial when designing online courses.

Humanising the virtual classroom

Humanisation of online learning is imperative, because learning is a social activity. Although computers and cables characterise online learning environments, the processes of learning and learning facilitation are human practices. On the one hand, Pelz (2004) confirms the possibility of a humanised virtual learning environment by arguing that ,when online course participants project personal characteristics into the discussion, they present themselves as "real people". On the other hand, Kehrwald (2007) asserts that failure to integrate social presence into online learning may be tantamount to dehumanising the learning process. In order to humanise the technology-mediated social process, social presence needs to be created in online learning environments (Kehrwald, 2007). The need to integrate social presence into online course design is confirmed by L. Rourke et al. (2001); Ludwig-Hardman and Dunlap (2003); Aragon (2003); Jochems and Kreijns (2006); Greyling and Wentzel (2007); and Kehrwald (2008). Ludwig-Hardman and Dunlap (2003, p. 9) add that, "Learning is a function of the activity, context, and culture in which it occurs". Learning is essentially a human activity and thus online course designers should reflect this attribute in their designs.

An example of humanising the virtual classroom is the incorporation of qualitative tools, such as interviews and observations in learning, as well as assessment activities into the course design (Bonnel & Meek, 2007). Bonnel and Meek (2007) argue that such qualitative tools bring real-world experiences to online students. They claim that such assignments, among other things, complement technology by bringing a humanistic component to online education.

The role of the course facilitator in integrating social elements into online learning environments may also humanise the otherwise impersonal environment of hardware and wires, e.g. the facilitator's modeling of appropriate levels of interactivity in online chats and discussion boards (Githens, 2007; Kehrwald, 2008). Researchers (Aragon, 2003; Greyling & Wentzel, 2007; Jochems & Kreijns, 2006; Kehrwald, 2008) agree that interactions in collaborative learning be integrated into online course designs in order to promote social presence in online learning environments.

Conclusion

Learner support that is integrated into online course design alerts and inspires course facilitators to utilise learner support techniques that enhance effective learning. It also empowers online students to be self-directed in their learning, develops team-building skills, breaks isolation through interactive collaboration, and stimulates learner engagement in a learning community. Such an online community is maintained by social presence that humanises the learning process.

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Editor's Note: This study has particular value for the way it assesses student competencies and the need for a basic computer course in a College of Business. It explains how the test instrument was constructed and how the resulting data was used to design as more relevant and effective course.

Foundations of computer applications for college students: a moving target

Thomas W. Gainey and Mariana S. Sanchez
USA

Abstract

As students entering college have increasing opportunities to develop computer-related skills both at home and in high school, there is some concern that the traditional computer applications course required by most colleges may not be adapting in a timely manner to fit this more computer-savvy group. This study surveyed 197 incoming freshman to determine their knowledge and experience with Microsoft Word, Excel, PowerPoint, and Access. Combined with input from other interested groups, we used this data to examine how our own introductory course fits the current needs of all stakeholders. The new curriculum that emerged from this process included more dynamic units that focus on emerging topics in technology and also more static units that emphasize more advanced applications in Microsoft Excel.

Keywords: on-line instruction, fundamental computer skills, freshman computer survey, Microsoft office, word, excel, PowerPoint, access, computer curriculum revision

Introduction

There is little doubt that freshmen entering colleges and universities today are a technology savvy group used to working with, and even relying on, a variety of computer-related applications and devices. As educators, we continue to adapt to these students by providing a multitude of online courses, by integrating web-based applications into our curriculum, and by using the latest technology to try to effectively communicate with them. Indeed, today's students present a new and unique set of challenges and opportunities for higher education.

Even with this more advance group of students, most universities continue to provide a fundamental computer course to ensure that all students have a basic set of skills. Some, however, now question whether this type of course remains necessary. After all, 75.6% of households now have computers (File, 2011), the ratio of students to computers in public schools in now 3:1 (Warschauer, 2010), and most students get some experience with word processing and presentation software in high school (Proffitt, 2012). Indeed, the prevailing wisdom among many college professors is that students now come to higher education with the necessary computer skills (Hostetler & Deeter, 2012).

Others, however, raise some valid concerns about eliminating this fundamental course. First, some point to the large "digital divide" among users. Specifically, in a 2012 study, only 59% of individuals with annual household incomes of less than $30,000 had a computer at home and only 52% of those households had the Internet. Conversely, 97% of households with incomes greater than $50,000 had both a computer and the Internet (Om, 2012). Second, is it possible that even if students have access to computers and mobile devices, they may not be using them to learn applications that they will need in college. Instead, students may focus on entertainment such as games, music downloads, and surfing the Internet (Fairlie & London, 2011). Finally, it could be argued that with the lack of qualified computer teachers in high school (Hoffman, 2012), not all students will have acquired the necessary skill-set. While some high schools actually offer MOS

Certification programs (Microsoft, 2010), it is likely that others do not have the resources to adequately equip students with the computer skills they will need in college.

Brief searches of ten higher-learning institutions in our state revealed that most had an entry-level computer course that their business majors were required to take. And, based on the course descriptions, several of these courses have apparently not been updated in some time, highlighting issues such as DOS, LAN, the Internet, and e-mail as prominent parts of the course. In fact, the university system in our state publishes expected learning outcomes that require many of these seemingly outdated introductory concepts. A review of these courses at other universities also revealed that, in most cases, there were learning outcomes associated with effectively using a word processor, a spreadsheet, a database management program, and presentation software. And, at our own school, covering these particular types of programs comprised a large part of our own curriculum. In fact, the nature of this course had changed very little over the past decade.

However, comments on student evaluations and our own observations led us to reexamine our approach with this curriculum. It was our belief that the student for whom our current curriculum was prepared some ten years ago was now the exception rather than the rule. Thus, the purpose of this study was to get a more accurate profile of entering freshman and to use these results to create a more appropriate, challenging course.

Current curriculum

Our current approach to the Fundamentals of Computer Applications course was developed over a decade ago and has remained essentially unchanged. It is basically a self-paced, online course where students review step-by-step instructions in a textbook. The course content involves introductions to file management, Windows, Word, Excel, Access, PowerPoint, and Adobe. For each of these topics the students complete a multiple choice quiz, a basic exercise, and then a more comprehensive "capstone" exercise. Except for the "final exam," which involves modifying an Adobe form and using the Word labels function, students complete the exercises outside of the classroom and submit them electronically through our web-based online platform. Because all students are completing the same exercises outside of the classroom, academic dishonestly is becoming increasingly prevalent. And, because only ten percent of the grade (e.g., the final exam) involves testing in a controlled environment, there is some question about the overall rigor of the course and how much we are actually assessing individual performance. There has been much debate, given students' increasing use of Microsoft Office in high school, about how much this type of introductory course actually challenges students to acquire the new skills that will be necessary in upper-level business courses.

Methodology

To better understand the Microsoft Office skill-set that students were developing in high school, we decided to survey incoming freshman during their summer orientation. The course in which we offer basic Microsoft Office training is provided in the college of business and is taken primarily by business majors. Thus, we surveyed incoming freshman who had already declared a business major with our Admissions Department during their application process.

To begin building our survey we asked two graduate students, who were both familiar with the requirements of our basic course and who had graded many of the assignments, to generate a list of items. Specifically, they were asked, for each major program within Microsoft Office, to list seven to ten major functions that we required students to learn in the course. Their list was then provided to two faculty members responsible for this course who also made recommendations. After receiving input from both the graduate students and faculty members, the final survey was

constructed. Because the orientation sessions were on a rather tight schedule, we were only allowed 10-15 minutes to administer the survey. Thus, we kept the survey relatively short. For each of the major Microsoft Office programs, students were asked if they had used the program before, how they would describe their level of proficiency, which of the major functions they had used, and then were asked to briefly describe how they had used the program in a project and/or school assignment.

The survey was administered to these students by academic advisors during the orientation. Students were required to be 18 years old and their participation was strictly voluntary. A total of 197 students elected to complete the survey. Because of our time constraints, and to encourage participation, students were not required to put their name on the survey, nor did we ask them to provide any demographic information.

Results of survey

Microsoft Word

Each of the 197 respondents reported that they had used Word in high school. In fact, 29% described their knowledge of Word as "Expert", 69% defined their knowledge as "Intermediate", and 2% noted they were simply "Beginners" with this program.

Table 1 shows the degree to which particular functions in Word had been used by the students. The data clearly shows that an overwhelming percentage of our respondents were familiar with the basic functions of this program. In fact, students noted that they had used Word in high school to complete a variety of school assignments such as essays, research papers, lab reports, poems, and senior projects. In doing so, many expressed that they were very comfortable using more advanced functions such as headers/footers, adding page numbers, and inserting pictures and pie charts.

Table 1
Microsoft Word: results of freshman responses

Word Functions	Percent Using Function
Use of bold, italics, and underline	100%
Create bullet lists	97%
Move, copy, cut, and paste text	99%
Format paragraphs	96%
Check spelling and grammar	99%
Insert headers, footers, and page numbers	95%
Insert images, charts, and tables	95%
Insert cover page and watermarks	63%

Some of the respondents noted that they also used Word for activities outside of their regular classroom assignments. In terms of personal use, students noted that they used Word to make "To Do" lists and to create resumes. For students involved in extra-curricular activities, students reported using word to created banners, flyers, mailing labels, and ballots.

In sum, the results showed that freshmen entering college were already very knowledgeable about Word and were comfortable using Word across many different applications.

Microsoft Excel

Eighty-two percent of our 197 respondents reported that they had previously used Excel in some capacity. However, 57% described their knowledge of Excel as only "Beginner" and only 1% described themselves as "Experts" with this program. Table 2 shows the degree to which particular functions in Excel had been used by the students. Interestingly, about two-thirds of the respondents had used Excel to insert charts or tables. However, only about one-third had actually created a formula in this program.

Table 2
Microsoft Excel: results of freshman responses

Excel Functions	Percent Using Function
Use of bold, italics, and underline	72%
Move, insert, and format columns and rows	74%
Create formulas	36%
Insert charts and tables	62%
Sort and filter data	17%
Create multiple workbooks	17%
Insert add-ins	14%

Individual comments revealed that Excel had been used in high school in courses such as AP Physics and AP Biology to create charts/graphs, in Accounting classes to prepare budgets and balance sheets, and in AP Statistics to organize data and make simple calculations. However, there were some advanced applications as well. A few students had used Excel to calculate simple correlations between variables in research-related projects. And, one student had actually used more advanced formulas to analyze data as part of a research program related to cell phone plans.

As with Word, a number of the respondents had also developed some experience with Excel working on more personal projects. Students noted that they had used Excel to calculate their GPA, to make personal calendars and workout charts, to keep statistics related to their athletic performance, and to build a spreadsheet for a "March Madness" competition.

In sum, it appeared that a large majority had some exposure to Excel, but that only about a third had any experience with using formulas. Given the degree to which upper-level business courses depend on students to understand and use formulas in their work, this was a "red flag" as we examined the data.

Microsoft PowerPoint

Ninety-nine percent of our respondents stated that they had used PowerPoint in high school. In fact, 49% classified their knowledge as "Expert" and another 49% believed that they had an "Intermediate" knowledge of this program.

Table 3 shows the degree to which particular functions in PowerPoint had been used by our respondent group. A very large majority had formatted new slides, created custom animations,

inserted sound effects, and setup slide show presentations. About 57% noted that they could also embed videos in their presentations.

Table 3
Microsoft PowerPoint: results of freshman responses

PowerPoint Functions	Percent Using Function
Use of Bold, Italics, and Underline	97%
Format New Slides and Slide Layout	98%
Move, Insert, and Format Tables/Illustrations	95%
Select Slide Themes	96%
Insert Slide Transitions	92%
Create Custom Animations	80%
Insert Sound Effects	86%
Create Slide Show Presentation	95%
Embed Videos	57%

Interestingly, several students mentioned that they had been using PowerPoint since sixth grade. In addition to just simple class presentations, students reported using PowerPoint to make presentations related to advertising projects, class-related field trips, science fair projects, and internships. Others had created jeopardy games, online foreign language assignments with recorded phrases inserted, and music-related applications.

What emerged from the data was a well-seasoned group of users with PowerPoint. Most had used it extensively and were very comfortable with this software.

Microsoft Access

Only 9% of our respondents reported that they had actually used Access. In fact, 94% described their knowledge of Access as "Beginner" and no one considered themselves an "Expert". And, as shown in Table 4, very few students had used any of the major functions within Access.

One student noted that Access had been used briefly in an Entrepreneurship course. Another wrote that Access had been used to organize some files. Most comments reflected a respondent group who had never used this program and was not even certain what it was designed to do.

Table 4
Microsoft Access: Results of Freshman Responses

Access Functions	Percent Using Function
Navigate Among Objects in Database	6%
Understand Storage vs. Memory	5%
Import Files	6%
Backup, Compact, and Repair Files	3%
Create Filters	1%
Sort Table Data on One or More Fields	2%
Use the Relationship Window	2%
Insert Add-Ins	1%

Additional stakeholder feedback

By administering the survey to the 197 incoming freshman and analyzing the results we felt that we had a reasonable idea of the current knowledge and skills that the students had attained in high school. However, there was also some recognition that other stakeholders were involved in the process. Thus, we solicited their feedback as well.

The first group that we contacted was the instructors in our business college. Given that we were ultimately preparing students to successfully complete the higher-level business courses, we felt that we should provide an opportunity for these teachers to convey the basic computer-related skills that they expected students to have upon entering their course. An e-mail requesting feedback was sent to the 54 faculty members in our college. Fifteen of those faculty provided responses.

The overriding theme from the faculty responses was that students should become much more proficient in Excel. One noted that some of his advisees had mentioned that they had been using Word and PowerPoint for years before college and felt that most of the instruction provided for these programs was unnecessary. One expressed frustration that students thought they knew more about Excel than they really did. In fact, one instructor noted that some of these students could not even remember how to build basic formulas and/or format cells once they made it to upper-level courses. In retrospect, during the three weeks that students were exposed to the basics of Excel in the foundations course, they may have gained a false sense of security because they were given step-by-step instructions for completing assignments and were allowed to complete graded assignments using templates online. However, when faced with a blank spreadsheet, and no specific direction, they might have felt somewhat lost.
Across business disciplines, the faculty stressed the need for more in-depth, rigorous coverage of Excel. Skills such as creating pivot tables, conducting basic statistical analysis (e.g., t-tests), computing financial ratios, developing financial sheets, and generating various types of graphs were a few of the basic Excel skills that faculty believed were important. One former student who now teaches at our university noted that she would have certainly benefited more in the upper-level courses if our coverage of Excel had been more comprehensive. And, another faculty member who had extensive experience in manufacturing observed that her colleagues who were more proficient in Excel definitely had an advantage in the work place.

Only one faculty member actually used Access (this was in upper-level MIS courses), and none of the faculty thought that we should spend more time on Word or PowerPoint. Again, with these Microsoft Office programs, faculty believed that the students were acquiring adequate skills in high school.

The second group that we contacted was the Board of Visitors in our college. The Board of Visitors is comprised of local business leaders as well as former graduates who now hold higher-level positions in various organizations. There were three main themes that were expressed by this group. First, they expected students to be able to perform the basic Microsoft functions such as Word and PowerPoint. They noted that creating documents and making presentations were essential parts of most jobs. Second, they expected a much higher level of expertise with Excel. Being able to create rather sophisticated spreadsheets using advanced formulas and functions, pivot tables, and charts seemed to be a highly valued skill among these senior leaders. There was no doubt that they expected students to be able to create more than very simple spreadsheets. In fact, one noted that having an Excel certification upon graduation might give students an advantage in the job market. Third, they noted that students should be up-to-date on emerging technologies. One individual noted that when they hired someone from the "outside", they really wanted this person to inject some new ideas into the workplace. They felted that graduates who had some understanding of the latest trends in technology could really make a difference in

streamlining processes and finding more efficient ways to handle some of the more manual systems that were already in place.

In the end, both our faculty and Board of Visitors truly provided some excellent feedback that proved to be instrumental as we designed our new curriculum.

Updated curriculum

As we designed our new curriculum, several issues that emerged through our research were viewed as critical components that should be incorporated. First, we believed that the time we had previously devoted to Word and PowerPoint should be significantly reduced. Almost all students completing our survey had already used these programs and did not need introductory-level instruction. Second, because Access was used so little by faculty, we felt that only a very brief introduction, as required by the university system, was necessary. Third, it was clear based on all stakeholder comments that we needed more in-depth coverage of Excel. We needed to make certain that students not only had exposure to Excel topics, but could develop spreadsheets from "scratch" instead of simply following step-by-step instructions and plugging numbers into previously created spreadsheets. Fourth, we needed to reduce the amount of academic dishonestly in this course. With students completing the same assignments from year-to-year in an online environment, the opportunities to "borrow" previously completed work proved too much of a temptation. In fact, it became increasing common to catch individuals forgetting to take the previous students' names off of the assignment they were turning in. Certainly, when faced with assessing performance in an online course, the inability to control this process can be frustrating in any course. However, the nature of this particular course left it particularly vulnerable to cheating. Thus, additionally controls were deemed to be critical.

In the end, the design of the curriculum contained both a "dynamic" and "static" component. The "dynamic" part of the course, which last for five weeks, will likely change from year-to-year. Here, we introduce emerging concepts and technologies, and we assess students' ability to handle the basics in Word, PowerPoint, and Access. For instance, as we roll out this course for the first time this Fall, students will get an overview of different operating systems, database management techniques, web-based applications, the Cloud, security issues in the workplace, SSDs vs. HDDs, and IT consumerisation. For each of these topics, students will review and study materials provided on our web-based platform and will then prepare assignments related to these topics that require students to demonstrate a fundamental understanding of Word, PowerPoint, and Access. Based on our research, we assume that most students already have a basic understanding of Word and PowerPoint. However, significant resources will be available to students, both online and in the computer lab, for students who may not have acquired these basic skills or need some remedial work. Again, as new technologies or topics emerge, the topics that we cover in the "dynamic" part of the curriculum will likely change as well.

The "static" part of the course will last approximately nine weeks. This part of the course will focus entirely on introductory and advanced applications in Excel. To prepare faculty for this change, all individuals involved with developing or teaching the course participated in a day-long, Excel Level II training program. Even the more experienced Excel users in our department discovered new applications during this training that they had not previous used. In the end, a curriculum was developed that will require students to not only learn the basics of Excel, but to also learn more sophisticated applications such as advanced formulas, advanced functions, and pivot tables. Additionally, students will be required to take an Excel-based mid-term and final exam in a controlled environment at our campus or at an approved testing center in another location. These two assessments will count a significant part of the final grade and will help us ensure that individuals in this course can demonstrate an appropriate, advanced understanding of Excel.

Conclusion

The opportunities to develop computer-related knowledge and skills both at home and in high school have increased dramatically over the past decade. The widespread availability of mobile devices and Internet access has created high schools graduates who are much more computer-savvy than those entering college a decade ago. Yet, in many cases, the introductory computer courses in higher education and the state-level mandates governing the content of these courses have changed very little over the past ten years.

Based on student comments on course evaluations and on our own observations, we had some concerns that our current approach in the fundamental computer course may no longer fit the actual needs of our students or other stakeholders in this process. Thus, we surveyed incoming freshmen to get a better idea of the fundamental skills and knowledge that they already possessed before taking our course.

In regard to Microsoft Office, we found that most students entering our university had already used programs such as Word and PowerPoint on a regular basis and felt very comfortable with basic applications. In fact, 26 of the 197 students (13%) that completed our survey told us that they had actually already taken a computer-based course that covered these two programs in some depth. However, we also discovered that a large percentage of these students did not possess the same comfort level with Excel. Only one-third had actually created a formula in this spreadsheet program.

The lack of these students' expertise in Excel, combined with the desire of our faculty for students to be more proficient in Excel, led us to made some major changes to our basic computer course for the first time in over a decade. Primarily, we reduced the coverage of Word, PowerPoint, and Access. And, we significantly expanded our coverage of Excel to include more advanced applications.

Our research also reminded us that freshman entering our college have a wide range of experience and knowledge. For the more advanced users, we are already discussing how to make a Microsoft Certification or test-out options a part of this course. And, for those needing remedial help with Word and PowerPoint, we are making those resources available as well. This is truly a course that must be designed for a diverse user group.

As high schools increasingly incorporate computer-related work into their curriculum, it is likely that we will need to continue to adjust our course to fit an even more advanced student. This is truly a moving target that we must always keep in sight. Clearly, we must make certain that our inexperienced students do not get lost, but we also want to provide a challenge for more advanced users. By continuing to integrate new and emerging technologies into the curriculum and by focusing on more advanced Excel applications, we hope to provide a skill set that will help make these students successful in the classroom and in their future careers.

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Editor's Note: This study is a valuable starting point for administrators and faculty to assess the relative impact of course length on student performance for distance learning classes.

Effects of online course length on undergraduate student performance

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Abstract

The impact of course length on student performance for traditional face-to-face class is a topic that has been studied extensively. However, there is limited literature discussing the impact of online course length on student learning. In this paper we examine the connections between course length and student performance for an online introductory course offered in four seasons, Winter (~3 weeks), Spring (~15 weeks), Summer (~4 weeks), and Fall (~15 weeks), from January 2010 to Summer 2013. Instead of using the original raw grades, calculated grades based on the assignments shared by all sessions are utilized to make comparisons. Our results indicate that students generally perform better in one session than in other seasons, while the differences among other seasons are not significant.

Keywords: Online, course length, undergraduate, student performance, mean, t-test

Introduction

The connections between course length and student learning have been an interesting and debatable subject for years. Majority of literature reports in this topic are based on the study for traditional face-to-face courses.

On one side, some researchers believe that college courses should be offered only in the traditional 15/16-week semester and any course offered in shortened formats would not have the quality to achieve its desired learning objectives.

Kretovics et al. (2005) found that faculty generally holds the view that intensive courses are less rigorous and effective than the 15-week full-semester courses. Collins et al. (2013) found that students taking courses in condensed formats faced greater challenges than those studying in standard 15-week semester. Harlow et al. (2013) reported that students taking introductory physics had better gain in 12-week class than in the 6-week class and the accelerated course objectives were not always achievable. Crowe et al. (2005) reported that new faculty members, who did not have the previous training and experience of teaching summer courses, might struggle maintaining the same rigor of regular courses in the beginning of teaching intensive courses, even though they did realize that projected student learning objectives should not be altered due to the change of course duration.

As Martin and Culver (2009) pointed out that

> "*Instead of earning a place as sophisticated and innovative course offerings that can serve the needs of varying student populations, summer sessions and intensive courses overall are still sometimes viewed as the short stepchild of the academy*."

On the other side, a number of researchers comparatively studied the impacts of course durations on student learning and found that students generally performed better in intensive formats.

Kucsera and Zimmaro (2010) studied the same course taught both in 9-week (or 11-week) intensive and in traditional 15-week formats and found that intensive courses received

significantly higher overall course ratings on student evaluations than did traditional courses. They concluded that "*negative beliefs concerning intensive courses may be unjustified*." Tatum (2010) reviewed the literature on fast-track classes, compared them with the traditional classes, and concluded that the current practices in accelerated education have advantages over the traditional ones. Logan and Geltner (2000) also found that students in the 6-week shortened sections had higher success rates than those in the 16-week sections. Adams (2013) reported that students in the 10-week accelerated courses had higher grades than those in the corresponding traditional 15-week courses. Austin and Gustafson (2006) did an extensive study on the connection between course length and student leaning by taking into account of student demographics. They found that intensive courses did result in higher grades than the 16-week long courses, and the higher grades were the result of an increase in knowledge, not due to a lower standard during intensive session.

In between these two sides, numerous researchers presented inconclusive results showing that course length has no significant effect on student performance.

Anastasi (2007) studied full-semester and abbreviated summer courses and found that the overall academic performance was similar in both formats. The author concluded that "*Contrary to accepted beliefs, student performance was not poorer during abbreviated summer courses compared to regular semester courses, even when holding various factors constant*." Nasiri and Shokrpour (2012) reported that students in the 17-week intensive class did not outperform those in the 34-week class. Scott and Conrad (1992) surveyed the literature thoroughly and concluded that: (1) Compressed courses can produce identical and even better learning outcomes; (2) Discipline matters: Social sciences and Humanities benefit most from intensive formats; (3) Students are supportive of intensive formats, which gave more people the opportunity to pursue college education; (4) Negative faculty attitudes are the main obstacles due to the highly labor-intensiveness of intensive course; (5) Time is not the most significant driving force of learning. Beran and Violato (2005) extensively studied the effects of student characteristics such as class attendance and course characteristics such as duration on student ratings and found that course duration had trivial influence on student ratings.

Seamon (2004) reported that students taking the abbreviated format of a course showed much better performance that those taking the semester-length version. However, the difference between the two groups faded after three years possibly due to the effects of course lengths on knowledge retention.

LaFountain (1995) examined course intensity and long-term retention on graduate-level research course and no effect of scheduling formats on retention was found. Lutes and Davies (2013) compared workloads of courses taught in 16-week and 8-week sessions based on survey data from 29,000 students and found that students spent slightly more time on the 16-week courses than on 8-week ones. However, the overall student performance was similar. Homeyer and Brown (2002) studied the academic effectiveness of three term formats (3-week, 5-week, and 15-week) and found no significant difference in student skill development and knowledge acquisition with regards to term length.

McLeod et al. (2005) reported that shortened course in composition was just as effective as the traditional version for first-year undergraduate student. Ewer et al. (2002) studied the effects of course length on student performance and found no significant difference between the 4-week and the 16-week versions, even though students with high GPA performed much better in the condensed format. Daniel (2000) reported that students, particularly adult and part-time students, generally favor intensive courses, even though they may not like some aspects, such as the lack of time to cover all the materials and to finish assignments, and the fatigue and stress related to these courses.

Some educators and researchers who had concerns about the effectiveness of abbreviated courses and held the belief that any course offered in a time frame shorter than the typical 15-week semester is inferior may have voluntarily changed their opinions when presented with the outcomes of successful intensive courses. Others who still concern about the quality of abbreviated courses may have accepted them reluctantly when facing the fact that intensive courses are offered to meet the needs of students.

As Davies (2006) indicated, intensive courses are put forward to meet the needs of its customers-students who demand flexibility and choice in modern age. Just like intensive courses, online courses are offered to meet the needs of students. However, online courses are often criticized for the lack of classroom interpersonal interactions, which are often replaced by student-content interactions. For this reason, Dunlap et al. (2004) proposed the idea of promoting student-to-content interactions as an alternative to the classroom interaction by redesigning course materials and changing the traditional content delivery methods. Scott (2003) found that students felt improved performance in successful intensive courses mainly for the following reasons: more concentrated due to taking fewer courses simultaneously, and easier to maintain energy due to short duration. The author (Scott, 2003) also pointed out that two of the most important characteristics necessary for a quality intensive course are classroom interaction and collegial classroom atmosphere, which can be only be achieved in face-to-face class.

In recent years, Distance Learning has skyrocketed (Allen & Seaman, 2005). More courses are offered online and more faculty members accept online teaching for the reason of flexibility (Shea, 2007). However, we have yet to find report specially focusing on how course length affects undergraduate student performance for online course.

Ferguson and DeFelice (2010) studied graduate student performance in online course offered in the 5-week intensive format and in the traditional 15-week format. The course contents and teaching methodology were the same for both formats. They reported that students in the intensive session showed better performance than those in the 15-week session. However, graduate students are academically more mature and generally have stronger self-learning capability than undergraduate students. Therefore, their results may not apply to undergraduate students.

In this study we investigate the connection between course length and student performance for an introductory online course offered to the entry-level undergraduate students during four seasons: Winter (~3 weeks), Spring (~15 weeks), Summer (~4 weeks), and Fall (~15 weeks), from January 2010 to Summer 2013, taught by a same faculty member.

The rest of the paper is organized as the following. In Section II we introduce the methods utilized in the study. Section III presents the results. Section IV briefly analyzes the results. Section V concludes the paper.

Methodology

The course is a low-level undergraduate course offered to students with diverse backgrounds and whose contents extensively cover computer technology. The platform used for the online course was the *Angel*^{TM} learning management system. Discussion forums and emails are the prime means of communication among the instructor and the students. The course requires students to interact with his/her classmates and instructor by participating in the discussion forums. For every discussion topic a student is required to submit one post and respond to three posts from other at a minimum. In addition, a standalone discussion forum named “Ask a question” is set up for the convenience of students to ask questions. Anyone in the class can see the questions being asked, answer them, and see the post answers to them.

The course contents were divided into a number of modules, each of which contains the following five folders with the following names and contents:

Module-at-a-Glance. It contains an overview and a brief introduction of the module, the learning objectives, activities, and due date.

Learning Contents. It contains lecture slides, video links, and readings

Homework. It typically contains one assignment and its dropbox.

Discussion Forum. It contains open-end discussion topic related to the contents of the current module.

Assessment. It contains a quiz.

The same textbook (different versions) has been used for all fifteen sessions, from January 2010 to June 2013. The first eight modules in one session contain the same materials, including homework assignments, discussions, and quizzes, as those in another session. At the end of each session, every student is required to take a comprehensive final exam.

In this study, a calculated grade for every student is utilized, based on the first eight homework assignments 20%, first eight discussion forums 20%, first eight quizzes 36%, and the final 24%. Note that other module(s) and exam(s) (ex., Module#9, Midterm Exam) are not used in calculating the overall course scores in this study because they are either different across sessions or only exist in some sessions but not in others. Therefore, the course scores given in this paper may not be the same as the real (raw) scores given to the students at the end of a class. They are calculated scores utilized to represent real scores. Readers may question the validity of this approach. However, our results (given in next section) indicate that the calculated scores well represented the real scores.

In all, there are 230 students attended the 15 sessions (Maximally allowed enrollment for the course is 20). With the calculated grades for every student, we define the following three types of mean grades:

Individual-based mean (I): average grade based on the grades for all the students combined.

Class-based mean (C_i, $i=1, 2, \ldots, 15$): average grade based on the grades for the students in a particular session of a particular year.

Season-based mean (S_j, $j=1, 2, 3, 4$): average grade based on the grades from all the students in a particular season (Winter, Spring, Summer, or Fall) across all years.

What are the relationships among the three types of means?

Given the following symbols:

N–Total number of students

$N_1, N_2, \ldots, N_{15}$ – Number of students for each session

M_1, M_2, M_3, M_4 – Number of students for each season

C – Overall class-based mean

S – Overall season-based mean

Where $N = N_1 + N_2 + \ldots + N_{15} = M_1 + M_2 + M_3 + M_4$.

The following equations hold:

$$C = (C_1 + C_2 + \ldots + C_{15})/15 \quad (1)$$

$$S = (S_1 + S_2 + S_3 + S_4)/4 \quad (2)$$

$$I*N = I\,(N_1 + N_2 + \ldots + N_{15}) = C_1 N_1 + C_2 N_2 + \ldots + C_{15} N_{15} \quad (3)$$

$$I*N = I\,(M_1 + M_2 + M_3 + M_4) = S_1 M_1 + S_2 M_2 + S_3 M_3 + S_4 M_4 \quad (4)$$

If the numbers of students in all 15 sessions are the same, i.e.,

$$N_1 = N_2 = \ldots = N_{15} \quad (5)$$

$$M_1 = M_2 = M_3 = M_4 \quad (6)$$

Then we can get $I=C$ from equation (1), (3), and (5), and from equation (2), (4), and (6) we can get $I=S$. That is to say, the three types of mean are the same as given in equation (7).

$$I = C = S \qquad (I = C \text{ always implies } I=S) \quad (7)$$

If the numbers of students in the 15 sessions are different from each other, but the season-based student counts are the same, i.e., equation (6) holds but equation (5) does not hold. Then we get:

$$I = S \neq C \quad (8)$$

It can be seen that no other conditions can establish equality between any two of the three types of means.

Given the real data in the study we find neither equation (5) nor equation (6) holds. Therefore, the mean grades are different from each other.

In this paper the t test for equality of means is adopted to check if two sets of data are significantly different from each other. The results are given below.

Results

1. Testing the validity of using calculated grades to evaluate student performance

In this paper we select the homework assignments, discussion forums, and quizzes in the first eight modules and the final exam to calculate the course grade for the purpose of having a fair foundation of comparison. Theoretically, the calculated grades for each student may be significantly different from the original real grades. Therefore, it is necessary to check if the calculated results can be used to represent the real grades.

Using the t test for equality of means, we find the calculated individual-based mean is not significantly different from the original mean (t=0.088, p=0.930), as given in the 1st row of Table 1.

Table 1
The t-test results comparing original mean with calculated mean (α=0.05)

Type		N	Mean	SD	t	df	Significance	t critical
Individual-based	Original	230	81.3	10.69				
					-0.088	458	0.930	1.97
	Calculated	230	81.4	11.25				
Class-based	Original	15	81.7	3.27				
					-0.090	28	0.929	2.05
	Calculated	15	81.8	3.19				
Season-based	Original	4	81.3	2.19				
					-0.049	6	0.962	2.45
	Calculated	4	81.4	2.03				

The class-based average grades for the fifteen sessions are plotted in Fig. 1, from which it can be seen that the original grades are very close to their corresponding calculated grades.

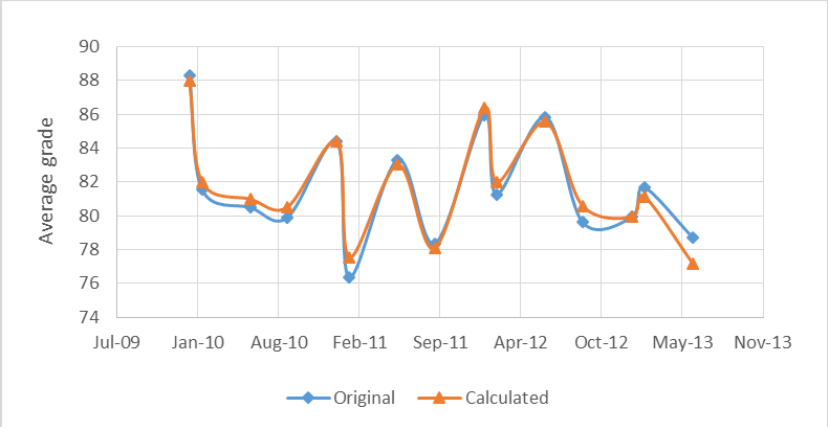

Fig. 1 Class-based mean grades

The t test for equality of means shows that the calculated class-based mean is not significantly different from the original (t=0.090, p=0.929), as given in the 2nd row of Table 1. Similarly, it is found that the calculated season-based mean is not significantly different from the original (t=0.049, p=0.962), as given in the 3rd of Table 1.

From these results it can be concluded that the calculated grades truly represent the real grades. Therefore, the calculated grades can be used to evaluate student performance.

2. Effects of session length on student grades

The class-based mean grades are plotted in Fig.2, from which it can be seen that for each of the following three years, 2010, 2011, and 2012, students got the highest average grade in the winter session (January).

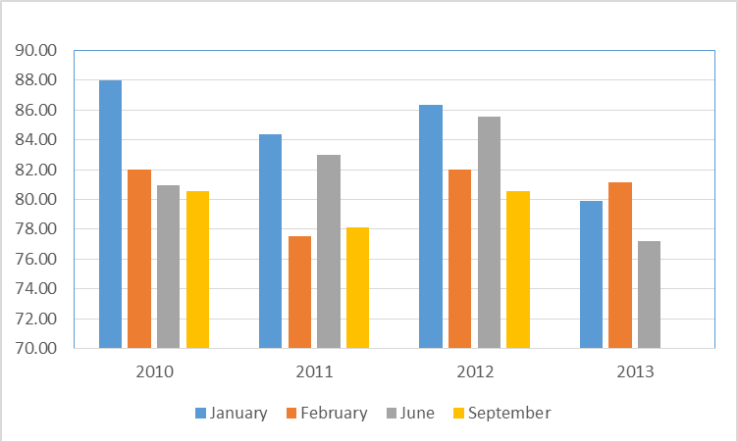

Fig. 2 Class-based mean grades

Season-based mean grades are given in Table 2, from which it can be seen that January has the highest overall mean, followed by June, February, and September in that order. The t test is utilized further to find out if the grades are significantly different from each other.

Table 2
Season-based mean grades

	N	***Mean***	***SD***
January	54	84.3	8.92
February	69	80.7	11.95
June	55	81.0	12.21
September	52	79.9	11.15

The results of using the same t test for all the seasonal combinations are given in Table 3.

Table 3
Season-based t-test results (α=0.05)

Season	*df*	*t*	Significance (*p*)	*t* critical
January vs. September	104	2.40	0.018	1.98
January vs. February	121	1.88	0.063	1.98
January vs. June	107	1.61	0.11	1.98
January vs. Others	228	2.22	0.027	1.97
September vs. June	105	-0.613	0.541	1.98
February vs. September	119	0.49	0.628	1.98
February vs. June	122	-0.161	0.872	1.98

The following conclusions can be drawn from Table 3:

> The mean grades in Januaries are significantly different from those in Septembers (t=2.40, p=0.018).
>
> The mean grades in Februaries, Junes and Septembers are not significantly different from each other.
>
> The mean grades in Januaries are significantly different from those combined in other three seasons (t=2.22, p=0.027).

Discussion

Students performed significantly better in the 3-week winter sessions than in both the 4-week summer sessions and the ordinary 15-week sessions (spring and fall). This conclusion is consistent with the reported results in some literature (Van Scyoc & Gleason, 1993; Sheldon & Durdella, 2009) for traditional face-to-face courses, that is, course length does have an effects on student performance and students perform better in intensive formats.

What are the possible reasons contributing to the difference?

Reason 1: Effects of course load

Most students typically take one course in winter session, while during the summer multiple sessions are available and students can take two or more courses simultaneously, and during the ordinary 15-week semester students might take 5 or six courses. Students are more focused while taking less courses.

Reason 2: Student readiness

Students are generally alerted about the intensiveness of the 3-week winter course upon registration. They are required to obtain a copy of the syllabus and the required textbook before the course officially starts. They are warned that they need to spend 4 hours or more each day for the duration of the class. And if they are not ready to make such a commitment, they should not be taking the course in winter.

Reason 3: Personal motivation

Students taking courses in the winter session tend to be highly motivated and want to finish degree quickly.

Reason 4: Effective knowledge retention

Due to the short period of time of winter session students have better knowledge retention upon taking the tests.

The fact that students in the summer sessions did not show significant performance difference from the ordinary 15-week semester may indicate that other factors (D'Souza & Maheshwari, 2009) besides course length could also affect student grades, such as GPA, SAT score, age, personality, and so on. These variables are not considered in this study.

Conclusion

For traditional courses the effects of course duration on student performance have been an interesting and debatable topic for decades. Many such reports can be found in literature. Online course as a relatively new form of learning and teaching has been offered as an alternative to the ordinary face-to-face courses. Nowadays more and more courses are taught online to meet the needs of both students and faculty. The burgeoning of distance learning has massively diversified

the formats of online courses. However, there is extremely limited literature on how online course length affects student performance.

In this paper we examined an undergraduate introductory computer technology course which has been taught online fifteen times in four seasons (3-week winter session, 15-week spring session, 4-week summer session, and 15-week fall session) between January 2010 and June 2013 by the same instructor and with very similar contents.

Calculated grades representing the original scores are utilized to assure identical course materials across sessions. The t test for equality of means is used to compare student grades. Our results show that students perform significantly better in winter session than in other seasons, and there is no significant performance difference among spring, summer and fall sessions.

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Editor's Note: This is a difficult topic – relating emotion to motivation and their impact on learning. This study brings together a host of related theories and research.

Emotion, motivation and online learning

Firat Sarsar
Turkey

Abstract

Motivation is one of the important topics not only in the field of psychology but also for education. Many different variables may affect motivation, human emotions is one of them. Undoubtedly, emotions affect motivation in positive ways like being happy to accomplish a task, and negative ways like hate or a dislike, or desire to escape from the task. This paper will provide a brief narrative about the employee relation between emotion and motivation based on current literature. This paper also will make the links and connections between emotion, motivation and online learning.

Keywords: Emotion, motivation, online learning

Introduction

Motivation is a very complex topic involving a cluster of subtopics on how it occurs and how it should be sustained. Motivation started to be explored by the field of psychology and mostly has been theoretically developed and applied by the field of education. Motivation was divided into four categories by the psychological perspective: biological, emotional, cognitive and social. These categories were also supported by different theories such as Instinct Theory, Drive Reduction Theory, and Arousal Theory.

Motivation has diverse meanings (Sarsar, 2012). Skinner (1953) defines motivation as a rewarded human acting towards to stimuli. He also stated that there are no advantages to resorting to non-observable events like thinking, because environmental consequences are capable of explaining even very complex chains of behaviors.

Keller (2007) tabled representative motivational constructs and categories into two parts: Value Related and Expectancy Related concepts. Some of the theories will be briefly explained as follows.

Table 1.
Representative motivational constructs and categories. (Keller, 2007)

Value-Related Concepts		Expectancy-Related Concepts	
concern with explaining how certain types of goals become important for students/people and affect their behavior		concern with the question of expectancy for success	
Self-actualization	:Maslow (1954)	Attribution	:Weiner (1985)
Need for achievement	:McClelland(1976)	Personal causation	:DeCharms (1976)
Sensation seeking	:Zukerman(1978)	Locus of control	:Rotter (1966)
Competence	:White (1959)	Learned helplessness	:Seligman (1975)
Reinforcement value	:Rotter (1966)	Self-efficacy	:Bandura(1977)
Curiosity	:Berlyne (1965)	Expectancy of success	:Fibel & Hale (1978)

Maslow's perspective of motivation is related to satisfaction and desire. Maslow (1954) explained self-actualization as the highest level of his hierarchy. However, reaching self-actualization requires or satisfies some previous steps. The first step is Biological and Physiological needs. It is concerned with the basic needs such as food drink, air, shelter, sex, etc. which meet the humans' biological and physiological needs. The second step is safety needs. This step focuses on protection from health issues, security, order, stability, law etc. The third step is social needs. It is related to belongingness and love needs. It is also about involving the communities such as online communities. The other step of needs is esteem needs. It is more about reflecting personal value. (see Figure 1)

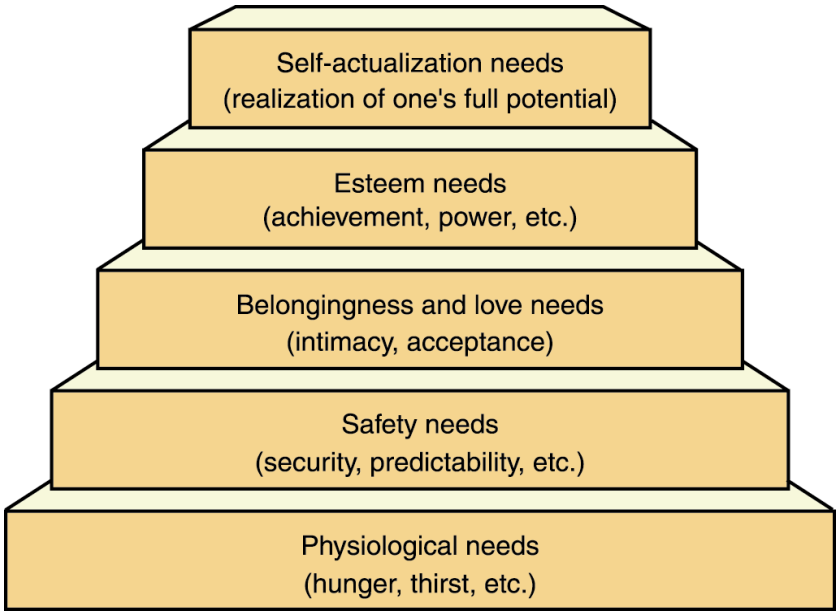


Figure 1. Maslow's Hierarchy

When all these steps are satisfied, a person can go through the last step which is self-actualization needs. It is to have self-awareness. Tay and Diener' s (2011) recent study mentioned that Maslow's theory is mostly correct; however as a result of this study, they stated that people may have a relationship socially (step 3) without fulfilling previous needs (basic needs and safety needs). I will also restate this result as it relates to online learning.

McClelland, an American psychologist, has proposed his theory about needs. He stated that humans have three main and essential drives and they are based on humans' life experiences (McClelland & Burnham, 1976). These three needs were classified as achievement, affiliation, and power. Achievement refers to one's desire of accomplishing the target or having the mastery skills on a specified topic; affiliation refers to willingness to be belonging to a group; power refers to desire to control peoples' behavior and impact the feelings of others.

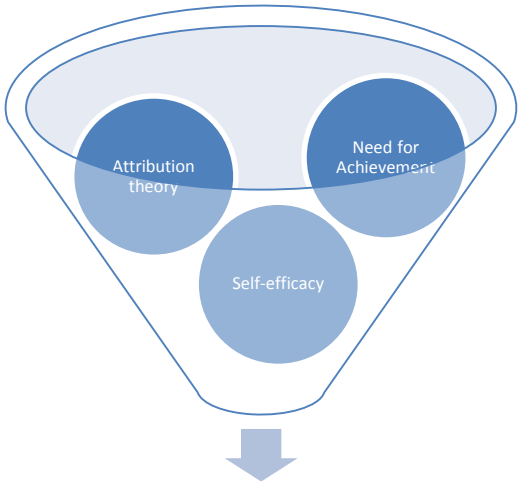
Attribution theory content with motivation and emotion was first discussed by Weiner in the early 1980s (Weiner, 1985 and 1986). This theory that has a lot of weight in academia to answer the main question which is why and what they do. This theory looks at how average people understand the meaning of the world or the specific event (instruction) and what effects to change their behaviors based on their understanding and its implications (also environmental), so causes to and the behaviors can be interpreted (Martinko, 1994). Important stages in this theory are observing, determining and attributing. With respect to education, different factors are related to the theory such as ability, task difficulty, effort, and luck. (Batoli, n.d.)

The last theory that will be explained is self-efficacy theory. This theory reminds me of a personal story. When I was a child, there was a cartoon movie called Pollyanna. The main character was always thinking in a very positive way, although the situation wasn't desirable. She was thinking that she could overcome every problem when she believed she could. When I started to read the Self-efficacy from Bandura, it reminded me of the cartoon movie. Bandura (1995) defines self-efficacy as a belief that somebody can organize or accomplish a specific action and manage the process by using his/her capabilities.

Bandura discusses the self-system of a person; however this system includes many different variables such as attitude, learning skills, and students' abilities for a specific task. He believes that the self-system of itself is very important to understand the situation and respond to it. That is why he says that self-efficacy is the important component of the self-system (Bandura, 1997).

Self-efficacy is related to feelings and also emotions. Students should know what they are doing, and then feel/believe how efficiently they can achieve the goals. The theory supports motivation, which can be increased by students individually, so motivation is directly related to self-efficacy (Pajares & Urdan, 2006). If the self-efficacy is low, being motivated can be low too, because students anticipate failure more than achieving the goals. The theory also believes that high/strong self-efficacy might enhance the accomplishment. (Eisenberger, Conti-D'Antonio & Bertrando, 2005)

Self-efficacy helps to give a good start for motivated students. There is no doubt that when they decide when or how to start, it will increase their willingness to engage in the specific task. If the students have sufficient confidence in their capacities and their success, they can focus on the learning, so they can be motivated to succeed in the course.



To summarize, one of the limitations of this paper is the number of theories previously mentioned. There are 4 main theories that drive my path to motivation and emotion in online learning. The first theory, *Self-Actualization*, is one of the starting-points of other theories. It basically shows which situations may drive us to go to next steps. The connectedness of the student to the *need for achievement theory* also may give him/her an incentive to have the feeling of accomplishment. *Attribution theory* may show that this feeling can help the activity in the future by seeing his/her attributions for failure or success. Live experiences will help the person to believe his/her capacity. In this point, *self-efficacy* believes how people feel, think, motivate themselves and behave in certain ways by knowing their capabilities. These theories help us to

understand how people think and feel during the learning process. What about the online learning perspective? Although the motivation and emotion connection are important for education, there is a lack of research on this topic in education (Schutz & Pekrun, 2007), especially in online learning studies.

In the next section, I will explain this connectedness in the online learning environment.

Motivation and emotion in online learning

Questions about motivation and retention of students enrolled in online courses has not been sufficiently researched. The scarcity of research and understanding about experiences of students taking online courses may result in low retention rates and lack of proper development and implementation of online learning programs. There is a need to better understand the relationship between self-efficacy, emotions, and motivation in online learning. It is even more important now when considering the huge growth of distance learning and online enrollment. According to statistics reported by the Sloan Consortium, an estimated 5.6 million students signed up for at least one online course in the fall of 2009. This represents a growth of 21% compared to the previous year (Allen & Seaman, 2010). A 2005 report estimates that more than 100.000 online courses were offered by colleges and universities worldwide, while a more recent survey claims that one out of four students enrolled in higher education have taken at least one online course (Oblinger & Hawkins, 2005; Allen & Seaman, 2009).

While exploring the connection between emotions and motivations in online learning it is important to know what kind of students typically enroll in online courses. Pedagogical strategies applied to online courses should be driven by exactly this knowledge of demographics and characteristics of learners. Many studies have provided descriptions of online students. They depict learners as being able to multitask, less tolerant of delays in communication and able to construct knowledge from fragments (Howell, Williams & Lindsay, 2003). Hiltz and Goldman describe students as being highly motivated and willing to learn at any place and anytime (Hiltz & Goldman, 2005).In addition, working professionals who take online classes are usually motivated by professional advancement and external expectations (Howell, Williams & Lindsay, 2003). The literature portrays them as being self-directed, goal oriented, responsible and competitive (Ross-Gordon, 2003).

Despite the fact that most online learners tend to be self-directed with a high degree of motivation, the knowledge of motivational factors in online learning environments is important because this type of learning places a lot of responsibility on the learner (Cahoon, 1998). Furthermore, the impact of social dynamics on student motivation and learning performance is widely recognized in face-to-face learning. The social aspects of teaching and learning are more difficult to detect and recognize in online learners. Therefore, in studying motivation in online learning one should identify and address personal and circumstantial variables contributing to increase or decrease in students' motivation. Some of the personal factors that can be addressed are individual beliefs, learning styles and skill level. Considering the lack of peer or face-to-face interaction in an online environment, self-efficacy and motivation will be affected by the learning environment and should be studied accordingly.

Personal beliefs of a student will likely be modified by the learning environment as well, as online learning will motivate students to engage in inquiry learning, work on open-ended tasks and link prior knowledge (Tsai & Chuang, 2005). In addition, Boyd (2004) discussed the importance of students taking the initiative and ability to self-direct their learning as another important personal characteristic of vital necessity for the success in online learning. Successful online students prefer to work on their own pace and can quickly move through activities, manage time, plan ahead and distribute their time effectively (Boyd, 2004). The presence or absence of

skill level required by the environment will likely affect students' success and motivation. Students are expected to know how to email and participate in web-based discussions, perform a variety of searches, and navigate through the internet. Learning strategies and their conscious use is also integral for a good performance in an online course. Those students who rely on their independence in learning, who are reflective and comfortable with abstract thinking, and those who are driven by constructivist-oriented beliefs will more likely find online learning enjoyable and stimulating.

The concept of self-efficacy usually implies one's confidence in his potential to organize and execute a given course of action in order to complete a task (Bandura, 1997). For instance, a student with high self-efficacy believes in herself and feels more capable of setting and achieving higher goals. She will be more persistent and motivated to pursue these goals. Therefore, self-efficacy is directly connected to motivation and persistence. Artino identifies four major sources that influence the development of self-efficacy: past experiences and mastery of a task, observations, social or verbal persuasion and internal judgments individuals make about themselves (Artino, 2006). Performance and accomplishments in learning are tied to this belief held by a learner that the task can be done successfully and will directly affect the amount of effort contributed to learning. Students will reduce their energy and efforts if they believe that the task is too difficult for them to succeed (Wang, Peng, Huang, Hou, & Wang, 2008). Not only efforts but also emotional states of students are affected by the level of self-efficacy. Thus a student with a strong sense of self-efficacy will approach a difficult task with more composure and calmness. On the other hand students who lack this quality will more likely believe that the task is more difficult than it actually is and will exhibit negative emotions such as frustration, anxiety, apprehension, and stress. This is a two way relationship, since the experience of negative emotions and fears about one's capability can lower his perception of self-efficacy and trigger anxiety and stress (Bandura, 1997).

It has been shown that self-regulation and self-efficacy are very important in online learning due to the nature of studies. Online learning environments are best suitable for self-regulated learners. Emotions have the ability to influence the amount of self-regulation that occurs. Anxiety, stress, anger and boredom have a negative impact on self-regulation, while joy, feelings of relaxation and relief may increase self-regulation and lead to higher levels of achievement. Emotions also determine the responses to difficult and unusual tasks that students are often asked to do in a class. When the task is difficult but relevant to learners, emotions may range from high level of excitement leading to determination of spending time and energy on the task, to high anxiety leading to adoption of coping strategies. On the other hand, when the activity is challenging but of less relevance to the learner, emotions will determine whether student will ignore the challenge or put forward just a little effort (Wosnitza & Volet, 2005).

Given that emotions play such an important role in self-determination, it is safe to conclude that students might quit online classes because there may not been a responsible teacher who would be aware of the students' emotional state and would help them to maintain the level of motivation and self-efficacy. Teachers should assess the emotional state of their students before each new challenge and task. As it has been mentioned, the emotions in learning are closely connected to the process of task evaluation and self-efficacy. Consequently, when the task is familiar but relative the level of emotions will be mild. When it is unfamiliar and relative there will be a high level of emotional engagement. When it either familiar or unfamiliar but of no relevance, there will be no emotional response and lack of involvement.

In addition to the origins of emotion, teachers should be attentive to their direction. In a learning situation when a student studies solo, the emotional response will be likely self-directed, while in a social situation it can also involve other students. Self-directed emotions can be expressed as enjoyment of the online-learning experience, pride for the achievements, and shame because of

failures; hopes of success are just some of the possible examples. Examples of other directed emotions are gratitude, envy, sympathy, admiration, etc. Why is it important to know the directedness of one's emotional behavior? Knowing the directedness of one's emotions is helpful in addressing their causes as one sees and experiences them. The directedness points out the source or what the individual thinks has caused them to get emotional, be it technological failure, inability to handle the software, lack of commentaries from peers in online dialogue, etc. Besides addressing emotions related to task evaluation and the general direction of the emotional states, literature differentiates between emotions generated before, during and after the learning process (Wosnitza & Volet, 2005).

One of the most difficult tasks in studying emotions in online learning is the lack of possibility of observation. While it is possible to observe, describe and interpret emotions in face-to-face learning, it is almost impossible task to do in online learning, due to the limited tools available to the learners for transmission of their emotions. In face-to-face learning some indicators of emotional stages are visible, when in online learning it is up to the individual to snow the amount of emotion she/he is willing to disclose. Therefore, online instructors should be well-aware of this limitation and be creative in detecting and responding to emotional states of their students if they want to maintain the level of engagement throughout the course. The understanding of negative emotions is especially important in online learning, in order to be able to provide timely feedback and assistance. When this assistance is delayed because of the lack of awareness from the teacher, it will contribute to the emotional response of the student prompting him to quit the class or disengage.

Conclusion

This brief literature in this paper stresses two important topics online learning environments: emotion and motivation. It is not easy to think of these two topics separately. Emotion affects motivation and vice-versa; however, unfortunately, it is not really considered by instructors in online learning environments. There might be many reasons for this, such as workload of instructors, poorly designed learning environments, etc. These reasons cannot be an excuse for not understanding students' needs. Students also might want to be understood emotionally in online learning environments, but there are limited options to understand them emotionally in online learning environments, especially in asynchronous learning environments. Asynchronous learning environments are mainly text-based and teachers and students have no constraints with timing and location. This situation increases the importance of a learning environment, because it is the main way to communicate and keep in touch with each other. Therefore, if you are teaching asynchronous learning environments, you should consider to

Hear your students' voice by reading their responses to the emails, discussion form and other options

Try to understand them clearly

Send them emotional messages to keep them motivated

Be open for realizing their emotional messages

Keep emailing them to show their progress

Do not hesitate to use positive words to motivate them

Find ways to encourage them to learn more by using the learning environments' tools

It should be taken into consideration that not all students can reflect their emotions online, because it might be that they don't how to reflect or they might not be comfortable reflecting their emotions online.

Researchers should find better and different ways to reach students emotionally, motivationally, socially and cognitively. The specialists in the field of instructional design and technology should focus more on how to make online learning environments efficient, as well as which tools might assist to understand students, especially emotionally and motivationally.

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Editor's Note: University schedules, policies and procedures were established in an era when students attended full time and the university was revered as a source of higher learning. Societal changes are now forcing universities to rethink their programs to fit the needs of the communities they serve. This is especially true of adult learners with work and family responsibilities. For many, full-time attendance is no longer possible, and the complexity of integrating university classes with family and job is a continuing problem. A change in philosophy to a student centered university may be around the corner, but in the meantime we must gather data to assure student success and continuous improvement in the quality and accessibility of learning programs.

Meeting the needs of adult learners in distance education

Denise J. Tolliver and Dr. Kelly Paynter
USA

Abstract

This paper explores seven journal articles that focus on higher educational institutions, their ability to meet the educational needs of adult learners (aged 25 and older), and the obstacles and benefits adult learners face in the twenty-first century. By identifying the needs of adult learners, both colleges and universities face ever-changing challenges of pre-existing demands on this genre of students. Family and employment, coupled with the technological demands of online learning (distance education) is at the forefront of the minds of the learner. Exploring the theories of Paas, Renkl, and Sweller (2003), and the asymmetrical relationship of intrinsic, extraneous, and germane cognitive load to learning patterns help course designers develop online learning programs, which maximize the educational value for adult learners. Review of research findings provides insight and gives guidance to help adult students achieve success in online courses and distance learning environments. Review of the role of higher educational institutions and the educators' relationship to students in online environments provide the basis to support conclusions in this paper.

Keywords: online learners, adult online learners, distance learning, cognitive load, adult students, non-traditional students, extraneous cognitive load, ineffective cognitive load, learning environment, effective semiotics, asynchronous learning

Introduction

Results from various studies indicate the necessity of higher education institutions to meet the needs of today's adult learner. According to Ritt (2008), "…the National Center for Education Statistics (NCES)…defines adult learners as individuals aged 25 or older" (p. 13). Numerous studies indicate there are increasing obstacles that face adult learners, which hinders the number of adults capable of attaining a postsecondary education. Thus, schools continue to face challenges that help adult learners complete academic programs of study. Results of quantitative and qualitative research give creditability to propose further investigation of whether or not learning institutions meet the needs of adult online students. The purpose of this paper is to explore input from adult learners to determine major factors affecting their success rate in completing higher education degree programs.

Factors affecting learning in adult learners

Kelley and McLaughlin (2012) study the feedback from learners of different age groups to determine the role of cognitive resources and support in learning. The authors further discuss the levels of feedback in correlation to the learner's abilities in what is learned. Results of ability tests and questionnaires help formulate findings that all learners benefit from some level of support. Additionally, Paas, Renkl, and Sweller (2003) correlate element interactivity to the intrinsic cognitive load because "…demands on working memory capacity imposed by element

interactivity are intrinsic to the material being learned" (p. 1). Thus, instructors must consider cognitive load of age groups to determine appropriate levels of support. Calvin and Freeburg (2010) analytically examine the results of multiple studies of the technology skills of adult distance learners in relation to learners completing online courses. While higher educational institutions strive to integrate technology in education, this movement further warrants investigation of the adult students' abilities to determine if forms of technology hinders distance learning. Moreover, "instructors and designers should find ways to include training on specific technical skills required for the specific course in response to students' continued requests for additional technical training" (Calvin & Freeburg, 2010, p. 70). Rey and Buchwald (2011) further explore experimental research in replicating the expertise reversal effect in a condensed period to determine if there are significant differences in assessment results of novice and experienced learners. While experienced learners bring previous knowledge into the learning environment, just-in-time instruction for the novice learner quickly evens the field for all participants to apply a knowledge base to current instruction. Moreover, the empirical research findings of Y. Wang, Peng, Huang, Hou, and J. Wang (2008) reveals strategies employed by students who successfully complete online courses and is worthy of investigating.

Discussion

The adult learner

Ritt (2008) explores reasons why the United States falls behind other countries in the number of adults with higher education degrees. As other countries emerge as leaders in educating its citizens, America struggles with barriers in policy and options for adult learners. Moreover, in 2012, the U.S. Department of Education funded grants for Student Support Services at 12 colleges and universities, which "…provide critical support to students who can benefit from extra assistance and encouragement along their college journey, enabling them to reach their personal goals and contribute to the economic vitality of our Nation" (U.S. Department of Education, 2012, para. 2). The U.S. Secretary of Education note, "In this era of the global economy, getting to college is not enough, it's vital that students also succeed and reach the finishing line" (U.S. Department of Education, 2012, para. 2). Although many believe that "a college education contributes to the overall well-being of individuals, communities, and society at large, we are challenged by the lack of progress in educating more citizens and developing the necessary intellectual capital to sustain and invigorate our workforce" (Ritt, 2008, p. 12). In the meantime, adult learners face financial dilemmas and a lack of knowledge for financing higher education. Ritt (2008) notes, "The majority of students encounter at least one barrier over their lifetime. Openly acknowledging these and other barriers and working with students to provide options and alternatives are what adult educators are expected to do on a daily basis" (p.14). Another group of adult learners worthy of looking at is non-traditional students. These students can qualify as non-traditional based on meeting any one or more of a number of categories such as, marital status, full-time worker, part-time student, single parent, or enrolling in college at a later age. Adults face personal, professional, and institutional barriers; however, they look to policy makers and higher education institutions to help alleviate some of their fears. In order for higher education institutions to help alleviate these fears, they must hear the voice of the adult learner. To help increase the United States' ranking in educating its adult citizens, federal initiatives, financial assistance, and university strategic plans must be in place, accessible, and easily understood by the adult learner.

For those adult learners who enrolled in online education, does technology hinder course completion? According to a study by Calvin and Freeburg (2010), "…although students do figure out how to cope with the technical aspects of an online course, additional training on using the technologies required would make it easier for busy adults to complete their web-based courses" (p. 69). Furthermore, online students' views of success in distance learning go beyond

their personal mastery of technology or access to technology. Online students largely attribute success in online classes to pedagogical pathways with clear assignment instructions, time management, and access to help when needed. Conversely, for working adults, employer-sponsored online education must balance with heavy workloads and other external factors affecting continued enrollment. Thus, equitable course workload in relation to class expectations and professional workload directly affect the adult student's perception of employer support in completing courses. However, "adult learners are more likely to drop out of online courses when they do not receive support from their family and/or organization while taking online courses, regardless of learners' academic preparation and aspiration" (Park & Choi, 2009, p. 215).

Studies to help improve adult student course completion

Cook (2012) uses graphics and multi-media tools in an online course to study the results of adult online student retention, cognitive load, and course completion rates compared to national averages. In reviewing cognitive load and semiotic elements of course design, findings of the research help to identify factors affecting successes and failures in online courses. The lack of bridging prior knowledge, coupled with challenges in technology, increases the stress level in online learning. With ongoing personal, family, or work related demands, technology obstacles only add to the frustration level of the adult learner. Published class syllabi enable students to review course requirements and prerequisite skills to determine if additional courses or training is necessary to achieve successful results. Online tutoring for distance education also assists students to meet academic requirements. Utilizing effective semiotics throughout online learning courses enables students to bridge current learning with prior knowledge to increase understanding of course materials, and ultimately increase course completion rates. Cook (2012) emphasizes how "schemas can contribute to the enhancement or impediment of learning" (p. 558). If course designers properly bridge prior knowledge to new course material, this process will help establish a pattern of achievement.

Furthermore, a look at the cognitive load theory (CLT) helps educators understand instructional designs and procedures that affect learning. Paas, Renkl, and Sweller (2003) compare the effects of low and high element interactivity as a basis of defining a student's intrinsic cognitive load. Extraneous, or ineffective, cognitive load is studied to increase effects of student learning associated with germane cognitive load, resulting in an asymmetrical relationship of intrinsic, extraneous, and germane cognitive load to learning patterns. This study correlates the amount of free working memory to the learner's ability to use newly learned material in application to advanced learning skills and knowledge.

Rey and Buchwald (2011) tested motivational and cognitive load effects in the replication process. Results of the research indicate that learners' prior knowledge affect cognitive load and is a relevant factor in course design. In addition, research findings are relevant to assessing student behaviors and characteristics in adaptive learning environments, which "…assess a learner's behavior and characteristics. This assessment serves as a basis to either modify the environment or to provide personalized feedback to the learner" (Rey & Buchwald, 2001, p. 46). Quantitative and qualitative research findings of Cook (2102) reinforce the need that students prefer to have continuous, relevant feedback from instructors, and easily understood course designs and instructions. If these basic factors are convoluted, this adds to the extraneous cognitive load of the student.

Above all, the goal is to improve the completion rate of students in distance education courses. Park and Choi (2009) examine various models to determine what affects adult learners' ability to complete online courses and degree programs. Researchers further investigate internal and external influences that hinder or support student success in higher education and workplace environments. Both quantitative and qualitative data provides insight for developing strategies to

retain students who begin online course work. "By providing opportunities to apply newly acquired knowledge into real situations, learners can feel that the skills and knowledge obtained from the course are useful and satisfactory and thus they can be motivated to persist in the course" (Park and Choi, 2009, p. 215). By analyzing descriptive statistics, Wang, et al. (2008) hypothesizes the effects of learning motivation, learning strategy, self-efficacy, and attribution in relation to learning outcomes. Results of the research aid in the development of learning support to increase student achievement in online environments. End of course surveys and feedback from students is essential in meeting the needs on online learners. Kelly & McLaughlin (2012) note, "Feedback should be matched to support components of the task that contribute most to the demands placed on cognitive resources…of the learner, specifically ability levels and prior experience, demonstrating the importance of considering individual differences in instructional design" (p. 34).

Another area of significance to the adult learners in online education includes feeling a part of the learning community. Many online courses require introductions for class enrollees and collaboration in class projects and assignments. While collaboration is important for community, are higher education institutions meeting the needs of adult learners who perceive collaboration hinders assignment timelines and personal achievements? Furthermore, the sense of learning community extends beyond the classroom without walls. Many universities with online programs are now assigning advisors to online students. This change is a result of feedback from online students to meet their needs in distance education. After the advisor communicates to the student, further questionnaires and emails establish a frequency of ongoing contacts with the student. The establishment of the personal advisors is instrumental in helping online students navigate through enrollment processes, mitigate stress levels to get questions answered in a timely manner, and provide academic advising services. Online advisors provide academic services equivalent to educational experiences provided to students in traditional educational settings.

Limitations of these studies

As some models studied by Park and Choi (2009) offer differing opinions on the definitions of distance learners in traditional settings compared to online settings, most models required modifying. Similarly, there are differences in adult learners and categories of non-traditional learners, with each facing individual circumstances, obstacles, personal mastery, and differing levels of self-motivation. To help researchers adequately assess a baseline for comparing the needs of adult learners, they must take into consideration prior knowledge and life experiences of the adult learner.

In comparison to the study conducted by Cook (2102), many small studies were similar in nature whereby researchers could not generalize the findings. However, "the findings, could still provide valuable insights into which factors could reduce student cognitive load, reinforce student retention in online courses, and contribute to the body of knowledge on eLearning in post-secondary education" (Cook, 2012, p. 561).

Conclusions and future studies

Since online education is growing at a fast pace, educators and curriculum designers should stay apprised of the needs of adult learners to increase the success rate of online class completion. "Although more choices and options are generally perceived as a positive experience, the adult student is often overwhelmed by too much information….Creating clear educational pathways with the adult student can encourage retention and degree completion" (Ritt, 2008, p. 15). Continuing studies, feedback from learners, and end-of-course surveys help educators and course designers determine what works best for adult learners in distance education. Furthermore, "according to the theory of self-regulated learning and present research, learning motivations and

learning strategy have direct effects on learning results" (Wang et al., 2008, p. 19). In the workplace, when organizations fund higher educational courses, they oftentimes require staff members to commit time or services back to the organization. One major incentive for staff to complete organizational-funded online courses is that organizations tie funding to course completion. There may be many other funded opportunities for adult learners in higher education; however, how well is the information dispersed? Besides financial carrots of attracting adult learners back to school, course designers strive to integrate learning objectives and course mastery that are relevant to adult students. Yet other groups of adult learners participate in life-long learning opportunities to enhance knowledge, job skills, or personal interests. Additionally, some colleges and universities offer free or reduced tuition to senior citizens.

According to the study conducted by Kelley and McLaughlin (2011), "…feedback requirements may be affected by the cognitive resources of the learner, specifically ability levels and prior experience, demonstrating the importance of considering individual differences in instructional design" (p. 34). Teachers in traditional classroom settings have numerous opportunities to provide immediate feedback regarding student ability levels and can quickly adjust teaching styles and methods to achieve instructional objectives. However, asynchronous learning environments may present some barriers in timeliness of feedback. In addition, current studies warrant continued evaluation to determine if the online education exceeds the cognitive load of adult learners. "When the load is unnecessary and so interferes with schema acquisition and automation, it is referred to as an *extraneous* or *ineffective cognitive load*" (Paas, Renkl, & Sweller, 2003, p. 2). When online courses exceed the extraneous or ineffective cognitive load of the adult learner, the adult learner ultimately has to determine the next course of action--whether to persevere in achieving course or program completion, or provide enough input whereby change occurs. It is then the responsibility of higher education institutions to communicate to valued stakeholders implemented changes designed to help in their educational journey to successful completion.

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