Visual Information Management: A New Skill for Online Course Development

Michael E. Courbat
Deborah L. Fravel

Follow this and additional works at: https://commons.erau.edu/jaaer

Scholarly Commons Citation

This Article is brought to you for free and open access by the Journals at Scholarly Commons. It has been accepted for inclusion in Journal of Aviation/Aerospace Education & Research by an authorized administrator of Scholarly Commons. For more information, please contact commons@erau.edu.
Visual Information Management: A New Skill for Online Course Development

Michael E. Courbat and Deborah Lewis Fravel

Abstract

Visual information management refers to the total package of effort that results in successful online delivery of education. It includes the delivery system, student preferences and perceptions, learning and teaching styles, and design factors (Bromham & Oprandi, 2006). Because online courses continue to be an increasingly larger and more influential factor in education, it is important to focus attention on strategies that optimize the outcomes of online education. This article describes some issues for consideration, as well as providing some suggestions for instituting policies and strategies to maximize benefits to students.

Introduction

Many colleges and universities face new challenges in the twenty-first century. Battered by increasing costs, stiff competition, and declining student populations, many academic institutions have opted to broaden their academic footprints by offering part or all of their courses online. They are investing more time, money and interest in adapting online activities for traditional types of education and training (Blake, Gibson & Blackwell, 2005). By the turn of this century, over 70 percent of all U.S. universities offered at least one online class, and estimates are that more than 90 percent currently do so (Shea & Boser, 2001). These institutions believe the new technology of the internet provides new opportunities for growth, survival, academic excellence, and opportunities not limited by the physical constraints of student residence halls, parking spaces or available classroom space. Further, online educational opportunities are more compatible with contemporary learners and nontraditional students who wish to pursue a degree in an alternative fashion. Along with these benefits, however, some new challenges are becoming evident.

Purkey (1978 and following) developed a theory suggesting that, ideally, instructors will deliberately create educational strategies that draw or invite students to learn. In Purkey’s scheme, two essential dimensions underlie effective education. The first addresses the deliberateness of an instructor’s teaching (intentional or unintentional), and the second addresses the attractiveness of the instruction offered (inviting or uninviting). Optimally, instructors will be intentionally inviting, teaching in ways to attract and encourage the students. These dimensions can also be combined in other ways (Smith, n.d.), such as drifting into a scenario where instruction is unintentionally inviting. This latter combination of qualities can be effective in the short term, but because the effort is unintentional, the teacher may not be aware of what is working and therefore is less likely to maintain the attractiveness over time. Instructors can also, without any ill will, provide instruction unintentionally uninviting for one reason or another. The worst case scenario, of course, would be for instruction to be intentionally uninviting.

Unfortunately, adapting curriculum and teaching methodologies to a web-based medium is not as easy or as simple as some would predict. In reality, the process of moving curriculum from a “talk and chalk” environment to a web based technology is very complex and time consuming. It is never just a matter of transferring...
traditional, classroom-based lectures, lesson plans, and assessment tools to an online format. In the transition from site-based physical locations to e-learning environments, faculty attempts to adapt curriculum may result in courses that are unintentionally uninviting. Shea and Boser (2001) noted that, in the race to providing online instruction, some universities seem to turn a blind eye to quality; corporate entities have found similar limitations when attempting to provide ongoing education for their employees. In this article, we contend that in an online environment, the deliberateness of the education being presented, and especially the presentation itself, may require significant relearning on the part of instructors. These changes have implications not only for instructional faculty, but for students as well as administrators. We contend the intentionality of curricular offerings needs to have at its core an understanding of the uniqueness of electronically based learning.

Many administrators see the movement toward electronic or e-learning as inevitable and have made strides in implementing the necessary changes to equipment, infrastructure, and policies to facilitate the process. However, modifications to computing resources, registration and business practices often prove to be far easier than the changes required of the instructional faculty. Failure to understand the complexity of this process, to recognize the challenges facing anyone writing curriculum for the web and the need to learn the new skills associated with web based education can have dire consequences:

The rush to implement eLearning has perhaps found full expression in the failure of Britain’s ambitious online university, UKeU, which gained only 900 of its target 5,600 students and officially wound up in 2004, four years (£50 million) after it was launched. The failure of UKeU has been blamed on its development being technology-led rather than being centered on pedagogical goals and ideals (Bronham & Oprandi, 2006, p. 21).

Clearly the transition from traditional education to web based classrooms is not without major challenges and unpredictable results. These challenges can be mitigated by instructors’ understanding of both delivery system, audience preferences, and learning style, and certain web based design factors. Taken together, these variables represent an updated approach to curriculum development that Bronham and Oprandi (2006) call visual information management. Using these concepts during online course development or transition will ensure that crucial design issues are not overlooked or improperly considered.

Delivery System

Distance learning is fast becoming the preferred method of instruction among many in America’s business community (Shea & Boser, 2001). With an economy requiring a more educated workforce, with job skills becoming obsolete at a faster pace than ever before and with an aging workforce, many businesses and industries are looking for a convenient way to re-educate their workers. Traditional methods of formal education, such as returning to a university or college, are not practicable. According to management expert Peter Drucker, “Universities won’t survive. The future is outside the traditional campus, outside the traditional classroom. Distance learning is coming on fast” (Blake, Gibson & Blackwell, 2005, p. 3).

Web based instruction is a form of distance learning that has been modified as the Internet has matured. What were cutting edge educational applications during the late twentieth century were supplanted by newer and more adaptable features. One of the keys to successful usage of these new educational features is an understanding of the instructional delivery system. Web based delivery systems can be divided into four categories: Web/computer-based training, web/electronic performance support systems, Web/virtual asynchronous classrooms and Web/synchronous classrooms (Blake, Gibson & Blackwell, 2005, p. 4).

Web based computer training includes education where a program is either physically loaded onto a computer hard drive, available on a storage device, or available over the internet at a specific web address. Easy access to this specific program from one’s location is a major advantage of this type of application. It also does not require the presence of an instructor or even other students.

Web/electronic performance support systems are specific applications that use the Internet to connect to specific job-related databases, online tools and discussion boards to find specific solutions to real world industrial or business problems. An example of this is the familiar online technical support center or customer service support systems.

These first two varieties of web based educational systems tend to have a greater application to business or industrial organizations rather than with a college or university. The second two types of web based educational system are most prominent in institutions of higher learning and are the delivery and support systems used in contemporary web based educational programs. Understanding the capabilities and limitations of one’s specific delivery systems is crucial to the structure, operation and success of web based classes.
Web/virtual asynchronous classrooms are an adaptation of a traditional college or university classroom setting to the Internet. Here interaction can take place via email or discussion boards, assignments can be given, received and graded through postings. All this is done at the convenience of the student without the instructor needing to be present. Much of the personal interaction between the student and instructor is lost during this type of class but it is very convenient to a workforce comprising people needing additional education at their convenience.

Web/synchronous education is a variation of the previous educational method that involves more personal interaction. A predetermined time for class meetings is arranged for audio or video conferencing, for demonstrations to the entire class and for a more traditional college or university classroom experience. As a result, much of the convenience associated with the web/asynchronous classroom system is lost but you have more guidance from the instructor.

Regardless of which of these two approaches is used, certain operational characteristics are common. The student is expected to read and absorb the material posted to the web by the instructor, do the assignments listed there and upload their assignments to the appropriate site for grading by the instructor. Additionally the student may have to use a discussion board to interact with the other members of the class. Technical issues are usually not a major problem at this stage of web education development. It is during the application phase that expectations are not met and pedagogical issues arise. Much of this is due to a mistaken assumption about how online students learn information and interact with the internet.

Usability, Audience Preferences and Learning Style

From commerce to education, from manufacturing to the way society gets its news, the internet is restructuring the modern world like no other invention in recent history. One aspect of the web often overlooked, at least in the educational setting, is that it has shifted power and control over to the consumer. Nielsen (2000) noted the web is the ultimate customer empowering environment because the person clicking the mouse is the ultimate decision-maker. It has never been easier to find an alternative to poor service or a bad product; an alternative is only a click away. Commerce has historically followed the pattern of a user paying for a product or service before experiencing its usability. On the Internet, however, this simply is not the practice. Usability rules the web; consumers experience usability first and pay later.

What has this to do with online education? The students signing up for online education are bringing a unique set of skills, experiences and expectations to the virtual classroom. If the content presented there doesn’t match those expectations and their usability needs, they will leave. Students have learned to use a variety of traditional processes to categorize and prioritize the information presented to them. Some of these processes will not work in e-learning. Markel (2007) observed that one such process includes students’ reading body language and voice inflection as a part of internalizing much of the information received about a subject. The actual content presented, as well as the words used, are a minor part of the equation. Known as the 50/40/10 Rule, our students usually infer 50 percent of the information you trying to present from your body language, 40 percent from your voice inflection and only 10 percent from the written content. It is not that they are not listening to their instructors’ words; however, they tend to concentrate on gestures and vocal tone. When a course changes to an online format and the instructor is no longer physically present, the students’ only source of information will be the content provided. Unfortunately, learning from this source is the least effective part of their educational skill set.

It is also important to remember students develop their own skill set in navigating and using the Internet, and the technology used fosters some unique study habits. The Web is a user driven medium that is presented on computer screens of various sizes and quality. Reading from a computer screen is more difficult and slower than reading from printed material.

Because it is so painful to read text on computer screens and because the online experience seems to foster some amount of impatience, users tend not to read streams of text fully. Instead, users scan text and pick out keywords, sentences, and paragraphs of interest while skipping over insignificant text (Nielsen, 2000, p. 104). Therefore, skimming instead of reading appears to be a fact of life on the Internet. Students tend to minimize the number of pages they read. In a study of web user reading activity, 79 percent of the test group scanned any new page they came across (Nielsen, 2000, p. 104). This has major implications for instructors developing curriculum and updating web content. Large blocks of text that require students to dig out crucial information simply are not effective in an online environment.

In order to better understand the processes through which users approach and employ online information, Nielsen (2006) used heat map technology that tracks the exact movement of users’ eyes as they view a web page. This study revealed that people tend to read in an F pattern,
first looking across the lines at the top of the information, a
second horizontal section partway down the page, and then
down the left sides -- for example, at the beginnings of lines
in a bulleted list. Even blind web users follow this
technique, scanning with their ears. They tend to listen to
only a few words before deciding whether to keep reading
(cited in Redish, 2007). The challenge for educators, then,
is to make online pages intentionally inviting, first by
presenting the most important information at the very
beginning, or else very succinctly down the left side of the
page. Nielsen also recommends that headings, first
sentences, and first words be information-dense, because
they may end up being the only words the reader
internalizes.

Modern life is hectic and people simply don't have
time to work too hard for their information. As one
test user said, "If this [long page with blocks of
text] happened to me at work, where I get 70
emails and 50 voicemails a day, then that would be
the end of it. If it doesn't come right out at me, I'm
going to give up on it." (Nielsen, 2000, p. 106).

Changing from a chalk-and-talk educational
environment to a web centric one requires significant
modifications across the academic realm. Not the least of
these will be a new set of realistic expectations about what
students are capable of or willing to do as part of a class.
Instructors have long been accustomed to face to face
interactions with students, and to modifying the educational
process based on their daily and sometimes unspoken
feedback. This source of important data will be missing
from online education because that degree and nature of
contact is not available. This makes it more important for
online classes to be properly designed for the anticipated
student audience - if you build it and it is readily usable,
they will come.

How an educator presents information on the web
is crucial to the success of a web based class. In a recent
survey of the application process of online education to
industrial technology programs of the National Association
of Industrial Technology (NAIT), 86 percent of the
respondents' technology programs expected faculty
members to develop the necessary online curriculum with
little or no additional resources or specialized training
(Courbat, & O'Meara, 2008). Lacking crucial information
about the significant differences between the traditional and
online educational experience, instructors may simply
attempt to modify their existing curricular materials.
Development issues formerly left to people with design
skills--page layout, typography, the proper use of visuals
and rewriting textual material into appropriate placed and
sized "chunks" of data--are now being tackled by every
online educator. If done properly, these concepts disappear
into the background and are not noticed by the students. If
overlooked or neglected, they present some serious
problems in regard to usability. Nielsen notes that

Ultimately, users visit your website for the content.
Everything else is just backdrop. The design is
there to allow people access to the content. The old
analogy is somebody who goes to see a theater
performance. When they leave the theater, you
want them to be discussing how great the play was
and not how great the costumes were (Nielsen,

We believe that developing a process, technique or a
checklist of questions addressing these issues is necessary
during online course development. A proper mix of
technology-centered and content-centered concerns must be
addressed during this process. Failure to keep the proper
balance can be fatal to usability. The guidelines for this kind
of approach will use practices from graphic design to
enhance the curriculum development process as it applies to
online education.

Web Development and Visual Information
Management

The question that emerges from the above
discussion is how educators can develop courses that
balance the goals of maximum usability, (as defined by
students,) and a judicious quality and quantity of content.

Web design is a multidisciplinary pursuit that
consists of 4 primary components: content, form,
function and purpose. However, agreement as to
exactly how these components mix together varies
from person to person as well from as project to
project. While good Web design is hard to define,
there is certainly an understanding of what not to
do. The field has a great deal to learn from other
disciplines, particularly from the intersection of
graphical interface design and traditional print
design (Powell, 2000, p. 23).

We suggest that whatever process instructors use in
developing curricular content, it should reflect certain
aspects of visual information management. These
components, developed from graphic design principles, are
visual logic, hierarchy and organization.

Visual logic is concerned with the optimal balance
between visual sensation and graphic information. It
employs the elements of design components of shape, color,
line, size, texture, contrast and typography. It is critical that
word forms communicate a verbal message and function
effectively as graphic elements in a composition (Evans &
Thomas, 2004). Instructors should therefore begin to think of online information as more than just pictures and words but as items to be designed or structured to attract and hold the attention of our students. Doing so requires more than just an understanding the Internet is a visual medium. It requires we utilize it as a visual medium and design our documents as part of a complete writing system that can be understood and utilized by a multilingual audience (Starr, 2005).

People experience documents not just as two-dimensional visual fields, such as pages or page spreads, but also as three-dimensional objects they can touch. Printed documents have a weight and a relationship to the hand making them feel either natural or awkward to use. Even electronic documents take on the physical features of the hardware that embodies them, from the glowing pixels of the monitor to the software interface to the keyboard, mouse or trackball we use to navigate the document (Kimball & Hawkins, 2008, p. 73).

Visual logic suggests instructors use a systematic approach to this process by structuring both documents and text to make them more interesting and readable. Dense blocks of text without an identifiable structure or levels of headings, without contrast and visual relief, are uninteresting and hard to read, and certainly not an experience instructors want to inflict on their students. Course content should be designed to deliver the information we want to but also have maximum usability. This can be done only with intentionality: planning, forethought, and the use of an identifiable writing process. Goodall and Hebert (2005), contend that web writing is a new genre requiring new communication skill sets to use it effectively. This is as relevant to the instructor as it is to students.

Visual hierarchy, the second part of visual information management, expands the concept of structuring documents to create a consistent pattern where important elements are emphasized and the content is organized logically and predictably. Having knowledge of one’s target audience becomes crucial in this step. This task becomes more difficult because the Internet is global. Material posted on the web is theoretically available to anyone. However, different cultures perceive written material in fundamentally different ways. Starr (2005) breaks down the writing systems used throughout the world into seven different types: pictorial, logographic, syllabic, alphabetic, phonemic, phonetic and spectrographic (p. 108). Although elaboration on these systems is beyond the scope of this article, the point here is that no single approach will work effectively all the time. This realization becomes even more profound when we recognize that even within a specific culture, people can perceive visual information differently. Factor into the diverse nature of today’s online classroom, and it becomes quite clear how important it is to provide logical, predictable visual cues toward important content. Kimball and Hawkins (2008) ask a simple question about human perception. “Why do things look as they do?” This question may seem simple, but it has proven remarkably difficult to answer, leading to different theories of how we perceive things (p. 40).

Emphasizing what is important by using an easily recognizable and predictable pattern makes this perceptual process easier for the reader. Design concepts like contrasting the information in the foreground against a background field and using balance in document design are important. If our documents are pleasing to view and well organized to facilitate understanding, the impression is inviting and the learner is drawn into the content.

Visual organization expands this concept by emphasizing the design principles of clarity and consistency. Issues related to this topic are understanding the medium of the web, and writing content to take advantages of its features and understanding its limitations. Consistency in organizing the web site, including the development of one’s own personal writing style, is vital in this area.

Understanding that web content will be displayed on a variety of graphical displays makes the issues of page dimension, length, layout, fixed page elements and the use of graphical embellishments things to be considered. What the instructor wants the content to look like might not be what actually occurs, due to technical issues. At the very least, educators are encouraged to avoid the trap of letting a fancy design get in the way of usability.

All of the issues discussed thus far may seem obvious to anyone writing for the web. At the beginning of this article we noted the problem of academic and business organizations rushing headlong into web commerce and web instruction without a proper understanding of the task at hand. Corporate and academic administrators who are starting this process may have only a hint of the complexity of this task. The development of standards, checklists or procedures to follow in the transition process from traditional classroom technology to online classes can be of immense help. Rather than leaving all these decisions to individual instructional faculty members or to chance, institutions can be proactive in providing professional development activities that inform faculty members and teach these skill sets.

The application and development of web based
educational courses has been around for some years now and writers developed some general guidelines. Many are concerned with the technical issues of computing platforms, Internet provider servers, communication protocols and security concerns. While important, these address the computing issues, not the content issues of most concern to the academic faculty assigned to teach online courses.

Anecdotal evidence indicates the transition to an online educational environment transpires easily when a general standard or process is followed. Organizations like Quality Matters\(^1\) employ standards to help educators assure consistency and quality in online course development; also, the University of Phoenix, a totally online educational environment, has a well defined set of protocols, standards and processes in place to assure uniformity from course to course. Given the complexity of the task, these kinds of approaches seem helpful.

New computer tools and techniques are available to assist educators in improving web based instruction in a variety of curricular areas. The task of online knowledge building is profoundly different from traditional classroom course development work and requires a systemic approach emphasizing the collaboration and cooperation of all the participants (Myllari, Ahlberg & Dillon, 2009; Bacci, 2008; and Strassman & D'Amore 2002).

We have included a content focused checklist (Appendix A),\(^1\) for use improving the process of writing for the web. The list begins with ideas established by Markel (2007), whose work emphasizes some of the technical content issues. The additional checklist items are more concerned with content development issues. Both parts of the list highlight issues and concerns that should be addressed in developing an online course. Applying graphical design principles and understanding the nature of the web can only enhance curriculum and make this process easier.

**Conclusion**

For a variety of reasons, including usability, convenience, and economics, e-learning becoming the preferred method of delivering advanced educational degrees. The transition from a traditional academic setting to an online educational environment will require substantial changes to infrastructure, policies and processes. Many institutions have problems with the transition process for lack of understanding and standardization. Many educators are struggling because of a lack of understanding about the medium they are now writing for, their audience and the internet in general. They often lack sufficient training, guidance or knowledge to easily transition to online education.

The authors, both of whom have experience teaching online, have suggested some issues which will need to addressed in order to maintain educational quality during a transition to online learning. Design concepts like usability, clarity, consistency, variety, hierarchy and proportion are important tools to consider in developing web content that is intentionally inviting. It is critical to recognize and maximize efforts to address the visual nature of both the internet and course content. To this end, the authors presented a proposal for achieving these goals by utilizing visual information management. This concept assists the novice online course developer in recognizing and addressing the visual issues which are at the heart of effective online content. Examining web content for design logic, effective visual hierarchy, consistency and visual contrast are some of the keys to this approach. Another suggestion is to utilize a consistent plan or process in examining the content generated. We also encourage educators to use a content oriented checklist and have included a sample framework for beginning a checklist.

The transition to a web based educational environment cannot be ignored. Educators can be encouraged and facilitated in updating their skill sets to include the development of effective web content. This requires more than superficial changes to our institutions, processes and curriculum, changes that can profoundly change the nature of the education provided.

**Recommendations**

The Internet is a dynamic infrastructure which has undergone many changes as its computer based technology matures. At heart it reamins an efficient information retrieval and communication system used by individuals with a variety of needs. Future research could address how web users perceive the visual content placed there, what they find effective and ineffective, and the process by which they make decisions about that content be done. Generating effective curricular content is only possible if educators know how students will perceive and interact with the online platform and content.

Additionally, universities and colleges requiring their faculty to teach in a web based environment will want to assist those individuals in understanding the dynamics of this new teaching environment. Providing them the skills, tools, time and resources necessary to develop the superior

\(^{1}\) Contact MarylandOnline, Inc., for more information at www.qualitymatters.org
content required for use in any web based environment is paramount.

Michael E. Courbat has been an a licensed pilot since 1972 and an industry consultation in the fields of manufacturing, aviation and occupational safety. Questions or comments about this manuscript may be directed to him at mcourbat@gmail.com.

Deborah Lewis Fravel is an associate professor and department chair at Northwest Missouri State University. She can be reached at dftravel@nwmissouri.edu.
References


Appendix A

Web Content Checklist

In writing for the web site, did you:

- Analyze your audience and purpose before planning your site?
- Allow for effective contrast between the background color and the text color?
- Make the text easy to read by using brief chunks of text?
- Use simple language and short sentences?
- Create informative headers and footers?
- Include a site map or index?
- Design the site with people with impaired vision, hearing or movement in mind?
- Design the site to accommodate the needs of multi cultural visitors?
- Get permission to publish any material you did not generate?
- Ask permission to link?
- Revise and test the information?

(Selected from Markel, 2007, p.542)

Additional Checklist Items

- Use a Writing Process? (plan, draft, revise, edit and proofread)
- Have someone edit your content for usability issues?
- Adhere to or establish standards for your web site?
- Adjust your writing and documents for the web environment?
- Analyze your documents for visual logic, hierarchy and organizational problems?