

Evaluating the Cost Effectiveness of Online and Face-to-Face Instruction

Sharon Jeffcoat Bartley

Assistant Professor, Human Resource Development
College of Business Administration, 439 Stokely Management Center
University of Tennessee, Knoxville, TN 37996-0570, USA
Tel: +1 865-974-7392
Fax: +1 865-974-2048
sbartley@utk.edu

Jennifer H. Golek

Doctoral student, College of Business Administration
439 Stokely Management Center, University of Tennessee
Knoxville, TN 37996-0570, USA
Tel: +1 865-974-6397
Fax: +1 865-974-2048
jhessen@utk.edu

Abstract

Online instruction is gaining an increasing presence due to the benefits associated with it, including the ability to consolidate education and training across geographical and time constraints, and the claim by many that online education and training is cost efficient. This paper provides a relatively concise and useful history of online learning, and a discussion of issues to be faced by the professional who intends to move the education and training environment online in response to the current academic and business environments. It presents a cost matrix tool by which the costs of online education and training can be tabulated and/or compared with the costs of the traditional education and training medium.

Keywords

Online education, Online training, Face-to-face training, Cost matrix

Introduction

The advent of the Internet and the widespread adoption of advanced technological measures have led to a new emphasis on online education and training both in the academic and business worlds by providing unique alternatives for reaching larger audiences than ever before possible. In the academic world, universities now have the ability to provide distance learning opportunities through online classes for students—traditional or non-traditional, full-time or part-time, and international—who perhaps have had limited access to advanced educational opportunities. Online education is especially valuable to those students who juggle demanding work, familial and social schedules that necessitate access to learning in special forms. The idea of online training becomes valuable to the business world as well as trainers also face situations with adult learners who may experience similar constraints especially those of time and geographical distance.

Statement of Problem

The current academic and business environments in the global economy view the implementation of online education and training programs as a necessary avenue for training and implementing programs across the global network. However, the rapid adoption of online education and training has created a void in the literature. Those few studies published to date primarily compare online education to tradition education rather than evaluating the ability of an online education course to meet its predetermined goals (Newton et al., 2002). A study completed by Aragon et al. (2002) evaluated learning in the online and “traditional” classroom, and found no significant differences between the methodologies. Given the lack of conclusive research concerning the effectiveness of online education, cost comparison factors may serve as the primary criterion to determine which methodology to use. The question to the academician and to the business professional however becomes how to determine the cost effectiveness of education programs offered online when compared piecewise to the traditional education medium. The cost matrix proposed in this paper provides the professional with a tool to

compare the costs of educational programs offered online to that of programs offered face-to-face in a more traditional educational setting.

Theoretical Framework

History of Distance Learning

Using distance learning to further educational goals is not a new concept. Late in the nineteenth century, the American public became involved with correspondence education through the postal system. Distance learning eventually evolved with technology through the introduction of radio programming, then local television such as PBS, and eventually to telephone- and video-based courses. In recent years, the availability of Internet access and widespread adoption of affordable personal computers has made online education the largest sector of distance learning (Evans & Haase, 2001). In the early nineteen-nineties, online education was limited to a small number of expensive electronic classrooms owned and operated by large universities and businesses, but today the technology is pervasive and available to large sections of the public (Kilby, 2001).

The advent of the Internet has had a profound effect on business, forcing the evolution of everything from ordering systems to selling platforms. A similar impact is expected for distance learning. E-businesses are discovering that e-learning has great growth potential, and that this directly equates to increased profits (Kilby, 2001). These impending changes require a reconceptualization of how training courses are designed (Lairson, 1999). The evolution of training had begun, but much still needs to be considered as attitudes and technologies continue to change. These developments are further necessitated as the clientele for training changes. An increased emphasis on globalization, development of increasingly sophisticated communication systems, the need for lifelong learning, and the growth of the earner-learner environment drives these changes. In fact, Price Waterhouse Coopers estimates that approximately seventy percent of large companies cite the lack of trained employees as a major barrier for future growth (Clarke & Hermens, 2001).

The technological infrastructure necessary for online learning is firmly established through recent rapid improvements in bandwidth, the pervasiveness of computers in the household, improved technological standards, the permeation of computers into schools and businesses, and the adaptive nature of technology (Clarke & Hermens, 2001). The majority of moderate and large sized corporations and universities have extensive information technology groups to manage and develop their systems; therefore, adequate resources should exist to form project development groups for extended online training systems. However, if businesses and universities and their training and development professionals fail to recognize the large potential commitment of time and resources to the development, updating and maintenance of these systems, a significant financial and resource drain could be placed on the organization.

Business trainers and academicians deal primarily with adults who come with many familial and social commitments, and who need the ability to learn without geographic boundaries. Further, these older learners are different from the traditional student in that they are continuous, informal, adaptive, and motivated learners who seek the ability to stay competitive in their lives and also for career advancement (Evans & Haase, 2001).

Models of Online Learning

The face-to-face classroom environment has many established models for optimizing the learning process, but online education currently lacks models upon which to structure its processes. Typically, a common misconception in the application of existing pedagogies occurs when traditional classroom models are merely adapted into the online medium (Shaw, 2001). The main barriers associated with the online learning environment lie not with the technologies currently available, but with the pedagogical assumptions and conceptions underlying their use. The development of innovative and effective methods made possible by advanced technologies are constricted by the narrow perspective of online education held by many who think only of static online tutorials and online books (Kilby, 2001). This greatly hampers the development of innovative and effective methods for completing educational processes online. Given the wide availability of technology in the marketplace, both at learners' residences and workplaces, the options are innumerable. Many practitioners fail to reframe their conceptions of learning and teaching in the online environment, leading to extremely damaging consequences for the learners involved in the training. Another problem is the common juxtaposition of pedagogy and technology. Although the natural tendency is to separate them, the practitioner should consider

simultaneously pedagogy and technology as s/he designs and develops the online learning experience (Jackson & Anagnostopoulou, 2001).

Online learning is a subset of a collection of learning tools collectively referred to as flexible learning. To date two primary pedagogies have been associated with these learning environments: student-centered learning and experiential learning. Student-centered involves negotiation between the learner and the instructor as to how learning proceeds in the “classroom.” Experiential learning allows the learner to exhibit a degree of control over the situation and determines the degree by which he or she becomes involved. Further, experiential learning has a degree of correspondence between the learning environment and the real environment where daily work is conducted (Thorpe, 2000) and can be successfully used for teaching cognitive concepts as well as preparing learners in academic and work settings to develop conceptual, judgmental and cognitive skills so important in today’s workplace (Bartley, Kupritz & Powers, 2003).

The ILDIC model (Integration Learning Design in Multimedia CD-ROM) identifies many required components of e-pedagogy and suggests that the e-learning pedagogue needs to include conventional pedagogy, online awareness, the ability to plan and manage events online, comprehension of the current and future potential of technology, and the ability to interweave technology into the training design (Good, 2001). Taylor (2002) asserts that the following ideas also need to be considered in the implementation of online programs: using online learning efficiently, team-based efforts, additions to existing classroom presentations, both synchronous and asynchronous programs, the trainer learning curve, cost, using multimedia to augment presentations, reaching distance learners, assessing learner needs, ability to access course material, ability to distribute course information, ability to give and receive feedback, class management techniques, techniques to measure results, and procedures to update material. In order to successfully meet these requirements, one needs to devise an infrastructure to support distance-learning needs and to orient distance-learning programs to traditional programs (Evans & Haase, 2001).

Wild et al. (2002) discusses the development of an e-learning value chain within organizations which includes the following steps: assessing and preparing organizational readiness; designing appropriate content; designing appropriate presentations; implementing e-learning. Reducing the training process to a logical value chain provides additional methodologies that may help in the justification of training programs. Presentation of a well thought out and documented plan is far more likely to gain support than less structured ideas. Further, these steps combined with one of the currently accepted models can constitute a comprehensive and effective e-learning program. The currently accepted models include CBT on the Web (popular for occupational training), synchronous learning and the electronic classroom (Whitlock, 2001).

Bates (1995) discusses the ACTIONS model for assessing learning technologies such as online learning. The ACTIONS model includes consideration of the access, costs, teaching and learning, interaction and user-friendliness, organization, novelty and speed of the training intervention being developed. Each of these issues is imperative to consider in the development of new training models, especially when one is considering the use of new training methodologies that have not yet been fully validated, such as online training.

Benefits of Online Learning

The many benefits associated with online learning are well discussed in the literature. First and foremost is the current economic situation, which necessitates the need for companies to economize. With more than fifty million workers to re-train, any discovery leading to decreased expenses is extremely well received, and distance-training programs have already proved their ability to save millions of dollars each year (Evan & Haase, 2001). In today’s rapidly changing work environment, the need for just-in-time training, similar to the many other just-in-time functions such as production, is essential (Wild, 2002). Economic and time benefits achieved from training are essential in the current environment; therefore the creation strategic alliances for the training function have become extremely popular. Businesses and educational institutions have begun to join together to share in the responsibility of building a globally competitive work force (Vincent & Ross, 2001). Firms seek to position themselves to be the most competitive in the new international marketplace, and e-learning is a way to empower such a workforce with the skills and knowledge necessary to create those advantages (Wild, 2002). In order to actually achieve these goals, companies must revise their perception of training as an unredeemable cost to the company and view expenditures to develop human potential as an investment with unlimited potential returns (Vincent & Ross, 2001).

The returns of training, whether traditional or online, include improved performance and attitudes from employees necessary to achieve organizational growth (Kilby, 2001). Online training allows learners to work at their own pace to complete required technical and work related training or complete full degree or certification programs (Taylor, 2002). Online training and education allows learners who would be otherwise denied the opportunity to increase their personal knowledge and abilities, the ability to reach the tools to empower themselves (Furnell, 1998). Further, the use of online and distance training has removed the need to travel in order to join together to learn and study (Cornford & Pollock, 2003). This results in both significant cost reduction and also reduction in lost time and opportunity from having employees away from their responsibilities for extended periods of time.

Evans & Haase (2001) discuss ten benefits of online training that are readily available to companies upon the implementation of these new and innovative programs. These benefits include increases in the impact of the money invested in training programs, significantly reduced employee travel cost and time, the ability to train more people, more frequently and in shorter sessions that are easier to coordinate and schedule. Further, online training is scalable because it offers the ability to add instructors and students as needed, with fewer changes and re-developments. Trainers now have the ability to deliver programs with a consistent message in a way that can quickly be disseminated company wide, with real-time updates and information access. With online training, the concepts for group learning and collaborative problem solving can be delivered to networked sites, including the employee's home.

Online training is learner-centered, which allows learners more control with course pacing, sequencing and styles. The benefits of online training can be achieved through the development of corporate universities or through the use of strategic alliances between technology and media companies, learning and research universities and newly formed and developed e-learning companies (Clarke & Hermens, 2001).

Bartolic-Zlomislic & Bates (1999) identify many potential benefits associated with online learning. First and foremost is the ability to reach new markets, both national and international. Given the widespread competition for the best courses in the academic world and the multinational nature of many corporations, this is a more important benefit than ever before. Along with the ability to enter new markets comes the ability to form international partnerships for online learning. Economic benefits associated with online learning include the fact that many times online learning can fully recover its costs within only a few training sessions. However, this is not always true and requires a complete and comprehensive evaluation of the costs associated with a given online learning program. In addition, online learning can also result in a reduced time to market for courses. This benefit is dependent on the skills of the designers and their familiarity with the online format. Educationally we see benefits for the students not only through their learning of the course material, but also through their learning of new technologies.

Limitations of Online Learning

The integration of online training can have a large impact on the learning and performance of the employees involved in the company processes. Although online learning is becoming mainstream in many organizations, many doubt that it is adequately meeting the needs of either the learner or the organization (Kilby, 2001). There is a continued idea that the online training outputs should only be compared to those that have been achieved previously by the "traditional" training functions. The focus should be shifted to include the evaluation of whether or not online training is meeting the goals that were set out during the planning stage of the training (Jackson & Anagnostopoulou, 2001).

Without the evaluation of learning and performance achieved by these programs, one faces the very real possibility that the company will cease to place support in favor of training programs (Jakupec, 2000). Further difficulties encountered in the use of online training programs are faced in the evaluation stage of the program. To date, there has been the inclusion of some assessment, but few formal training evaluation processes have been implemented (Kilby, 2001). In order to justify the results of the training programs, better tools are needed to evaluate the results of training.

Little discussion can be found in the literature about the financial constraints of the online training medium. Although Swanson (2001) proposed how to show the cost and benefit of a training program, others have focused little attention on the comparison of costs between different program options. Phillips (1997) proposed that costing methods should determine "fully loaded costs" – all costs identified and linked to design, development

and implementation of a specific program. A case study presented by Philips (1997) provided a cost matrix for a fully loaded program, but again the tool stopped short of comparison between different programs.

Some fear that too much emphasis is placed on the technology of online courses, often at the expense of the learning and design process. The experience that a learner has in the online classroom is determined largely by the way new learning technologies are presented. The technology must be able to deal with a multitude of learning theories and learning styles (Whitlock, 2001). Vincent & Ross (2001) discuss the directed use of learning styles in the online classroom. They suggest allowing the learners to determine their learning styles individually using many readily available online tools. The results of these exercises can be presented to the facilitator or instructional designer, and used to assist in assessing and meeting the unique needs of the adult learner. Vincent & Ross (2001) present a variety of Internet sites where tools for evaluating learning styles, personality types and multiple intelligences are freely available.

Design Issues Concerning Online Learning

Although instructional design has always been an important aspect of education and training, the implementation of online learning programs necessitates the need for particular attention to be paid to the design process. A more global view of design must be adopted if online training is to achieve its potential to be adaptable to a multitude of learning environments (multi-national, multi-lingual and international collaborations), reduce travel time, and reduce overall cost to the learning organization (Kilby, 2001). Design methods ensure that a variety of resources and activities are included in the course and that the amount of technology used is not overwhelming to the student (Shaw, 2001). An equitable match should exist between the materials and medium being used in the online training environment, and assurances made that all of the technology is readily available to the learners (Evans & Haase, 2001). Instructional designers must have a concrete understanding of the theory behind their learning models in order to be effective in the online environment (Good, 2001). In the development of online courses the majority of the focus seems to be given to the concrete aspect of the course, with little thought given to the complete integration of e-mail, discussion groups and chat functions. Without the complete integration of such functions, the learner in the online environment can become lost in the virtual world, without recourse in times of need (Kilby, 2001).

Companies reaching the time where employee skills require constant updating to meet changing demands may rush to implement online training courses without the required degree of planning and research jeopardizing the many benefits associated with adequately planned online training (Newton et al., 2002). A dull, unrewarding course taught in the classroom environment becomes even duller and less rewarding in the online environment (Kilby, 2001). Just like in the "traditional" training environment, the users of online learning seek a satisfying learning experience and the perception that they have gained knowledge and skills. By its nature, online training occurs without extensive interaction between members of the class and the trainer, which can lead to an anti-social environment where learners feel isolated (Kilby, 2001). Swanson & Holton III (2001) discuss the importance of social learning as part of the learning process in learning organizations. The new online courses must be developed from a learner-centered model, with instruction that begins at the learner's level of current understanding with his/her needs driving the training process.

In order to design effective online courses, education and training professionals must negotiate the social, economic and political policies that govern and influence the training procedures in place at the university or corporate levels. The education and training professionals must effectively and efficiently provide appropriate learning materials to the learners as well as provide for practice for realistic work situations (simulations, for example). A usable mechanism to answer questions and foster discussions among learners must be available as well as an assessment tool(s) to assess learning both effectively and accurately. Facilitators and learners must have the ability to access quick and accurate technical support services. Many of these design and learning considerations can be achieved through the use of simple chat and e-mail functions that are readily available with appropriate technology. As an example, even with very limited programming skills, a practitioner can create interactive applets that reside on the Internet or on one's personal computer to facilitate the learning of new ideas. However these innovation elements must be incorporated during the design phase, not added as an afterthought.

Another new aspect of instructional design to be implemented is the aspect of online security. To date, significant consideration has not been given to the use of security features for adequate securing of private information. Furnell et al. (1998) discuss the security framework that should be considered in the development of these new courses. They consider the online course as a five-stage model: enrollment, study, suspension,

completion, and termination. Each of these stages has its own idiosyncrasies and poses potential problems that need to be clearly evaluated prior to the distribution of online modules for many reasons, but primarily for the protection of proprietary information. The issue of security in the online environment must remain a primary concern of the education or training professional as the necessary learning materials are developed and distributed.

Costs of Online Learning

Models for Determining the Costs of Online Learning

Determining the cost of online learning is an essential component in deciding whether these new techniques are appropriate for a particular organization. In addition to examining the value added components for learning, one must also consider the cost, and whether these costs are justifiable.

Bartolic-Zlomislic & Bates (1999) discuss the potential benefits and limitations of online learning, including careful consideration of the costs associated with online learning. They suggest dividing the cost factors into three groups: capital and recurrent costs, production and delivery costs and fixed and variable costs. Capital and recurrent costs include things such as equipment and support for the equipment, production and delivery include those costs incurred in the development and delivery of the course, and fixed and variable costs are those that either remain constant regardless of the number of participants (fixed) or change with the number of participants (variable).

Calculating the ROI of Online Learning

The calculation of ROI as a justification for a training intervention is a more important facet of the training proposal than ever before. Without a comprehensive evaluation of the costs and saving achieved though implementation of the training program organizational leaders will have a hard time approving the necessary funds for development of the training intervention.

The ROI calculation has been presented in the training literature in a number of sources. Simply, the ROI calculation requires only knowledge of the net program benefits and the program costs. A ratio of these two numbers indicates the return on investment. One of the reasons that trainers often fear making this ROI calculation is fear that the net program benefits cannot be accurately predicted. Computation of the program costs, while cumbersome, can easily be accomplished with a modest time commitment. Computation of the net program benefits requires some complex assumptions concerning the effectiveness of a program that has yet to be designed or implemented.

Evaluating the Costs of Online versus Face-to-Face Learning

The current business environment has led to many changes in the allocation of funds within an organization. Today it is much more difficult to justify the expenditures on any number of different items. People look at training and see a quick fix through the use of online training tools. What they fail to evaluate is whether or not online learning is really more cost effective than face-to-face learning. In most situations it will be true that given staff who have experience in the technical aspects of developing online training and enough time, online training will become more cost effective than face-to-face training. The large initial expenditures in new equipment and training for the developers can take a substantial amount of time to implement effectively. Bartolic-Zlomislic & Bates (1999) discuss that the start up costs associated with an online learning program can often be cost prohibitive for many organizations.

Consideration of the cost of online learning is not a new concept. Bartolic-Zlomislic & Bates (1999) discuss these costs in their article and many others have stimulated similar discussions. Turoff (1997) discusses the costs for the development of an online university under a set of assumptions. These assumptions include the fact that students with work in learning groups or teams, there will be a group orientated communication system, faculty already know the necessary technology, technology will be used for all the tasks and the internet is used as the primary form of delivery. Although these assumptions may be realistic for some organizations, for many they will be highly unrealistic. In many organizations the assumption that faculty or trainers are already familiar with the necessary technology is a highly unrealistic assumption. Others make similar gestures for the discussion of the costs associated with online learning.

| | | Online Training | | Face to Face Training | |
|-----------------------------|--|-----------------|-------------------|-----------------------|-------------------|
| | | One Time Costs | Per Session Costs | One Time Costs | Per Session Costs |
| Analysis | | | | | |
| | Analysis Team Costs ¹ | | | | |
| | Office Supplies and Expenses | | | | |
| | Printing and Reproduction | | | | |
| | Outside Services | | | | |
| | Equipment | | | | |
| | General Overhead Allocation | | | | |
| | Miscellaneous | | | | |
| | Total | \$ | ^a | \$ | ^a |
| Design / Development | | | | | |
| | Design and Development Team ¹ | | | | |
| | Design User Interfaces | | | | |
| | Asynchronous Computer Systems | | | | |
| | Synchronous Computer Systems | | | | |
| | Design Function Elements | | | | |
| | Asynchronous Computer Systems | | | | |
| | Synchronous Computer Systems | | | | |
| | Design Graphical Resources | | | | |
| | Asynchronous Computer Systems | | | | |
| | Synchronous Computer Systems | | | | |
| | Office Supplies and Expenses | | | | |
| | Program Materials and Supplies (i.e. Film, Videotape, Audiotape, overhead transparencies, artwork, manuals and materials, and miscellaneous) | | | | |
| | Printing and Reproduction | | | | |
| | Outside Services | | | | |
| | Equipment | | | | |
| | General Overhead Allocation | | | | |
| | Computer Resources | | | | |
| | Individual Computer Costs / Upgrades | | | | |
| | Computer Classroom | | | | |
| | Server Purchase / Upgrade | | | | |
| | IT Salary Support ¹ | | | | |
| | Miscellaneous | | | | |
| | Total | \$ | ^c | \$ | ^d |
| Implementation | | | | | |
| | Participant Costs ¹ | | | | |
| | Instructor Costs ¹ | | | | |
| | Program Materials and Supplies | | | | |
| | Participant Replacement Costs | | | | |
| | Lost Production | | | | |
| | Facility Costs | | | | |
| | Facilities Rental | | | | |
| | Facilities Expense Allocation | | | | |
| | Catering | | | | |
| | Equipment | | | | |
| | General Overhead Allocation | | | | |
| | Miscellaneous | | | | |
| | Total | | \$ | ^e | \$ |
| Evaluation | | | | | |
| | Evaluation Team ¹ | | | | |
| | Participant Costs ¹ | | | | |
| | Office Supplies and Expense | | | | |
| | Printing and Reproduction | | | | |
| | Outside Services | | | | |
| | Equipment | | | | |
| | General Overhead Allocation | | | | |
| | Miscellaneous | | | | |
| | Total | | \$ | ⁱ | \$ |
| Grand Total | | | | | |
| | Fixed Costs for Training Session (a+c) | \$ | ^f | \$ | ^f |
| | Per Training Session Costs (d+g+i) | | \$ | ^o | \$ |
| | Anticipated Number of Training Sessions | | | ^b | ^b |
| | Total Overall Costs for all Sessions (e x b) | \$ | ^h | \$ | ^h |
| | Total Overall Costs (f+h) | \$ | | \$ | |
| | | | | | |
| | | | | | |
| | ¹ Personell Computation should include a minimum of the number of oaricipants x average salary x employee benefits factor x projected number of days on project x daily meal expense x average daily travel expense | | | | |

Figure 1. Cost matrix

To comprehensively evaluate the costs effectiveness of online learning, practitioners and adopters need a comprehensive tool to evaluate the costs associated with online learning as compared to those associated with face-to-face learning. Figure 1 provides a cost matrix for the evaluation of these costs. The cost matrix is

structured to be consistent with the basic Instructional Systems Design (ISD) model for training (Beckschi & Doty, 2000). Each stage of the ISD model (Analyze, Design, Develop, Implement, and Evaluate) is associated with a set of costs that would be relevant for the online learning format, the face-to-face learning format, or both. An individual would consider the training intervention being developed, the number of times the training will be used with and without updates and the total number of participants anticipated. Using these factors along with knowledge of the technological infrastructure already in place within the organization, one can use this tool to make a comprehensive evaluation of the cost effectiveness of the proposed online training program.

Conclusion

This discussion has evaluated issues to be faced by the educational or training professional who intends to move the learning environment online in response to the current business and academic environments. Universities and corporations are in precarious economic positions at the current time with high emphasis placed on cost reductions in any manner possible. For this reason, the prospect of online education becomes a lucrative option, given that it does not require extensive travel costs or time by large numbers of employees and allows learners to participate no matter where they are located geographically. It is especially effective for those employees in small, remote office locations (Taylor, 2002). Online education has the benefits of scalability, easy access and timeliness, all of which are extremely desirable in today's economic climate (Clarke & Hermens, 2001). Centralization of education options creates new demands for modules that can affect the interests of learners in many different geographic locations and diverse international areas, requiring new forms of collaboration between the stakeholders in the training process and new ways for those in diverse geographic locations to share this information (Jakupec, 2000). The challenge is to transform a simple printed lesson transmitted via computer technology into an exciting online classroom with powerful interactive features for the learner. The education and training professional should recognize the opportunity afforded by online instruction to implement these new technologies so that the online environment is a rich and value-added teaching methodology.

Online instruction is gaining an increasing presence because of its reported benefits, its ability to consolidate learning across geographical and time constraints, and the claim by many that online learning is cost efficient. However, the education and training professional needs a tool with which to justify the development costs of online instruction. The metric provided here may prove helpful for making such determinations and it is introduced so that others may conduct quantitative studies on the matter of cost comparison using this cost matrix. This tool is intended to aid the education and training professional in many different ways. First, if those responsible for training wish to proceed with the implementation of online training systems, they will likely need a tool with which to justify the potential costs associated with such a program. Secondly, if those responsible for learning are under pressure to implement new online instructional programs, this tool may also provide an avenue to argue the point for necessary resources. Overall, the need for the financial justification of the conversion to online instructional programs is necessary. The cost matrix (see Figure 1) is a proposed tool to assist education and training professionals to begin discussion regarding costs associated with online programs in their universities or organizations. In addition, experimental evidence through continued study of comparisons of the benefits and costs of online and face-to-face instruction would be beneficial.

References

- Aragon, S. R., Johnson, S. D., & Shaik, N. (2002). The influence of learning style preferences on student success in online versus face-to-face environments. *The American Journal of Distance Education, 16* (4), 227-244.
- Bartley, S. J., Kupritz, V. W., & Powers, M. (2003). Effectiveness of a low ropes course experience to promote learning in an HRD graduate course. *Workforce Education Forum, 30* (1), 22-37.
- Bartolic-Zlomislic, S., & Bates, A. W. (1999). Investing in online learning: potential benefits and limitations. *Canadian Journal of Communication, 24*, retrieved October 24, 2004 from <http://tonybates.ca/papers/investing.html>.
- Bates, A. W. (1995). *Technology, open learning and distance education*, London: Routledge.
- Beckschi, P., & Doty, M. (2000). Instructional systems design: A little bit of ADDIEtude, please. In Piskurich, G. M., Beckschi, P., & Hall, B. (Eds.) *The ASTD Handbook of Training Design and Delivery*, New York: McGraw Hill, 28-41.

- Clarke, T., & Hermens, A. (2001). Corporate developments and strategic alliances in e-learning. *Education + Training*, 43 (4), 256-267.
- Cornford, J., & Pollock, N. (2003). *Putting the university online: Information, technology and organizational change*. Philadelphia: Open University Press.
- Evans, J. R., & Haase, I. M. (2001). Online business in the twenty-first century: An analysis of potential target markets. *Internet Research: Electronic Networking Applications Policy*, 11 (3), 246-260.
- Furnell, S. M., Onions, P. D., Knahl, M., Sanders, P. W., Bleimann, U., Gojny, U., & Roder, H. F. (1998). A security framework for online distance learning and training. *Internet Research: Electronic Networking Applications and Policy*, 8 (3), 236-242.
- Good, M. (2001). On the way to online pedagogy. In Stephenson, J. (Ed.) *Teaching and learning online: Pedagogies for new technologies*, Sterling, VA: Stylus Publishing, 165-174.
- Jackson, B., & Anagnostopoulou, K. (2001). Marking the right connections: Improving quality in online learning. In Stephenson, J. (Ed.) *Teaching and learning online: Pedagogies for new technologies*, Sterling, VA: Stylus Publishing, 53-66.
- Jakupec, V. (2000). The politics of flexible learning: Opportunities and challenges in a globalized world. In Jakupec, V., & Garrick, J. (Eds.) *Flexible learning, human resource and organizational development: Putting theory to work*, New York: Routledge, 67-84.
- Kilby, T. (2001). The direction of Web-based training: A practitioner's view. *The Learning Organization*, 8 (5), 194-199.
- Lairson, T. D. (1999). Rethinking the "course" in an online world. *Campus-wide Information Systems*, 16 (5), 186-190.
- Newton, D., Haase, S., & Ellis, A. (2002). Effective implementation of online learning: A case study of the Queensland mining industry. *Journal of Workplace Learning*, 14 (4), 156-165.
- Phillips, J. J. (1997) *Return on investment in training and performance improvement programs* (2nd Ed.), Houston, TX: Gulf Publishing Company.
- Shaw, K. (2001). Designing online learning opportunities, orchestrating experiences and managing learning. In Stephenson, J. (Ed.) *Teaching and learning online: Pedagogies for new technologies*, Sterling, VA: Stylus Publishing, 53-66.
- Swanson, R. A. (2001). *Assessing the financial benefits of human resource development*, Cambridge, MA: Perseus Publishing.
- Swanson, R. A., & Holton III, E. F. (2001). *Foundations of human resource development*, San Francisco: Berrett-Koehler Publishers.
- Taylor, R. W. (2002). Pros and cons of online learning - a faculty perspective. *Journal of European Industrial Training*, 26 (1), 24-37.
- Thorpe, M. (2000). Pedagogical assumptions in flexible learning. In Jakupec, V., & Garrick, J. (Eds.) *Flexible learning, human resource and organizational development: Putting theory to work*, New York: Routledge, 175-192.
- Vincent, A., & Ross, D. (2001). Personalize training: Determine learning styles, personality types and multiple intelligences online. *The Learning Organization*, 8 (1), 36-43.
- Whitlock, Q. (2001). Course design for online learning - what's gone wrong? In Stephenson, J. (Ed.) *Teaching and learning online: Pedagogies for new technologies*, Sterling, VA: Stylus Publishing, 182-194.
- Wild, R. H., Griggs, K. A., & Downing, T. (2002). A framework for e-learning as a tool for knowledge management. *Industrial Management & Data Systems*, 102 (7), 371-380.