

## Introduction

Any learning program must consist of certain basic principles and methods of instruction. A planned course of content must be developed, learning objectives must be clearly stated, and a process of evaluation must be taken into consideration (Moore & Kearsley 1996, p. 203).

Moore & Kearsley (1996) discuss how "Open Universities, in the early 1970s, applied a total systems model approach to the design and implementation of distance learning." (p. 19).

Today, the most widely used methodology for developing new learning programs is called Instructional Systems Design (ISD). This approach provides a step-by-step system for the evaluation of learners' needs, the design and development of course materials, and the evaluation of the effectiveness of the intervention (Moore & Kearsley, 1996, p. 102).

The information presented here is a learning design plan for the upcoming Data Center University course: Fundamental Cabling Strategies in the Data Center. The purpose of this learning design document is to analyze and investigate possible solutions to address the obvious lack of current cabling documentation and training content. The planned course will address the standardization of both power and data cabling strategies, which have proven to be more efficient and cost effective than traditional methods.

## Learning outcomes

At the completion of this course, the participant will be able to:

- Discuss the evolution of cabling in the data center
- Classify two common types of data center cables
- Describe two cabling installation practices
- Identify the four strategies for selecting cabling topologies
- Utilize two cable management techniques
- Recognize the challenges associated with cabling in the data center

## Learning resources

Proposed learning resources include:

- Learner self-study and fellow participants
- White papers
  - [http://www.apcmedia.com/salestools/NRAN-6CN8PK\\_R0\\_EN.pdf](http://www.apcmedia.com/salestools/NRAN-6CN8PK_R0_EN.pdf)
  - [http://www.apcmedia.com/salestools/FLUU-5T3TEU\\_R0\\_EN.pdf](http://www.apcmedia.com/salestools/FLUU-5T3TEU_R0_EN.pdf)
  - [http://www.apcmedia.com/salestools/NRAN-69ANM9\\_R0\\_EN.pdf](http://www.apcmedia.com/salestools/NRAN-69ANM9_R0_EN.pdf)
  - [http://www.apcmedia.com/salestools/SADE-5TNRLE\\_R0\\_EN.pdf](http://www.apcmedia.com/salestools/SADE-5TNRLE_R0_EN.pdf)
  - [http://www.apcmedia.com/salestools/SADE-5TNRMB\\_R0\\_EN.pdf](http://www.apcmedia.com/salestools/SADE-5TNRMB_R0_EN.pdf)
  - [http://www.apcmedia.com/salestools/SADE-5TNRMF\\_R0\\_EN.pdf](http://www.apcmedia.com/salestools/SADE-5TNRMF_R0_EN.pdf)
- Web-sites
  - <http://availability.com/>
  - <http://computerworld.com/index.jsp>
  - <http://www.apc.com/products/>
  - <http://www.networkworld.com/topics/datacenter.html>
  - <http://www.research.ibm.com/thinkresearch/index.shtml>
  - <http://www.nfpa.org/necCategoryList.asp?categoryID=192&cookie%5Ftest=1>

- Various posted assigned readings
- Suggested texts (Optional)
  - NFPA (2004). *National Electrical Code 2005 Softcover Version (National Fire Protection Association National Electrical Code)*. Thomson Delmar Learning. ISBN: 0877656231
  - Rosenberg, P. (2004). *Audel Guide to the 2005 National Electrical Code*. Wiley Publishing Company: Indianapolis, IN. ISBN: 0764578022

### **Possible learning activities**

When determining possible learning activities it is important to use all sensory channels: V = visual, A = auditory and K = kinesthetic. Using all three will reinforce the learning concepts.

Six possible learning activities include:

- View power point slide (V)
- Conduct research and develop a webliography (V, K)
- Participate in an interactive exercise online utilizing the cable build-out tool: [http://www.apcc.com/tools/cable\\_selector/index.cfm?lid=Cable%20Selector](http://www.apcc.com/tools/cable_selector/index.cfm?lid=Cable%20Selector) (V, K)
- Read articles and summarize the significant details (V, K)
- Participate in a Web Scavenger Hunt or WebQuest (V, K)
- View a Webcast on the topic of cabling (V, A, K)

### **Pro and cons of learning activities**

1. View a Power Point presentation

#### Pro

Power Point is a common program, and it is easy to use. This activity would be for good for simple information transmission.

#### Con

This activity assumes that the participant has access to, and knows how to use Power Point. Also, simply viewing a presentation does not give the learner the opportunity to apply knowledge in a real world setting.

2. Conduct independent research and develop a webliography

#### Pro

This learning activity is an excellent way to foster learner autonomy. Learner autonomy addresses how each individual learner can take charge of his or her own independent learning. The level of learner autonomy depends upon the individual learner's sense of personal responsibility and self-directedness (Peters, 2001, p. 29). It can also immerse participants in real-world issues using primary source materials.

#### Con

Web-based activities can be time consuming and participants can often waste time unless they have good guidance through the websites and materials.

3. Participate in an interactive exercise online utilizing a cable build-out tool

Pro

This activity would immerse participants in real-world issues using a web-based interactive tool. It allows participants to apply what they have learned in the course. It allows them to effectively analyze their cabling needs, and associate an estimated cost with their cabling investment.

Con

This tool is an APC-sponsored tool. The result does not yield a product-agnostic solution.

4. Read articles and summarize the salient points

Pro

This learning activity is an excellent way to foster learner autonomy. It can also immerse participants in real-world issues using primary source materials.

Con

Participants may infer the wrong conclusions if the right questions are not asked, or if the appropriate guidance is not given.

5. Participate in a Web Scavenger Hunt or WebQuest

Pro

This type of activity is a great way to ensure that participants are reading and comprehending web-based resources. It can also immerse participants in real-world issues using primary source materials.

Con

These activities take time and creativity to plan. It can be difficult to match standards and activities with specific assessments to ensure that participants are reaching their learning goals. Web-based activities can be time consuming and participants can often waste time unless they have good guidance through the websites and materials.

6. View a Web-cast on the topic of cabling

Pro

Web-casts allow the participant to leverage the strength of the telephone and fuses it with the Internet's capacity to delivery real-time visual communication at low cost. Web-casts enable presenters to conduct virtual seminars for anyone to participate as long as they have a PC with an Internet connection. Web-cast technology not only makes traditional seminars more affordable, they facilitate reaching a wider audience and add considerable advantages over traditional onsite seminars such as interactive Q&A, real-time collaboration, and the ability to digitally archive for playback from a company Website.

Con

Occasionally, there is a fee associated with certain webcasts and webinars. It will be impertitive that there be no fee associated with the web-cast used in this course.

### **Proposed learning activities**

After analyzing the data, there are four learning activities that will be used. They include:

1. Conduct research and develop a webliography
2. Read articles and summarize the significant details
3. Participate in an interactive exercise online utilizing a cable build-out tool
4. View a Webcast on the topic of cabling

### **Assignments for assessment: Evaluating the participant's learning**

Morrison, Ross, and Kemp (2004) state that "the broad purpose of evaluation is to determine to what extent the objectives of the instruction are being attained. The assessments used to inform the evaluation should therefore have a direct relationship with the objectives" (p.247).

The plan to assess the learner includes assignments which ask the participant to:

- Keep a journal to document the learning process (10%)
- Create a glossary of important terms and figures (10%)
- Write a paper on a cabling topic of choice in the data center (30%)
- Play a role in a group exercise (20%)
- Take two self-check multiple choice skill checks (10%)
- Respond to and discuss topics and questions posed in the online community (20%)

### **Course evaluation strategy**

In addition to evaluating participants' acquired level of knowledge, it is also important to implement an evaluation strategy for the course itself. Gunawardena, Carabajal, Lowe and Wood (2000) stipulate that the adoption of a solitary method for evaluating the quality of online learning is unsatisfactory. Using one method only provides one moment in time, one perspective (p. 487). To ensure a more well-rounded analysis, distance education administrators should to employ both formative evaluation and summative evaluation (Gunawardena, Carabajal, Lowe & Wood, 2000, p. 485).

#### *Formative Evaluation*

Formative evaluations are ongoing throughout the instructional process, and are generally administered to ensure that the course will achieve its stated goals. In the distance learning environment, an instructor might have an online evaluation form that focuses on the course strengths to leverage and opportunities for improvement, technical and delivery concerns, and content areas in need of further coverage. Formative evaluations will identify major gaps in the instructional plan or the need for minor adjustments. "Formative evaluations facilitate course and content adaptation and enable the instructor to improve instruction on an ongoing basis. Formative evaluations can be distributed via electronic mail, telephone, surveys and questionnaires" (National Education Association, 1995, p. 1).

#### *Summative Evaluation*

"A summative evaluation is accomplished upon course completion to determine the overall effectiveness of the class. The focus is on participant performance, course relevancy, learner approaches toward delivery methods, and the instructor's teaching methods and efficiency" (National Education Association, 1995, p. 1). Although they will not help current participants since they are conducted upon course completion, summative evaluations allow the instructor to develop a revision plan in order to improve the next instructional delivery by providing information for designing a new plan, program, or course (National Education Association, 1995, p. 2).

Summative data survey questions may include items such as:

- List three to five weaknesses and strengths of this instructional unit.
- What did you think would be covered in this course, but was not?
- Would you recommend this course to a friend? Why or why not?

Gunawardena, Carabajal, Lowe and Wood (2000) take a systems view approach to evaluation. The Systems Component Contexture Model accounts for the four overall components of the system, each with three subsystem elements - the institutional context, the instructional experience, and the learner experience - all contained within a foundational boundary. The authors define the function of evaluation

is to systematically monitor the pressure pulls (inputs and outputs) of each component, and the effect on the learner.

1. Content – Concerned with the topics presented
  - a. Institutional Level – How does the course achieve institutional goals? How does it help to address the overall mission?
  - b. Instructional Level – What are the objectives of the course? What are the desired outcomes?
  - c. Learner Level – Are there any prerequisite skills needed? What is the goal and what is the roadmap to achieve those goals? Are there any attitudinal factors which need to be addressed?
2. Context – Concerned with situational and environmental factors
  - a. Institutional Level – How will the delivery technology be supported? What are the participant-faculty ratios? How will the institution manage the course? What is the extent of flexibility in regards to growth?
  - b. Instructional Level – What type of technology will be chosen? How familiar are the current instructors with the technology they will be using?
  - c. Learner Level – How will the learner be supported? Will the learner need technology training prior to taking the course?
3. Collaboration – Concentrates on intra- and inter-institutional collaborations and partnerships and how best to negotiate common goals and roadmaps for success.
  - a. Institutional Level – How will the collaboration between all levels and department within the institution, as well as external partners be ensured?
  - b. Instructional Level Support: How will participant to instructor interaction be addressed?
  - c. Learner Level – How will participant to participant interaction be supported, encouraged and facilitated?
4. Control – Concerned with learner control
  - a. Institutional Level - What is the assessment philosophy? What are the accreditation requirements?
  - b. Instructional Level – Which learning theory is used? Which method of ISD was used? Why did the instructor use particular form of technology for delivery of this course?
  - c. Learner Level – What is the level of learning?

## Conclusion

The purpose of this learning design document is to provide a pathway from the contextual analysis to the beginnings of the virtual classroom. This plan has stated objective learning outcomes, identified learning resources, explored the pros and cons of possible learning activities, suggested potential assignments for assessment, as well as illustrated techniques for course evaluation. When this student-centered learning process is applied successfully, the result will be an engaged learner who not only embraces the concept of distance learning, but thrives in the virtual classroom.

## References

- Gunawardena, C., Carabajal, K., Lowe, C.A., & Wood, J. (2000, August). *Models and methods for evaluating online learning networks*. In Conference Proceedings of the 16th Annual Conference on Distance Teaching & Learning (pp. 483-488). Madison, WI.
- Moore, M.G., & Kearsley, G. (1996). *Distance education: A systems view*. Belmont, CA: Wadsworth Publishing Company.

Melissa Smith  
OMDE 607  
Learning Design for Fundamental Cabling Strategies in the Data Center  
July 10, 2006

Morrison, G.R., S. Ross, and J. E. Kemp. (2004). *Designing effective instruction*. (4<sup>th</sup> Ed.) New York: John Wiley and Sons.

National Education Association. (1995, October). Summative evaluation and formative feedback. *Update*. 1(4). Retrieved July 6, 2006 from <http://www.nea.org/he/heupdate/upv1no5.pdf>

Peters, O. (2001). *Learning and teaching in distance education - Analyses and interpretations from an international perspective*. London: Kogan Page.