

# Chapter LIV

## Developing an Integrated Evaluation Framework for E-Learning

**Yonjoo Cho**

*Indiana University at Bloomington, USA*

**Sunyoung Park**

*University of Minnesota, USA*

**Sung Jun Jo**

*University of Minnesota, USA*

**Chang-Wook Jeung**

*University of Minnesota, USA*

**Doo Hun Lim**

*University of Oklahoma, USA*

### ABSTRACT

*The purpose of this chapter is to provide an integrated evaluation framework of e-learning based on the basic concepts of evaluation and previous evaluation models. Several evaluation models were reviewed in order to lay the foundation for our proposed model of e-learning evaluation. Stufflebeam (1983), Kirkpatrick (1987), Phillips (1997), and Holton (1996) were chosen as four representative training evaluation models. The frameworks developed by Rosenberg (2001) and Khan (2005) were also reviewed to address several evaluation design issues for e-learning. Based on six evaluation models, an integrated framework is suggested for comprehensive e-learning evaluation. This integrated framework consists of six stages (i.e., context, resources, process, product, implementation, and outcomes) and two levels (i.e., program and organization). The practical case is introduced as an example that uses the integrated evaluation framework.*

## INTRODUCTION

E-learning is defined as the delivery of learning, training or educational programs via electronic means (Stockley, 2003). E-learning involves the use of a computer or electronic device in ways to provide training, educational or learning material. Although computers and the Internet had been used for education and training for many years previously, the term 'e-learning' has existed for less than a decade, but its impact is prevalent in the education, business, and the public sectors. Our extensive literature review showed that the first books referring to e-learning were published in 2001 (Horton, 2001; Rosenberg, 2001). The e-learning handbooks of ASTD (Rossett, 2002) and the American Management Association (Piskurich, 2003) followed within the next years.

The Sloan Consortium's annual report (Allen & Seaman, 2007) showed the recent state of online learning in US higher education. For instance, almost 3.5 million students took at least one online course in the fall of 2006—a nearly 10 percent increase over the number reported the previous year. Improved student access was colleges' and universities' top reason for offering online courses and programs. A *New York Times* article titled, "High cost of driving ignites online classes boom" (Dillon, 2008) provides a testimonial of online learning's main advantage.

Another study of employee learning survey (Masie, 2008) reported on how employees in companies around the world learn at work, and how their learning preferences are changing. E-learning was ranked as the second most frequently used learning tool/method next to reading in the workplace. The majority of employees today rely heavily on self-directed and asynchronous resources, such as e-learning, to learn for work.

E-learning is believed to deliver various benefits, including cost-efficiency, convenience, interactivity, and flexibility in terms of easy updating and distribution, to name just a few (Rossett,

2002). In spite of these benefits of e-learning, there are quality issues involved: technology application-focus (Harris, 2005), a lack of learning experiences (Macpherson, Elliot, Harris, & Homan, 2004), and insufficient management support (Kim, Bonk, & Oh, 2008).

A discussion of the pros and cons of e-learning in terms of quality issues led us to look closely at the existing evaluation models and to serve as input for our integrated evaluation framework for e-learning. In this chapter, we intend to provide background information on e-learning evaluation; the concept of evaluation; existing evaluation models (i.e., four traditional models and two e-learning-specific models); our integrated evaluation framework for e-learning; a practical case-in-point; and our conclusion.

## BACKGROUND

Evaluation is defined as "the process of determining the merit, worth, and value of things and evaluations are the products of that process" (Scriven, 1991b, p.1). Evaluation provides information to judge and assess an object's merit and worth (Stufflebeam, 2001). Focusing on programs in an educational context, Tyler (1991) identified the six purposes of evaluation: (1) to monitor current programs; (2) to select a better program to replace the previous one; (3) to assist in developing a new program; (4) to identify the effects of a program; (5) to estimate the costs and effects of a program; and (6) to test the relevance and validity of a program.

## Purposes of E-Learning Evaluation

The definitions of evaluation need to be reexamined and clarified when using technology and e-learning in education and training. Organizations have recognized the usefulness of e-learning and have had high expectations of its quality, which

influenced the learning process and experience (MacDonald & Thompson, 2005). Based on practical needs, six purposes of e-learning evaluation were identified (Horton, 2001, p. 2):

1. **To justify investments in e-learning:** An effective evaluation can play a role in proving that e-learning contributes to organizational profits. These proofs can encourage top executives to increase investments in e-learning for the future.
2. **To make better decisions about e-learning:** An appropriate evaluation provides information to decide regarding analysis, development, and implementation of e-learning.
3. **To encourage stakeholders to be accountable:** Evaluation encourages stakeholders in e-learning, including departments, developers, instructors, facilitators and suppliers to take expected responsibilities.
4. **To demonstrate financial responsibility:** Evaluation demonstrates that e-learning focuses on business goals for financial outcomes.
5. **To improve e-learning quality:** Evaluation can measure the quality and effectiveness of e-learning and can identify areas that need improvement.
6. **To encourage learning activities and participation in e-learning:** The evaluation process encourages participants to be involved in learning activities and experiences by applying knowledge and sharing opinions.

### **The Significance of E-Learning Evaluation**

Evaluation in e-learning has become a critical issue, as evaluation plays an important role in improving the quality of e-learning and in justifying technology use in education (MacDonald & Thompson, 2005). The significance of e-learning

evaluation can be suggested from several perspectives in the systemic approach (Macpherson et al., 2004), resource allocation, and productivity (Turmel, 2003).

First, e-learning evaluation is valued for its systemic approach. Through systematic and holistic evaluation, organizations can view e-learning as an organizational strategy that develops human resources and improves competitive advantages for overall business goals (Macpherson et al., 2004). For example, if e-learning is used to obtain partial efficiencies in a narrow sense rather than as a part of a wider strategic approach, the evaluation of e-learning cannot provide comprehensive insights leading to developing organizational strategies.

Second, e-learning evaluation can contribute to resource allocation for training and development. Resources include both direct costs (e.g., designing and delivering e-learning) and indirect costs (e.g., replacing employees for training and development activities) (Burrow, 2003). The initial cost of e-learning in many cases is believed to be higher than the cost of developing traditional training programs, so the need to demonstrate returns on investment is much more demanding than the traditional counterpart. Organizations can make decisions regarding the degree of investment and cost for the entire training, according to the organizational availability for e-learning.

Third, e-learning evaluation enables organizations to check increased benefits from e-learning because e-learning provides a solution for productivity issues. Employee productivity in a job can decrease, even when he/she participates in traditional training and builds competencies after training, due to various departmental and organizational constraints (Turmel, 2003). Through the evaluation process, e-learning can be recognized to play a role as alternate solutions for improving productivity by allowing electronic feedback of trainees' utilization of learning content back to their jobs and tasks.

## THE CONCEPTS OF EVALUATION

According to the Joint Committee on Standards for Educational Evaluation (JCSEE) (1994), evaluation is defined as “the systematic investigation of the worth or merit of an object” (p. 3). The JCSEE, based on the definition of evaluation, has focused on standards such as comprehensive principles for assessing the quality of evaluation in education (Stufflebeam & Madaus, 1983). Evaluation standards are principles that obtain agreement from professionals in evaluation and enhance the quality and fairness of an evaluation (JCSEE, 1994; Stufflebeam & Madaus, 1983).

### Standards for Evaluation

The standards for evaluation consist of four categories: *utility*, *feasibility*, *propriety*, and *accuracy* (JCSEE, 1994). *Utility standards* define whether an evaluation serves the practical information needs of a given audience. The standards included in the *Utility* category are: stakeholder identification, evaluator credibility, information scope and selection, values identification, report clarity, report timeliness and dissemination, and evaluation impact. *Feasibility standards* call for evaluation to be realistic, prudent, diplomatic, and economical. The three standards in the *Feasibility* category include: practical procedures, political viability, and cost-effectiveness. *Propriety standards* are intended to facilitate protection of the rights of individuals affected by evaluation. The eight standards in the *Propriety* category are: service orientation, formal agreement, rights of human subjects, human interaction, complete and fair assessment, disclosure of findings, conflict of interest, and fiscal responsibility. *Accuracy standards* are intended to ensure that an evaluation will reveal and convey accurate information about a program’s merit and/or worth. The twelve accuracy standards are: program documentations, context analysis, described purposes and procedures, defensible information

sources, valid information, reliable information, systematic information, analysis of quantitative information, analysis of qualitative information, justified conclusions, impartial reporting, and meta-evaluation.

### Types of Evaluation

The types of evaluation vary, according to the contents, objectives, domains, functions, criteria and systems. The following section introduces two types of evaluation, formative and summative evaluation, which differ based on function within this classification.

Formative evaluation is an approach of evaluation designed, done, and intended to support the process of improvement (Scriven, 1991a). Formative evaluation refers to evaluation efforts to ensure that: (1) the training program is well organized and runs smoothly; and (2) trainees learn and are satisfied with the program (Noe, 2008). This type of evaluation provides information on how to make a program better and has a project or course team as a primary audience (Oliver, 2000). Formative evaluation is conducted most often by those people who are involved in developing what is to be evaluated, such as project or course team members; it can be conducted externally to provide timely information when required. Formative evaluation, therefore, seeks to find valuable information about objects for improvement through evaluation activities during the process (Kifer, 1995).

Summative evaluation refers to evaluation conducted to determine the extent to which trainees have changed as a result of participating in a training program (Noe, 2008). Summative evaluation is done for people or decision-makers who need evaluative conclusions for any reasons besides development (Scriven, 1991a), and it is often meant as an external process concerned with judgment rather than improvement (Oliver, 2000). Evaluation, as a summative approach, is the systemic and objective determination

concerning the value of an object. In addition, evaluation can be implemented by the judgment of an object, based on accumulated evidence about how it compares with similar objects in meeting the needs of consumers (Scriven, 1991a). Consequently, summative evaluation leads to a final report regarding the effectiveness of what is being evaluated. Based upon the summative evaluation results, the target object can be either terminated or significantly modified for continuation.

## **EXISTING EVALUATION MODELS OF E-LEARNING**

In this section, the existing evaluation models and frameworks were reviewed in order to lay the foundation for understanding the evaluation of e-learning. Stufflebeam (1983), Kirkpatrick (1987), Phillips (1997), and Holton (1996) were chosen as representative training evaluation models. The frameworks developed by Rosenberg (2001) and Khan (2005) were also reviewed in terms of specific evaluation issues for e-learning.

The reasons for selecting four existing evaluation models are as follows. First, the traditional training evaluation model by Kirkpatrick (1987) was considered because this model has been the most influential antecedent of existing training evaluation frameworks (Horton, 2001). Second, Phillips (1997) embraced the concept of the cost-effectiveness of training as an additional evaluation issue of Kirkpatrick's (1987) layered approach. Third, while these two models were chosen, especially for outcome-based evaluation, two other comprehensive models by Stufflebeam (1983) and Holton (1996) were included to broaden the scope of evaluation, not only to individual and contextual/environmental issues, but also to the developmental process.

On the other hand, Khan (2005) and Rosenberg (2001) were selected as representative e-learning evaluation models, as they reflect the unique nature of e-learning. Khan (2005) offers an e-learning-

specific evaluation model by incorporating people, process, and product in an e-learning program. Rosenberg (2001) expands the domain of evaluation by covering the costs, quality, accessibility, and speed of an e-learning program. Rosenberg's (2001) evaluation model is more inclusive than Khan's (2005) counterpart in that the former covers financial and customer factors, as well as the quality of e-learning programs.

## **Stufflebeam's CIPP Model**

The original version of the Context-Input-Process-Product (CIPP) model was developed in the late 1960s (Stufflebeam, 1983). The initial model was a substitute evaluation framework for the widespread thought that training evaluation should focus on objectives, testing, and experimental design (Stufflebeam, 1983). The main concept of the CIPP model includes four components of evaluation: context, input, process, and product of the training program (Stufflebeam, 2003).

First, context evaluations assess the current problems, stakeholders' needs, rationale of the program, and organizational strengths and opportunities (Singh, 2004; Stufflebeam, 2003). This step is crucial in defining the institutional context, setting the target trainee group and its underlying needs, and understanding the appropriateness of the proposed goals and objectives (Stufflebeam, 1983).

Second, evaluations for input examine the allocation of human and physical resources in organizations (Stufflebeam, 1983). The main objective of input evaluations is to appreciate the organization's system capability, procedures for budgeting and scheduling, and most importantly, certain alternatives to flexibly satisfy the stakeholder's needs with cost-effectiveness (Singh, 2004; Stufflebeam, 1983).

Third, process evaluations focus on the implementation of the plans (Stufflebeam, 1983). The benefits of process evaluations encompass the improvement of procedural design and its imple-

mentation by detecting or predicting defects in the process (Singh, 2004; Stufflebeam, 1983).

Fourth, product evaluations assess the outcomes of the program (Singh, 2004; Stufflebeam, 2003). Whether intended or unintended, short term or long term, outcomes should be measured based on stakeholders' judgment and qualitative and/or quantitative approaches (Stufflebeam, 1983).

The main thrust of the CIPP model is based on the view that "evaluation should not be done to prove but improve" (Stufflebeam, 1983, p. 118). The overall evaluation from context to outcomes enables training to better serve its stakeholders.

### **Kirkpatrick's Four Levels of Evaluation**

One of the most dominant evaluation frameworks for training has been the four levels of evaluation by Kirkpatrick (1987). The main concept of Kirkpatrick's model has formed the foundation of the layered approach of the most prominent evaluation frameworks (Horton, 2001). Although this classical model was initially established in 1959, it still seems to show a flexible application as an effective evaluation framework for e-learning (Horton, 2001; Strother, 2002).

The model consists of four progressive stages. Starting with the first level, the framework assesses more advanced outcomes of the training program, including: (1) participants' immediate reaction to the training program; (2) acquired knowledge and skills by learners; (3) learners' application of learning into practice; and (4) the business result of the training (Kirkpatrick, 1998). The evaluating criteria for each level include:

- **Level 1** (Reaction): Trainee satisfaction.
- **Level 2** (Learning): Acquisition of knowledge and skills.
- **Level 3** (Behavior or Performance): Improvement of behavior on the job.
- **Level 4** (Results): Business results achieved by trainees.

Although the four levels of evaluation have been influential in the field of training evaluation over the past 30 years, there have been some criticisms regarding its simplicity (Galloway, 2005). In other words, this model excessively focuses on the assessment of the training outcome (Holton, 1996), regardless of diverse training contexts. Moreover, it is not easy to measure outcomes from each level in actual evaluation practices (Noe, 2008). From a theoretical perspective, this model lacks conceptual evidence of the sequential occurrence of each level's outcome (Noe, 2008). Kirkpatrick (1998) originally argued that the higher level's outcome cannot occur if there is no positive outcome in the lower level; however, there has been little academic evidence for this argument (Noe, 2008). Despite these drawbacks, there is no doubt that this seminal evaluation model has been most influential in the field over the last several decades.

### **Phillips' ROI Evaluation**

Phillips (1997) argues that the most critical priority of training professionals is to evaluate the financial return on investment (ROI) of their activities. In addition to Kirkpatrick's four levels of evaluation, as briefly discussed in the previous section, he suggested integrating another level: the evaluation of ROI – the cost-benefit ratio of the training program (Phillips, 1997). The main idea is that the outcome at the fourth level is translated into monetary value and is compared with the cost invested to the training program (Strother, 2002).

The evaluation of ROI is considered as an outside component of Kirkpatrick's four levels, but is often referred to as Level 5 evaluation (Noe, 2008). The evaluating criteria for Level 5 should be the cost-benefit effectiveness of the training (Galloway, 2005; Phillips, 1997).

Although there are certain opposing arguments against using the ROI concept to evaluate training outcomes, this approach has continuously

gained its rationale as an evaluating standard for training. In an actual organizational context, there are continuous demands to verify the training's effectiveness and accountability (Mungania & Hatcher, 2004). The demonstration of the ROI of training can be an appropriate way to attract organizational support, based on increased credibility (Galloway, 2005).

### **Holton's Evaluation Research and Measurement Model**

Holton (1996) developed a comprehensive evaluation research and measurement framework, based on the criticism of Kirkpatrick's (1987) evaluation model. His inclusive framework was established to consider various intervening variables affecting training outcomes. While the traditional evaluation model of Kirkpatrick (1987) focuses only on training outcomes, Holton (1996) encompasses more diverse factors, such as motivation, trainability, job attitudes, personal characteristics, and transfer climate, all of which may influence the transfer process of learning into individual performance and organizational results.

Holton (1996) clarifies three layers—motivation elements, environmental elements, and ability/enabling elements—that influence learning transfer into organizational results through individual performance. While the motivation elements include motivation to learn and to transfer learning into performance outcome, the environmental factors encompass the culture and climate, which are the foundation of the transfer efforts. An effectively designed transfer mechanism aligned with organizational goals is also included as the third influential factor. In addition, secondary influences, such as personality characteristics, readiness, and job attitudes were considered to be significant variables for training effectiveness (Holton, 1996).

The evaluation research and measurement model is meaningful in that it provides a systemic and inclusive background for training evaluation

(Holton, 1996), though it is difficult to implement in practice. Holton's effort in developing an inclusive framework reflects the main objective of this chapter, which is to establish the integrated evaluation framework from a comprehensive perspective.

### **Khan's Evaluation Issues in E-Learning**

Khan's (2005) evaluation model for e-learning programs is composed of two dimensions. The first dimension focuses on the people, processes, and products of e-learning. Evaluation issues of e-learning should consider: (1) how e-learning materials are planned, designed, developed, delivered, and maintained; (2) how well courses are taught and supported; (3) how well program and institutional-level services are provided; (4) how e-learning programs are viewed by stakeholders; and (5) how well learners have learned the materials.

Another dimension of evaluation concerns the sequential process of e-learning. It involves the content development process, including the planning, design, production, delivery and maintenance process, and the evaluation process of e-learning programs (Khan, 2005).

While this two-dimensional framework is meaningful in that it encompasses relatively broad evaluation issues in e-learning-specific contexts, several limitations can be indicated. First, Khan's evaluation model has little connection with learning outcomes, which have been recognized as one of the most important evaluation criteria in the previous literature (e.g., Kirkpatrick, 1987; Rosenberg 2001). Second, the model fails to incorporate certain important factors affecting the outcomes of e-learning programs comprehensively. For example, contextual factors (Stufflebeam, 1983), such as support from management and learning cultures in the organization, are neglected. Third, Khan (2005) does not give any idea about the next step after an evaluation. What action should be

taken if the evaluation results are not satisfactory? This question should have been addressed.

### Rosenberg's E-Learning Success Criteria

Rosenberg (2001) insists that showing improvement in performance is not sufficient to justify e-learning programs. Rather, he proposes four criteria that organizations should consider in evaluating and justifying e-learning programs: cost, quality, service, and speed.

He suggests that the value of e-learning is the sum of its ability to save money, generate benefit to a business (i.e., enhance skill and knowledge, improve job performance, and influence results), be available to everyone and do all of these at high speed. His evaluation framework is inclusive and comprehensive in that it incorporates the financial aspect (cost), customer's needs (service), and the uniqueness of Internet-based learning (speed), as well as performance and the results of e-learning program quality (Rosenberg, 2001).

Based on a review of the six evaluation models, Table 1 summarizes the key concepts of these models reviewed in this chapter.

### AN INTEGRATED EVALUATION FRAMEWORK FOR E-LEARNING

Although previous evaluation models provide diverse insights, it is difficult to say that they reflect comprehensive approaches for e-learning evaluation. For example, Kirkpatrick's model focuses on outcomes after people experience e-learning programs, ignoring how e-learning design and development are undertaken.

As for an alternative model of e-learning evaluation, our integrated framework is established, as shown in Figure 1. The framework is appropriate for e-learning evaluation in terms of successfully considering various aspects before and after implementing an e-learning program. The integrated framework also reflects the perspectives of both e-learning providers and users. Before

Table 1. Summary of six evaluation models

Evaluation Model	Summary
Stufflebeam's CIPP Model	<ul style="list-style-type: none"> <li>• Context: Are the mission and program goals being met?</li> <li>• Input: Does the quality and quantity of resources meet the needs?</li> <li>• Process: To what extent were the program components implemented?</li> <li>• Product: What impacts and outcomes have resulted from this program?</li> </ul>
Kirkpatrick's Four Levels of Evaluation	<ul style="list-style-type: none"> <li>• Level 1 (Reaction): Trainee satisfaction</li> <li>• Level 2 (Learning): Acquisition of knowledge and skills</li> <li>• Level 3 (Behavior or Performance): Improvement of behavior</li> <li>• Level 4 (Results): Business results achieved by trainees</li> </ul>
Phillips' ROI Evaluation	<ul style="list-style-type: none"> <li>• Return on Investment</li> <li>• Cost-benefit ratio of the training</li> </ul>
Holton's Evaluation Model	<ul style="list-style-type: none"> <li>• Motivation elements: Motivation to learn and transfer learning</li> <li>• Environmental elements: Culture and climate</li> <li>• Ability/enabling elements: Transfer design linked to organizational goals</li> </ul>
Khan's Evaluation Issues in E-Learning	<ul style="list-style-type: none"> <li>• Content development process: Planning, design, production &amp; evaluation</li> <li>• Elements: People, process, and product</li> </ul>
Rosenberg's E-Learning Success Criteria	<ul style="list-style-type: none"> <li>• Cost: Financial aspect</li> <li>• Quality: Kirkpatrick's Four Levels</li> <li>• Service: Customer needs</li> <li>• Speed: Responsive system</li> </ul>



e-learning programs are available to an audience, the entire procedure is evaluated based on the needs of those undergoing the e-learning program. How e-learning is implemented, and what outcomes the e-learning program creates should be evaluated after people finish their studies via e-learning.

Our integrated framework consists of six stages: context, resources, process, product, implementation, and outcomes. It also includes two levels at which the six evaluation stages take place: the program and organizational levels, which influence the evaluation of each stage differently in terms of micro and macro perspectives. Since there are two types of products in the e-learning context, e-learning program and the outcome from that program, we divided Stufflebeam's product stage into three phases of product, implementation, and outcomes. While Stufflebeam's (1983) and Holton's (1996) models were embedded into the overall phases of the integrated framework, Kirkpatrick's (1987) and Phillips' (1997) traditional evaluation concepts were included in the last evaluation phase of outcomes. Evaluation issues of Rosenberg (2001)

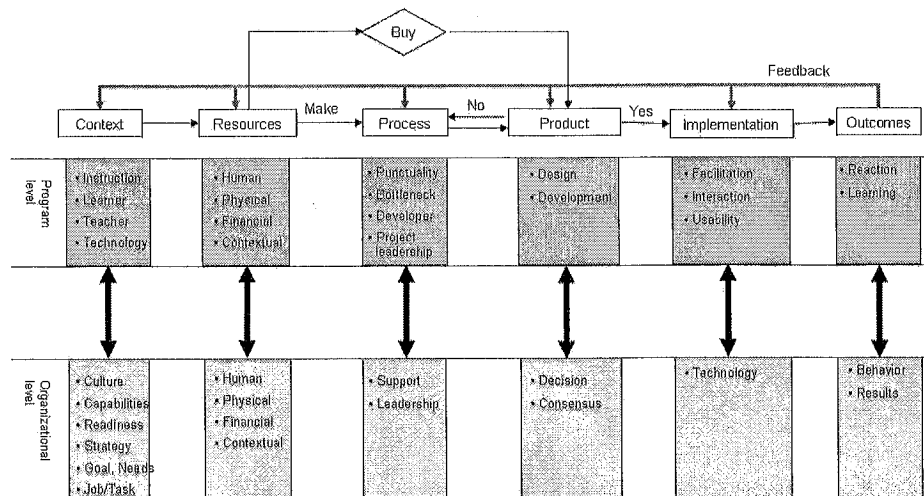
and Khan (2005) were also integrated in order to establish our proposed evaluation framework applicable to the e-learning context.

### Context

The first stage of the integrated evaluation framework for e-learning is related to the context of e-learning. In this step, the overall teaching model and instructional decisions, individual learners' aspects, faculty development and technology issues for e-learning should be considered at the program level. These factors must be aligned with the learning objectives of the organization. In a broader organizational context, organizational culture, climate, and capability for learning and transfer can be evaluated. An organization's training needs and readiness for training are also important issues to examine.

This stage of context evaluations is similar to that of Stufflebeam's model, and is based on Holton's idea that evaluation should not tie only into training outcomes. This is a very significant initial step for the integrated evaluation framework of e-learning.

Figure 1. The integrated evaluation framework for e-learning



## **Resources**

As the second stage, e-learning can be evaluated in terms of whether the various types of organizational resources – human, physical, financial, and contextual resources – are allocated effectively. For example, evaluators should examine whether appropriate instructors and training staff, required tools and the infrastructure of e-learning, as well as investment and support from management, were effectively assigned. The concept of effective resource allocation addresses the cost-effectiveness issues of Stufflebeam's model, as well as it emphasizes evaluation at both the program and organizational levels.

After the assessment of this stage, training professionals should decide either to buy an e-learning program from external firms or to make their own program. If they decide to buy a program, product evaluation is the next step; otherwise, they move onto the development process stage.

## **Buy**

Training professionals find existing e-learning programs in the market after considering the stage of context and resources. If existing e-learning programs are appropriate for learning objectives, they can outsource them. Buying e-learning programs contribute to cost-effectiveness and time-saving when they include similar contents and functions that buyers want.

## **Process**

The third stage, process, is considered when training professionals decide to develop e-learning programs with their own resources. Process includes a series of activities needed to develop e-learning programs as an entire project, and is similar to the process evaluation of Stufflebeam's model. The process evaluation of the integrated framework focuses on how an e-learning program is successfully created and managed in terms of project

management. For instance, a proper management schedule (punctuality), clarifying the problems in creating the e-learning program (bottleneck), collecting opinions from the developers and stakeholders of e-learning (developers), and establishing positive relationships among members and leading teamwork (project leadership) are all important factors for process evaluation.

## **Product**

Product evaluation, the fourth stage, involves the design and development of e-learning. The main concerns of designing an e-learning program include the following: contents (objectives, accuracy, and level), instructional design (clear objectives, design evaluation tools, and instructional strategies) and storyboard (blueprint for development). Through the design, visible outcomes for development are created. In development, a specific type of e-learning is decided through coding and the art design. Based on the results of the development process, a prototype (for example, one learning module) is created as a sample of the entire e-learning program. Unexpected problems or errors can be corrected by reviewing the prototype. If critical deficits are found, training professionals or the e-learning development team will go back to the process evaluation. After the prototype is revised and confirmed by organizational decision and consensus, e-learning production is conducted as an entire package. Product evaluation merely serves as a final output as an object rather than targeting the results of implementation for an e-learning program. Therefore, it is a narrower concept than the product evaluations in Stufflebeam's (1983) model as a comprehensive outcome.

## **Implementation**

Unlike the other stages of evaluation, evaluating implementation of e-learning includes two

steps: pre-implementation evaluation and on-implementation evaluation. Pre-implementation evaluation is conducted to decide whether or not an e-learning program is ready to be published. The evaluation focus in this stage serves to clarify and minimize unexpected technical errors. Internal evaluators recruited from those who were involved in the design and development process check if the e-learning website is working properly as designed and developed. Thus, by clicking every link and testing every function in the website, facilitation, interaction and usability of the e-learning program are evaluated.

On-implementation evaluation is primarily conducted by feedback from the learners. Even if no errors are found in the pre-implementation evaluation, it is possible that unexpected errors and problems are found once the program is implemented because the server where the e-learning program is installed should accommodate multiple users. Adequate capacities of servers and network lines should be secured, based on the precise estimation of the number of trainees, peak time, and duration of visits. Because the main purpose of implementation evaluation is to detect and fix unexpected technical errors, the development staff should be alert in responding to these errors instantly.

## **Outcomes**

Evaluating outcomes corresponds with the quality evaluation suggested by Rosenberg (2001). This stage is the core evaluation because all preceding activities aim to improve the quality of the program. Therefore, we suggest that the interrelationships between outcome evaluation measures and other evaluation measures be examined. Each correlation coefficient can be used as an index showing the validity of evaluation measures across the entire evaluation process. Kirkpatrick's four levels are considered in this stage, as suggested by Rosenberg (2001). Level 1 (reaction) and level 2 (learning) categories are

evaluated on the program level, while level 3 (behaviors) and level 4 (results) are concerned with measuring the organizational effects of the e-learning program.

## **CASE IN POINT**

With an attempt to illustrate how our framework of e-learning evaluation is utilized within the Career and Technical Education (CTE) field, we conducted an evaluation study addressing the various aspects of contextual factors influencing the learning outcomes of a CTE program. This evaluation study is titled, "Evaluating Instructional and Learner Factors Affecting Course Outcomes for an Online CTE Program."

### **Purpose of the Evaluation**

In our evaluation study, the purpose was to examine what variables in learner characteristics and instructional variables influenced course outcomes made by a group of online learners. The key evaluation question was as follows: What variables in learner characteristics, instructional variables, and learning motivation and involvement influence course outcomes in learner satisfaction, learning gains, and perceived learning application for a CTE online course?

### **Evaluation Context**

A group of undergraduate students within a CTE program were asked to participate in the evaluation. The participants for the study included 125 students (39 male and 86 female) who took a program evaluation course conducted online at a southeastern US university.

The students took the online course, which required the completion of thirteen learning modules for a semester period, except for the course orientation and project presentation meetings. The workload of one learning module was equivalent

to that of one week's classroom instruction. Four sub-learning sections comprised one learning module. The online learning modules provided subject content in learner and program evaluation. The students were required to complete various online learning activities and assignments, including group discussions, virtual case studies, pre/post tests, review quizzes, weekly assignments, and group and individual projects. The purpose of these learning activities was not only to aid learning, but also for the online learners to apply acquired knowledge and skills while learning.

### Evaluation Procedure and Data Analysis

This study utilized several instruments for the data collection. First, an online questionnaire was used to obtain the evaluation data from the students about the context (instructional quality, learner characteristics and motivation), resource (learning support), product (learning activity), implementation (learning involvement), and outcomes (course satisfaction, perceived learning, posttest, learning gain, and perceived application). A knowledge test set was administered to assess the learners' learning gain after each semester. Regarding the instruments to assess learning motivation, we utilized the Learning Motivation Questionnaire (LMQ), composed of 24 question items (Lim & Kim, 2003). To collect the survey data, the learners were asked to participate in the surveys conducted online at the end of each semester. The data collection was performed for five semesters, including one summer semester between 2003 and 2005.

### Application of the Integrated Evaluation Framework

- *Context.* Learner characteristics (gender, age, distance learning experience, and online learning preference), learning motivation

and instructional quality were considered as contextual factors for this evaluation.

- *Resource.* Learning support is included as a resource element. This factor was identified as a contextual resource in our framework (Stufflebeam, 1983).
- *Product.* A learning activity could be evaluated as a product. Answers from questions of diverse learning activities measure the effectiveness of various learning activities designed for students.
- *Implementation.* Learning involvement concerns the extent of student participation, facilitated by the instructor of the e-learning program via the implementation process.
- *Outcomes.* Measures of the e-learning outcomes include the criteria of reaction (course satisfaction and perceived learning), learning (posttest and learning gain), and perceived behavioral change (perceived learning application).
- *Process.* The process evaluation was omitted because this evaluation case was established by information from learners who were not involved in developing e-learning programs with respect to project management. Based on the elements of the integrated evaluation framework, Table 2 summarizes the relationships between each evaluation criterion and the outcomes.

### Findings

First, as seen in Table 2, the learners' satisfaction (reaction) with the online course was significantly related with instructor quality (context), learning motivation (context), learning support (resource), learning activity (product), and learning involvement (implementation). Second, learning did not present any relationships with the remaining evaluation criteria, except for the relationships between the perceived learning and learning motivation/involvement. This finding reflects the notion

Table 2. Correlations between learning outcomes and instructional and learner factors

Outcomes		Context		Resource	Product	Implementation
		Instructor Quality	Learning Motivation	Learning Support	Learning Activity	Learning Involvement
Reaction	Course Satisfaction	.614**	.305**	.371**	.606**	.919**
	Perceived Learning	.170	.556**	.121	.061	.263**
Learning	Posttest	-.041	.144	-.084	-.059	-.061
	Learning Gain	-.034	.130	.019	-.021	.021
Behavior	Perceived Application	.174	.436**	.099	.069	.230**

\* $p < .05$ , \*\* $p < .01$  (Two-tailed tests)

that it is difficult to create meaningful evaluation results when the evaluation is conducted beyond the reaction level. Third, the behavioral level learning outcome (perceived learning application) was significantly correlated with learning motivation and learning involvement. From these findings, it seems that those variables related to learners' internal states (learning motivation and learning involvement) play a critical role in influencing learning outcomes for e-learning.

By applying our integrated evaluation framework, one can discover which elements are correlated with each level of e-learning outcomes. Thus, the proposed framework enables organizations to improve the quality of e-learning programs by identifying the relevant factors of the outcomes, as well as it enables organizations to increase the validity of e-learning evaluation.

## CONCLUSION

The purpose of this chapter was to provide an integrated evaluation framework for e-learning, based on a review of existing evaluation models. General and traditional evaluation models, such as Stufflebeam (1983), Kirkpatrick (1987), Phillips (1997), and Holton (1996) were reviewed. Rosenberg (2001) and Khan (2005) were also reviewed in terms of specific evaluation issues for the e-learning environment. Based on these six existing evaluation models, we present an integrated framework for e-learning evaluation. The integrated framework consists of six stages (context, resources, process, product, implementation, and outcomes), reflecting both e-learning providers and users.

Our integrated framework is appropriate for e-learning evaluation in terms of considering various aspects before and after implementing an

e-learning program. Before e-learning programs are available to an audience, the entire procedure is evaluated based on the needs of those undergoing the e-learning program. How e-learning is implemented, and what outcomes the e-learning program creates should be evaluated after people finish their studies via e-learning.

We are particularly concerned with two major issues related to the integrated evaluation framework for e-learning. One is that the entire evaluation process should focus not only on outcomes as it used to be, but also on other stages, particularly the context from the beginning. We believe that in order to see the vocal benefits of the cost-effectiveness of e-learning, an up-close needs analysis and assessment of e-learning in the context stage is a must. The other is that the process stage is even more significant because there are many factors to consider in the design and development of successful e-learning programs and courses.

We presented a case of an evaluation study to illustrate how our framework of e-learning evaluation is utilized. The evaluation study was conducted to address various aspects of contextual factors influencing the learning outcomes of e-learning. An important finding was that the course outcomes were mostly affected by diverse factors of e-learning, including context, resource, product, and implementation. This finding suggests that further research be undertaken, particularly in the area of e-learning course management, which was listed as a limitation of the current e-learning environment.

We would like to see more carefully designed and developed e-learning programs and courses that are curriculum-based and theoretically driven. Our integrated evaluation framework for e-learning can be a ground work with respect to suggesting both a bigger picture (context) and a detailed process and product. In so doing, organizations can show performance improvement by organizational members' rich learning experience, with the help of the e-learning environment.

## REFERENCES

- Allen, I.E., & Seaman, J. (2007). *Online nation: Five years of growth in online learning* (Annual Report). Retrieved on September 17, 2008, from [http://www.sloan-c.org/publications/survey/pdf/online\\_nation.pdf](http://www.sloan-c.org/publications/survey/pdf/online_nation.pdf)
- Burrow, J. (2003). Level III evaluation of e-learning. In G.M. Piskurich (Ed.), *The AMA handbook of e-learning* (pp. 393-409). New York, NY: AMACOM.
- Dillon, S. (2008, July 11). High cost of driving ignites online classes boom. *The New York Times*. Retrieved on December 5, 2008, from <http://www.nytimes.com/2008/07/11/education/11colleges.html>
- Galloway, D.L. (2005). Evaluating distance delivery and e-learning. *Performance Improvement*, 44(4), 21-26.
- Harris, J. (2005). Our agenda for technology integration. *Contemporary Issues and Technology and Teacher Education*, 5(2), 116-122.
- Holton, E.F., III. (1996). The flawed four-level evaluation model. *Human Resource Development Quarterly*, 7(1), 5-21.
- Horton, W. (2001). *Evaluating e-learning*. Alexandria, VA: American Society for Training & Development.
- The Joint Committee on Standards for Educational Evaluation (1994). *The program evaluation standards: How to assess evaluations of educational programs*. Thousand Oaks, CA: Sage Publications.
- Khan, B.H. (2005). *Managing E-learning: Design, delivery, implementation, and evaluation*. Hershey, PA: Information Science Publishing.
- Kifer, E. (1995). Evaluation: A general view. In G.J. Anglin (Ed.), *Instructional technology: Past,*

- present and future* (pp.384-392). Englewood, CO: Libraries Unlimited.
- Kim, K., Bonk, C.J., & Oh, E. (2008). The present and future state of blended learning in workplace learning settings in the United States. *Performance Improvement*, 47(8), 5-16.
- Kirkpatrick, D.L. (1987). Evaluation. In R.L. Craig (Ed.), *Training and development handbook* (pp. 301-319). New York, NY: McGraw-Hill.
- Kirkpatrick, D.L. (1998). *Evaluating training programs: The four levels*. Philadelphia, PA: Berrett-Koehler.
- Lim, D.H., & Kim, H.J. (2003). Motivation and learner characteristics affecting online learning and learning application. *Journal of Educational Technology Systems*, 31(4), 423-439.
- MacDonald, C.J., & Thompson, T.L. (2005). Structure, content, delivery, service, and outcomes: Quality e-learning in higher education. *International Review of Research in Open and Distance Learning*, 6(2), 1-25.
- Macpherson, A., Elliot, M., Harris, I., & Homan, G. (2004). E-learning: Reflections and evaluations of corporate programs. *Human Resource Development International*, 7(3), 295-313.
- Masie, E. (2008). *The voice of the learner: How employees learn in 2008*. Retrieved on July 16, 2008, from <http://www.masieweb.com/p7/Voice-of-the-Learner-070708-appendix.pdf>
- Mungania, P., & Hatcher, T. (2004). A systemic, flexible, and multidimensional model for evaluating e-learning programs. *Performance Improvement*, 43(7), 33-39.
- Noe, R.A. (Ed.) (2008). *Employee training and development* (4<sup>th</sup> ed.). New York, NY: McGraw Hill.
- Oliver, M. (2000). Evaluating online teaching and learning. *Information Sciences & Use*, 20, 83-94.
- Phillips, J.J. (1997). *Return on investment in training and performance improvement programs*. Houston, TX: Gulf Publishing Company.
- Piskurich, G.M. (Ed.) (2003). *The AMA handbook of e-learning*. New York, NY: AMACOM.
- Rosenberg, M.J. (2001). *E-learning: Strategies for delivering knowledge in the digital age*. New York, NY: McGraw Hill.
- Rossett, A. (2002). *The ASTD e-learning handbook*. New York, NY: McGraw-Hill.
- Scriven, M. (1991a). Beyond formative and summative evaluation. In M.W. McLaughlin & D.D. Phillips (Eds.), *Evaluation and education: At quarter century* (pp.19-64). Chicago, IL: University of Chicago Press.
- Scriven, M. (1991b). *Evaluation thesaurus*. Beverly Hills, CA: SAGE Publications.
- Singh, M.D. (2004). Evaluation framework for nursing education programs: Application of the CIPP model. *International Journal of Nursing Education Scholarship*, 1(1), 1-16.
- Stockley, D. (2003). E-learning definition and explanation. Retrieved on September 17, 2008, from: <http://derekstockley.com.au/elearning-definition.html>
- Strother, J. (2002). An assessment of the effectiveness of e-learning in corporate training programs. *International Review of Research in Open and Distance Learning*, 3(1), 1-17.
- Stufflebeam, D.L. (1983). The CIPP model for program evaluation. In G.F. Madaus, M.S. Scriven & D.L. Stufflebeam (Eds.), *Evaluation models: Viewpoints on educational and human service evaluation* (pp.117-141). Boston, MA: Kluwer-Nijhoff.
- Stufflebeam, D.L. (2001). *Evaluation models*. San Francisco, CA: Jossey-Bass.

Stufflebeam, D.L. (2003). The CIPP Model for evaluation. *Proceedings of the 2003 Annual Conference of the Oregon Program Evaluation Network (OPEN)*, October 3, Portland, Oregon.

Stufflebeam, D.L., & Madaus, G.F. (1983). The standards for evaluation of educational programs, projects, and materials: A descriptions and summary. In G.F. Madaus, M.S. Scriven & D.L. Stufflebeam (Eds.), *Evaluation models: Viewpoints on educational and human service evaluation* (pp. 395-404). Boston, MA: Kluwer-Nijhoff.

Turmel, W. (2003). Evaluating your e-learning implementation. In G.M. Piskurich (Eds.), *The AMA handbook of e-learning: Effective design, implementation, and technology solutions* (pp. 373-391). New York, NY: AMACOM.

Tyler, R.W. (1991). General statement on program evaluation. In M.W. McLaughlin & D.D. Phillips (Eds.), *Evaluation and education: At quarter century* (pp.1-17). Chicago, IL: University of Chicago Press.

## KEY TERMS

**Context:** Specific conditions or situations of e-learning, including program level (instruction, learner, teacher, and technology) and organi-

zational level (culture, capabilities, readiness, strategy, goal and job).

**E-Learning:** A type of learning where the medium of instruction is computer and Internet technology.

**Implementation:** Assessment of e-learning readiness for publicity and applications of the feedback from learners in e-learning.

**Integrated Evaluation Framework for E-Learning:** Comprehensive e-learning evaluation framework with six stages (context, resources, process, product, implementation, and outcomes).

**Kirkpatrick's Four-Level Evaluation:** The layered evaluation approach with four progressive stages: Level 1 (reaction), level 2 (learning), level 3 (behavior/performance) and level 4 (results).

**Outcomes:** The evaluation of e-learning quality in terms of reaction, learning, behavior and results.

**Process:** Decision processes to create and manage e-learning.

**Product:** Outcomes of design and development of e-learning.

**Resource:** human, physical, financial, and contextual resources of e-learning design, development, and implementation.

**ROI:** Cost-benefit ratio to clarify return on investment of diverse programs.