A Comprehensive E-Learning Model

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Abstract

In e-learning, people are involved in the process of creating e-learning materials and making them available to a specified audience. The People-Process-Product Continuum or P3 Model (Figure 1) can be used to map a comprehensive picture of e-learning (Khan, 2004, in press). For example, people involved in e-learning can be referred to as the E-Learning Team responsible for producing e-learning materials (Figure 1).

In this article, I discuss the stages of the e-learning process in terms of people responsible for providing various e-learning and blended learning products.

The e-learning process can be divided into two major phases: (1) content development, and (2) content delivery and maintenance (Figure 2). A typical e-learning process has planning, design, development, evaluation, delivery, and maintenance stages. The e-learning process is iterative in nature. Although evaluation is a separate stage of the e-learning process, shown in Figure 1, ongoing formative evaluation for improvement (i.e., revision) should always be embedded within each stage of the e-learning process. Individuals involved in various stages of the e-learning process should be in contact with each other on a regular basis and revise materials whenever needed.

Based on the size and scope of the project, the number of individuals involved in various stages of an e-learning project may vary. Some roles and responsibilities may overlap, as many e-learning tasks are interrelated and interdependent. A large-sized e-learning project requires the involvement of various individuals. In a small or medium-sized e-learning project, some individuals will be able to perform multiple roles. When an e-learning course is completely designed, developed, taught, and managed by a single individual, it is clear that the same individual has performed the role of content expert, instructional designer, programmer, graphic artist, project manager, etc. This is an example of a small-size e-learning project. Many of my colleagues have had experiences in developing their online courses by themselves, with intermittent staff support from their institutions.

1. Introduction

In this article, I have tried to identify various roles and responsibilities involved in e-learning. Some roles and responsibilities may be relevant to specific stages of the e-learning process. For example, an instructional designer is generally involved during the content development process, whereas services from a technical support person are mostly needed during the content delivery stage. Please note that the roles of individuals and their general responsibilities listed in Table 1 are by no means complete. The titles used for various e-learning roles (in Table 1) are not to suggest that an e-learning institution must create such specific positions; rather, the intention is to describe the roles and responsibilities required for e-learning projects. Based on what is appropriate for your specific projects, you can either hire new people or outsource to external sources.

2. Stages of the E-Learning Process

Next, the following e-learning stages are discussed in terms of what individuals in e-learning actually do and what they produce or deliver (that is, the *people* and the *products* at each *stage* of the *process*):

- planning;
- design;
- production;
- evaluation;
- delivery and maintenance;
- instruction stage;
- marketing.

2.1 Planning Stage

At the planning stage, the planning team (which can be comprised of individuals such as director, manager, instructional designer, etc.) should develop a project plan by analyzing various aspects of the people, processes, and products involved in the e-learning initiative. This plan must be pedagogically and financially sound and should guide each e-learning team (e.g., production, evaluation, delivery, maintenance, instructional, and support services) to engage in their respectively assigned activities. During the planning stage, the team creates a project plan that clearly identifies the people, process, and product of each stage of the e-learning process, including, design, development, evaluation, delivery, and maintenance. The plan also indicates the estimated completion time for each task.

Director, project manager, research and design coordinator, and instructional designer are among the *people* who work together to make the project plan pedagogically sound. The business developer works with the team to make sure that

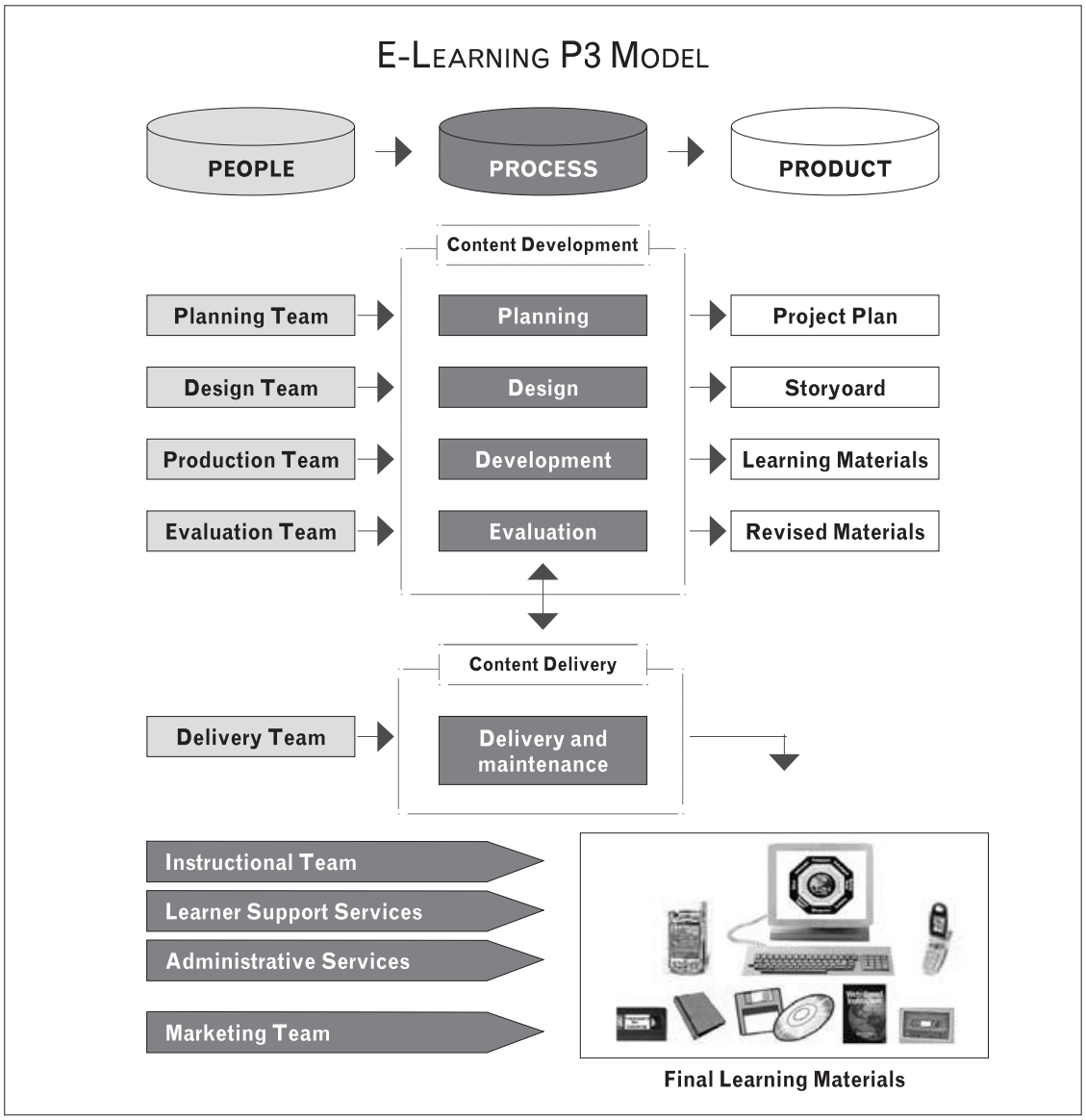

Figure 1 Learning People-Process-Product Continuum.

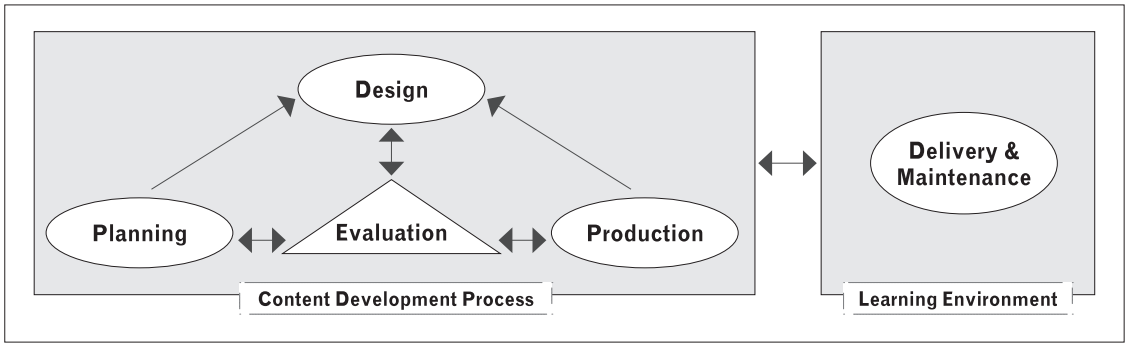

Figure 2 The Iterative Process of E-Learning.

the plan is financially sound. The business developer should also develop a marketing plan by including empirical data on the institution's course quality, student satisfaction, and retention rates. The research and design coordinator assists the business developer in analyzing student data and also provides valuable research information about e-learning on a regular basis. Outside consultants can also be part of the planning process.

The *product* of the e-learning planning process is a sound *e-learning project plan* (see Figure 1). The e-learning project plan provides guidance during the various stages of the e-learning process. E-learning designers, developers, evaluators, and instructional and support staff should follow the guidelines of the e-learning project plan to provide a meaningful environment for learners.

2.2 Design Stage

At the design stage, the *people* include the research and design (R&D) coordinator, who leads the e-learning course design process. With a comprehensive understanding of learners' needs, institutional capabilities, and experience in e-learning design and research, the R&D coordinator is responsible for reviewing course content for pedagogical soundness and the selection of the appropriate delivery medium. In this stage, the people involved include instructional designers, as well as those who work with subject matter experts, interface designers, copyright coordinators, and evaluation specialists. The major *product* of an e-learning course design process is the *storyboard* (see Figure 1). During the development of the course storyboard, the design team communicates with the production and delivery teams for any technical and production related issues.

Instructional designers are knowledgeable about how to use various attributes and resources of the Internet and digital technologies to design e-learning activities. Based on the content types, they can incorporate instructional strategies and techniques best suited for the selected audience. However, it is important to note that instructional design services may not be adequately available in some institutions. With some knowledge of instructional design, many instructors can design their own online courses.

In developing course contents, subject matter experts may decide to use copyrighted materials from outside sources. Instructional designers work with copyright coordinators to negotiate permission to use these copyrighted materials.

Interface designers are responsible for the presentation of e-learning content. They make sure that the learners can use e-learning materials in a user-friendly environment. They work with instructional designers to create a consistent look and feel for all e-learning contents.

Following the overall goals and objectives of the course, evaluation specialists design various assessment strategies to measure students' performance in e-learning.

Please note that an instructional designer with skills and knowledge in interface design and assessment strategies may be able to play the role of interface designer and evaluation specialist in small- to medium-sized e-learning projects. However, for large-sized e-learning projects, services of specific interface designers and evaluation specialists are critical.

Many online universities use outside content experts for their courses. I provided the content for a course entitled «Developing and Implementing e-Learning Systems» for the Masters in Education in e-Learning at the Jones International University (JIU). As a content author, I worked directly with an instructional designer, who guided me in the preparation of the course content. While writing content for the course, I had to provide a list of all additional readings (e.g., journal articles and books chapters). The copyright acquisition coordinator at JIU negotiated with publishers about using their materials in the course. However, one publisher's price to do so was unacceptable to JIU. Therefore, I had to revise the content to select another reading assignment. Information about the course is available at: http://www.jonesinternational.edu/ourPrograms/course.php?crs=101&spc=65&prg=2

2.3 Production Stage

At the course production stage, the production team creates the online course from the course storyboard created during the design stage. The production coordinator leads the e-learning production process. Team members include, but are not limited to these *people*: course integrator, programmer, graphic artist, multimedia developer, photographer/videographer, editor, learning objects specialist, and quality assurance person. The production coordinator makes sure that the timeline is maintained for all deliverables. The e-learning production process is time consuming. It is a collaborative process in which each member does his or her own specific tasks for a course. For example, the course integrator cannot put all parts of a lesson together if each member does not provide his or her part of the task, on time.

In e-learning, members of the development team can be remotely located. The production coordinator should make sure that members are in good communication with each other and in compliance with due dates for their respective tasks. All members must have patience, as continually emerging issues may demand new changes and modification in the e-learning, which in turn can be added work for all members. Members should put their works in designated areas on a centralized server (which we call a «development server»). The development server becomes a collaborative work space for the e-learning members. Recently, I served as a consultant for an e-learning project at the World Bank, where I worked with the project manager, instructional designers, graphic artists, and programmers who were remotely located.

Once the course is created, it is important to do pilot testing with a representative group of diverse learners. For the pilot testing, learners can access the course at the development server with a password. These learners can be remotely located. For an efficient evaluation of the pilot project, the course should be designed to receive learners' comments on a specific page. For example, if a learner finds a symbol is culturally offensive on a page, he or she can attach his or her comments with that specific graphic or the page. The production coordinator can make these comments available to responsible team members. Data from the pilot testing will provide valuable information about what works and what does not work. Instructional designer and the interface designers can work with the production team and revise the course whenever appropriate.

The *product* of the production process, then, is *course materials* ready for pilot testing (see figure 1).

TABLE 1
ROLES AND RESPONSIBILITIES IN E-LEARNING

Role of Individual	*Responsibilities*
Director	Directs e-learning initiatives. Develops e-learning plans and strategies.
Project Manager	Supervises the overall e-learning process, including: design, production, delivery, evaluation, budgeting, staffing, and scheduling. Works with coordinators of various e-learning teams.
Business Developer	Develops business plan, marketing plan, and promotion plan. Coordinates internal and external strategic partnerships.
Consultant/ Advisor	Provides independent, expert advice and services during various stages of e-learning.
	Content Development Process
Research and Design Coordinator	Coordinates e-learning research and design processes. Informs management and design teams about the latest data pertaining to online learning activities and research.
Content or Subject Matter Expert	Writes course contents and reviews existing course materials (if any) for accuracy and currency.
Instructional Designer	Provides consultation on instructional strategies and techniques for e-learning contents and resources. Helps select delivery format and assessment strategies for e-learning.
Interface Designer	Responsible for site design, navigation, accessibility, and usability testing. Responsible for reviewing interface design and content materials to be compliant with national accessibility guidelines.
Copyright Coordinator	Provides advisement on intellectual property issues relevant to e-learning. Responsible for negotiating permission to use copyrighted materials including articles, books chapters, videos, music, animations, graphics, Web pages, etc., from copyright holders.

Evaluation Specialist	Responsible for evaluation and assessment design and methodology. Conducts and manages student assessment and evaluation of e-learning environments.
Production Coordinator	Coordinates e-learning production process.
Course Integrator	Responsible for getting all pieces of e-learning (e.g., Web pages, chat rooms, Java applets, e-commerce, etc.) working together under a learning management system.
Programmer	Programs e-learning lessons following the storyboard created in the design process.
Editor	Reviews e-learning materials for clarity, consistency of style, grammar, spelling, appropriate references, and copyright information.
Graphic Artist	Uses creativity and style to design graphical images for e-learning lessons.
Multimedia Developer	Responsible for creating multimedia learning objects, such as audio, video, 2D/3D animations, simulations, etc.
Photographer/ Videographer	Responsible for photography and video related to e-learning contents.
Learning Objects Specialist	Guides the design, production, and meaningful storage of learning objects by following internationally recognized standards (e.g., SCORM, AICC, IEEE, etc.).
Quality Assurance	Responsible for quality control in e-learning.
Pilot Subjects	Participates in e-learning pilot testing.
Delivery Coordinator	Coordinates the implementation of e-learning courses and resources.
	Content Delivery and Maintenance Process
Systems Administrator	Administers LMS server, user accounts, and network security.
Server/Data base Programmer	Responsible for server and data base related programming especially for tracking and recording learners' activities.
Online Course Coordinator	Coordinates the instructional and support staff for online courses.
Instructor(or Trainer)	Teaches online courses.
Instructor Assistant	Assists the instructor or trainer in instruction.
Tutor	Assists learners in learning tasks.
Discussion Facilitator or Moderator	Moderates and facilitates online discussions.
Customer Service	Provides generic help and points to appropriate support services based on specific needs of customers (i.e., learners).
Technical Support Specialist	Provides both hardware- and software-related technical help.
Library Services	Interactive library services for learners who can ask questions to librarians about their research, both asynchronous and in real time via the Internet.
Counseling Services	Provides guidance on study skills, self-discipline, responsibility for own learning, time management and stress management, etc.

Administrative Services	Administrative services include admission, schedules, etc.
Registration Services	Responsible for efficient and secure registration process for e-learning.
Marketing	Responsible for marketing e-learning offerings.
Other (specify)	

2.4 Evaluation Stage

Several phases of evaluation can be conducted during the overall e-learning process. These evaluations are conducted to improve the effectiveness of e-learning materials. There are two types of evaluation, formative and summative. By conducting ongoing *formative evaluation*, we can improve the e-learning product as it is being developed. *Summative evaluation* is usually conducted to do the final assessment of e-learning products. However, e-learning projects undergo ongoing evaluation for improvement. Therefore, formative evaluation is inherent in e-learning development process.

Instructional designer and interface designers are among the *people* who assist the evaluation specialist in analyzing learners' feedback from the pilot testing. With learners' feedback, the evaluation specialist communicates with the design and production teams for revising the course accordingly.

Once the course is delivered, *students' evaluation* (both ongoing and at the end of the course) will provide important feedback, which can be used by the design and development team to revise the course materials for improvement. However, some institutions may not have the luxury with having non-students to pilot test their courses. In such situations, the method of testing on the first delivery with real students can be useful.

The *product* of the evaluation process is *revised course materials*, which can be offered to learners (see Figure 1).

Once the course materials are developed and approved by the institution, the next step is to make them available to the specified audience.

2.5 Delivery and Maintenance Stage

All online course materials should be accessible by the learners at anytime from anywhere in the world. All supplemental course materials (e.g., CD, DVD, audio and video cassette, book, course pack, etc.) should be delivered to learners. The delivery and maintenance or D&M team consists of individuals such as systems administrator, server/data base programmer, Webmaster, etc., who are the *people* responsible for maintaining an effective and efficient learning environment, with their assigned roles and responsibilities.

The D&M team maintains the leaning management system (LMS) and data bases, provides technical support to students, instructors, and support staff, and

manages LMS user accounts and network security. They also provide technical assistance to the design and production teams in the areas of software and hardware related issues for e-learning. They are responsible as well for duplicating and distributing learning materials, and installing and maintaining the course. Ongoing updating and monitoring is a major part of the e-learning maintenance process. Individuals involved in maintenance should keep e-learning materials updated on a regular basis. They should also check to see that all links and resources are active. In some institutions, e-learning materials are developed by outside vendors, who may be responsible for migrating all learning materials to the institution's server.

Overall, the D&M team is responsible for ongoing updating and monitoring of the e-learning environment, including security measures for access control and information confidentiality. No institutions are immune from hackers. Any networks can be targets of hackers, if security is lacking.

The *product* of the delivery and maintenance process is a set of well-maintained *learning materials* available for registration (see Figure 1).

2.6 Instruction Stage

At the course *instruction* stage (see Figure 3), instructional and support services staff or ISS are the *people* involved (see Table 2) in delivering the instructional *product*. The instructional and support services staff may include (but are not limited

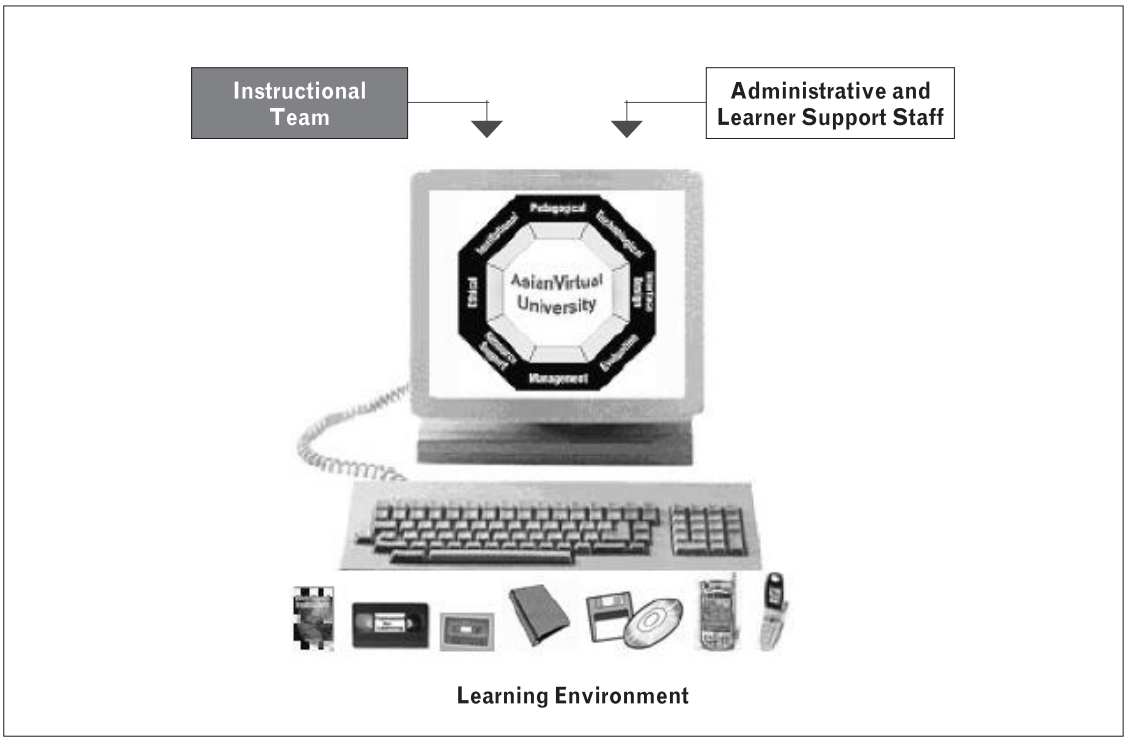

Figure 3 E-Learning Environment.

to): course coordinator, instructor, tutor, course facilitator, discussion moderator, technical support, librarian, counselor, customer service, registration and administrative staff, etc.

When a course is offered, the ISS is at the front line. Students deal with the ISS. They expect uninterrupted and meaningful learning environments. The online course coordinator should make sure that registered students receive orientation for the course and that ISS support is available as promised. The course coordinator should always be in touch with the delivery and maintenance team to resolve any technical problems that the ISS team may encounter during the course.

Depending on the organizational structure of an institution, the course coordinator may have to work with various departments within the institution, including registration, admissions, legal offices, etc. It is important to note that the instructional staff for online courses may or may not be part of the e-learning management team; they may be managed by academic or training departments. Table 2 can be used to assign responsibilities for individuals in the ISS team. For example, Ms. Lee has been teaching online courses for several years and has experience in providing technical support. With Ms. Lee's instructional and technical skills, she can be assigned the responsibilities of an instructor, discussion facilitator/moderator, and technical support for the course EL201.

2.7 Marketing Stage

The emergence of the Internet as a viable medium for distributed learning has attracted both academic and non-academic institutions to the e-learning arena. These institutions hope to see a great return on investment in e-learning. As a result, an increasing number of these institutions are currently offering e-learning courses/programs. Now, learners have more options to choose from—a variety of e-learning courses or programs from all over the world. This is good for learners, but it makes the e-learning market very competitive. In this e-learning market, non-academic institutions or vendors often compete with academic institutions with their e-learning offerings.

Ongoing market research with e-learners (i.e., clients) can provide institutions with comparative advantage over others in their e-learning offerings. Market researchers and recruiters (or salespersons) are among the *people* who should be part of the overall e-learning marketing initiative. The scope of this marketing operation may depend on institutions' e-learning policies and types of their clients (i.e., learners). One of the important marketing strategies is to make accurate and updated information about their e-learning offerings known to as many potential learners as possible.

This can be accomplished by registering e-learning sites with search engines, banner advertising, postings in listservs, brand strategy (e.g., brand names), endor-

sement by credible people and institutions, etc. Effective marketing *products* will help institutions to attract and recruit students for their courses and programs.

Table 2

PERSONS IDEAL FOR ROLES AND RESPONSIBILITIES DURING INSTRUCTIONAL PROCESS.

	Administrative								*Instructional*									*Learner Support*								
Name of the Person Ideal for the Job	Project Manager	Admission	Registration	Payment	Bookstore	Financial Aid			Online Course Coordinator	Instructor (or Trainer)	Instructor Assistant	Tutor	Discussion Facilitator/Moderator	Learning Objects Specialist	Copyright Coordinator	Guest Speaker (or outside Expert)			Delivery Coordinator	Systems Administrator	Server/Data base Programmer	Customer Service	Technical Support Specialist	Library Services	Counseling Services		
Mr. Lee (Course Number 201)										√			√										√				

3. Conclusion

In conclusion, new developments in the learning sciences and technologies provide opportunities to create well-designed, learner-centered, engaging, interactive, affordable, efficient, easily accessible, flexible, and meaningful distributed and facilitated e-learning environments.

The *E-Learning P3 Model* provides a comprehensive picture of the e-learning process and helps to identify the roles and responsibilities for the design, development, evaluation, implementation, and management of all e-learning and blended learning materials and systems.

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