INTEGRATING DISTRIBUTED LEARNING AND EPSS FOR GREATER PERFORMANCE OUTCOMES

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ABSTRACT

Distributed learning solutions can reduce travel time, instructor costs, lodging, and the need for training facilities. However, two significant challenges remain: 1) the need to streamline and reduce up-front training, and 2) the mitigation of knowledge decay that occurs between training and workplace application of new knowledge and skills. A training strategy that embeds electronic performance support tools directly within electronic courseware promises an efficient, effective, and convenient method to create an authentic learning experience, achieve greater learning outcomes, and realize immediate improvements in human performance.

Embedded EPSS tools augment courseware activities to increase learning, but they can also be uncoupled following training and made available to workers as a just-in-time performance support *toolkit*. Government entities striving to become *learning organizations* can employ this integrated approach to extend learning and performance into the workplace, reaching far beyond an initial learning event . This paper presents a research-based and applied methodology that guides instructional designers through a cognitive design process for creating hybrid courseware. The cognitive design process assesses content, technologies, context, tasks, and objectives to determine an optimal strategy that supports both the student s need to learn and need to do.

The paper will also describe a case study that highlights specific techniques used to implement a hybrid courseware strategy for the Defense Acquisition University (DAU). The case study will include outcomes achieved for reducing overall course length and improving workplace productivity.

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Danielle Burbank is an EPSS and Instructional Designer/Analyst acting as a consultant for SI International, Inc. She has a broad range of experience in instructional design, performance support, and training. Her background includes program analysis, instructional systems design, performance support system design, interface design, and usability testing. She also has relevant experience developing and delivering instruction as a teacher and trainer. Ms. Burbank has designed and developed several hybrid learning programs for organizations such as the Defense Acquisition University, U.S. Department of Transportation, and Federal Deposit Insurance Corporations. She has designed and recommended unique, workable solutions that allow organizations to achieve maximum performance and learning. As a doctoral candidate at the University of West Florida, she conducts research in human performance and learning and is frequently asked to serve as a consultant throughout SI International s varied practice areas and for other companies and government agencies.

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INTRODUCTION

Distributed learning allows learners to participate in educational activities in classrooms, workplaces, homes, and community settings. A distributed learning course can be defined as one that combines these activities in such a way that one or more of the instructional events that traditionally have occurred in the classroom are distributed to learners so that they may occur while learners are separated by either time or space from one another and the course instructor (Welsh). Distributed learning is a six billion dollar a year industry and currently growing at more than thirty percent every year (Primary Research Group, 2000). Because training for the workplace occurs to improve workers performance, training stakeholders today place more and more emphasis on selecting distributed learning interventions that will result in the greatest performance outcomes.

Achieving adequate return on investment in training and learning requires that some instructional events be distributed while others remain localized. It also means that knowledge and skills learned in training must carry into the workplace to improve worker performance. Increasingly, the front-end tasks of the instructional designer will be to conduct cost/benefit analyses of various distributed learning modes. An emerging form of instruction today is hybrid courseware, in which a large percentage of the instructional events are distributed to learners in the field. Because face-to-face meetings have extreme costs related to travel, lodging, and training facilities, they are reserved for learning reinforcement, community-building, to achieve learning outcomes that require face-to-face interaction, and for assessment (Welsh). To date, a hybrid solution has still largely meant the integration of multiple training methods, while an Electronic Performance Support System (EPSS) has been historically seen as a way to replace training. However, as the focus on performance increases, new thinking is bringing both EPSS and courseware together in hybrid solutions that integrate learning and doing.

An EPSS improves the efficiency of work processes. It provides real-time expertise and information necessary to manage complex work tasks. Gloria Gery defines an EPSS as, an electronic system that provides integrated on-demand access to information, advice, learning experiences, and tools to enable a high level of job performance with a minimum of support from other people (cited in Cote, 1998, p. online). An EPSS can simplify processes, provide decision support, and assist in task completion.

An EPSS generally includes three primary component types: Advisory, informational, and learning. The advisory component provides help whenever the user needs it and usually consists of a job aid in electronic form. Information provides all the information a user needs to complete a job. This data can be procedures, regulations, company policies, specifications, digitized photographs, digitized movies, animation, sound, or drawings. The data may or may not be stored in a database (Desrosier & Harmon, 2000). Learning experience as part of an EPSS differs from traditional computer-based training (CBT). Users of the EPSS learn from the advisory component that aids decision-making, provides best practices, offers tips and hints, or guides the user through a task. Learning experience can also be provided in the form of CBT related to the EPSS. However, integrating all three components types in a hybrid distributed learning environment provides the best opportunity to improve performance and achieve learning outcomes.

INTEGRATING EPSS INTO DISTRIBUTED LEARNING ENVIRONMENTS

Integrating EPSS tools or features into a distributed learning environment provides benefits to the learners and the organization by streamlining training and mitigating knowledge decay. Integration of EPSS in a learning environment can also assist in the reduction of cognitive overload and prior knowledge requirements.

Course designers must determine what students need to learn compared to what students need to know to complete a job task. This requires additional analysis tasks such as job task analysis. Because performance support traditionally emphasizes just in time support rather than supplying information needed just-in-case, designers must carefully weigh the decision to provide information in the form of learning or as a performance support tool (Reeves, 1996). Careful analysis of content, job tasks, and users determines the task frequency, information and new concepts, processes, or rote information and its frequency of use. Infrequently used information may best be presented as a tool, while frequently used rote information may require that users learn the content to improve performance. Processes can be presented in a tool, learning environment, or a combination of both depending on the task frequency and prerequisite knowledge. Course designers can also use the integration of EPSS features to motivate students and increase learning achievement. According to the ARCS model of motivational design, embedded performance support tools such as checklists, examples, flowcharts, frequently asked questions and forms--are likely to influence student satisfaction. Because embedded performance support tools relate to actual job tasks and provide practice, they may also influence the three remaining elements of the ARCS motivational model: attention, relevance, and confidence.

After analysis questions included in this paper (tables 1-4) determine the appropriateness, lengthy lessons can be offloaded to tools that are more efficient. To achieve the maximum benefits of EPSS and distributed learning integration, tools should be introduced within the context of formal learning using cognitive strategies such as cognitive apprenticeships, minimalist design, case-based approaches, and functional context. These strategies are discussed in the design section of this paper.

Further functionality and improved workplace performance requires the ability to uncouple tools after the formal training event for on-the-job support and scaffolding. Uncoupling tools allows course participants to use the tools introduced in the course while completing actual job tasks. This strategy provides a course that teaches the knowledge required to do the job, but also provides the tools necessary to complete job tasks more efficiently and effectively long after course completion. Instead of asking coworkers for assistance or researching course materials, the user accesses an electronic tool to complete the job task with as much or as little scaffolding that is needed for task completion. This streamlines training to actual job tasks because the tool introduced in the course represented a realistic job task. Users become comfortable using the tool and the tool acts as the catalyst to recall other concepts and knowledge learned in the course.

Streamlining and Reducing Up-front Training

In addition to conducting cost/benefit analysis of potential distributed learning modes, needs analysis activities must also focus on human performance technology solutions to augment instruction. Course designers must analyze available EPSS features that can be accessed and incorporated into the distributed content to make learning more authentic and/or to reduce training time while meeting the same performance outcomes (Welsh). Although the explicit goal of performance support tools is not to help people learn, research has indicated that people learn a considerable amount from them anyway because time on task is generally viewed as proportional to the amount learned. Several studies of time on task in hybrid courseware showed a positive association between learning and achievement and time on task. Rather than passively learning or reading content, embedded performance support tools provide users with additional time on task as they use the tool to meet an objective (Sleight, 1997). Furthermore, the technological advantages of distributed learning allow instruction to be easily packaged with, or linked to EPSS features such as performance support tools.

In an effort to reduce training costs while improving workplace performance, the Defense Acquisition University (DAU) began converting traditional instructor-led courses to distributed learning environments with integrated performance support. In a course created for Department of Defense contract specialists, course participants traditionally spent three weeks in off-site training followed by up to six months of informal on the job training. Math-related tasks proved to especially problematic both in the traditional course and on the job. Through hybrid design, CON 104 became 33 modules of web-based training (WBT) completed in about 60 hours and 24 hours of instructor-led training (ILT) in negotiations and capstone exercises. The course length was reduced by about 30%. Further cost benefits remain to be seen as graduates begin to use the tools in the workplace to increase performance and decrease assistance needed from peers. DAU is not evaluating the use of tools after course completion. However, during the course pilot students immediately began to think of situations in the workplace where the tool would be helpful. This type of reflective application was more common among those students already doing the job or with more than six months between CON104 and its prerequisite course. Incorporating 45 performance support tools into the new online course reduced several lengthy lessons, allowed learners to meet the same performance outcomes, often with better mastery, and provided learners with the practice necessary to use the tools in the workplace.

Mitigation of Knowledge Decay

The integration of EPSS features in the distributed learning environment contextualizes learning and allows participants to experience active learning. EPSS features decrease cognitive load and provide learners the realistic practice necessary to meaningfully encode new information and then move it into long-term memory (Miller &Miller, 1999). Published learning retention rates show that when learners read information, only 10% is retained. Learners who learn by doing retain up to 90% of knowledge and skills (Dwyer, 1996). Furthermore, case studies show that the integration of performance support tools may cause learners to spend more time on the learning task, which means more time rehearsing new information and making it more likely the new information will move into long-term memory. (Sleight, 1997)

Reducing Cognitive Overload and Prior Knowledge Requirements

Prior knowledge requirements for specific job tasks are generally learned in training so that a learner can complete some other more complex task at a later date. EPSS features can incorporate some of the prerequisite knowledge so that the learner must only use the tool to complete the complex task. For example, contract specialists must sometimes use regression analysis or improvement curves to determine if a cost or price is reasonable. Knowing how to complete regression analysis or improvement curves mathematically is prerequisite knowledge, taught traditionally in ILT. However, the ultimate goal was not knowing how to do the math to complete regression analysis or improvement curves, but determining the reasonableness of a price or cost mathematically. Several of the EPSS tools provided in the course for contract specialists contain the prerequisite knowledge in the form of a calculator that outputs a percentage of the cost or price reasonableness in a manner of minutes. Training for these two infrequently completed job tasks previously took days and learners often required assistance from others when completing this task later in the workplace. The tools for these tasks reduced cognitive overload and prior knowledge requirements during course completion, and reduced the need for assistance from others when completing the task in the workplace. A course graduate had the ability to use the tool to provide assistance instead of a peer.

Integrating Distributed Learning and EPSS

To integrate EPSS features into a distributed learning environment, the course designer must design from the perspective of both learner and worker. For EPSS features to be integrated into a distributed learning course and uncoupled later in the workplace, the course designer should follow these guidelines:

1. Chunk information in a manner logical to the learner.
2. Allow the user to access that portion of information relevant to the task without being overloaded with non-relevant information. Scaffolding for novices is provided through links to additional information.
3. Allow users to find answers to specific task-related questions.

DESIGNING HYBRID COURSEWARE

Another consideration before analysis begins is the organization of information. The organization of the information must mirror the learner s normal work habits and focus on the performance of those work tasks (Tangey, 2000). All information must be presented in a manner logical to the learner. In addition to subject matter experts, a diverse group of potential learners should be analyzed to obtain their perspective as a novice, expert, or a range between them.

For an EPSS to be useful and effective, users must understand how to use the EPSS. This may require that users have some prior knowledge of the EPSS features. If the EPSS feature is introduced in the course, the user will gain the familiarity needed to use the EPSS feature in the future. In some cases, the user must be familiar with the material used in support. For example, if the user must know the difference between dependent and independent variables before using a regression analysis tool, one might think this information should be taught prior to tool use. However, this information can be included in the scaffolding of the tool and introduced at the appropriate time during tool use. In addition to providing prerequisite knowledge, introduction of EPSS features in the learning environment provides a non-threatening introduction to electronic performance support that increases the likelihood of later EPSS use in the workplace (Tangey, 2000).

In some cases, the learning environment teaches the basic knowledge and concepts, or prerequisite knowledge. Then it introduces the EPSS feature or performance support tool using this prerequisite knowledge with a simulated job task. This allows the learner to practice using the support in a non-critical environment in an appropriate context. The context provided in the simulated job task or scenario allows the user to construct his or her own knowledge because it provides the schemata to encode the prerequisite knowledge into long-term memory. For example, contract specialists may be required to construct their own price index numbers. The online portion of the course teaches learners when they must construct their own price index numbers and why. The embedded tool assists users in quickly constructing price index numbers and then adjusting price or cost with them. Because learners must be familiar with requirements for adjusting cost or price with index numbers, a tool practice embedded into the content provides a realistic scenario requiring the learner to user prerequisite knowledge and the performance support tool to solve a problem regarding price or cost adjustments. When similar situations are encountered in the workplace, prerequisite knowledge and the ability to access electronic performance support prompts the user to complete the task using the acquired knowledge and EPSS feature.

Analysis

Most experts in EPSS design tend to base initial design on instructional systems design (ISD) models in combination with a software design model; however, they place more emphasis on the front-end analysis than what normally occurs in designing training (Tangey, 2000).

The first decision after analysis is to determine if the course should be distributed learning or ILT, or some combination of the two. If there is a verified learning need, the designer must decide if the instruction can be successfully implemented in the context for which it is intended (Cole, Jonassen, & Wilson, 1993). Secondly, the designer must determine the stability of the content. Given previous considerations, content that frequently changes may benefit from distributed learning over the Internet or Intranet because it can be updated frequently and rapidly.

After determining the delivery method, the course designer should review the objectives to determine if the intended audience can achieve the objectives using the determined technology. Some of the examples and key messages may not be appropriate for the technology. In the case of the contract specialists, the third module of the original course was negotiations. While some basic information about negotiating, such as win/win, win/lose, or lose/lose could exist as distributed learning, role-play could not. An important objective of the course was for students to master specific negotiation situations and techniques. In class, students completed role-play and analyzed the performance of classmates. Because video was not an option for this course, the role-play activities remained as ILT. This also served an important need for students to work together and with an instructor. CON104 is considered one of the most difficult courses in the contracting curriculum and students needed live human feedback at some point in the course.

Audience analysis is also an important consideration in designing hybrid courseware. Audience preferences, needs, and learning styles must be considered. If the audience is too uncomfortable with the course format, the course will not succeed. As previously mentioned, contract specialists were extremely intimidated by CON104, and the initiative to provide it in a distributed learning environment required some compromises. Stakeholders originally believed the entire course should be delivered online. After audience analysis, the design team had to consider the learners need for immediate, live human interaction. Designers should also consider how the technology fits the way the audience prefers to get information. If the audience prefers self-instruction, a computer-based tutorial with supporting materials may be most appropriate (Brown, Collins, and Duguid).

Detailed Analysis for EPSS features

The detailed content and job task analyses are the biggest area of difference when designing hybrid courseware with EPSS features as opposed to a single delivery method. Designers must complete a job task analysis to determine expected procedures and tasks, actual tasks completed and their procedures, and the users perspective. Task frequency is one of the most important questions to consider in analysis. Unusual or infrequently performed tasks require more time to process and tend to have higher percentages of errors. Designers must also look for tasks involving complex decision-making. These tasks benefit from electronic support because learners do not need to know or remember the rules that govern a decision making process (EPSS Indicators).

The content for contract specialists in CON104 was examined from a performance perspective since the material was very detailed and quite difficult. The design team learned that many of the students used small segments of the content frequently, but would need all segments of the content at some time in their career. To enhance learning, the course content was presented in realistic scenarios using situated learning techniques and several other cognitive apprenticeship model elements.

Another aspect of task analysis to consider is areas where mistakes in performance of the task are costly. Designers should pay special attention to areas where mistakes are costly in terms of:

- Danger to the worker or operator or others
- Damage caused to facilities, equipment, or materials
- Expensive reworks or rejects of projects
- Increased organizational costs; or loss of clients and customers due to inadequate, defective, or untimely delivery of products or services. (Tracey, 1998)

In the case of CON104 there was little danger to others or facilities in contracting. However, many tasks involved complex decisions, math calculations, and infrequently used prerequisite knowledge where the cost of errors was very high. This course had to ensure that contract specialists did not repeat the public mistakes of the past, such as paying four hundred dollars for a hammer.

Another aspect of the analysis should examine the objectives in terms of Bloom s taxonomy of the Cognitive Domain. Each objective should be analyzed to determine its potential mastery with a performance support tool. Knowledge and comprehension level objectives rarely require a tool for objective mastery, unless it is knowledge that is very infrequently used or easily forgotten. In a hybrid course built for Federal Deposit Insurance Corporation (FDIC), Account Officers needed to learn the basic description of environmental hazards and special resources. The objective required knowledge level mastery as learners identified hazards or special resources. This appeared to be prerequisite knowledge to be applied in the workplace and the presentation recommendation normally would have been instruction. However, audience and job task analysis determined that Account Officers only need to identify environmental hazards or special resources in 1% of job tasks. Because the information is easily forgotten and infrequently used, our design team created a reference tool that could be easily accessed at a time of need.

In contrast, Application, Analysis, Synthesis, and Evaluation level objectives could frequently make use of EPSS features in order to aid student mastery of the objective. The definition of the application level objectives require that students select, transfer, and use data and principles to complete a problem or task with a minimum of direction. If the learner or performer does not really need to know how to select and transfer the data, an EPSS advisory component could assist in that process and then guide the user through task completion. If the goal is problem or task completion, an EPSS feature may be a more efficient method for objective mastery and meeting the performance objective than instruction. In the FDIC course, learners were required to implement an approved method for asset disposition. This complex decision was infrequently completed, but was a high cost decision. If disposed of improperly, FDIC could be open to public lawsuits. Therefore, in addition to the basic concept introduced in the course, a tool was created to help course graduates determine the best asset disposition by answering a few questions about the asset.

Audience analysis also plays a role in determining the need to integrate EPSS features into courseware. Research has indicated specific characteristics required by users of EPSS. These characteristics hold true for EPSS integrated into Distributed Learning Environments (Tangey, 2000).

- The learner must be computer savvy enough to know the basics of computer operation.
- The learner must be able to learn independently. Human assistance is rarely available immediately. The EPSS features should provide the bulk of the support. Learners who require frequent interaction with instructors and guidance to stay on task and on schedule will be challenged to complete a distributed learning course with EPSS features.
- The user must be motivated to successfully complete their job. The EPSS features must be seen as a valuable resource. If users do not access the EPSS features, there is no performance support. If a learner is not motivated to successfully complete his or her job, he or she will not feel the need to access electronic performance support. The EPSS features will be useless.

As part of audience analysis, determine the least common denominator or least knowledgeable user among the potential audience and design with that person in mind. Also, consider the expert user in terms of hiding irrelevant information. The goal of electronic performance support is to allow a novice to perform like an expert. However, even the experts need support every now and then. Therefore, the performance support should also exhibit scaffolding. Learners enrolled in a course are frequently novices and can get some of the information they need from the content of the course. However, back in the workplace, a user does not have time to repeat course modules, lessons, or topics. The EPSS features must provide scaffolded, or drill-down support. Novice users should be able to access prerequisite knowledge or examples, while experts have the ability to skip that information. In the case of contract specialists, who must perform complex math calculations to make cost or pricing decisions, an EPSS tool provides math in a glass box. Novices can see examples and formulas for each step of the calculation, while an expert user can keep these features hidden, enter the required data and receive a calculated figure for entered data.

The audience analysis for CON104 determined that novice contract specialists experienced performance problems in the workplace directly related to CON104 content. Because there was a minimum of 6 months time to competency, novices asked for median of 60 hours of assistance from peers in the first 12 weeks on the job. This took away from the novices productivity and the experts productivity in the workplace. Additionally, almost all of the questions about the audience (table 1) indicated the need for EPSS features. The content questions did not indicate a need for an EPSS, but analysis of the performance tasks and objectives did. Therefore, the design team determined the bulk of the content and prerequisite knowledge for job tasks should be presented through instruction.

Using Checklists for Analysis

The following checklists (tables 1-4) can be used in analysis to determine the level of integration for EPSS features within a distributed learning environment. In using these lists, begin with EPSS. Anything that does not fit into the EPSS should be considered for content presentation. Furthermore, even if the audience and content analysis do not provide strong indicators for an EPSS consider the questions for performance outcomes and objectives. In the case of CON104, the initial analysis for content and audience did not indicate strong support for an EPSS. However, analysis of the objectives did indicate the need for integrated performance support tools for specific objectives.

Table 1 *Audience Questions for Analysis*

Questions for Analysis	**Yes**	**No**
If two or more questions can be answered with yes, you should consider examining the content for EPSS integration.		
Audience		
1. Do performers have easy access to a computer?		
2. Do learners possess the necessary characteristics to use an EPSS in terms of literacy, computer expertise or motivation?		
3. Is turnover for the job high among potential learners?		
4. Are the performers dispersed in diverse locations?		
5. Do novice learners require significant training from peer or supervisors after returning to the workplace?		
6. Can the student successfully complete the course without human interaction or feedback?		
7. Are the learners motivated to successfully complete their job?		
8. Do the learners exhibit characteristics of independent learners?		

Table 2 *Content Questions for Analysis*

Questions for Analysis	**Yes**	**No**
If two or more questions can be answered with yes, you should consider an EPSS.		
Content		
1. Is the content process oriented?		
2. Can an EPSS be supported, maintained, and updated?		
3. Does the learner need quick access to large bodies of information (i.e. customer service phone center)?		
4. Is the content difficult to remember at a given time of need?		
5. In comparing knowledge (cognitive information) to skills (tasks to be completed), do skills outweigh knowledge?		
6. Does the client believe any content should remain as Instructor-led training?		
7. Can the content be effectively taught as an independent study?		
8. Does the content lack the requirement for use of soft skills?		
9. Does the information need to be customized for different job roles within the organization?		
10. Does content need to be structured so learners who have prerequisite knowledge will be able to skip areas of known knowledge?		

Table 3 *Performance Outcome Questions for Analysis*

Questions for Analysis	**Yes**	**No**
If two or more questions can be answered with yes, you should consider integrating EPSS features into the applicable section of content.		
Performance Outcomes/Objectives		
1. Is the task complex and/or not easily learned or remembered?		
2. How critical is the task in terms of non-compliance or poor performance?		
3. Is time available to obtain/use the support?		
4. Is the task frequently repeated?		
5. Does the task involve complex decisions?		
6. Are errors frequent in task completion?		
7. Is there a right or preferred method of task completion?		
8. Are the tasks sequential operations, processes, or procedures		
9. Is the task standard for acceptability difficult to achieve?		
10. Does the task involve skills that deteriorate over time if not used regularly and frequently?		
11. Will the user be required to apply cognitive knowledge to perform a skill or make a decision?		
12. Is the task complex and/or not easily learned or remembered?		
13. Does the Bloom s Taxonomy level of the objective indicate task performance?		

Table 4 *Other Questions for Analysis*

Other Questions to Consider	**Yes**	**No**
1. Does the task occupy a large percentage of the learner s time? *Consider: Increase performance by reducing time to complete task compared to the importance of the learner s knowledge in order to increase performance (effectiveness)*		
2. Does the potential Return-on-Investment justify additional costs associated with EPSS?		
3. Are there significant budget constraints?		

Cognitive Strategies for Designing Hybrid Courseware

Cognitive design strategies are an important aspect of the design phase. Because the design centers around EPSS features integrated into a distributed learning environment, cognitive strategies best support the learner and the course graduate in the workplace. Cognitive strategies appeal to adult learners, rely on some prior knowledge, and promote the retention and transfer of learning through contextualized, active learning.

One of the models used in designing hybrid courseware is minimalist design. In minimalist design, learners must have some prior knowledge on which to construct new knowledge. This design allows learners to start immediately on meaningful realistic tasks, reduces passive activities and reading, and helps make errors and error recovery less traumatic and more pedagogically productive (Cole et al., 1993). The design of CON104 relied on minimalist design to some degree in giving learners meaningful, realistic tasks, in the first lesson. Although, the course is text heavy, the design team incorporated several Socratic activities, knowledge reviews, tool practices, and case studies to reduce the reading required.

The other larger cognitive design strategy designers must consider for a distributed learning course with integrated EPSS features is the Cognitive Apprenticeship. There are many versions of the Cognitive Apprenticeship and just as many components within each one. However, the following components remain crucial to a well-designed hybrid course.

Situated Learning teaches knowledge and skills in contexts that reflect the way the knowledge will be useful in real life (Cole et al., 1993). This strategy eases transition to job conditions and fits well with the EPSS Distributed Learning Hybrid. The CON104 course used realistic situations as examples and instruction. Learners could relate the situations to their own job experiences.

Coaching and feedback provides hints and help as needed. The CON104 course has several opportunities to test learning without penalty. All answers receive constructive feedback. Wrong answers also trigger feedback with a link to the section of content that taught the particular concept or skill. All of the tools contain hints and examples to show how and/or why something is done. These hints and examples provide a limited amount of instruction, but are not shown until a user requests them. This provides the necessary scaffolding to get users of varying abilities and experience through the process.

Articulation and reflection activities ask students to think about and give reasons for their actions. The design for CON104 refers to these as Socratic activities and they are very popular among students and instructors. Rather than read a page of content, students try to complete reflective activities such as matching new concepts to prior knowledge. Feedback coaches the student. All of the students surveyed stated they would rather complete these reflective type activities than non-scored test-like activities.

Exploration allows learners to try different strategies and observe their effect. Exploration of EPSS features like tools then allow students to become familiar with the tool while they begin to explore situations appropriate for tool use in the workplace. The tool practice exercises provide the exploration, and the scenarios encourage students to try out different strategies and observe their effect.

Case-based approaches expose learners to a wide range of contexts and allow them to view realistic cases from multiple perspectives. Realistic cases related to job tasks interest students. By giving students tasks complex enough that all information is not immediately available the student learns what he or she needs to know, or might consider while doing the task, at precisely the points in the task at which the student becomes interested in knowing the information. Each lesson in CON104 contained a case study at the end of the lesson.

SUMMARY

Integrating distributed learning and EPSS leads to greater performance outcomes in the workplace and in the learning environment. ILT, especially face-to-face meetings have extreme costs related to travel, lodging, and training facilities. Because of this, many organizations use face-to face meetings primarily for learning reinforcement, community-building, achieving learning outcomes that require face-to-face interaction, and assessment. Integrating an EPSS or its features into a distributed learning environment provides benefits to the learners and the organization by streamlining training and mitigating knowledge decay. Integration of EPSS features or tools in a learning environment also assists in the reduction of cognitive overload and prior knowledge requirements.

As organizations focus on performance as part of training new thinking brings both EPSS and courseware together for greatest performance impact. The integration of learning and doing using cognitive design strategies requires additional front-end analysis. The course designer must adapt to these changes to create a hybrid course that provides adequate return on investment in terms of learning and performance. This involves analysis to determine the best delivery methods, audience receptiveness to a hybrid course, and detailed analysis of the content and specific objectives. Because there are common characteristics associated with workplace performance and learning, questions related to task frequency, audience, context, task decisions, and task complexity can help a designer create hybrid course that integrates distributed learning and EPSS features to maximize learning achievement and workplace performance.

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