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LO + EPSS =
Just-in-Time Reuse of Content
to Support Employee Performance

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ABSTRACT

Anyone involved in the design and development of training knows that the creation of training materials, be it for classroom or online delivery, can become a tedious, repetitive process. Objectives and content may be repeated or duplicated for use in other training interventions. Learning objects have long held the promise of addressing some of these training development inefficiencies. Anyone involved in the delivery of training knows that business conditions often require training interventions to be delivered in ways that are not ideally structured or timed. Electronic performance support systems (EPSS) have long held the promise of addressing some of these training delivery inefficiencies. Historically, the reuse of learning objects largely has been solely targeted at training interventions. This article examines the notion that learning objects can be adapted and combined with electronic performance support systems. By doing so, a performance technologist can not only choose to develop and reuse learning objects for just-in-case training but also to develop and reuse learning objects for just-in-time performance support.

The quandary with developing training content

Redundant. Futile. A waste of time.

These are just a few of the many things that an instructional designer or developer might feel while building training, job aids, help files, or other tools that have been identified as performance interventions.

Anyone involved in the design and development of training knows that the creation of training materials, be it for classroom or online delivery, can become a tedious, repetitive process. Objectives and content may be repeated in other sections of the same course. Content from other courses may be duplicated, reused as-is, or even revised in new courses. Content from training may be rehashed and delivered to employees in other ways such as job aids, manuals, or other types of on-the-job support. Anytime changes occur in the environment or business process, the developer must revise not just one, but all of these interventions.

Learning objects have long held the promise of addressing some of these training development inefficiencies. In the seminal work, *The instructional use of learning objects*, Wiley (2000) described learning objects as "any digital resource that can be reused to support learning" (p. 7). In other words, learning objects are "instructional components that can be reused a number of times in different learning contexts" (Wiley, 2000, p. 3). Through the use of learning objects, a training developer could search for learning objects that have already been created by other designers and developers, reuse the learning objects in new training offerings, combine these objects with newly created learning objects, and share this new content with others for future use. By doing so, an organization could potentially reduce the overall time necessary to design and develop training materials.

To facilitate sharing and reuse of learning objects, many organizations have adopted systems known as *learning content management systems* (LCMS). An LCMS is generally an environment that allows members of a project to contribute, collaborate, and interact with one another during the development of a training project. The exact features of an LCMS vary from system to system and vendor to vendor. Most systems provide basic file management capabilities for learning objects such as versioning, check-in/check-out, and security. Some systems also allow a developer to attach high-level information to each learning object, also known as *metadata*. Other developers can conduct a search through this metadata to locate learning objects that may be of interest to them in new training offerings. In addition, more advanced systems may also provide integrated authoring tools, compliance with industry standards such as AICC and SCORM, workflow automation, and course publishing capabilities. Figure 1 illustrates the relationship between learning objects and a learning content management system.

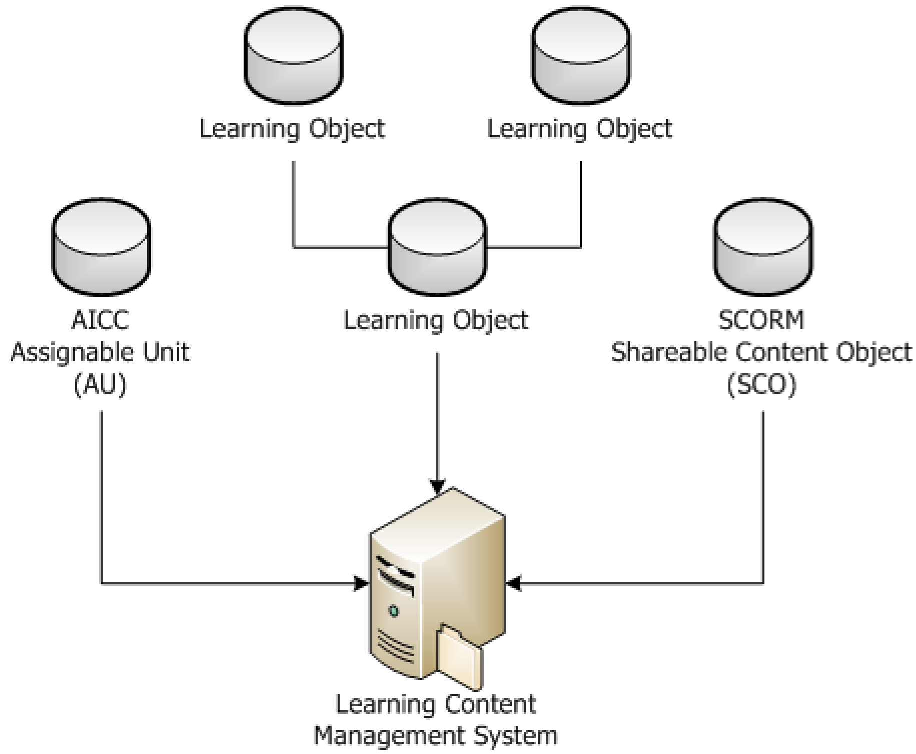

Figure 1. Relationship between learning objects and a learning content management system.

The quandary with delivering training content

Disenchanted. Frustrated. Annoyed.

These are just a few of the many things that an employee might feel after they realize that they attended your training course weeks ago and have now forgotten some important pieces of information that you imparted to them.

Anyone involved in the delivery of training knows that business conditions often require training interventions to be delivered in ways that are not ideally structured or timed. For example, a corporate compliance mandate may require that all employees worldwide take “awareness” training. A content analysis may reveal that employees would benefit from a classroom-based training intervention with an emphasis on social learning and peer interaction. Alternatively, the performance problem could be addressed simply through a newsletter or other form of communication. However, due to the sheer number of employees or pressure from management sponsors, a performance technologist may choose to deliver the training through an instructor-led or web-based training course that must be taken days, weeks, or even months before the employee would find a relevant job situation to apply the new compliance guidelines.

Electronic performance support systems (EPSS) have long held the promise of addressing some of these training delivery inefficiencies. In her groundbreaking work, *Electronic performance support systems*, Gery (1991) described EPSS as a system that provides "individualized on-line access to the full range of…systems to permit job performance" (p. 21). Unlike training interventions that may require an employee to temporarily abandon their work, attend a training class, or take a web-based training course, and then return to their job to hopefully apply their newly-acquired knowledge, electronic performance support systems provide employees with the tools and information they need to perform their work while they are on-the-job. By doing so, employees can readily learn and apply information in the context of their work. Common forms of support systems include online help, frequently asked question pages, and even job aids. Figure 2 illustrates the relationship between electronic performance support systems and on-the-job performance.

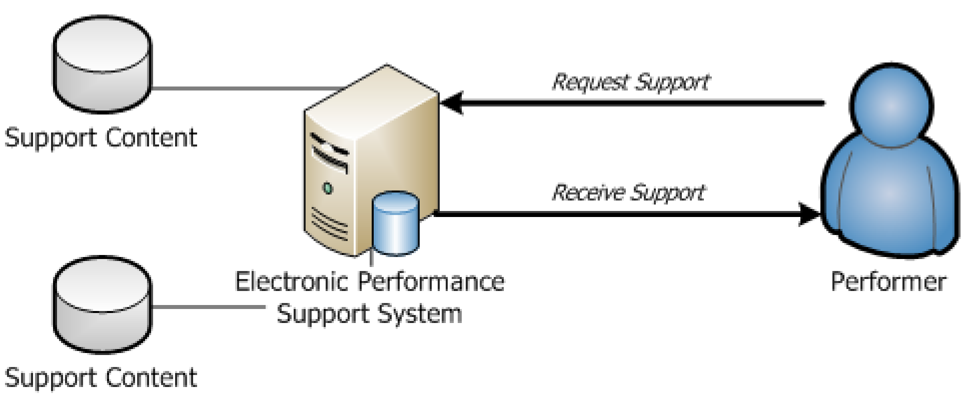

Figure 2. Relationship between the performer and an electronic performance support system.

Solving two problems with one solution

What if you could address these two issues of developing and delivering training at the same time? What if you could address inefficiencies with content redundancy while putting in place the infrastructure and strategy to support on-the-job performance in one fail swoop?

Historically, learning content management systems and the associated reuse of learning objects have largely been targeted at training interventions. Fortunately for performance technologists, there are a growing number of ways to reuse learning objects. Today’s learning content management systems have progressed to a point where they can be adapted and combined with electronic performance support systems. By doing so, a performance technologist can not only choose to develop and reuse learning objects for training interventions, but also develop and reuse learning objects for performance support interventions. Figure 3 illustrates this concept of just-in-time reuse of content to support employee performance.

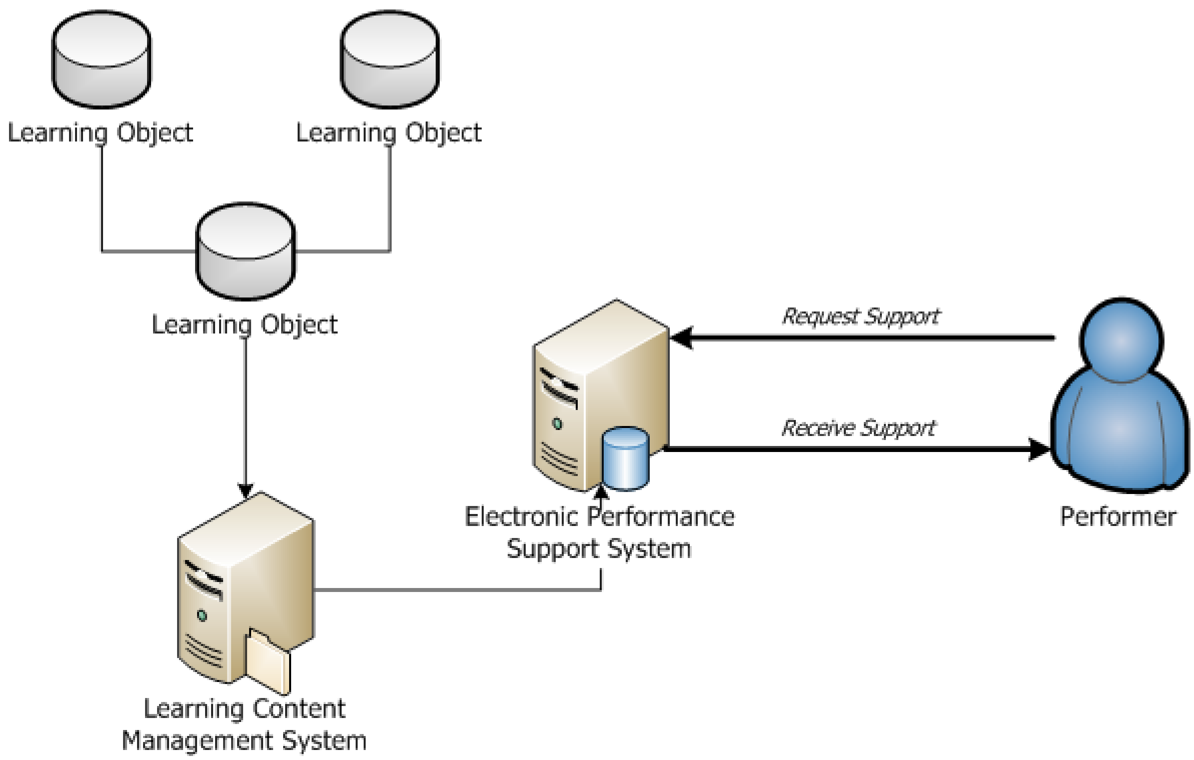

Figure 3. Linking an LCMS and EPSS to enable the reuse of learning objects to support on-the-job performance.

A *LO + EPSS* case study

This notion of reusing learning objects to provide on-the-job performance support is more than just an fanciful idea. It has proven real-world benefits. Let's examine a case study of a training group at a Fortune 100 company. For reasons of confidentiality, we'll refer to this organization as *The Group*.

As with many organizations during the dot com boom of the late 1990's, *The Group* made the transition from classroom-based training interventions to eLearning, specifically online web-based training. Since the vast majority of *The Group*'s customer base was involved in the development and deployment of enterprise software applications, the shift to eLearning made sense. However, *The Group* performance technologists quickly found that eLearning was not the sole intervention required to address the customers' problems. Since employees were often trained weeks or sometimes months prior to the implementation of a software release, employees quickly complained that they could not perform their job or that the "eLearning course was not effective." In certain situations, *The Group*'s performance technologists addressed these gaps by combining the web-based training interventions with other instructional interventions such as peer training or virtual classroom sessions. In other situations, performance technologists also prescribed interventions to help employees quickly refresh their knowledge and apply the information when they return to the workplace such as job aids or help systems.

While the introduction of additional interventions such as eLearning, blended learning and performance support addressed performance problems related to enterprise software releases, it created another issue: the workload of instructional designers and developers quickly ballooned. Content that was initially created for a web-based training course had to be recycled for presentations and activities in a virtual classroom offering. Procedures and simulations in an eLearning course had to be recreated in online help applications or even paper-based manuals and job aids. In addition to the cost and time associated with the initial development of these materials, the maintenance and revisions between the multitude of interventions also stretched *The Group*'s resources.

In light of these challenges, *The Group* reengineered its business strategy to reduce its overall reliance on synchronous training interventions, continue its investment in web-based training, increase its use of embedded performance support directly in software application interfaces, and reuse content across its portfolio of learning and performance interventions. This direction required changes to *The Group*'s technical infrastructure, engagement and change management with customers, an increased focus on performance technology and analysis, and partnerships with downstream stakeholders.

Infrastructure. During its transition from the classroom to an online training model, *The Group* had already invested in a learning management system (LMS) to deliver and track web-based training courses. The LMS also included a rudimentary learning content management system (LCMS) that provided authoring tools, managed training content and files, and published finished web-based training courses for learners to take. To enable the reuse of content for on-the-job support, changes were made to the LCMS' publishing tools to recognize content within a web-based training course as individual objects. Instructional designers and developers could then identify and tag these learning objects for performance support use. The LCMS was modified to allow for *deep linking*: the ability to open a specific learning object within a course or even a specific screen within a learning object. An EPSS was added to allow enterprise software applications to make requests, or *web service* calls, for support content. The net result of these infrastructure changes allowed an employee to request information and support from context-sensitive links within the interface of software applications and seamlessly be taken directly to the correct learning object(s), previously used in a training course, now used for on-the-job support. Figure 4 illustrates these infrastructure changes.

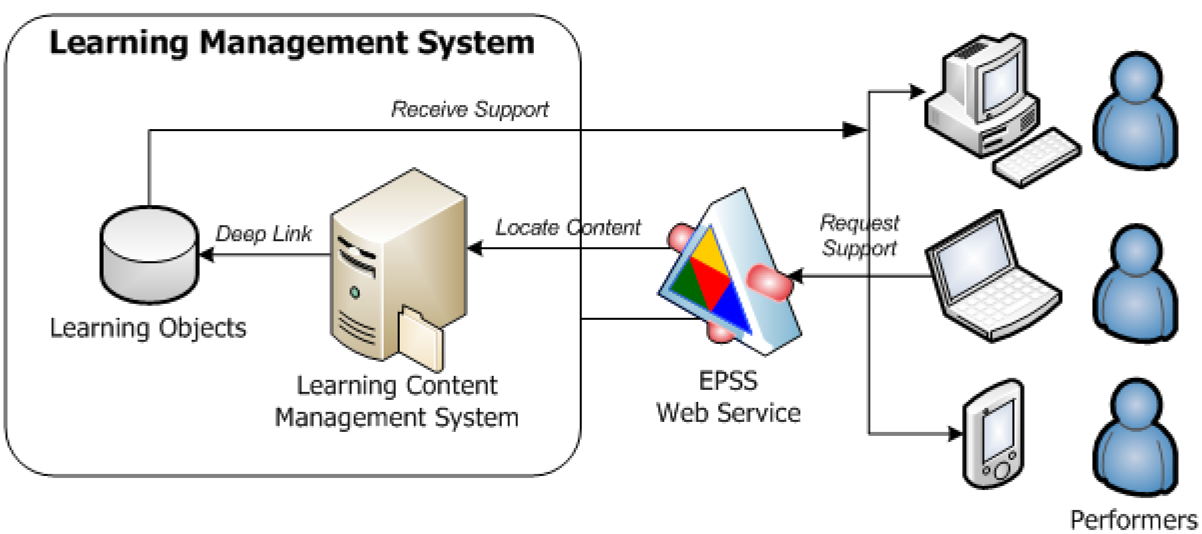

Figure 4. Infrastructure changes implemented by The Group.

Change management. The changes in *The Group*'s strategy and infrastructure also meant that project leads and developers needed to be informed of how these changes would affect them and their customers. *The Group* initially identified software projects that were small, low-risk and would be open to experimenting with new technology. Results from these initial pilot projects led to formative changes in the strategy and infrastructure. In addition, summative evaluation data collected from these projects were used to develop communication and sales packages that were then used to educate other potential customers and show them real examples of how the technology was used to benefit customers, stakeholders, and ultimately the users of the software application. The key theme of the change management activity stressed that the additional investment on the part of software teams was minimal, but the benefits to the employee and other downstream stakeholders were significant. For example, the aforementioned EPSS included a web service that allowed software developers to embed permanent, unchanging deep links into their application interfaces. Even though training developers in *The Group* may revise learning objects and the content within them, these changes could be done independently from the enterprise software application. As a result, employees could reap the benefits of integrated and up-to-date support content with a one-time investment on the part of the customer.

Performance technology and analysis. Since *The Group*'s performance technologists were now asked to prescribe different types of training interventions with varying levels of on-the-job support, performance technology and its associated analyses have grown increasingly important to *The Group*. For example, in addition to conducting task analyses to determine instructional objectives for a training intervention, performance technologists must also work with human factors engineers or other usability experts to conduct studies to identify potential problem areas in the workflow and software interface. These issues are then mapped to the appropriate instructional objective in the training intervention and ultimately its associated learning object.

Partnerships. As a training-only organization, *The Group*'s relationship with its customers was very one-dimensional: instructional designers and developers received content from software developers, business analysts, and other subject matter experts. By transitioning to a performance and reuse organization, *The Group* had to redefine its existing partnerships and build new relationships with other stakeholders. Its relationship with its primary customers, the software application teams, transitioned to a bi-directional relationship where *The Group* was not only receiving information to develop into training, but was also actively involved in identifying issues in the software and recommending specific ways to maximize employee performance. While the traditional Kirkpatrick levels of evaluation were useful in measuring training interventions, new methods had to be devised to measure the effect of performance support and content reuse. To that end, *The Group* built new relationships with downstream stakeholders and developed new evaluation instruments and metrics using their data. For example, when employees encountered issues using an enterprise software application, they often called a phone-based help desk. Metrics from the help desk were captured before the implementation, immediately after, and on a continual basis to show the effect that the training and performance support interventions had on escalated issues and call volume to the help desk.

Benefits of *LO + EPSS*

While *The Group*'s transition from an *instructor-led training* to *eLearning* to *performance and reuse* organization was not without its share of challenges, the benefits have been clear and tangible. Figure 5 details the number of web-based training courses and performance support requests delivered by *The Group* from 2000-2006. The figure shows that web-based training sessions steadily increased until the year 2004. Once *The Group*'s performance support strategy became well-entrenched in 2003-2004, the quantity of training interventions reached a plateau of approximately 140,000 training sessions per year, while performance support interventions increased rapidly. Today, *The Group* regularly delivers more content through performance support interventions as compared to training.

Figure 5. Delivery of training and performance support from 2000-2006.

Table 1 provides some of the actual cost savings realized by *The Group* through the reuse of learning objects to provide on-the-job performance support. As mentioned earlier, one of the key metrics established by *The Group* was the downstream effect that their interventions had on help desk call volume. By taking advantage of embedded on-the-job support, employees could learn how to perform their work and avoid a phone call to a live agent for support. The cost avoidance for these help desk calls was estimated at over $5 million dollars over the lifetime of the performance support system. Another indicator was the amount of money that *The Group* saved in reusing training content for performance support purposes. The savings for content development was estimated at a more modest $47,609. However, it is important to note that this estimate only takes into account initial development costs and does not factor in the cost to maintain, revise, and sustain redundant learning objects long-term.

Table 1. Cost savings due to reuse of learning objects for performance support.

Lifetime EPSS Requests	Avg Cost per Help Desk Call	Estimated Help Desk Savings
406,502	$25.00	$5,081,275*

Learning Objects Used for EPSS	Avg Cost to Develop Each Learning Object	Estimated Savings Due to Content Reuse
881	$54.04	$47,609

* Based on 2:1 relationship between EPSS requests and help desk calls.

In addition to these hard financial savings, other less tangible benefits can be realized through this approach:

1. While the time and cost to develop an initial set of training materials are easy to measure, what is often underestimated or neglected is the effort required to sustain materials. Since this approach consolidates instructional content to a single set of learning objects rather than two or more versions of similar material, ongoing maintenance costs can be greatly reduced.
2. Through the use of EPSS, there is an increase in task performance as the performer is able to access the learning object without severely disrupting their workflow. There is also some merit to the fact that, even for on-the-job performance support, the performer will review the same content in the same format that he or she originally consumed it as part of the instructional courseware. This alignment enhances the performer's ability to recognize and recall prior knowledge and then apply it to a job-specific context.

3. Performer's attitude and confidence levels can affect their job performance. With performance being supported by both training and EPSS intervention, performers may feel better equipped to handle the change.
4. Metrics that examine the use of performance support in software applications can be used to feed usability enhancements or business process re-engineering efforts. For example, prior to software upgrades, *The Group* provided data showing the top performance support requests from performers to software development teams. These data usually highlighted high-use functionality in the application that was later targeted for streamlining or automation. Alternatively, the data was also used to indicate potential usability issues in the software interface that was later tested by a human factors engineer and redesigned.
5. An overall increase in data quality can be realized anytime a single source model is employed, as is the case with learning objects. This can reduce potential issues related to conflicting versions, out of date, or incorrect content.
6. Reliance on traditional event-based training can be reduced as organizations adopt performance support and other non-instructional interventions. This transition can be facilitated through the adoption of blended learning approaches.

Instructional design considerations for success

In order to successfully reuse learning objects for training and performance support purposes, performance technologists, training designers, and developers must reinvent their instructional design methods and practices. The key difference with this dual-intervention approach is that learning objects will no longer be consumed in an aggregate such as in a training module or course. They will also be consumed individually for on-the-job support. This change offers some unique instructional challenges and opportunities.

Learning objects that will be used for training and performance support must be able to provide effective instruction individually and then later be combined with other objects for training purposes. In general, such learning objects should address a single learning objective, be brief, quickly consumable, and be void of any specific information or context that can confuse or distract the learner in an on-the-job support mode.

This notion of removing context from the learning object touches on Wiley's *reusability paradox* (2004). Wiley argued that the more work or situational context that a learning object provided, the more instructional value it provided to the performer. However, the more context that was embedded in a learning object, the less useful it would be for reuse. As a result, the challenge lies in introducing this much needed context to the performer without compromising the reusability of the individual learning objects.

Figure 6 illustrates one potential approach to address this paradox: create additional learning objects that support the core learning objects used for training and performance support. These disposable learning objects break all of the aforementioned rules. Such disposable objects would not be reusable or self-sufficient. These learning objects would be heavy with context and designed with no intention to ever stand alone. Some objects may not address a learning or performance objective. Their sole purpose is to address Wiley's *reusability paradox*: to infuse context into the training courseware by serving as contextual glue, applied as needed between core learning objects. This enables designers to maintain the instructional integrity of learning objects to be used for performance support while making these same learning objects viable for reuse in a training intervention.

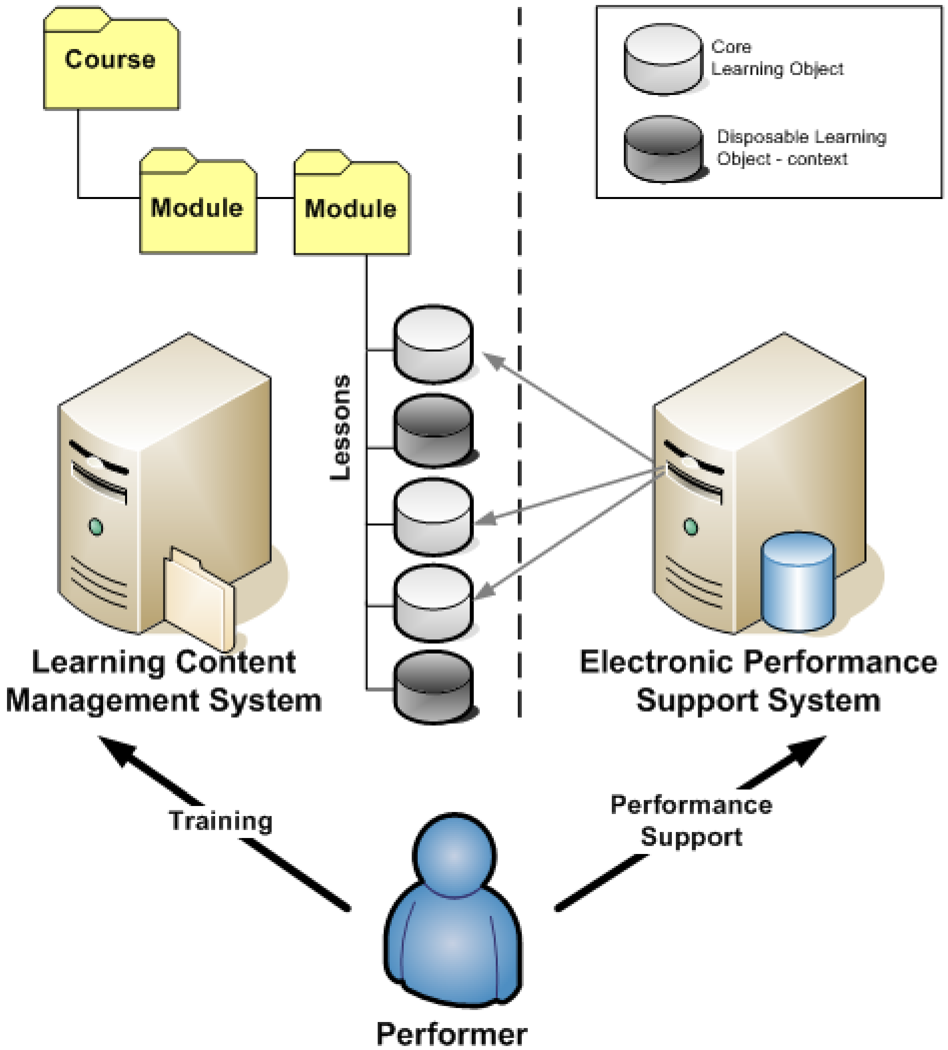

Figure 6. Use of core and disposable learning objects to enable reuse of content for training and EPSS.

Instructional media considerations for success

In the current environment, finding a software tool or learning content management system that can accommodate the reuse of learning objects for training and performance support can be challenging. In the case of *The Group*, an existing system was customized to meet the requirements of the intended solution. Fortunately, LMS and LCMS vendors are now recognizing the value of performance support and expanding the capabilities of their systems to support this approach.

Another consideration is that, in the case of *The Group*, an integrated or *extrinsic* performance support system was used (Gery, 1995). This extrinsic system allowed the performer to go directly to the relevant help content without having to search for the information. In the event that a given performance problem or business conditions cannot accommodate such an extrinsic EPSS, then a less integrated or *external* design can be used (Gery, 1995). In some cases, multiple types of EPSS can be used: for example, an extrinsic context help system could be coupled with an external search engine or FAQ.

A final media consideration is the presentation of the learning object when it is delivered through the EPSS. Should the look and feel match the training course or software application? Should the learning object be delivered in a popup window or inside of a web-based training player? Is there value in the performer having the ability to navigate to other content outside of the originally requested support topic? Such questions are situational and decisions should be based on the conditions around a specific performance problem. The key is that such options are considered during the design phase with the customers, stakeholders, and performers in mind.

Conclusion

Learning objects and performance support systems have been long-standing interventions for performance technologists. When combined together, they can provide an effective and efficient strategy for organizations seeking to reduce issues with redundant instructional content development while helping their employees maximize their performance on-the-job.

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