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Don't Train in Vain: An Enterprise Information System Implementation Training Strategy

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Don't Train in Vain: An Enterprise Information System Implementation Training Strategy

by

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Abstract

Universities often rely on complex information systems to manage student data. When higher education institutions implement enterprise resource planning (ERP) systems to replace legacy systems, they may introduce new processes, concepts, and terminology to the students, faculty, and staff who are the system's end users. A well-executed training plan can foster end-user adoption and increase an implementation's chance of success. This thesis project provides a blueprint for incorporating a training plan that best fits the needs of end users into an overall system implementation project plan. To effectively train end users, the training team must identify skill gaps, ascertain the most effective methods of delivery, select compelling trainers, develop materials in concert with subject matter experts, and continually evaluate the program for its effectiveness.

Keywords: training, information systems, persuasion, media richness, instruction

Don't Train in Vain: An Enterprise Information System Implementation Training Strategy

Colleges and universities today often rely on complex information systems to manage data for admissions, class enrollment, grading, financial aid, and various other administrative records. These information systems may be developed in-house or configured using enterprise resource planning packages, which, according to Brehm, Heinzl, and Markus (2001), began to proliferate in the 1990s. Brehm et al. (2001) say, "Enterprise resource planning (ERP) packages are often viewed as off-the-shelf software, because adopters implement them by setting parameters (called configuration), rather than by traditional programming" (p.1). When higher education institutions implement ERP systems to replace older legacy systems, they may introduce new processes, concepts, and terminology to the students, faculty, and staff who are the system's end users.

Higher education institutions can spend vast amounts of time, money, and resources implementing enterprise information systems, but these projects can be put at risk if end users are unable or unwilling to use the software. A well-executed training plan can foster end-user adoption and increase an implementation's chance of success. Nelson and Cheney (1987) define training in this context as "formal efforts to transfer required IS [information system] knowledge. The topics include IS concepts, technical skills, organization skills, and knowledge about specific IS products" (p. 548). Training can take many shapes and qualities depending on the needs and types of end users and must be executed in an organized, timely fashion to be effective. Projects face time and resource constraints, and project management must justify the time and resources spent on tasks included in the overall project plan. This thesis project provides a blueprint for incorporating a training plan that best fits the needs of end users into an overall system implementation project plan.

The training blueprint proposed here is based on the concept that training and persuasion are intertwined, and draws upon media richness, instructional design, computer-mediated communication, information systems, and social media theories. Examples are also incorporated from the author's experience as training lead during the Rochester Institute of Technology's implementation of a PeopleSoft Campus Solutions student information system (SIS) from 2009-2013. It begins with a justification for investing in training, followed by five steps to developing a training plan:

1. Determine to what extent training is needed.
2. Identify the appropriate delivery methods.
3. Select compelling trainers.
4. Create the training materials in conjunction with subject matter experts (SMEs).
5. Execute, evaluate, and improve the training.

Why is Training Worth the Investment?

The benefits of providing end-user training when implementing a new information system may seem obvious at first: end users must know how to use the software in order to perform their jobs. Culnan (1985) determined that "when a system is first introduced, users will initially require a large amount of training and support in order to become comfortable with the system's command language" (pp. 306-307). Nelson and Cheney (1987) expanded on this concept by conducting an empirical study of 100 middle- and upper-level managers from 20 companies with strategic dependencies on information systems. Confirming Culnan's premise, they conclude that "computer-related training is positively related to computer-related ability" (p. 556).

However, research suggests that training provides benefits that go beyond simply teaching end users software competencies. Lee and Xia (2011) studied the effects of persuasion, training, and first-hand use on the perceptions of users adopting new information systems. The authors note that "even when a technology adoption decision is made at the management level and its use is mandatory, users can still delay, obstruct, underuse, or sabotage the technology if they do not perceive it to be useful or easy to use" (p. 288).

While users may initially seem set in their opinions, Lee and Xia (2011) argue that user perceptions are "subjective and idiosyncratic and may change as users continue to re-evaluate the technology over time" (p. 288). The study focuses on ways training and persuasion can shape the perceived usefulness (PU) and perceived ease of use (PEOU) of a new information system as users adopt the system over time. A study was conducted on 92 business major undergraduate students adopting a new software engineering tool. Subjects were broken into four equally-sized groups and researchers manipulated the presence of training and the quality of persuasive arguments using "different degrees of argument valence and argument strength" (p. 290). The results of the study indicate that "user training helps users form a more realistic, objective perception about the usefulness of the technology in the early stage of the adoption process. Thus the adoption process tends to be more stable and smooth" (p.293). The authors also suggest that as users gain training and experience with a new system, the effects of persuasive arguments are reduced and "managers should take into account conditions under which persuasive messages are delivered to users when anticipating the strength of the effect of argument quality" (p. 293). The authors acknowledge one of the limitations of their study is the use of undergraduate student subjects over time, but the results are nonetheless intriguing. The study indicates that training

and persuasion are closely linked and have an important stabilizing influence on the early stages of end users adopting new information systems.

The work of Brown, Massey, Montoya-Weiss, and Burkman (2002) builds upon previous technology acceptance model (TAM) research studying the relationships between beliefs, attitudes, behavioral intention, and usage behavior. Much of the previous TAM research focused on acceptance in volitional contexts and found that "usefulness and ease of use are primary drivers of user intentions to adopt new information technologies" (p. 283). However, Brown et al. were more interested in studying mandatory use contexts where "employees do not have a decision regarding use. In these types of mandated situations, the system must be used to complete one's own job tasks that are *also* tightly integrated with the tasks of multiple other job performers" (p. 284).

The authors felt the need to gain a better understanding of mandated settings because of "the desire to minimize sabotage and unfaithful appropriation of technology, and the resulting costs to organizations associated with such behaviour" (pp. 283-284). The subject of the study was a multi-bank holding company converting its affiliate commercial and retail banking branches to a new standardized computer banking system. A mail survey was sent to employees of four bank affiliates adopting the new system and interviews and focus groups were conducted with managers and day-to-day users. Brown et al. (2002) found that, unlike previous research studying volitional settings, the results from the mandatory setting "show that ease of use was the primary determinant of behavioural intention, with perceived usefulness a significant *secondary* determinant" (p. 290). While perceived usefulness is not found to be a primary determinant, the authors contend that it is still important to encourage positive attitudes about use. The authors argue that "in a mandatory setting, the organization must work to engender positive attitudes

toward the technology and its use" because "the consequences of negative use are potentially profound" (p. 291). Implementations of new systems can cause paradigm shifts within an organization and "the more the balance of power changes, the greater the likelihood that attitudes toward using the system will be negative" (p. 293).

Brown et al. (2002) state that organizations can promote positive attitudes towards a new system by offering employees support mechanisms including "training, formation of user groups, formal announcements, testimonials and managerial support" (p. 291). In order for training and other supporting mechanisms to promote such positive attitudes, they need to provide a holistic view and "go beyond knowing which 'button to push.' Instead, users need to know why they are pushing this button, how pushing this button will change how they perform their jobs, and how pushing this button will impact others' job performance" (p. 291). This study is significant because it suggests that training in mandatory use settings has more power than simply teaching competencies—training is also an act of persuasion that can prevent the consequences of negative attitudes towards a system that arise from a perceived shift in power, including under-use, turnover, and sabotage.

Despite the benefits of providing end users training–both the seemingly obvious and more subtle—training is sometimes overlooked and can become an afterthought in the grand scheme of implementations. During their interviews with middle- and upper-managers, Nelson and Cheney (1987) found an interesting trend:

> In each case, interviewees stated, time and time again, how important they felt training was to the successful integration of systems. Yet the resources formally committed to training remained relatively low across the 20 survey companies. In general, companies

> were found to be "spending" less than 2% of their resources (human and financial) on training end users. (p. 556)

The authors also noted that the companies interviewed dedicated low headcount numbers to training as well, with "anywhere from zero to five people assigned to their training staffs" (Nelson & Cheney, 1987, p. 552). Institutions spend the overwhelming majority of their time, money, and effort building and configuring their information system and relatively little money and resources to ensure end users know how to use the software. Providing adequate training with little monetary or manpower resources is not an insurmountable task, but requires careful planning. The following five phases of training must be accounted for when developing the training plan for an information system implementation.

Phase 1: Determine the Training Needs

The first step of developing a training plan is identifying who needs to be trained, what they need to be trained to do, and when they need the training. McConnell (2003) provides an excellent framework for identifying an organization's training needs. A training need is identified as "a gap between actual performance and desired performance or between current abilities and job requirements that can be closed by training," (p. 66). McConnell states that "training should be designed, offered, and conducted for some purpose—to meet some objective—to fulfill some identified need," (p. 64). He notes that training needs can be identified by managers, employees, staff departments, training employees, or external consultants. The author recommends meeting or surveying some or all of these groups in order to determine areas and employees that appear to have training needs, then prioritizing the training needs based on factors including deadlines and the number of potential employees to be trained (p. 101).

Once these needs are identified and prioritized, McConnell recommends conducting a full analysis of each need that examines nine criteria: training subject(s), importance of the training, urgency or time requirements, current training population, potential training population, frequency of training, subject review and update, required results of the training, and content information sources (p. 104).

Training Subject(s)

The first step in McConnell's (2003) process for analyzing training needs is to define the subject and detail any related "sub-subjects" (p. 105). The sub-subjects McConnell refers to may be concepts, procedures, or tasks necessary to understand or execute the main subject. This breakdown may be complex with several tiers, as McConnell notes that "within each of the sub-subjects there could be further sub-subjects" (p. 105).

Importance of the Training

McConnell (2003) suggests using a 5-point Likert scale ranging from 1 (*not important*) to 5 (*very important*) to rank the importance of the subjects and sub-subjects (p. 106). He states that training can be ranked very important if "employees cannot perform their job until the training has occurred" (p. 106). He also notes that importance can be quantified in terms such as monetary value or man hours saved via training. McConnell argues this step has value because "the importance of training, along with its urgency, can then be used to prioritize the order in which to fulfill training needs" (p. 107).

Urgency or Time Requirements

Deadlines and go-live dates can be used to define urgency or time requirements, according to McConnell (2003, p. 106). Referred to as "just-in-time training," instruction is often closely linked to launch dates in order to maximize retention and ensure the training mirrors the

final product as closely as possible. In the event that launch dates shift, the urgency of the training may shift as well.

Current Training Population

Defining the current training population entails describing users and getting counts of the number of end users that need to be trained. McConnell (2003) notes that "the number of people to be trained can have a significant impact on the training program design" (p. 107). The current training population may determine whether training should be offered in group settings or as self-guided materials. The training population's impact on training format will be further discussed later in this study.

Potential Training Population

The potential training population differs from the current population because it is a projection of future users who will eventually need training in addition to immediate users. McConnell (2003) says "consideration needs to be given not only to the current training population but to any future trainees as well" (p. 108). If an information system is being released through a phased implementation, different populations may need the same training at different points. Training planners should also consider what material can be integrated into onboarding training for future users. In the higher education setting, this may involve incorporating training into freshman seminar courses, new faculty and staff orientation programs, or materials given to transfer students.

Frequency of Training

McConnell (2003) argues "how often the training course is to be conducted depends on several factors, including:

- Employee availability

- Total number of current employees to be trained
- Maximum size of training classes and method
- Required time to conduct training
- Projected future training population" (p. 108).

It may not be possible to train all users simultaneously, so trainers may have to offer training a variety of days and times, or even outside typical business hours.

Subject Review and Update

McConnell (2003) notes the need to schedule time to reexamine the relevance of the training being deployed. "Your investigation should indicate an approximate timetable for reviewing training subject content to ensure it is still current and relative," he says (p. 110). Improvements or changes to the system, organizational restructuring, and shifts in job assignments could all affect training subjects.

Required Results of the Training

When determining training needs, the focus should be goal-oriented. "What someone most needs in order to develop or design a training program is a statement of exactly what the training is to accomplish," says McConnell (2003, p. 110). The author stresses the need to be as specific as possible when describing the outcomes. Required results might be described in terms of how quickly a trainee can perform a task, or how accurately they can recall a concept.

Content Information Sources

The final portion of McConnell's (2003) analysis model is to identify the people or documentation sources that can provide information for training content, and outlining "what specific type of information each can offer" (p. 111). In the context of information systems training, this may include subject matter experts (SMEs), consultants, or configuration

documents. Once the training needs have been identified and thoroughly documented, the training team can develop a clear plan of work and identify the best methods for training the necessary populations.

Phase 2: Identify the Appropriate Delivery Methods

Training can come in many shapes and sizes, and trainers have a myriad of tools and techniques at their disposal. Ideally, training should be available in a multitude of formats so that end users with different learning preferences and schedules can receive training in a desired format. However, it is not always feasible or prudent to offer training in every format available for a given task. In this section we will examine the most common training techniques and how they can be applied to an enterprise system implementation, and we will also review media richness research that examines how those techniques can be best applied.

Training Techniques

Nelson and Cheney (1987) identify seven instructional formats or techniques for delivering end-user training in the context of information system (p. 549). The seven training techniques they identified are:

- Courses, Lectures, or Seminars
- Tutorial
- Computer-Aided Instruction (CAI)
- Interactive Training Manual (ITM)
- Resident Expert
- Help Component
- External

Each method has distinct advantages and disadvantages. This section will define each method, provide examples of how they have been leveraged in the case of RIT's implementation of an ERP product—PeopleSoft Campus Solutions—to replace their legacy student information system, and identify how each method can be used most effectively.

Courses, lectures, or seminars. Courses, lectures, or seminars are used for delivering consistent content to mass audiences who use the system in a similar fashion. Nelson and Cheney (1987) note that in this format the "the instructor is an internal or external 'expert' in IS. There are instructional materials, and the instructor determines the course content. The course is conducted inside the organization" (p. 549). In the context of the PeopleSoft Campus Solutions SIS implementation, RIT developed separate courses for each of the self-service components of the system–Student Center, Faculty Center, and Advisor Center. Due to their modular format, these courses can also be easily integrated into orientation materials for incoming students, faculty, and staff once the implementation is complete.

Typically, attendees receive handouts or training manuals upon arrival; the instructor then goes through a presentation and/or scripted demonstration, with time reserved for questions and answers at the end. When first offering these sessions, it may be advantageous to have at least one additional member of the training team on hand to take notes during the Q&A period to identify gaps in the presentation and to follow-up on any unanswered questions. Alternatively, the session could be recorded using a video camera or voice recorder, but notice should be given to attendees if this is done.

Tutorial. The tutorial is a more free-form format than courses, lectures, or seminars that is tailored to an individual person or group. Nelson and Cheney (1987) define tutorials as a format where "each user is individually taught by an instructor or colleague. There are usually

few instructional materials, and the material is covered in an order determined by the interests of the student (i.e. the user)" (p. 549). While the authors define this as a form of one-on-one instruction, tutorials can also be an effective way to train a specialized group or department. For example, during the PeopleSoft Campus Solutions SIS implementation, training tutorials were conducted for groups such as the Office of Graduate & Part-Time Enrollment Services and a collection of advisors for international campuses. Since those groups interact with the system in a way that is different from typical end users, it was more effective to train them in a separate setting and manner. It may be most convenient to conduct types of sessions during a department's standing team meeting.

Tutorials require a trainer who is well versed in the intricacies of a system and can field questions that veer from a scripted path. Often times this means the tutorial needs to be facilitated by a functional lead or team member. Requesting a list of questions ahead of time can help the trainer prepare for the session and also evaluate whether a specialized tutorial is needed, or if the requestor could actually receive all of the necessary information from a general course. Tutorials are not as efficient a delivery method as courses, lectures, or seminars so, when requests for tutorials come, the training team must make judgment calls on whether or not to offer a tutorial or refer them to a more general session.

Computer-aided instruction (CAI). The first two training techniques are traditional methods of instruction where an instructor teaches attendees in a classroom setting. For enterprise system implementations, however, you may need more complex methods of delivery. In the example of the PeopleSoft Campus Solutions SIS implementation, the dedicated training team of two people could not have feasibly trained the 17,000 students and thousands of faculty and staff in a timely manner relying solely on in-person classroom techniques. Conversely, it is

unreasonable to expect 100% attendance if training is not a gateway to receiving access to a system. Some end users prefer to simply try to learn the system on their own and refer to online training materials when they encounter problems. Providing computer-aided instruction (CAI) allows you to reach a much larger, decentralized audience. According to Nelson and Cheney (1987), CAI is

> the original term for on-line use of a computer to administer instruction directly to one or more people. In many areas CAI has come to mean computer-based drill and practice; in other areas any computer-based tutorial, particularly one aimed at teaching the use of technology, is referred to as CAI. (p. 549)

CAI can take on many forms, such as flash-based interactive modules, instructional videos with screen captures and voiceovers, or simulated "sandbox" environments. For each format there are even more tools that can be used to develop the CAI module—for example, instructional videos could be recorded using Adobe Captivate, iShowU, Jing, or a number of other free or commercial software products. Some enterprise systems even come with their own proprietary CAI development tools, such as the Oracle User Productivity Kit (UPK) that in some instances is offered along with PeopleSoft Campus Solutions software RIT's SIS is based on. Many of these products could suffice, so the training team must identify products they can use comfortably and efficiently and ensure that the final output can be easily adopted by end users.

Interactive training manual (ITM). Nelson and Cheney (1987) describe interactive training manual approach as "a combination of tutorial and CAI. This is an application-oriented IS and a guidebook which are used together. The guidebook contains lessons and the application system provides the examples and exercises" (p. 549). This format allows end users to practice

transactions in a simulated environment without making actual changes that impact data in a production system.

ITMs require perhaps the most preparation of all of the training techniques, and should therefore be used judiciously. For RIT's PeopleSoft Campus Solutions SIS implementation, the training team used ITMs extensively to teach advisors how to enroll students in classes using back-office pages. These are crucial, time-sensitive transactions that advisors need to perform regularly and are relied upon by students and faculty. The complexity, importance, and volume of these transactions dictated that advisors needed practice performing them before doing them in the production environment. To facilitate this practice, the training team partnered with project technical leads to set up a training environment that mirrored the production environment. To keep sensitive personal and academic information confidential, the training team filled the training environment with "dummy" data including fabricated students and classes. The training team created mock scenarios that mimicked real-life transactions and prepared guidebooks to lead trainees through the exercises. ITM training sessions were typically offered in 20-person computer labs. Upon arriving, attendees would receive login information, a guidebook, and some contextual instruction from the trainer. They would then complete the exercises. Once the training session was completed, the training instance would be refreshed and all practice transactions would be cleared. These ITMs required extensive planning but once all of the preparations were in place they were an effective way of providing attendees first-hand experience using the system without conducting transactions that affected actual student data.

Resident expert. The resident expert (RE) technique of training is the least formal of the methods discussed here but one that many users feel the most comfortable with. Nelson and Cheney (1987) describe the resident expert as

> a passive version of the tutorial technique in that training is user initiated. It takes advantage of the fact that users are more likely to ask when they need to know rather than to attend a course or consult a book or the system itself. (p. 549)

Trainers are often seen as the "face" of an information system implementation and may be expected to serve as de facto resident experts. Resident experts are not simply for those who are too busy to attend formal training sessions; they are also an important resource for those who do attend formal training and have follow up questions or encounter situations not covered in training materials.

The project training team members do not have to be the only resident experts, however. Training teams for system implementations are often only dedicated to the project for a finite period of time, so it is important to have resident experts with more permanent positions throughout an institution. RIT's PeopleSoft Campus Solutions SIS implementation training team assembled a group of representatives from across the university and met with them weekly to provide them more in-depth knowledge of the system and answer questions the representatives gathered from their constituents. Each college and several key divisions from academic affairs and student affairs designated a member for this group, and they became the college or division's resident expert. The qualities that make good resident experts are the same qualities that make good trainers, which will be discussed further in this study.

The team of resident experts established during RIT's SIS system implementation was primarily composed of staff members; however, training plans for future system implementations at higher education institutions may find it beneficial to leverage this technique for training faculty as well. Yohon and Zimmerman (2006) examined how faculty prefer to learn software technology, and the results were intriguing. The authors surveyed a systematic random sample of

liberal arts and sciences faculty about their software usage at a university with "about 1,400 faculty members and more than 25,000 students" (p. 11). Despite the fact that faculty had ample opportunities to receive training on new information technology, the authors found that faculty were unlikely to attend formal training sessions. According to Yohon and Zimmerman, "about 84% of the participants reported being aware of the university courses introducing new technologies. That said, 67% had not completed any of the courses, 21% had completed one course, 9% had completed two courses, and 3% had completed between three and five courses" (p. 18). The authors found that "faculty members are more likely to talk with other faculty than to attend seminars, personally try new software or observe other faculty" (p. 18). This research indicates the resident expert technique is the most effective way of engaging and training faculty.

Help component. Nelson and Cheney (1987) note the following:

> Most IS contain at least primitive "help components" which give error messages when the user makes mistakes. In some cases short explanations are also provided. "Layered" help components let the user proceed through successive layers of instructional material, each involving more detail. The "bottom" level may be a CAI system. (p. 549)

Help components often come built-in out of the box with enterprise information systems. The pages within PeopleSoft Campus Solutions by default came with help icons that linked to PeopleBooks, vanilla official documentation compiled by Oracle. If it is desired to link to more personalized help content, such as a training website or wiki, it may require additional system configuration and collaboration from project technical leads.

External. All of the training methods discussed so far have been handled internally within the organization; however, in some instances training outside the organization is required. Nelson and Cheney (1987) state that external training could come in the form of "relevant

college courses such as these present in an MBA program, vendor sponsored seminars and independently sponsored seminars" (p. 549). External forms of training are most commonly used for training technical or functional leads, or those configuring the system. It is not as feasible to train end users with external methods due to the costs associated with sending people to these types of sessions. Although Nelson and Cheney say "the courses are conducted at sites away from the organization," (p. 549) they could also be offered as a webinar or by bringing in a training consultant to provide vendor-delivered training courses.

Social media. Nelson and Cheney's 1987 study provided an excellent inventory of training techniques at the time, but an important new vehicle has emerged since the time of that study's publication: social media. Wasserman (2013) describes the power of social media and highlighted the ways in which the National Highway Institute (NHI) used social media "to engage the transportation as well as provide targeted job aids" (p. 30). Social media possess inherent abilities to collect feedback and engage users in ways more traditional media fall short. Wasserman explains how the NHI leverages mobile devices during training sessions "for audience polling to gather live responses from participants during presentations using text messaging, Twitter, and webpages. This live audience tool is a flexible, cost-effective instrument" (p. 31). She also notes that "NHI is using other social media outlets to broadcast messages to larger audiences. Through the FHWA Facebook, Twitter, and YouTube pages, NHI will continue to educate about upcoming trainings and initiatives" (p. 31).

RIT's PeopleSoft Campus Solutions SIS implementation training team used social media as a method to educate and inform students who were too busy or uninterested in attending courses, tutorials, or other formal forms of training. Using official Facebook and Twitter accounts, the training team was able to broadcast blog posts and YouTube videos with timely,

targeted documentation about how to perform key tasks in the system. It was also used to disburse information about more formal training sessions in case followers felt the need to attend. Furthermore, the accounts served as virtual resident experts—students frequently posted or tweeted questions to the Facebook and Twitter accounts, and the training team could quickly reply with the appropriate information. RIT also has a relatively large presence on the popular social media site Reddit. The site organizes content posts by areas of interest called "subreddits," and RIT has one of the largest college subreddits with over 6,400 registered users as of February 2015. The training team monitored RIT's subreddit for questions and replied with instructions when appropriate. The social media landscape is quickly evolving, and the benefits of using them as a training method are not fully understood, but their potential is great and merits further investigation.

Selecting the Appropriate Techniques

A fully developed training plan for a large system implementation could potentially include each of the delivery methods discussed in this section. The key to offering the right mix is to examine the complexity of the tasks you are training and match them to the methods that best meet your audience's needs. Media richness theory provides a good set of criteria for choosing the appropriate methods. Timmerman and Kruepke's (2006) study sought to provide a "comprehensive summary of [computer-assisted instruction] effects among college student samples" (p. 74) through meta-analysis. While previous meta-analyses suggested that CAI may improve college student performance (Christmann & Badgett, 1999; Cohen & Dacanay, 1992; Fletcher-Flinn & Gavatt, 1995; Kulik & Kulik 1986; Kulik, 1994), the authors felt that emerging technologies and a trend of computerizing the classroom over the past 20 years created a need for a more up-to-date comprehensive look at CAI. Timmerman and Kruepke believed that "by using

the media richness framework, it may be possible to categorize the characteristics of different CAI technologies; then, by using meta-analytic methods, we can determine which types of CAI offer the greatest potential for effectively communicating classroom content" (p. 74). The authors conducted a meta-analysis of 118 studies from 1985-2004 that "appeared to meet the criteria of comparing student performance across CAI and traditional instructional formats, including measures of student performance following the use of CAI and traditional instruction, and providing sufficient quantitative data to compute effect sizes" (p. 80). The results of Timmerman and Kruepke's study indicate that "students who use CAI fare better than their traditional instruction counterparts," (p. 90) but they also caution that when CAI content is used to teach simple tasks, it can make content more difficult to review or prompt overload, decreasing student performance (p. 93). From a practical standpoint, the authors also offer the following:

> It is crucial to consider whether the necessary resources including development time, hardware (for the instructor and students), software, and so forth are accessible. Although a variety of new technologies are available to simplify the development of CAI, a fairly substantial investment may still be necessary to develop high quality materials. (p. 93)

Although this study focuses on the effects of CAI and media richness on college students, the questions raised about the contextual and practical implications of when to use CAI are important for anyone developing a training plan. Time, resources, and the complexity of the task being taught must be considered carefully.

The work of Lengel and Daft provides a good structure for selecting the appropriate method. Lengel and Daft's 1988 study examines the media effective executive managers use to

communicate with employees within their organization given an ever-expanding array of methods to choose from. The authors argue the following,

> a medium can enhance or distort the intended message, and the explosion in electronic technology is making media selection an even more critical issue. Each channel of communication—be it written, telephone, face-to-face, or electronic—has characteristics that make it appropriate in some situations and not in others. (p. 225)

Lengel and Daft (1988) highlight a medium's "richness" and the degree of a message's routineness as the two key factors for determining the most appropriate channel to communicate with. They view all media on a richness continuum based on the following three characteristics: "(1) Ability to handle multiple information cues simultaneously (2) Ability to facilitate rapid feedback (3) Ability to establish a personal focus" (p. 226). While routine communications are simple and straightforward, "non-routine communications have greater potential for misunderstanding, and are often characterized by time pressure, ambiguity, and surprise" (p. 226). Lengel and Daft summarize media richness by saying:

> Effective communication is a matching process; the richness of the medium should be selected to fit the nature of the message. Communication success will occur when rich media are used for nonroutine messages and when lean media are used for routine messages. Communication failures will occur when a rich medium is used to convey routine messages or when a lean medium is chosen for nonroutine messages. (p. 227)

While time, money, and resources are important considerations when identifying the media to use for training topics, the primary determinant should be the complexity of the task. In order to be effective, however, the medium for the training must be delivered through an effective source.

Phase 3: Select Compelling Trainers Who Can Deliver the Material Persuasively

As argued earlier, providing training when implementing information systems is partly a persuasive act; we can look to rhetorical theory for ideas to make in-person training sessions more effective and resonant. In *Rhetoric,* Aristotle discusses the methods of persuasion presenters can employ as they speak:

> Of the means of persuasion supplied by the speech itself there are three kinds. The first kind reside in the character [ethos] of the speaker; the second consist in producing a certain [the right] attitude in the hearer; the third appertain to the argument proper, in so far as it actually or seemingly demonstrates. (p. 8)

Leveraging these means of persuasion requires a speaker

> who can reason logically, can analyze the types of human character [ethe], along with the virtues, and, thirdly, can analyze the emotions-- the nature and quality of each several emotion, with the means by which, and the manner in which, it is excited. (p. 9)

In the context of an information system implementation, a persuasive trainer would be someone who can clearly state the reasons for adopting the software, is competent using the software and understands the contexts in which to use it, and understands why his audience may be ambivalent about adopting it.

Training is more persuasive when trainees perceive that the trainer has a high degree of competency using and navigating an information system. This competency can actually be built during the system's implementation through the development of training materials themselves. By modeling transactions and creating test scenarios, trainers can gain a great deal of experience using the system and learning its intricacies and behaviors. Trainers with backgrounds similar to those of the audience may be able to make arguments that resonate with trainees. In RIT's SIS

implementation, one of the trainers was an alumna, a former advisor, and a former instructor. She could draw from those experiences to tailor examples that current students, advisors, and faculty could relate to. Sharing these experiences is important, as it is not enough to simply rely on titles to build credibility and ethos. As Aristotle says, "trust in the speaker should be created by the speech itself, not left to depend on antecedent impression that the speaker is this or that kind of man" (book 1, chapter 2).

It is important for the training team to evoke the right emotions from the trainees, and the most important emotion a trainee can leave a training session with is confidence. Trainees must feel confident that they have the tools to effectively overcome any challenges they experience with a new system and complete tasks central to their jobs on their own. Aristotle states "there are, in fact, two things that render human beings indifferent to peril—inexperience and resourcefulness" (p. 111). Trainees who have not used previous iterations of legacy information systems, such as new hires, may in fact appear more confident than those who have mastered the legacy systems and are attempting to translate how the new information applies to previous ways of completing job tasks. Therefore, it is important for trainers to use a reassuring tone and make sure that trainees feel they have enough resources available to overcome obstacles.

According to Aristotle the logos mode of persuasion depends on an easily understandable delivery. Aristotle says "a good style is, first of all, clear," (p. 185). Aristotle argues "language which does not convey a clear meaning fails to perform the very function of language. The style, again, should be neither mean nor above the dignity of the subject, but appropriate," (p. 185). This means the trainer must strike a balance between using superfluous technical jargon and avoiding dumbing down the language unnecessarily for the audience. Training materials should

be written in clear, concise, direct language. When the audience asks for clarification, the trainer should respond appropriately.

The most effective trainers will be those who can relate to the audience, instill confidence in trainees, and deliver information in a clear, easily digestible manner. The next component of the training strategy is to develop training materials in concert with subject matter experts so as not to undermine the trainer's credibility by delivering inaccurate information.

Phase 4: Create and Review the Training Materials in Collaboration with Subject Matter Experts

Developing training materials is often a collaborative experience. Typically, in order to write accurate, comprehensive training materials, trainers must rely on assistance from some form of subject matter expert. In the context of an enterprise system implementation, SMEs could be internal technical or functional leads, external consultants, or a combination of those sources. Since such SMEs may be expensive or more focused on configuring the system than developing training materials, it is critical for technical writers to make effective use of their time with them.

Technical writer Debbie Walkowski (1991) explored the relationships between technical writers and software engineers serving as technical experts, focusing on the perspectives of the technical experts. After surveying 19 software engineers, she identified several characteristics of some technical writers that her interviewees did not appreciate. The software engineers reported frustration when the technical writers they worked with did not have fundamental knowledge of the subject matter, did not ask educated questions, or did not behave in a professional manner. While it may seem like common sense to come to a meeting with an SME prepared with

background knowledge and behave in a professional manner, it is helpful to know the audience and be cognizant of these potential points of friction.

Lee and Mehlenbacher (2000) also explored the relationships between technical writers and subject matter experts, but instead focused on the perspectives of technical writers toward SMEs. The authors informally surveyed 29 technical writers through a professional listserv for professional technical writers as well as two writers from high-tech companies in Research Triangle Park, NC. Lee and Mehlenbacher studied the obstacles technical writers perceive towards the documentation process and found that "what writers disliked most about working with SMEs is that they did not give the writers enough of their time" (p. 546). The results indicate that this conflict in time may partially be a result of overall project planning because "instead of staggering deadlines, often the SME and the writer shared identical or parallel deadlines" (p. 546). Further complicating this time obstacle, the authors found "writers also observed that some SMEs did not see the importance of documentation in general" (p. 546). The study suggests that trainers and technical writers must be prepared to work with SMEs who are pressed for time and may not see the value in training and documentation. The studies by Walkowski (1991) and Lee and Mehlenbacher (2000) suggest that technical writers and trainers can strengthen their credibility with engineers and SMEs by focusing on professionalism and preparation. Alred, Oliu, and Brusaw (1992) also stress the need for preparation and emphasize studying the subject field's vocabulary because "a grasp of such fundamentals will gain you the respect of the experts you interview" (p. 85). The authors also recommend learning "as much as you can about the interviewee and his or her department or organization. If your interviewee has published in the field, read all work related to your project" (p. 85).

Lee and Mehlenbacher (2000) assert that trainers must also emphasize their role "as a link or liaison between companies and their users" (p. 547) when working with SMEs. The authors say that one of the technical writer's roles is to anticipate users' questions and draw out the answers from the SMEs. Alred et al. (1992) take this concept a step further and use the analogy of technical writers as translators for end users. SMEs are often highly skilled experts and may use technical jargon that users won't understand or don't need to know. Alred et al. say technical writers must identify the essential concepts and "translate these ideas into clear English for your audience" (p. 85).

To ensure nothing is lost in translation and that the instructions are accurate, you must perform some form of review prior to implementing the training. Alred et al.(1992) describe several types of reviews that may take place, including a documentation plan review, peer review, technical review, customer service review, marketing review, edit review, management review, and legal review; however, the authors note that "it would not be practical for any technical writer to use all the reviews described here" (p. 248). In the instance of an enterprise information systems implementation, at the very minimum trainers should reconnect with SMEs for a technical review. The authors state this "thorough critique of your document by a technical expert examines its technical accuracy and completeness" (p. 248). By behaving professionally and properly maintaining your relationship with subject matter experts, you will be able to rely on them throughout the training development and review process to ensure the information you deliver is as accurate, up to date, and complete as possible.

Phase 5: Execute, Evaluate, and Improve the Training

Even if a training team properly determines training needs, identifies the most appropriate training methods, chooses compelling trainers, and develops the training materials in

lockstep with SMEs, they will likely find areas where training may not meet intended results and there is room for improvement. In order to improve the training sessions and materials you deliver, it is important to continue to collect feedback and questions after sessions have concluded. It is not simply enough to offer training; you must make sure that the training you provide is effectively helping end users perform the required tasks. Evaluations can identify room for improvement within the training program and any unnecessary topics, modules, or courses that can be removed. Kirkpatick (1998) argues that evaluation is also important "to justify the existence of the training department by showing how it contributes to the organization's objectives and goals" (p. 16). As noted earlier in this study, administrators and project managers may look critically at training programs when faced with budget or staffing constraints, so evaluations could potentially provide evidence to the training program's value. Kirkpatrick outlines a four-level sequence to evaluate training programs: reaction, learning, behavior, and results (p. 19).

Reaction

Kirkpatrick's (1998) reaction level of training evaluation refers to measuring how satisfied the trainees are with the material covered and the trainer's delivery of the information. The author argues that measuring reaction adds value to the training process because it

> gives us valuable feedback that helps us to evaluate the programs as well as comments and suggestions for improving future programs. Second, it tells the trainees that the trainers are there to help them do their job better and that they need feedback to determine how effective they are. (p. 25)

Kirkpatrick (1998) also notes that the quantitative data provided by measuring reaction can help ease management's concerns and can be used to establish performance standards for

training. To quantify reactions, Kirkpatrick recommends developing a concise form that "provides the maximum amount of information and requires the minimum amount of time," (p. 26) while still allowing users to provide written comments and suggestions. An effective form will likely include a combination of Likert scale questions and open response questions. Kirkpatrick encourages trainers to get 100% immediate response by building in time to the training session and requesting participants complete the evaluation before leaving the room (p. 33). Once reaction evaluations are completed, the training team needs to examine the results and compare them against a set of standards to ensure trainees' expectations are being met. Kirkpatrick states that "the standards should be based on past experience, considering the ratings that effective instructors have received" (p. 36). If the results of the reaction evaluation fail to meet the standards, action must be taken. Kirkpatrick notes four types of appropriate actions:

1. Make a change—in leaders, facilities, subject, or something else.
2. Modify the situation. If the instructor does not meet the standard, help by providing advice, new audiovisual aids, or something else.
3. Live with an unsatisfactory situation.
4. Change the standard if conditions change. (p. 36)

Of Kirkpatrick's four methods of training evaluation, reaction is the simplest method to measure and assess. Measuring how your trainees feel about the content and delivery of your training is crucial to the training program's success.

Learning

The next stage of training evaluation examines "the extent to which participants change attitudes, improve knowledge, and/or increase skill as a result of attending the program" (Kirkpatrick 1998, p. 20). In order to effectively assess whether or not learning has taken place,

Kirkpatrick (1998) recommends evaluating trainees against a control group that has not received the training and to measure trainees' knowledge, skills and/or attitudes before and after the training. "The difference indicates what learning has taken place," (p. 41) Kirkpatrick notes.

The methods for evaluating knowledge and attitudes differ slightly from measuring skills—knowledge and attitudes can be assessed using what Kirkpatrick (1998) dubs a "paper-and-pencil" test (p. 40) and skills must be measured using a performance test. If testing a skill that is entirely new to the trainee, the before-and after approach is not appropriate, and the trainee simply needs to be evaluated following the training. Kirkpatrick encourages trainers to get a 100% response rate by incorporating a simple, brief learning assessment at the beginning and end of each training session, then taking appropriate action after assessing the results. Although the paper-and-pencil descriptor Kirkpatrick uses to describe the test is somewhat dated, the concept is still effective. Instead of using actual paper and pencil, the test could also be incorporated directly into computer-aided instruction methods or offered as a web form in other settings.

Evaluating learning is crucial because unless learning has occurred, behaviors cannot be changed. However, learning and behavior must be measured independently, because even if learning occurs, there may be a climate to prevent or discourage behavior change. If this is the case, it may mean more is needed from a change management perspective than wholesale changes to the training program.

Behavior

Kirkpatrick's (1998) third level of training evaluation seeks to answer "what change in job behavior occurred because people attended a training program?" (p. 48). Measuring behavior is more complex than the methods previously discussed and requires a different approach. While

Kirkpatrick suggests evaluating reaction and learning immediately, he notes that when assessing behavior "no evaluation should be attempted until trainees have had an opportunity to use the new behavior" (p. 50). Sometimes, it can take up to 2-6 months for behavior change to take place. If it is practical, Kirkpatrick suggests evaluating the trainees before and after the program, although in many cases it is simply not feasible to evaluate them before the training.

To evaluate behavior change, Kirkpatrick (1998) says "evaluators should survey and/or interview one or more of the following: trainees, their immediate supervisor, their subordinates, and others who are knowledgeable about their behavior" (p. 51). When implementing an information system in a higher education setting, there are several candidates worth interviewing or surveying to observe behavior—is the IT service desk receiving more or less calls than usual after the system implementation? If you are training advisors, do their students feel their advisors are able to adequately assist them using the system? If you are training students, are advisors receiving more calls from students since the implementation? Is the usage of outdated or shadow systems continuing or on the decline? These are all questions and users that may be worth exploring. However, Kirkpatrick cautions that "you should compare the cost of evaluating change in behavior with the benefits that could result from the evaluation" (p. 55). Interviews can take a considerable amount of staff time, but Kirkpatrick argues that "if a program is going to be repeated, the time and money spent evaluating it can be justified by the possible improvements in future programs" (p. 56).

Results

The fourth level of training evaluation is what Kirkpatrick (1998) calls "the most important and perhaps the most difficult of all—determining what final results occurred because of attendance and participation in the training program" (p. 59). At this stage of evaluation, the

training team must look for tangible evidence the training has had an impact on their university. Has productivity increased? Are students receiving a higher quality of advisement from staff? Can faculty more efficiently and accurately enter information into the system? These are the types of questions that must be asked.

As with other forms of evaluation, Kirkpatrick (1998) recommends using control groups and measuring both before and after the program when practical. As with measuring behavior, time must pass before one can accurately measure results. The author notes that trainers should "remember the principle that the possible benefits from an evaluation should exceed the cost of doing the evaluation, and be satisfied with evidence if proof is not possible" (p. 69).

Conclusion and Discussion

Offering training is an important component of an effective implementation of a new information system at a higher education institution. Training is crucial not only to teach tasks and processes, but also to convince end users that the information system will be beneficial. To effectively train end users, the training team must identify skill gaps, ascertain the most effective methods of delivery, select compelling trainers, develop materials in concert with subject matter experts, and continually evaluate the program for its effectiveness.

Additional research should be done to explore how effective social media can be as a training tool for information systems implementations and other settings. The richness of training materials delivered through social media can be tailored to the topic, but researchers should examine whether such material can stand out or be effective in an environment that is more anecdotally associated with entertainment and news. Future research could also examine how the training consumption tendencies differ for varying audiences such as faculty, students, and staff.

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