

Practical Considerations for In-House Development of Distributed Learning and Mobile Learning



**Courseware Standards and Certification Division
TRADOC Capability Manager-TADLP
U.S. Army Training Support Center
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Practical Considerations for In-House Development of Distributed Learning and Mobile Learning

Prologue -

Practical Considerations for In-House Development of Distributed Learning (DL) and Mobile Learning provides guidance for Army DL managers and staff about what to consider when contemplating the use of an in-house development model rather than continuing the current practice of acquiring contractually developed (outsourced) DL courseware. The paper attempts to maintain a neutral position and does not purport to advocate in-house development vis-a-vis contractually developed courseware, or vice versa. The focus of the paper is on the *minimum essential requirements* to establish and maintain a viable in-house development team in a typical Army DL environment. The minimum essential requirements should be capable of supporting quality content design and development efforts, though proponents may find that in-house development may be best suited for lower-level content and interactivity (e.g., knowledge-based activities). Contractual services may still be required (or preferred) for more intensely interactive content (e.g., games and simulations). As a consequence, any shift to in-house development by a proponent or agency may become, as a practical matter, a mixed operational model, relying on both in-house *and* contractually developed content.

The paper proposes an in-house development team consisting of at least five individuals with the following suggested GS position classifications and associated competencies:

1. a team leader/project manager (GS-1701)
2. an instructional designer (GS-1750)
3. a graphics designer (GS-1084)
4. a courseware developer/applications software specialist (GS-2210 or GS-1550)
5. at least one subject matter expert [SME] (GS-????)

The paper further describes the potential training needs, software/tools, facilities/equipment, and other considerations that will be important to take into account when thinking about forming and supporting an in-house development team. Foremost among many considerations is the fundamental requirement of securing command support for whatever actions are contemplated by the proponent or agency.

As an important caveat, the paper is *not* intended to endorse any in-house development team decision or action by a specific proponent or agency, nor does it promise or support any personnel or fiscal resources required to do so. All resources required to establish and support an in-house development team are the total responsibility of the individual proponent or agency, and not the TCM-TADLP.

(The current 9/22/11 update of this document now includes supplemental information and guidance relating to mobile devices and mobile applications development.)

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Introduction

The history of Army distributed learning (DL) is yet to be written, but one element of the history will be the shifting pendulum of utilization of *internal* versus *external* development capabilities, i.e., “in-house” development efforts contrasted with out-sourced, contractually developed DL courseware products. In early Army DL there was an effort to create and maintain in-house development teams. But after failure to find, train, and maintain the right people the effort ended. With contracted DL development, the process has met with much frustration. Long production time, lack of subject matter experts, lack of review time, and lack of agreement over design continue to be significant issues. In the end, the purpose for making the decision to return to in-house development may be born of out of this frustration with the current DL development process. If this is the case, then a long and thoughtful reflection over how the return to in-house development will result in a different outcome is necessary before making the final decision.

This concept paper will provide practical guidance for Army DL managers and staff about what to consider when contemplating use of an in-house development model rather than acquiring contractually developed (outsourced) DL courseware. The practical guidance will begin with a definition to be vetted with members of the training and education community for approval. Then the paper sets out guidance primarily in the form of a set of minimum essential requirements to establish and maintain a viable in-house development team. The paper will also attempt to outline some of the issues related to whether distributed learning training and education products are best developed by “...the scruffy ensemble of local proponent 1750s and SMEs” or by “...professional designers and developers” typically found within the Army’s contracting organizations. While this overly simplistic characterization of personnel may seem somewhat unkind, it serves to underscore the real choices DL managers must make in providing DL training and education products for Soldiers and civilians.

Definition of In-House Development

A working definition of “in-house development” is the combined capacity of an organization’s personnel, skill sets, training, software tools, facilities, equipment, and other resources leveraged in order to rapidly design, develop, and deploy Army DL products to key stakeholders. Most often, the aggregation of such in-house development resources is referred

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to as an “in-house DL development team,” or “DL cell” denoting the small group structure associated with many DL projects. While the connotation of in-house *development* seems to restrict DL instructional systems design (ISD) activities to only one portion of the traditional ADDIE model, a well functioning in-house development team would actually execute some portions of ALL of the ADDIE components: analysis, design, development, implementation, and evaluation.

For purposes of this paper, the focus shall be on the *minimum essential requirements* to establish and maintain a viable in-house development team in a typical Army DL environment. Some proponent schools or agencies may wish to go beyond the minimum essential requirements for in-house development; however, most will be constrained by fiscal and personnel resources. This paper is intended to guide their threshold (re-)entry requirements back into the in-house development mode of DL operations.

Within the larger e-Learning industry, in-house development is linked to the related concept of “rapid e-Learning,” as a means of describing the shortened development process made possible by new software, web-based tools, and the shifting roles of designers, developers, and subject matter experts (SME’s). Two major elements that characterize rapid e-Learning are short timeframes and ease of development:

- Courseware which can be developed in less than three weeks
- Subject Matter Experts (SMEs) act as the primary development resource
- A well-known tool (e.g. PowerPoint) or user-friendly templates form the starting point for courseware
- Simple assessment, feedback and tracking are usually provided
- Media elements which enhance learning but do *not* create technology barriers may be included (e.g. voice)
- Learning modules can be taken in one hour or less, often in less than 30 minutes.
- Synchronous (scheduled or live) and asynchronous (self-paced) models may be utilized.

Jennifer De Vries, “Rapid E-Learning: Groundbreaking New Research,” Bersin & Associates, 2004, www.e-learninglist.co.uk/whitepapers/101LTIArticle6-25-04.pdf

Many new content development tools have been designed and marketed specifically as “rapid e-Learning” to help fulfill in-house development needs. Knowing when to use rapid-Learning, instead of more traditional content development tools, is a key consideration for developers.

Jennifer De Vries suggests the following factors as examples of when rapid e-Learning *should* be used:

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Delta	Teaching the difference between what was learned and what has changed
Disposable	Content that has a short shelf-life and will go out of date
Continuous	Topics that require frequent and regular updates
Urgent	Problems that must be addressed immediately
Introductory	Introductory topics that may preface an instructor-led class or more detailed blended learning program

Table from Jennifer De Vries, "Rapid E-Learning: Groundbreaking New Research," Bersin & Associates, 2004, www.e-learninglist.co.uk/whitepapers/101LTIArticle6-25-04.pdf

Rapid e-Learning is a growing element of design and development support. Many e-Learning companies have re-structured in-house operations to take advantage of a more streamlined and efficient ways to produce content and courseware for online learning markets. When searching for more information about in-house development, "rapid-e-Learning" is a good, substitute keyword search item for related topics.

Why In-House Development?

In order to develop and maintain an in-house development effort, training and education managers must understand the scope of this undertaking and answer a basic question of why they are pursuing this path. The first decision points for in-house development should involve a reasonable examination of the goals and objectives of such a move, i.e., --- *Why would in-house development be advantageous for the Army? --- What problem(s) would in-house development solve for our organization? --- Would in-house development produce better, more effective DL products? --- Would in-house development be more cost efficient than contracting for DL courseware?* All of these questions, and associated characteristics, should be analyzed when trying to determine the best course of action for your particular school or agency. Some decision factors to consider might include:

Flexibility – The capability to design and develop DL products for multiple audiences, purposes, and platforms, depending on current proponent requirements, and the capacity to shift development priorities if proponent needs change.

Responsiveness – The capability to respond to changes in proponent needs for DL products, especially the capacity to rapidly update and modify existing DL content and learning materials based on lessons learned.

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Timeliness – The capability to provide specific, distributed learning products within a relatively short timeframe (1-4 weeks?) as opposed to the extended timeframes associated with contractual products (typically, 4-6 months or longer).

Cost containment – The potential capacity to save money on DL products by producing them internally, especially as staff becomes more proficient over the span of several DL projects, i.e., to achieve a better return on investment (ROI) for DL products over time.

Design options – The capability to develop DL products that reflect different approaches to design, instead of relying on a single, contractor-provided design template ---e.g., to help proponents create learning objects that can be re-used in different DL products.

Availability of new tools – The capabilities of new, user-friendly, content authoring tools allow in-house staff to create and develop quality DL products not previously obtainable by non-programmers.

A simple table outlining development options can be useful, for example:

Factors supporting in-house development	Factors supporting use of a contractor
You are in direct control	A fixed term commitment
Your staff will enhance their skills	No resources to re-allocate after the project
Development over several DL projects should be cheaper	Expertise already available in project management, course design, and so on
Maintenance of DL product should be easier	More aware of recent industry developments
You know the unit/agency culture	Not influenced by internal politics
Fewer copyright problems should arise	May be more credible than internal DL developers
The tools are better and easier to use	Access to the <i>latest</i> specialized software
Likely to produce DL products faster	Current DL financial model supports this method
New federal rules on out-sourcing (OMB A-76)	

(Table adapted from: [How to Plan and Manage an e-Learning Programme](#), by Roger Lewis and Quentin Whitlock, 2003, Gower Publishing Company, Chapter 11 "Managing the E-learning Development Team" page 153.)

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A key enabler of in-house development efforts has been recent advances in software and web-based tools available to DL staff. New tools such as Articulate, Captivate, and Mohive make sophisticated development possible, even though in-house staff may lack programming skills:

Most current authoring tools have the technical infrastructure built directly into the tool, freeing designers to focus on content and graphics, without having to worry about programming the course. That means much smaller teams can develop content for a fraction of the price of outsourcing, and because the content is programmed automatically, they can cut months from the development process (Gale, 2008).

However, in-house development typically encodes ad hoc business practices that have evolved over time at that agency, that may *not* necessarily represent the enterprise/industry best practices typically found in many out-sourced products, i.e., DL managers need to be careful that in-house development activities do not leave them vulnerable to “in-breeding” of organizational bias and agency imperfections (Dodds, 2006). To illustrate, Army DL operations compel an in-house development team to be attentive to business practices found in TRADOC 350-70 regulations, section 508 compliance activities, and local Directorate of Information Management (DOIM) network standards and practices.

If timeliness is an important proponent consideration for in-house development, then proponents must have some practical understanding of what amount of development time might be required for typical DLETP projects. Research-based estimates from the American Society for Training and Development (ASTD) cite that the amount of time it takes **to develop one hour of e-learning training** varies from **93 hours** (for text-only, limited interactivity, no animations, without any template software) to **365 hours** (for limited interactivity, no animations, with a template such as Lectora, ToolBook, or Captivate). Variations among other development factors may produce even greater estimates of time required to develop one hour of e-learning (Defelice and Kapp, 2009). Much of the variation in the ASTD development estimates can be attributed to a client’s lack of understanding of the scope of an e-Learning project, lack of knowledge of appropriate technologies, and a mis-calculation of the amount of time required for a thorough review of an e-Learning product (Defelice and Kapp, 2009). If you become your own “client” by choosing to do in-house development, will you be able to overcome these potential pitfalls? Will your in-house development efforts actually reduce overall development time and produce a quality Army DL product that is on time and within budget?

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Finally, it is important to note that the ultimate decision to build in-house development capacity within your organization is NOT necessarily an “all or nothing” decision. It is likely that some projects in the future will require external support for various reasons, and that any shift to in-house development may become, in actual day-to-day practice, a mixed operational model. Additionally, recent versions of Army DLETP delivery orders and templates have made incremental development of smaller DL products and learning objects more feasible. With the end of the current contract vehicle in sight, proponents must turn their attention to the capabilities of what will be a new and more flexible contract vehicle.

Minimum Essential Requirements of an In-House Development Team

Personnel – How many and what kind of personnel do you need in order to conduct practicable in-house development operations? A typical minimum configuration would involve at least five individuals with the following suggested GS position classifications:

1. a team leader/project manager (GS-1701)
2. an instructional designer (GS-1750)
3. a graphics designer (GS-1084)
4. a courseware developer/applications software specialist (GS-2210 or GS-1550)
5. at least one subject matter expert [SME] (GS-????)

(List adapted from: How to Plan and Manage an e-Learning Programme, by Roger Lewis and Quentin Whitlock, 2003, Gower Publishing Company, Chapter 11 “*Managing the E-learning Development Team*” page 150.)

If resources permit, a sixth additional personnel type could be cast into the in-house development team mix. An audio-visual (A/V) production specialist (GS-1071) could be added, but this person would not necessarily be required for all types of DLETP product development. It may be possible to “share” this person, on occasion, from within other parts of your organization, or hire an individual for the team on a part-time, temporary basis, as needed.

The courseware developer/applications systems specialist position may be somewhat problematic with regard to the GS position classification structure. While some of the work may be educationally related (screen design, storyboard and script development, etc.), the key aspect of the position is the capability to manipulate and interface with various types of application software (e.g., Flash, Captivate, Articulate, ToolBook). Hence, the information technology specialist (GS-2210) or the computer science (GS-1550) titles as the suggested classifications. As noted previously, many new content authoring (rapid e-Learning) tools may

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not necessarily require high-level, computer technology, programming skills. This particular position and GS classification on the in-house development team should remain adaptable and responsive to local needs and requirements.

The SME requirement will probably vary from project to project, both in terms of actual numbers of SMEs required as well as the type of SME required by the content area to be developed. Part of the difficulty in making an in-house development effort work will be the search for, and availability of, SMEs to work on time-constrained projects. In an out-sourced development project, that effort is typically built into the contractual language and project specifications --- and one in which the contractor is responsible for securing appropriate SMEs.

Finally, another consideration for DL managers is how in-house developed products might affect other personnel and roles within your organization. For example, the role of “course manager” is likely to expand for an in-house developed product in that the course manager will probably now assume more responsibility for courseware implementation, courseware maintenance, and LMS integration. On the other hand, your contracting officer representative (COR’s) personnel might experience a decline in day-to-day activity and workload. Such changes in work roles may impact your organization in unanticipated ways.

Skill Sets – Beyond the minimum essential personnel, what specific skill sets are required to conduct practicable in-house development operations? As a useful starting point, GS position classification information is helpful for general occupational information and job duties typically associated with the classifications (see “Federal Classification and Job Grading Systems” at the Office of Personnel Management website at: <http://www.opm.gov/fedclass/>). For example:

GS-1701 – Supervisory general education and training: professional work in the field of education and training, by a person who accomplishes work through the direction of other people. The program segment or work directed is administrative, technical, complex clerical, or comparable in nature. The functions, activities, or services provided have limited geographic coverage and support most of the activities comprising a typical agency field office, an area office, a small to medium military installation, or comparable activities within agency program segments.

- Plan and schedule ongoing production-oriented work on a quarterly and annual basis, or direct assignments of similar duration.
- Adjust staffing levels or work procedures within their organizational unit(s) to accommodate resource allocation decisions made at higher echelons.

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- Justify the purchase of new equipment. Improve work methods and procedures used to produce work products.
- Oversee the development of technical data, estimates, statistics, suggestions, and other information useful to higher level managers in determining which goals and objectives to emphasize.
- Decide the methodologies to use in achieving work goals and objectives, and in determining other management strategies.

Supervision and oversight at this level requires significant and extensive coordination and integration of a number of important projects or program segments of professional, scientific, technical, managerial, or administrative work comparable in difficulty to the GS-12 level.

Supervision at this level involves major recommendations which have a direct and substantial effect on the organization and projects managed.

GS-1750 – “Instructional Systems Specialist” Professional positions, the duties of which are to administer, supervise, advise on, design, develop, or provide educational or training services in formal education or training programs. The work requires knowledge of learning theory and the principles, methods, practices and techniques of one or more specialties of the instructional systems field. The work may require knowledge of one or more subjects or occupations in which educational or training instruction is provided.

“Instructional Systems Specialist” with an emphasis on “Instructional Design” duties:

- determine the learning objectives and task learning relationships, cluster learning events, organize course content, and develop instruction design plans;
- analyze learning problems, select teaching strategies using appropriate models, and develop course plans using this information;
- identify tasks that can be efficiently and effectively supported by job or skill performance aids;
- select suitable performance measures or develop new measures required to document effectiveness;
- develop learning maps and perform learning analyses from the initial training levels through the operating levels of tasks or jobs;
- derive performance objectives and criterion test items; and
- use a systems approach to training.

“Instructional Systems Specialist” with an emphasis on “Instructional Materials Development” duties:

- plan and organize the work, determine possible sources of information, and conduct fact finding;

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- develop or revise the specific content, organization, style, format, emphasis, and treatment of each segment of the instructional courses or systems; and
- develop finished products including lesson plans, training texts, television programs, programmed texts, or computer assisted instruction.

NOTE: Preparing lesson plans, course outlines, bibliographies, etc., are normal functions of a teacher or instructor. The function of instructional materials development goes further and may involve preparing complete narrative texts covering the courses or units, supplemental study guides, instructor's manuals, case studies, or practical exercises to be used with the texts.

GS-1084 – “Visual Information Specialist” Persons who perform work involved in communicating information through visual means. Work in this series includes the design and display of such visual materials as photographs, illustrations, diagrams, graphs, objects, models, slides, and charts used in books, magazines, pamphlets, exhibits, live or video recorded speeches or lectures, and other means of communicating. The work requires knowledge of and ability to apply the principles of visual design; knowledge of the technical characteristics associated with various methods of visual display; and the ability to present subject matter information in a visual form that will convey the intended message to, or have the desired effect on, the intended audience.

Some positions combine visual information work as described above with personal production of finished illustrations, exhibits, and other visual products. This is particularly the case at small agencies utilizing a "generalist" approach in their visual arts organizations. These mixed positions are classified in this series when the work involves the design, production, and display of a variety of visual materials requiring a broader knowledge of the principles and techniques of visual design than is associated with the more specialized fields of illustrating, photography, or exhibits construction.

Visual information is most commonly communicated by means of printed material, exhibits, and oral presentations.

- Printed material includes books, pamphlets, magazines, newspapers, posters, and other similar material which is reproduced by one of the printing processes.
- Exhibits may be either two- or three-dimensional and, in addition to printed material, make use of models, artifacts, specimens, dioramas, murals, audiovisual presentations, and electronic devices that permit viewers to access desired information or activate a display.
- Presentations generally consist of formal speeches, briefings, or training lectures using visual materials presented to the audience in the form of photographic slides, overhead transparencies, flip charts, and posters.

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Regardless of the means of communication used, visual information specialists do not determine the subject matter content of the material, nor do they decide the audience to which the information is to be presented. However, they must be familiar with audience characteristics such as attitudes, age, and educational and interest level to select those visuals that are best suited to the intended audience. When suitable visual material is not available, they decide its basic content and form and arrange to have it produced by an illustrator, photographer, model maker, or other type of craftsman, or they may produce it themselves.

GS-2210 – “Information Technology Specialist” (Applications software specialist) Work that involves the design, documentation, development, modification, testing, installation, implementation, and support of new or existing applications software.

Functions commonly performed by employees assigned to this specialty may include:

- analyzing and refining systems requirements;
- translating systems requirements into applications prototypes;
- planning and designing systems architecture;
- writing, debugging, and maintaining code;
- determining and designing applications architecture;
- determining output media/formats;
- designing user interfaces;
- working with customers to test applications;
- assuring software and systems quality and functionality;
- integrating hardware and software components;
- writing and maintaining program documentation;
- evaluating new applications software technologies; and/or
- ensuring the rigorous application of information security/ information assurance policies, principles, and practices to the delivery of application software services.

Some specific information technology functions related to mobile applications and mobile devices (whether GS-2210 or GS-1550) might include:

- develops mobile applications for smart phones, tablets, and other mobile devices;
- demonstrates proficiency in multiple programming languages including, but not limited to, Java, C, C++, Objective-C, Windows Mobile, Blackberry, and Symbian;
- supports and enhances existing applications to ensure maturity for products on smart phones, tablets, and other emerging mobile platforms; and,
- creates application prototypes with new features or entirely new applications on current and future mobile platforms.

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GS-1550 – “Computer Sciences Specialist” Professional positions which primarily involve the application of, or research into, computer science methods and techniques to store, manipulate, transform or present information by means of computer systems. The primary requirements of the work are (a) professional competence in applying the theoretical foundations of computer science, including computer system architecture and system software organization, the representation and transformation of information structures, and the theoretical models for such representations and transformations; (b) specialized knowledge of the design characteristics, limitations, and potential applications of systems having the ability to transform information, and of broad areas of applications of computing which have common structures, processes, and techniques; and (c) knowledge of relevant mathematical and statistical sciences.

Typical functions performed by Computer Scientists include:

- Development of software systems using a knowledge of techniques, procedures, and processes such as operating system theory, data structures, computer system architecture, Software engineering, and computer communications.
- Development of computer graphics systems using a knowledge of graphic display systems, general purpose graphics languages, and optimization techniques involving preprocessors graphical algorithms, memory management methods, and high-speed communication links.
- Development of integrated computer systems using a knowledge of:
 - computer software concepts such as data representation, data structures, file systems, operating systems, computer languages, software development methodologies, and network protocols;
 - computer hardware concepts such as computer architecture, computer communication systems, peripheral control systems, and bus architectures; and
 - mathematics such as calculus, mathematical analysis, probability, linear algebra, statistics, discrete structures, and abstract algebra.

GS 1071 – “Audiovisual Production Specialist” Positions that involve supervising or performing work in the production of videotaped and live television programs; live and prerecorded radio broadcasts; motion picture films; broadcast type closed circuit teleconferences; and other similar productions, such as slide shows with sound accompaniments. The work requires the ability to plan, organize, and direct the work of writers, editors, actors, narrators, musicians, set designers, audio and lighting technicians, camera operators, and other associated technical personnel to produce, select, and arrange the actions, sounds, and visual effects required for the finished production. *Audiovisual Production Specialist* is the authorized title for nonspecialized positions involved in a variety of functions during different phases of a

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production to include directing, editing, scriptwriting, camera operating, set lighting, and video electronic graphics. All positions in this series require some degree of creative ability in communicating information through audiovisual means. The grade level criteria assume the possession of a basic degree of creative talent necessary to perform the work.

Complementary competencies

Complementary competencies required by in-house development team members *in addition to* the duties and knowledge, skills, and abilities (KSAs) outlined within the appropriate position classifications fall into three broad categories: administrative competencies, educational competencies, and technical competencies. While not *all* members of the in-house development team need to possess each competency, at least one person on the in-house development team needs to be skilled in the aptitude. Preferably, several members of the team should be proficient in several of the competencies for redundancy purposes and to cover extended absences of team members. Clearly, some of the following competencies overlap with the above GS position classification descriptions; however, they are worth mentioning as specific, practical considerations when launching an in-house development team:

Administrative competencies would include: project management skills, planning skills, costing and budgeting skills, small group interaction skills, client management skills, interviewing skills, liaison skills, quality control skills, and general writing and communication skills.

Educational competencies would include: task analysis skills, training needs analysis skills, subject matter research skills, assessment and evaluation skills, interactive questioning skills, script writing skills, and storyboarding skills.

Technical competencies would include: media selection skills, simulation design and development skills, interface design skills, *specific* content authoring tools skills (e.g., PowerPoint, Captivate, Articulate, Flash, Fireworks, Acrobat, ToolBook, Presenter, Lectora, Mohive, etc.), application programming skills, SCORM development and testing skills, learning management system (e.g., Saba, Blackboard, Atlas Pro) skills, video production skills, and audio production skills.

A good resource document, "Skills for In-House Teams," is available from Kineo (2009) as a structured guide for various skill levels (entry level, intermediate, advanced), using PowerPoint and Articulate: http://www.kineo.com/documents/Kineo_Guide_skills_in_house_teams.pdf

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Training – If existing personnel do not possess required skill sets for in-house development, what types of training might be useful to enhance their design and development capabilities? Since technologies, software, and equipment change over time, how will you keep your in-house development team up-to-date on the latest knowledge and skill sets necessary to operate efficiently and effectively? How will your in-house development team improve their skills? All of these issues suggest that you will need to consider a training strategy as part of your in-house development efforts. As part of that training strategy, the team leader will need a way to evaluate the technical skill levels of various team members, and monitor those skill levels over time (Shinder, 2006). The team leader will need to establish reasonable timeframes for training activities of team members, and in a small organizational setting, be willing and able to sometimes postpone production activities in favor of training activities. Again, contrasting this with out-sourced, contractually developed DL products, a contractor is paid to *produce* and supply already trained personnel for the task as part of the process, i.e., training is something that you buy “up-front” with the contract.

For Army proponents and centers, in-house development training activities may take a number of forms and utilize an assortment of delivery methods. Classroom-based training, web-based training, tutorials, books, magazines, conferences, etc. all may contribute to individual team members learning new skills or updating and refreshing old skills. Some training may be developed internally and offered for all team members (a portion of your in-house development effort may be focused on creating training specifically for your own staff). Other training may be external to the organization and offered for only selected team members. Whatever in-house development team training strategy is adopted by your organization, it will need to be funded adequately, and the team leader will need to insure that training opportunities do not go unused or become unnecessarily delayed.

The Army itself may offer appropriate training for in-house development topics through various formal and informal educational venues at proponent schools. For example, The United States Army Signal Center of Excellence offers an “Introduction to iOS App Development” course and an “Android App Development” course to personnel that have already have a Computer Science related degree or recent programming experience. Additionally, the U.S. Army Training Support Center at Ft Eustis offers Blackboard related training for instructors and developers. Several Army schools offer specific training for specific software and hardware tools that are used within their organizations. It may be possible to cross-enroll other civilian or military personnel from outside the organization, if the training is “discovered” and a request is made to enroll your in-house development personnel.

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There is no shortage of eLearning training vendors and companies. A quick Google search will produce hundreds of possibilities. Most commercial vendors supply pay-per-use training sessions, and tend to be expensive. However, some software and equipment vendors will provide free (or discounted) training for products that are purchased from the company.

Some practical training resources and professional development activities for in-house development team members may include:

Training and Education Professional Organizations – For example, American Society for Training and Development (ASTD), American Management Association (AMA), Association for Computing Machinery (ACM), Association for the Advancement of Computing in Education (AACE), EDUCAUSE, League for Innovation in the Community Colleges (LFICC), and World Organization of Webmasters (WOW). Training and education professional organizations can provide training opportunities in a number of ways: through training programs or certifications, through conferences and professional meetings, and through published and online materials (books and magazines).

ASTD offers a number of certificate programs, including an eLearning instructional design program (<http://www.astd.org/content/education/certificatePrograms/ELearning/>). ASTD also sponsors an annual “TechKnowledge” conference specifically for personnel assigned to developing and managing eLearning, in addition to their annual ASTD international conference and exposition (<http://www.astd.org/content/conferences/techknowledge/>). ASTD sponsors an online eLearning magazine “Learning Circuits” which is listed as “ASTD’s source for eLearning” (<http://www.astd.org/LC/>). ASTD publishes a number of books and other printed materials that support eLearning, including “Designing E-Learning” and “Implementing E-Learning” (<http://store.astd.org/Default.aspx?tabid=167&ProductId=7321>).

Other professional organizations have similar training resources available. EDUCAUSE is a nonprofit association whose mission is to advance higher education by promoting the intelligent use of information technology. EDUCAUSE sponsors an annual conference that explores many eLearning topics, as well as other meetings and seminars that support eLearning training activities (<http://net.educause.edu/EDUCAUSEAnnualConference/1352>). EDUCAUSE also publishes several print and online journals “EDUCAUSE Review” and “EDUCAUSE Quarterly” that promote education and training. The League for Innovation in Community Colleges sponsors an annual conference on the application of information technology to teaching and learning. The Interservice/ Industry Training, Simulation and Education

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Conference (I/ITSEC) is an annual conference that focuses on military training and simulation applications (<http://www.iitsec.org/Pages/default.aspx>).

Many non-association affiliated conferences are also available, including “eLearning DevCon 2010” sponsored by Rapid Intake, INC. held at the University of Utah. A list of session topics for eLearning DevCon may be found at: <http://elearndevcon.com/sessions.asp#sessions>. Also, the Masie Center (Elliott Masie) sponsors an annual conference, this year called “Learning 2010” (<http://www.learning2010.com/>).

Vendor Training and Tutorials

Many software vendors provide affiliated training for products purchased. Adobe, Blackboard, Saba, Microsoft are all examples of vendors that provide free seminars, webinars, and other training activities specifically for their products. Many vendors will also provide enhanced, pay-for-use training events, although training costs may be prohibitive for smaller DL organizations.

Another source of training is web-based or computer-based training tutorials, usually for specific software products and skill sets. As an example, “Skillsoft” is a commercial provider of on demand e-learning and performance support solutions. The Army has purchased an enterprise-wide Skillsoft license as part of the “Army e-Learning Program” and Soldiers and civilians have free access to hundreds of information technology tutorials, management tutorials, and eLearning topics (<https://usarmy.skillport.com/>). The Army e-Learning site also grants access to “Books 24X7” which gives Soldiers and civilians access to an extensive library of full-text e-books and technology-related topics. Other commercial, web-based, tutorials include Lynda.com (<http://www.lynda.com/>) and Atomic Learning (<http://www.atomiclearning.com/>).

Web Resources

Finally, there are many online eLearning resources available for free. Several websites are cited with appropriate links in the “*Other Online Resources*” section at the end of this document. One particular set of education and training resources especially helpful for additional *research* on eLearning topics is a growing collection of online research journals. Here is a small sample of research journals and eLearning magazines currently available online:

- Adult Education and Development (http://www.iiz-dvv.de/index.php?article_id=121&clang=1)
- Canadian Journal of Learning and Technology (<http://www.cjlt.ca/index.php/cjlt>)

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- Contemporary Educational Technology
(<http://www.cedtech.net/>)
- EDUCAUSE Review
(<http://www.educause.edu/er>)
- eLearn Magazine
(<http://www.elearnmag.org/index.cfm>)
- E-learning and Education Journal
(<http://elead.campussource.de/>)
- Electronic Journal for the Integration of Technology in Education
(<http://ejite.isu.edu/>)
- Information Technology, Learning, and Performance Journal
(<http://www.osra.org/journal.html>)
- International Journal of Emerging Technologies in Learning
(<http://www.online-journals.org/i-jet>)
- The Journal of Distance Education
(<http://www.iofde.ca/index.php/jde>)
- Journal of Educational Technology and Society
(<http://www.ifets.info/others/>)
- Journal of Interactive Online Learning
(<http://www.ncolr.org/jiol/>)
- Journal of Learning Design
(<http://www.jld.qut.edu.au/>)
- Journal of Online Learning and Teaching
(<http://jolt.merlot.org/>)
- Journal of Teaching, Learning, and Assessment
(<http://escholarship.bc.edu/jtla/>)
- Journal of Literacy and Technology
(<http://www.literacyandtechnology.org/>)
- Journal of Technology Education
(<http://scholar.lib.vt.edu/ejournals/JTE/>)
- Journal of Educators Online
(<http://www.thejeo.com/>)
- Online Journal of Distance Learning Administration
(<http://www.westga.edu/~distance/oidla/>)

Software/Tools – Which software or other technology tools will the organization be required to purchase or license in order to effectively support in-house development efforts? Which software or technology tools contribute to “rapid eLearning” development processes? Which software or technology tools match the development tasks, personnel, and skill sets in your

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organization? As noted previously, a very significant change in eLearning operations over the past few years has been the availability of new and improved software and technology tools. Trying to sort through all the new options is a complicated task, and there are no easy tool selections to recommend --- It all depends on your organizational circumstances and resources.

An excellent guide for identifying and selecting some of the tools is provided by Advanced Distributed Learning (ADL) in a document titled "Choosing Authoring Tools, v.1.4" (see References for a link). The guide lists and explains an extensive array of current authoring tools, and provides helpful information about making choices among them. The choice(s) of an authoring tool is important because most tools are "...designed for particular styles of learning, delivery platforms, file formats, e-learning standards, and production workflows" (ADL, 2009, p. 6). Making the wrong choice could waste time and money, and result in DLETP products that don't work properly. The ADL guide also notes that "durability" is an important factor in choosing an authoring tool, in that whatever tool is adopted by the organization must continue to be available and supported over time (ADL, 2009, p. 6). The ADL guide provides a list of "criteria for assessing quality and suitability of tools," as well as a comprehensive list of "general recommendations" for making an authoring tool selection (ADL, 2009, pp. 20-22) as well as a Sample Tool Requirements Matrix to assist in the tool selection.

One topic which generates a significant amount of discussion (and consternation) among DL practitioners is the use of PowerPoint as a prevalent DL development tool. There are DL practitioners "...who praise PowerPoint as a primary enabler of rapid e-learning content development" and those "...who view PowerPoint as nothing more than a way to mass produce page-turning content" (Chapman, 2005, p. 6). Neither camp may be completely justified in their opinions. Some of the reasons for the use of PowerPoint as a common development tool include: ubiquity, ease of use, short learning curve, short development times, conversion of legacy content, and suitability for use by SMEs (Chapman, 2005, p. 8). Regardless of your perception of PowerPoint as a development tool, it is a fact that *much* of the existing learning content within Army proponent schoolhouses is currently in the form of PowerPoint files. Fortunately, many of the new software tools use PowerPoint files (.ppt) as the starting point for additional eLearning design and development. Software products like Captivate, Presenter, Articulate, Camtasia, and Impatica all take the .ppt file format and convert it to more educationally rich (e.g., with animations, audio, interactive/branching, assessments, etc.) eLearning content. One practical consideration for in-house development is having a strategy (how and why?) to use (or re-use) existing PowerPoint content as part of your new in-house development efforts.

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Microsoft Office applications (Word, PowerPoint, Excel, Access, Publisher, and Outlook) are currently part of "Army Golden" software packages and already installed on most Army workstations. Nonetheless, these software tools are an important part of an in-house development team toolkit, especially PowerPoint (as noted above). One aspect of an in-house development team training strategy should be to include these Microsoft applications as "trainable" skills --- many people have the tools, but few utilize (or know about) all the development power contained in the tools such as the ability to author web pages from WORD, or the ability to create interactive training from PowerPoint. Other Microsoft products such as "Project" or "Visio" may help with in-house development project management tasks.

Other common DL development tools and packages include a collection of Adobe software products such as Dreamweaver, Fireworks, Flash, Acrobat Pro, Photoshop, Illustrator, Presenter, Captivate, and Soundbooth. These Adobe products are typically bundled into a suite such as "Adobe Creative Suite 4" or "Adobe eLearning Suite" which mix and match various individual software components, and have varying costs per suite. One important consideration in any choice of software tools is the output file format, i.e., how robust and how suitable are the output files for a web-based environment? For many of the Adobe products, the output file format is "Flash" (.swf), which is an almost universally accepted web format. Many externally-produced interactive multimedia instruction (IMI) products developed by Army contractors are built using a Flash platform. ("Flash programming" may be a specific applications software specialist skill set [GS 2210] that an in-house development team may want to recruit for or train.) Additionally, many of the Adobe products will also produce SCORM compliant packages as a selected file output options.

Other potential software and technology tools for in-house development include Camtasia, Articulate, GameStudio, Cold Fusion, Centra, Connect, Wimba, Lectora, Mac OS and Xcode for iOS/iPhone/iPad development, and Eclipse for Android development and Android SDK.

A final practical consideration for *any* of the software and tools is whether you really need a specific tool(s) to accomplish your DL development purpose? For example, if you plan to use Blackboard or Atlas Pro as your Learning Content Management System (LCMS) delivery platform for a particular DLETP product or project, can you simply place native content (documents, .pdf files, images, etc.) into the LCMS and let the LCMS functionality (e.g., learning units, adaptive release, discussion boards, web links, testing engine, etc.) accomplish the sequencing of instruction and the overall DL purpose?

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Facilities/equipment – What dedicated facilities and equipment will be necessary to support in-house personnel? In general, in-house development will involve the agency purchasing many new items that are usually part of a contractor’s overhead. The expectation is that the new facilities and equipment resources can be amortized and depreciated over time, i.e., that the cost/benefit should favor in-house development in an extended timeframe (...a better ROI?).

Workspace – While current staff may have adequate workspace, creating an in-house development team will likely involve adding more staff members (more workspaces) and also spawning a need for improved workspace configurations, a conference/meeting room, storage rooms, better lighting, sound proofing, etc. Additions and/or improvements to in-house development team workspaces will, as might be expected, require additional fiscal commitments.

Furniture – Additional in-house development team members will also require office furniture, and existing staff may benefit from upgraded desks and work surfaces, chairs, etc. Special equipment (below) may require special furniture.

Equipment – Investments in new equipment for the in-house development team will consume substantial, up-front, financial resources. In-house development team members will require (and benefit from) high-end computer workstations, with (multiple?) large, high-resolution video displays. (The graphics designer may require an Apple workstation for design and/or graphics software. A mobile applications developer must have an Apple workstation/laptop to develop iPhone and iPad Applications.) Other equipment needs may include digital cameras and other related photography equipment, video cameras, audio equipment, a projector for the conference room, scanners, high-quality color printers, copiers, high-capacity external drives, and dedicated servers.

Supplies – Finally, the budget for supplies and other office disposable items should also be increased, as computer paper, ink, imaging paper, DVDs, graphics tools, etc. for the in-house development team will expand (and shift from external contractors).

A typical in-house development team software, tools, and equipment “shopping list” may include some of the following items:

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<ul style="list-style-type: none"> • Upgrade government workstations to run selected in-house development software, as necessary • Software to design and develop content, e.g.: <ul style="list-style-type: none"> ○ Adobe e-Learning Suite ○ Adobe Creative Suite 5 ○ Articulate ○ Captivate ○ Camtasia ○ Adobe Premiere ○ Mac OS and Xcode 	<ul style="list-style-type: none"> • High capacity storage media • Image and/or document scanners • High-end printers • Digital cameras and other supporting photography equipment • Digital video equipment • High quality microphones • Miscellaneous cables, connectors, etc. • Various digital devices and platforms to “test” content delivery
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Other Resources – Other resource considerations may vary from one proponent to another, but will probably include at least some of the following items. All proponents will require additional fiscal resources to accomplish the transition to in-house development. For many, this increased financial activity may require an increase in budgeting activities and financial planning, i.e., a heavier reliance on resource management (RM) personnel in your agency. Personnel considerations will also intensify working relationships with the human resources personnel in your organization. A concept plan may be required to justify the increase in personnel or the shift in work areas. Some staffing needs may be accomplished through the use of interns and may obligate added supervisory or training responsibilities on the part of the in-house development team leader. At a minimum, new hiring activities will consume a significant amount of time for existing staff, especially at the beginning of a transition to in-house efforts.

A Certificate of Networthiness is required for any software not included on the Army Golden Software list or the Approved Army Products list. Consider this requirement before making a purchase decision.

Local area network access and capacity, and reliable connectivity to the wide area network (NIPERNET/SIPERNET), is an important in-house development team consideration. Without a strong network infrastructure capability, in-house development team activities would be severely constricted in today’s web-based learning environment. Enterprise solutions for in-house development such as the Rapid Online Content Creation Environment (ROCCE), the Mancen Rapid Development Suite (MRDS), and the Learning Object Generator (LOG) may provide low cost entry into in-house development. Finally, the in-house development team must have reliable and robust access to one or more of the Army’s learning management

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systems (LMS) such as Saba, Blackboard, or Atlas Pro, either through an enterprise-wide access license or through one of the Army's Lifelong Learning Centers (LLC).

Other considerations – (...remember, this is **Army** training and education)

The proponent school that does make the in-house development transition should be mindful that ALL aspects of the **TRADOC 350-70** regulation still apply, and now, may become the responsibility of local DL operational staff rather than contracting staff.

For example,

- Training Requirements Analysis System (TRAS) documents must still be completed for DLETP products produced in-house: an Individual Training Plan (ITP), Course Administrative Data (CAD), and a Program of Instruction (POI) as appropriate are required for Army training and education products.
- Also, you must create and update the Course Management Plan (CMP) for in-house DL products.
- Comply with TRADOC Quality Assurance standards.
- An in-house development team must meet all standards and specifications, such as SCORM (if required) and section 508 Disabilities Act requirements.
- Update of the Training Development Capability (TDC) and Automated Systems Approach to Training (ASAT) may be required as well as the catalog information for the Reimer Digital Library (RDL).
- A search of the DAVIS-DITIS and other content repositories is required before development to ensure there is no usable content that can be reused in the new project.
- Testing strategies must follow appropriate guidance from TRADOC Pamphlet 350-70-5
- Validation must follow appropriate guidance from TRADOC Pamphlet 350-70-10
- And finally, all web-based content must follow the Department of Defense Instructions 1322-22 and 1322.26.

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Having **command support** for in-house development efforts, is a critical element of establishing and maintaining an in-house development operation. Required fiscal and personnel resources will be authorized *only* with command support, and the Commander must have a personal understanding of how in-house development contributes to more effective and efficient DL operations. Command support is especially important when things don't go according to plan: the transition to in-house development is a complex organizational undertaking and will require the coordination and support of many units within the command. Command support also implies that the required parameters of ARFORGEN, the TRADOC Campaign Plan, TCM-TADLP policies, etc. have been reviewed and incorporated into in-house development operations.

It may be important to conduct and demonstrate an actual **cost/benefit analysis** for in-house development, as contrasted with external, contractual DLETP products. While anecdotal arguments may be sufficient to make a plausible case for in-house development, firm data which help demonstrate actual performance efficiencies (or inefficiencies).

As has been previously noted, the **availability of SMEs** within the organization (or within the extended command) is a critical factor for sustaining and enhancing an in-house development team. Having the appropriate SME is crucial for content development that reflects field conditions and the contemporary operating environment. Without an appropriate SME, many DLETP products or projects would falter, and not produce adequate DL content. Given the current combat operations tempo, this may be "...a bridge too far" for some organizations.

Dedicating time and money for a **training strategy** is essential for the long-term success of an in-house development team. Training must become an annual budget item, and minimally, an annual activity. As noted in this paper, consideration must be given for training "down-time." The lack of training of in-house staff will ultimately degrade any timeliness, responsiveness, or cost containment justifications originally made in favor of in-house development, by producing DLETP products or projects that do not represent state-of-the-art DL protocols.

Lastly, it is important to remember that in-house design and development activities must be closely synchronized with the projected **delivery environment**. Large download files generally won't work well with mobile platforms, standardized content such as SCORM packages may not be necessary for blended learning with an instructor-in-the-loop, and games and simulations may not play on platforms other than the one they were originally designed for. No amount of in-house development will overcome a poor instructional strategy or an incoherent choice of design options.

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Conclusion

Creating a “rapid e-Learning” process in-house may be a reasonable approach for some, *but not necessarily all*, DL proponents. The decision to do so should involve reviewing a number of the considerations outlined in this paper. Establishing the goals and objectives of such a transition is an important first step for the proponent, and should be aimed at answering the general question “...why in-house development?”

In-house development should involve conscientious proponent decisions about personnel, skills sets, training, software/tools, and facilities/equipment. Army proponents and training centers must evaluate and compare existing contractual performance with anticipated performance of in-house DL operations. There will probably be some imperfect appraisals on both sides of the argument, but the overall analysis process should attempt to achieve a balanced approach.

In-house development is not a panacea for all perceived contractual troubles; however, in-house development can yield important benefits to Army DL operations if thoughtfully and carefully implemented.

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Other Online Resources

<http://www.adlnet.gov/Technologies/Evaluation/default.aspx>

Advanced Distributed Learning (ADL) Research & Evaluation pages

<http://www.astd.org/communities/networks/eLearning/>

American Society for Training and Development (ASTD) E-Learning community web site (see E-Learning discussion board link).

<http://www.educause.edu/>

EDUCAUSE - a nonprofit association whose mission is to advance higher education by promoting the intelligent use of information technology.

<http://www.elearninglearning.com/>

A community collecting and organizing the best information on the web about eLearning.

<http://www.elearnspace.org/>

Everything elearning web site by George Siemens. (With extensive eLearning resource links)

<http://www.kineo.com/elearning-resources/elearning-resources-home.html>

Kineo "Free Thinking" – At the Kineo website, we share our thinking on the latest in e-learning. Browse our popular free reports, e-learning market updates and tool reviews or listen to our audio interviews and hear what others have to say.

<http://ctlinstdesign.project.mnscu.edu/>

Minnesota State Colleges and Universities – Instructional design for eLearning site.

Appendix A

Suggested Timeline for In-House Development Team Start-up Activities

Given the practical considerations outlined in the document, how long would it take to fully implement an in-house development team in a typical Army DL environment? Obviously, the answer will depend on the state of existing personnel, skill sets, training, software/tools, facilities/equipment, and fiscal resources --- i.e., do you already have the right people, with the right skills, adequate training, and sufficient resources to make it all happen, or will you need to start with zero in-house development resources? Or, more likely, start somewhere in between.

Here is a list of potential timeline considerations and a plausible timeframe for each:

- Analysis of existing personnel, skill sets, training, software/tools, facilities/equipment, and resources (+ cost-benefit analysis?) - **1 month**
- In-House Development concept approval(s) and funding authorization(s) – 3 months
- Hiring process for specific personnel – **average of 3 – 6 months per position**
- Development of training strategy – **1 month**
 - Training time for specific skill sets - **1- 6 months**
 - Training time to update general design/development skills – **1 month per year**
- Acquisition process for software/tools - **2 – 3 months**
 - Networthiness process for non-Army Golden software - **6 months**
- Acquisition process for equipment – **2- 3 months**
- Acquisition process for facilities – **4 - 6 months**
- Securing SMEs – (**1 month** within command, **3-6 months** outside of command)
- TRADOC DL compliance and QAO activities – **1 month**
- Attainment of long-term funding and support – (**ongoing process**)

Some activities listed above must be conducted before proceeding to next steps. Other activities may be conducted concurrently. The estimated time for successful start-up of an in-house development team is **1 – 2 years** from the time of an internal decision to do so.

In-House Development Team Start-up Timeline

