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ADL and Beyond

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ADVANCED DISTRIBUTED LEARNING FOR A GROWING SECURITY COMMUNITY

Introduction to ADL

A number of terms are used to denote the application of information and communication technologies (ICT) in education and training: learning technologies, interactive multimedia instruction, computer-based training, networked learning, e-learning, etc. Some of them are more specific than others, and the choice of *Advanced Distributed Learning* (ADL) as a title and main topic of this issue of *Information & Security* was driven by two factors. First, the term ADL originated within the initiative, which is related to military education and training and, thus, it is probably known to regular readers of this journal. Second, the term is well known outside of this community; some associate it with targeted approach to deployment of learning technologies in educational institutions.

Considering the community's attitude to the use of ICT in education in the last decade, it is possible to notice some changes. On the one hand, those who pioneered transformation of traditional education processes to distance learning and training slowed down innovations to evaluate outcomes and identify areas of promising return on investment (ROI). On the other hand, more and more educators are willing to learn how to use ICT in their professional activities and are ready for a try. Both sides agree that particular technologies are useful and effective in certain situations. This is a good starting point. ADL is not seeking to substitute each educational process and get teachers and trainers out of job; it rather creates a spectrum of technologies for learning and training support to make the process efficient, affordable and accessible.

The papers in this special issue discuss variety of applications and technologies and represent views from around the world on the role and perspectives of ADL. Altogether, they form a picture of objectives, achievements, research topics, practical tasks, and thoughts related to ADL.

The papers are grouped in three sections, though there are other connections among them. The first section is focused on the ADL initiative and activities related to or inspired by it at national or international level. The next one contains examples of learning technologies and discussion of the role of technical standards in ensuring

interoperability among separate applications. Contributors to the last section discuss some cultural and legal aspects of implementing learning technologies and their impact on community.

ADL and multinational collaboration

This special issue starts with first-hand information from *Robert Wisher* and *J. Dexter Fletcher* about ADL in its original and most precise meaning. The authors offer a historical overview of ADL both as a research field and as framework for the introduction of innovative technologies in learning and training, and share their thoughts about future advancements.

The ADL initiative achieved noticeable results in a short timeframe. It united efforts of leading researchers and practitioners in the field of e-learning and set up objectives in order to:

- Prioritize research studies;
- Focus research on achieving practical outcomes;
- Combine isolated technical accomplishments into a common framework.

The international recognition and the success of the ADL framework and approach were driven by several factors, such as:

- *Accountability and gradual progress.* Together with the challenging goals of providing individualized, high quality and affordable training and education, the project has a stepwise agenda, which is practical and manageable;
- *Healthy pragmatics.* Although based on awareness of the leading research in the field, the adopted common model and framework capitalized on proven techniques, ready for large-scale deployment;
- *Added value.* Technologies are targeted at specific audience, tailored for particular pedagogical tasks and recommended in a certain training scenario. This ensures their didactical effectiveness, efficiency, and acceptance;
- *Standards for today.* Interoperability specifications, produced by the ADL, ensure basic compatibility and interaction among learning technology components leaving space for future advancements.

A realistic view on what is available for large-scale use in meeting challenging goals might have its impact on e-learning community that overcame a period of doubts and instability caused by the crisis in the IT industry.

The ADL topic is caught up by *Jannie Barrett* who described implementation of the ADL concept within the Partnership for Peace (PfP) initiative and the evolution of bilateral Swiss-USA collaboration into a large multinational project involving NATO

and Partner countries. The initiators of the project provide leadership and coordinate participation of individuals and organizations in a number of ADL-related activities, including development of an open-source learning management system (LMS) and free learning content. The strategic vision of the PfP Consortium to attain interoperability through education and training [1] brought to life a pioneering effort aimed at providing affordable learning technologies. The PfP ADL working group, which hosted the project, built up a community of and set up a forum for researchers, learning content developers, instructors and educational administrators from civilian and military educational organizations. The ADL working group activities are arranged around project developments and enriched by sharing experience with experts outside of the group.

The PfP Consortium supported information infrastructure development in Partner countries by supplying equipment necessary to establish collaboration through networking. The first steps towards the PfP LMS and shared content implementation were made at a high time of commercial developments when ideas of open source software and shared learning content were in their infantry.

The state of the art in the PfP ADL is marked by the following achievements:

- A new version of the PfP LMS is on the way, which further develops the idea of simple, reliable and manageable system. It has a modular architecture and is able to run SCORM-conformant courses developed elsewhere. It further supports web-classroom activities and courseware development.
- More than 20 courses were designed and made available for all interested parties. Many of them resulted from a collaborative development process and allied the experience of multiple parties. The courses are in use by training centers, universities and institutes of security studies in NATO and Partner countries and are offered for distance learning, self-study, and as a supporting measure to face-to-face instruction.
- The courses are being transformed into SCORM-conformant format to facilitate their wider dissemination. This would also simplify further collaboration in maintenance and update of the courses. This is especially important for learning content related to current situation, such as in the courses *Introduction to NATO* and *Terrorism and its Implications for Democratic States,* to name just two. SCORM packages of the PfP LMS courses may be retrieved for use in a particular educational organization, and then recombined and tailored to its needs.

The next paper contains a detailed description of the course developed in the PfP LMS - *English Skills for Staff Officers in Multinational Operations*. The authors report on their experience in collaborative design and development of a language-

learning course, as well as results of a pilot study. They started their work with user needs analysis and adhered to simple solutions to make course appropriate for use in Partner countries. Availability of computers with Internet connection and bandwidth sufficient for large volumes of information, as well as personnel skills for working in a computer environment vary significantly around the world. In some former Partner countries that recently joined NATO, such as Estonia, necessary conditions for information society and extensive use of ICT in everyday practice are already created. Many other countries still have an uneven distribution of available ICT services and low computer and Internet literacy level. At the same time, the countries with less developed technological infrastructure are in a sharp need of language training for successful participation in multinational operations.

The instructors, participating in the project, piloted a course with assistance from the George C. Marshall Center students. The obtained feedback confirmed that primary goals, set up by the creators of the original learning material, where preserved and attained through distance learning. All information that was present in the traditional book-and-tape course was preserved, and efforts were made to make computer-based presentation more interesting, engaging, and cognitively challenging. However, the learning objectives of the course cannot be achieved completely without instructor. Technical achievements may enhance voice recognition; complex semantic-processing mechanisms may help understand the student's input and generate automatic response. But the real user objective is not to graduate with excellence, but to be able to work in multinational environment, perform professional duties and communicate with people.

The thresholds, beyond which learning technologies lose to humans, are discussed in the next paper. *Andrij Ivashchenko* and *Kateryna Synytsya* present a view on the ADL potential to support training of national forces for participation in multinational operations. The need for technological support is justified by several factors, including distributed location of volunteers, variety of their skills and experience, large number of personnel to be trained, complexity in providing sufficient number of qualified instructors for each location, short timeframe for training. The paper examines the whole spectrum of training support that may be provided during the training cycle and identifies specific content and technologies required at each stage. The project is initiated nationally and has a good potential for international collaboration with countries actively participating in multinational operations. The efficiency of the ADL-based training depends on the ability of learning content provider to deliver relevant and authentic experience. Thus, international collaboration in digitizing experience gained during the mission and its transformation into "lessons learned," examples and training assignments would facilitate enhancement of training quality.

The national perspective of training advancement for personnel taking part in multinational operations is followed by a paper by *Walter Christman* and *Tom Hazard* who address a wider issue from international viewpoint. They describe a large multinational initiative on *Coalition Information Systems and Operations* (CISO) Learning Network. The project is aimed at facilitating interoperability of multinational forces through information and knowledge sharing, community building and establishing learning and training programs and courses. A top-down approach facilitates benefiting from a variety of existing IT environments and techniques and focuses them on the promotion of "cognitive interoperability"—mainly at operational level—through learning, education, and training. Each of the technical components that may be involved—distributed libraries, interactive simulations, distance courses, collaborative tools, knowledge portals, etc.—has its specific features and purpose. As a whole, they are aimed at creating a sustainable, networked learning environment. The potential of technical integration is further discussed in the next section of the volume.

Applications and interoperability issues

The adoption of learning technologies by educational institutions and training centers is aimed at making learning and training more effective and efficient. Variety of learning content, pedagogical models, didactical strategies, and techniques offer broad opportunities to arrange effective learning. To this purpose, separate software components should be able to interact and exchange information that may be properly interpreted. It should be possible to integrate them into a complex learning environment managing a learning or a training process. Development of interactive multimedia resources for learning is still expensive and time-consuming, so quality learning content is created with a provision of its further reuse. The framework for interoperability and reuse is set up by technical standards and specifications. They specify common structure and format of data shared by several applications and determine interfaces between software components, thus allowing for transfer of information about the learning process among them.

Jeff Krinock discusses the role of technical standards in fostering learning technologies and enhancement of interaction between software components responsible for specific learning activities. The discussion is supported by analysis of an example of what three standards mean for pilot training. The author justifies the need for coordinated efforts to reach necessary synergy. One of the mentioned documents, SCORM, is a widely known product of the ADL initiative.[2]

The discussed standards have different scope; they are applicable to different technical systems that implement different learning models. At the same time, from the viewpoint of just-in-time training, each of the systems provides learning

environment for a particular learning activity, and their integrated use would be necessary to gain necessary qualification. The coordination of standards would facilitate combination and sharing of information about learning process and learner's knowledge and skills, and in the future would ensure close integration of respective environments for the purposes of learning on demand. Pereira and Law, in a paper presented in this section, give another example of an integrated environment, which supports several types of learning and may benefit from efficient information sharing mechanisms.

The interest to standardization is growing. Countries with highly developed information and telecommunications infrastructure have been closely following and participating in standards and specification development for a number of years. Their interest is driven by both vendors of educational applications, such as learning and learning content management systems, virtual learning environments, authoring tools, etc., learning content providers and users who are responsible for arranging and managing e-learning for students, employees, or individual learners. Others are catching up, driven by the interests of learning content managers, both administrators and local content providers who try to be competitive. The "I&S Monitor" section of the journal contains a list of organizations involved in standards development and of web sites monitoring news and events in this field.

In a short paper, *Kollár, Samuelis* and *Rajchman* share their experience of transforming already developed learning content into the SCORM-compatible format. Despite the availability of SCORM specifications and support from open source software, transformation of the learning content happens to be no easy task. The problem is that besides changes and updates required by technical specifications, it is necessary to change the vision of the learning content purpose.

Many early-developed courses were designed as an electronic copy of an instructional process. Such a course as a product of tutor-centered design reflected lectures presented by the instructor, and thus some fragments supporting "continuum" of the process are embedded here and there. Reusable content should be free of process-specific context, it should allow for recombination and use in different learning situations. On the other hand, successful learning indeed requires context and continuity, so chunks of reusable content should be glued together before being presented to the learner.

The SCORM-conformance of the course opens two opportunities. First, the course may be successfully transferred from one SCORM-conformant LMS to another; thus it will have wider applicability. In this scenario, the learning processes implemented in a course remain untouched, thus there is no need to de-contextualize separate objects. Another opportunity is to start with creation of proper learning objects (small

to medium size) to maximize their reusability.[3] These learning objects may be then combined together in multiple ways, with adding missing contextual information to ensure didactical consistency and validity of the resulting courses.

SCORM specifies combination of separate learning objects in a course and their interaction with LMS. It says nothing about the complexity of each object or didactical approach implemented in it. However, due to the lack of convenient authoring tools to create interactive and intelligent applications, the vast majority of courses are focused on presentation and delivery of learning material. The course of this type is designed as a linear sequence of units that correspond to the unique learning path. The paper by *Wasana Ngaogate* demonstrates that course topics may be sequenced in more than one meaningful way, thus creating multiple learning paths to be selected by a student. Extensively illustrated, the paper presents intuitive interface and simple course authoring procedures.

The next paper by *Márcia Pereira* and *Effie Law* addresses didactical issues and discusses a variety of learner-centered activities to enhance learning and training. Each of the described "learning choices" corresponds to some type of activity, implements a particular model of learning and requires specific information processing and knowledge presentation.

The latter two papers do not position themselves in the standards-paved technological streamline; instead they are focused on didactic strategies, which are well known by researchers but still not fully supported by most systems. Although standards for learning technologies are open to innovations, their orientation to the future rather than blessing of the old practices is often ignored. As a result, attempts are made to apply the standards within the traditional framework, which may not bring all their potential benefits.

ADL and Beyond

This section presents issues related to e-learning in general and to the impact of learning technologies on society. *Matt Fawkner* and *Greta Keremidchieva* discuss ethical issues related to plagiarism and incorrect use of information emerging in education and academic research. Although the roots of these issues are not directly related to Internet or mobile communications, outburst of available information aggravated the situation.

The ready availability of huge amount of resources, opinions, judgments, facts, statistics, illustrative materials on the one hand, gives enough food for thought, but on the other, causes a stress. It may be related to a fear to miss the most important point, inability to determine one's own position or to generalize and present different viewpoints in a balanced way. Current update rate and information volumes require

more efficient information processing. Skills to sort, catalogue and store information in a systematic way, and to find the source of certain information, are becoming critical.

Information browsing is a typical way of handling secondary sources. The global network and search engines cannot guarantee that the source will be available in the future, so without personal notes some sources may be lost not only for reading, but for referencing. Sometimes people are unable to separate their own conclusions from ideas fished during information browsing. It is interesting that not only the speed of reading, but also lack of rich visual and tactile information facilitate forgetting a source. People can no longer recall that some phrase was from a "large green shabby book."

The authors identify unintended breaches, caused by insufficient skills of using information and limited awareness of information ethics, and conscious information distortion – falsification of assessment results, corruption or change of information, use of forbidden sources or help from others, etc. In the first case, technologies may help bridge the gap by distribution of information and best practices through popular web sites and learning portals, thus raising awareness in the community. In the latter case, technological support is necessary for information security maintenance, authenticity and access control, uncovering fraud, etc. Intelligent information technologies are able to find text fragments documents in a sample that are copied from some known source. Moreover, they are also able to reveal semantic equivalence of fragments, including those presented in different languages, and to determine whether a style of the fragment corresponds to the general style of a particular author. Most of these technologies are used for special purposes, they are resource demanding, expensive and usually require some preliminary tuning to raise reliability. Their simple analogues are not as precise, reliable or smart, but are available for educational purposes.[4]

Information security issues are discussed in the paper contributed by *Konstantin Arkhipov* and *Vasiliy Ovodkov*. The authors interpret the concept of security in a wide sense, and consider technologies for information security, as well as expectations and perception of security by a user of learning technology system. Besides traditional methods of data protection and ensuring information integrity, its secure storage and transfer, the authors draw the reader's attention to techniques that take into account specifics of information content and representation.

From the viewpoint of a participant in distance learning, two aspects of security are offered for consideration. The first is related to one's perception of security as ability of a system to preserve data confidentiality (contact information, learning results), to ensure reliable information transfer and results validity (in case of distance testing,

document exchange), and to grant certain rights for learning control. As well as other features, the last one is important not only for the instructor but also for a learner, especially an adult learner. The other aspect is related to the influence considered from a range of special information presentation and structuring to facilitate desired opinion formation among the users – up to purposeful zombying. As in many other cases, this problem is not specific to distance learning, but is of importance due to public availability of technologies allowing to reach wide international audiences.

Information security issues for all fields of human activities are recently attracting close attention. According to the Information Week research,[5] 10 percent of the IT spending in education is expected to relate to security issues.

The concluding paper in this issue by *Ulrich Gysel* and *Jeff Krinock* focuses on situations, in which human-based apprenticeship and tutoring might be the best solution regardless of e-learning progress. The authors consider the use of computers to support learning, education, and training in the wider context of the general impact of technologies on communities and the transformation of educational processes in society. Confirming the positive effect of learning technologies on individual outcomes due to adaptation of learning and training to personal needs, expectations and requirements, the authors invite readers to shift their attention from short-term individual results to the long-term impact on community.

Humankind is moving towards information society where information technologies occupy a leading place, change needs and habits of people (to a certain extent), and put their everyday life in dependence of technological infrastructure. Adoption of IT in many areas, such as document processing or trade, changed the form of processed information but not the essence of work. It is expected that in education, IT will be able to perform more important role and to take more responsibilities. For this purpose, educational processes, roles and interaction between instructor and learner should be transformed; the final success depends on society's readiness to accept these transformations and to integrate them into educational traditions and culture formed in centuries.

This special issue of *Information & Security* is edited by Dr. *Kateryna Synytsya,* Co-Chair of the ADL Working Group of the PfP Consortium of Defense Academies and Security Studies Institutes. Jannie Barrett's article in this volume presents the activities of the ADL Working Group. Most contributors are members of that group. Certainly, the journal reflects thinking, concepts and experience from the collaboration of a few dozen people in the last five years or so. Therefore, to remedy potential biases, the last section of this journal issue directs the reader to additional ADL and related resources, that are readily available on the Internet and accessible free of charge. The selection was made by the Ukrainian CDT (Cooperative

Development Team) based at the International Research and Training Center for Information Technologies and Systems, Kyiv, Ukraine.[6]

Information & Security

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THE CASE FOR ADVANCED DISTRIBUTED LEARNING

Robert A. WISHER and J. Dexter FLETCHER

The U.S. Department of Defense launched the Advanced Distributed Learning (ADL) initiative in November 1997. It is the most recent and visible initiative in a long campaign to incorporate in practice the benefits of technology-based instruction and performance aiding – many of which benefits were created in the first place by defense related research and development. ADL is intended to accelerate large-scale development of dynamic and cost-effective learning environments and to stimulate a vigorous global market for these products. It is establishing a common technical framework for computer and Web-based learning that will foster the creation of reusable learning content as "instructional objects."

The goal of the ADL initiative is to ensure access to high quality education and training, tailored to individual needs, developed and delivered cost-effectively, available anytime and anywhere. This goal is viewed as something that can be achieved affordably, and thereby made feasible, only through the use of technology – specifically computer technology. ADL is preparing for a world where communications networks and personal delivery devices are pervasive and inexpensive, as well as transparent to the users in terms of ease of use, bandwidth and portability. Much current ADL effort is an attempt to understand how best to utilize the next generation technology infrastructure for learning anytime, anywhere.

The drive to use technology to enhance a learning experience begins with an understanding of how people learn. Prominent reports from educational researchers argue that traditional instructor-centered approaches must be replaced with more active instruction involving leaner interactions.[1] Researchers further specify the types of interactions that can occur in distributed learning environments.[2] Examples include interactions to increase willingness to engage in learning, to increase participation, and to enhance elaboration and retention. A feature of effective interactions is that they must result in the transfer of knowledge or a change in intrinsic motivation. ADL

can accommodate all of this interactivity in a manner that improves efficiency and reduces cost.

The ADL Vision

The ADL initiative is based on the view of future education, training, and performance aiding illustrated in Figure 1. As the figure suggests, this view, or 'vision', keys on three main components: (1) a global information infrastructure, with registered repositories populated by reusable instructional objects; (2) a server, which discovers, locates and then assembles instructional objects into education, training, and/or performance aiding materials tailored to user needs; and (3) devices that serve as personal learning associates on which the materials are presented.

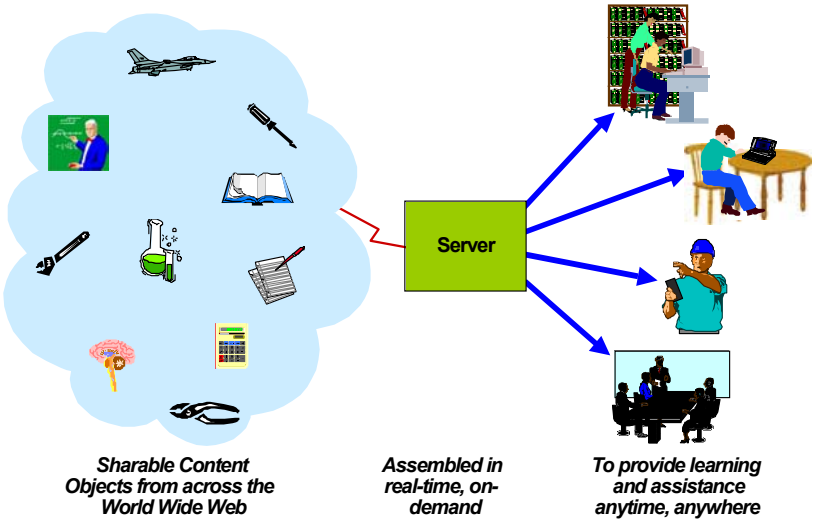

Figure 1: An Advanced Distributed Learning Future.

The server will assemble material on demand and in real time. This material will be tailored to the needs, capabilities, intentions, and learning state of each individual or group of individuals. Today, much of the work of the server is expected to be accomplished by 'middleware' in the form of learning management systems (LMSs). Within ADL, the term LMS implies a server-based environment in which the intelligence resides for controlling the delivery of learning content to students. The LMS knows what to deliver, when, and tracks student progress through the learning content.

Sharable Content Objects and Learning Management Systems

To date most ADL effort has been devoted to the specification of reusable, sharable instructional objects.[3] ADL development envisions the creation of learning libraries or repositories where learning objects may be accumulated and cataloged for broad distribution and use. Such repositories will provide the basis for a new instructional object economy that rewards content creators for developing high quality learning objects and assembling them into accessible, sharable, and adaptive learning experiences.

The development of reusable, sharable learning objects, then, is essential in achieving the ADL long-term vision. Among other things content must be separated from context-specific run-time constraints and proprietary systems so that it can be incorporated into other applications. Content must also have common interfaces and data. Content objects must, therefore, be:

- *Durable*: They should not require modification as versions of system software change;
- *Interoperable*: They should operate across a wide variety of hardware, operating systems and Web browsers;
- *Accessible*: It should be possible to index and find them as needed; and
- *Reusable*: It should be possible for many different development tools to modify and use them.

The key function of an LMS in the ADL context, then, is to manage content objects so that under the ADL initiative it should be possible for: A Web-based LMS to launch content that is authored by using tools from different vendors and to exchange data with that content, and for multiple Web-based LMS products/environments to access a common repository of executable content and to launch such content. The first function of launching content has largely been solved by ADL with the Sharable Content Object Reference Model, described later in this article.

In terms of common repositories of content, ADL is examining the *Handle System* [4] as a comprehensive system for assigning, managing, and resolving persistent identifiers, known as "handles," for digital objects (i.e., instructional objects) and other resources on the Internet. The Handle System consists of a unique and persistent identifier for a resource and its owning organization, a protocol for resolving the location of the resource, and a reference implementation of the protocol so that a resource can always be found. The Handle System has the backing of the International Digital Object Identifier (DOI) Foundation, which provides a framework for managing intellectual content, such as electronic journal articles, images, and instructional objects.[5]

The Sharable Content Reference Model (SCORM)

Specification of ADL instructional content objects is being accomplished through the development of the Sharable Content Object Reference Model (SCORM). SCORM constitutes an important first step toward liberating learning content objects from local implementations. It is intended to provide specifications that enable content objects to be easily shared across multiple learning delivery environments.

Procedures for developing such content objects are within the state-of-the-art, but they must be articulated, accepted, and widely used as guidelines by developers and their customers. These goals can only be achieved through collaborative development. Collaboration will also increase the number, quality and per unit value of content objects made available. Such collaboration requires agreement upon a common reference model. The SCORM is intended to be such a model.

The SCORM assumes a Web-based infrastructure as a basis for its technical implementation. ADL made this assumption for several reasons. First, Web-based technologies and infrastructure are rapidly expanding and provide a mainstream basis for learning technologies; second, Web-based learning technology standards are not yet widespread; and third, Web-based content can be delivered using nearly any medium (e.g., CD-ROM, stand-alone systems). In other words, if it runs on the Web, it will run almost anywhere.

This approach embraces industry's transition to common content and delivery formats. The SCORM extends this trend to learning technologies. A successful sharable content object reference model must then support full articulation of guidelines that can be understood and implemented in the production of sharable content objects. It must also be adopted, understood, and used by as wide a variety of stakeholders as possible (courseware developers, courseware tool developers, and courseware customers, for example), and it must permit mapping of any stakeholder's model for instructional systems design and development into itself.

Much of the work required to create the SCORM is being done in a collaborative manner involving industry, academia, and governmental agencies, and on a global scale. The primary function of the ADL initiative in this process is to organize, encourage, orchestrate, and document their development efforts—and to ensure that defense education and training requirements are reflected in their work.

Co-Labs

The ADL initiative has established 'Collaboration-Laboratories' or Co-Labs in the U.S. at facilities in Alexandria, Virginia, Orlando, Florida, and Madison, Wisconsin to help achieve its vision. Additionally, ADL Partnership Co-Labs have been initially

established in the United Kingdom and Canada. Other countries have expressed an interest in partnering with ADL. The Co-Labs help develop and test SCORM specifications and, more generally, determine how learning technologies can be best designed to bring about specific, targeted instructional outcomes reliably within as wide a range of instructional settings as possible. The ADL Co-Laboratories developed the SCORM conformance test software, procedures and supporting documents. The test software may be downloaded from the ADL website.[6] In addition, ADL has developed a testing certification process for organizations that wish to provide a testing service for their community of interest. ADLNet tracks developments concerning the certification process. Within the first year of operation, more than forty vendors have been formally certified as being SCORM conformant.

The Case for Technology

The case for ADL instruction and interactive ADL technology may be roughly summarized as the following:

(1) Tailoring instruction (education and training) to the needs of individual students is imperative for efficient learning, but such efficiency has been unaffordable because it requires one instructor for each student.

Research has shown that students tutored one-on-one score about 2 standard deviations (or 'sigmas') higher on end-of-course achievement tests than students taught in one-on-many classrooms.[7] This finding means for example and roughly that, with instructional time held fairly constant, one-on-one tutoring raised the performance of mid-level 50th percentile students to that of 98th percentile students. These and similar empirical research findings suggest that differences between one-on-one tutoring and typical classroom instruction are not only likely, but very large.

(2) ADL instruction and technology can, in many cases, make this instructional imperative affordable and, thereby, feasible.

Under any appreciable student load, it is less expensive to provide instruction with technology than to hire a sufficient number of tutors.

(3) ADL instruction is more effective than current instructional approaches in many settings across many subject matters.

We are not yet at the two standard deviation level, but analyses of more than 200 assessments of computer-based instruction showed an improvement of 0.32 sigma (roughly raising achievement from the 50th percentile level to the 63th percentile) for students using technology.[8] For instructional delivery through the World Wide Web, an initial inquiry based on 47 studies [9] indicated an improvement of 0.24 sigma (from roughly the 50th percentile to the 60th percentile). Another 44 assessments of

interactive multimedia instruction [10] produced an improvement of 0.50 sigma (from roughly the 50th percentile level to the 69th percentile), and five assessments of recent intelligent tutoring systems that directly mimic one-on-one instruction produced an improvement of 1.05 sigma (from roughly the 50th percentile level to the 85th percentile).[11]

(4) ADL instruction is generally less costly than current instructional approaches, especially when many students or expensive devices are involved.

Reductions in operating and support costs average about 63 percent. In a review of 40 studies, savings in the time needed to achieve given instructional objectives averaged about 30 percent.[12] If employed fully, these time-to-train savings could reduce the costs of specialized skill training in the Department of Defense by nearly one-fourth.

(5) ADL instruction is often the most cost-effective alternative for distributing instruction and for sustaining and enhancing the capabilities and readiness of military personnel after they are assigned to duty stations.

Travel, temporary duty, and permanent change of station costs can all be decreased by bringing instruction to learners rather than bringing learners to the instruction. More significantly, the time savings commonly found in technology-based instruction, allow personnel to be released earlier for operational duties – reducing personnel costs and increasing operational value.

(6) ADL instruction will become increasingly affordable and instructionally effective with the development and use of standardized instructional objects.

Early results indicate savings of about 50 percent, but the work is much too early to understand the full potential.

Overall, a rule of "thirds" emerges from assessments of technology-based instruction. That is to say that use of these ADL technologies reduces the cost of instruction by about one-third, and it either reduces time of instruction by about one-third or it increases the amount of skills and knowledge acquired by about one-third.

It should be emphasized that ADL capabilities can be used either by individuals or groups of individuals working in collaboration. The capabilities can be used in residential classrooms, remote classrooms, or any remote (distributed) location—workplace, home, or elsewhere—outside of classroom walls. Further, it is neither a goal nor an expectation that ADL instruction will replace all human instructors. They will continue to be needed. However, their roles and responsibilities remain perennial issues in the design and implementation of ADL instruction. Finding the right balance is important.

The Server and Intelligent Tutoring Systems

As many trainers will note, the greatest technical challenge for the ADL initiative is in construction of the Server shown in the middle of Figure 1. Help is on the way. Beginning in the late 1960's, and in parallel with research into computer-based instruction (CBI), groups of researchers began to explore the greater potential of 'information structure-oriented' approaches to represent human cognition and learning. The use of these structures to represent how we learn, master skills, and define subject domains eventually led to the development of an approach we now call Intelligent Tutoring Systems (ITS).[13]

'Intelligent' in the context of intelligent tutoring systems refers to the specific functionalities that are the goals of ITS development. These functionalities are distinct from those found in more conventional approaches to computer-based instruction. They require ITS to:

- Generate instruction in real time and on demand as required by individual learners;
- Support mixed initiative dialogue, allowing free form discussion between the technology and the student or user.

This generative approach is also the goal of the Advanced Distributed Learning initiative, which is intended to combine the benefits of object oriented development and Web delivery with those of technology-based instruction to achieve its objectives.

The ADL initiative and the development of ITS, then, have a number of key goals in common:

- Both are generative in that they envision the development of presentations on demand, in real time;
- Both are intended to tailor content, sequence, level of difficulty, level of abstraction, style, etc. to users' intentions, backgrounds, and needs;
- Both have a stake in research intended to accomplish such individualization;
- Both can be used equally well to aid learning or decision making;
- Both are intended to accommodate mixed initiative dialogue in which either the technology or the user can initiate or respond to inquiries in natural language;
- Both will benefit greatly from a supply of sharable instructional objects readily available for the generation of instructional (or decision aiding) presentations.

Web Development and ADL

The World Wide Web has essentially reset the development agenda for both CBI and ITS development. It has established an ever-improving communications and delivery platform for accessing knowledge. Much of the development work once needed to adapt to the latest technology platform has been eliminated. The Web has become the universal delivery platform.

The use of Internet and Web standards and infrastructures has freed learning system developers to focus on next-generation learning architectures. The emerging semantic Web, which along with its ontology will allow us to export any knowledge representation system onto the web and link it to any other, will only strengthen this link – substantially. Discussions are underway within many standards organizations regarding next generation Web-based learning architectures. These discussions are expected to eventually result in implementable specifications.

The Way Ahead

The ADL initiative is intended to take advantage of the rapid growth of electronic commerce and the World Wide Web, and apply it to the needs of the learning community and life-long learners. It will help provide the learning resources that the defense community needs to ensure the operational effectiveness of its forces. It will help provide similar resources to all federal agencies, which also depend on human performance and competence. Cooperative development among all sectors—government, private industry, and academia—is needed and is being used to achieve the goals of the ADL initiative. For example, ADL is seeking ways to integrate with simulations, through the High Level Architecture standard (IEEE Standard 1516). ADL is also seeking ways to integrate with multiplayer online games and collaborative learning environments.[14]

Users will (eventually) communicate with a personal learning associate using natural language dialogue initiated either by the device or by its users. It will be portable, perhaps small enough to be carried in a shirt pocket, or it may be the shirt itself. At present PDAs, laptops, and other personal computing capabilities are sufficient for ADL needs.

Notes:

1 Thomas M. Duffy and David H. Jonassen, "New implications for instructional technology," *Instructional Technology* 31, 5 (1991): 7-12.

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[11] Beverly P. Woolf and Wes Regian, "Knowledge-based training systems and the engineering of instruction," in *Training and retraining: A handbook for business, industry, government, and the military*, ed. Sigmund Tobias and J. Dexter Fletcher (New York: Macmillan Reference USA, 2000), 339-356.

[12] Fletcher, *Effectiveness and cost*.

[13] Martha C. Polson and J. Jeffrey Richardson, eds., *Foundations of Intelligent Tutoring Systems* (Hillsdale, NJ: Lawrence Erlbaum Associates, 1988).

[14] Curtis J. Bonk and Robert A. Wisher, *Applying collaborative and e-learning tools to military distance learning: A research framework*, Technical Report 1107 (Alexandria, VA: U.S. Army Research Institute for the Social and Behavioral Sciences, 2000).

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MULTINATIONAL COLLABORATION IN ADVANCED DISTRIBUTED LEARNING

Jannie W. BARRETT

Advanced Distributed Learning (ADL) has bridged the international training gap that existed in the past, enabling students from around the world to access courses, communicate with other students, share information, and interact with instructors, all in real-time.

Why ADL?

Among the advantages ADL provides are:

- Cost Savings;
- Increased Productivity;
- 24/7 Accessibility;
- Global Distribution;
- Tailored Learning;
- References;
- Promotion of collaborative learning.

Cost associated with training typically includes time, travel, lodging, meals and incidentals, registration fees, and tuition. Cost associated with traditional distance learning includes bulk mailings, manual tracking, and cumbersome updates and re-mailings. With ADL, the only cost association is time.

ADL also results in increased productivity. The need to leave the workplace in order to gain access to training is eliminated; an individual can morph the training into their current schedule. With seven days per week, twenty-four hours per day (24/7) Internet access, a user can access the internet-based ADL courses at anytime, from anywhere.

ADL provides the ability to reach geographically dispersed populations with a uniform and consistent approach. Course materials can be consistently updated, and

updates are immediate. Users discuss, debate, and brainstorm with instructors and colleagues around the globe. Individual customized learning environments adapt to each user's style of learning, with self-paced study and the automated progress tracking process.

Background

As part of the NATO Summit communiqué,[1] on 25 April 1999, the heads of state and governments of forty-two participating member nations endorsed the Partnership for Peace (PfP) education and training concept, including the implementation of the PfP Consortium of Defense Academies and Security Studies Institutes.

The United States and Switzerland determined that the establishment of an open-source, web-based environment linking the PfP Consortium in a collaborative network that facilitates the development of ADL was critical to the Consortium's success. To this end, the two countries signed a Memorandum of Understanding (MoU) on 25 April 1999, designed to establish an orderly framework, policies, procedures, and the respective responsibilities of the participants regarding mutual support in the development of this web-based environment. At the June 1998 Euro-Atlantic Partnership Council (EAPC) Ministerial the then Defense Secretary Cohen stated that "The United States has a three-part proposal for building among nations this enhanced education and training framework ..." That proposal included a cooperative network of PfP training centers, PfP Simulation Network, and PfP Consortium of Defense Academies and Security Studies Institutes. The intent includes the enhancement of interoperability and regional security and the improvement of education and training.

A Joint Planning Document (JPD) was developed and published to implement the MoU. This document, formally approved during a formal signing ceremony at the Pentagon on 13 May 2002, provides guidance to achieve the vision and strategic, collaborative, educational, and technological goals of the MoU, thereby initiating the multinational collaboration efforts for ADL. These efforts to date have resulted in numerous contributions to security cooperation. ADL products have been used in Swedish led exercises, the NATO Defense College, NATO School, and numerous other organizations throughout Europe.

Roles and Responsibilities

The responsibilities of the Swiss – U.S. MoU participants are carried out through a hierarchy of Designated Agents, Implementing Agents, and Academic Advisory Support Elements whose work is coordinated through a Joint Planning Committee (JPC). The Designated Agents are responsible for the implementation of the MoU.

The United States Joint Forces Command (USJFCOM) is the Designated Agent for the United States. The General Secretariat of the Federal Department of Defense, Civil Protection, and Sports is the Designated Agent for Switzerland. The Implementing Agents assist the Designated Agents in carrying out the provisions of the MoU.

The Academic Advisory Support Elements carry out the academic provisions of the MoU. The Joint Planning Committee, co-chaired by representatives of the Designated Agents, is composed of representatives from the Implementing Agents and the Academic Advisory Support Elements. It meets as required to address all matters relevant to the project (oversight, policy, planning, execution).

In January 2000, a U.S. Cooperative Development Team (CDT), consisting of a Team Leader/Planner, an Instructional Systems Designer/Training Developer, and a Systems Engineer, was formed to facilitate the conversion of traditional learning material to standards-based, internet-enabled interactive courseware. In February 2001, a similar Swiss CDT was formed to help support the ever-increasing demand for content/course conversions. Since that time, Canadian, Ukrainian, Russian, Bulgarian, Turkish, Swedish, Finnish, and Belgian CDTs have been formed and trained by the U.S. CDT. Additionally, the U.S. and Switzerland each provide Technical Program Integrators (TPIs) responsible for the coordination of all technical integration efforts of the project.

While the original CDTs were forming, and beginning to develop the first courses, a group of system engineers and programmers representing many PfP countries, including, Lithuania, Bulgaria, Switzerland, Germany, Estonia, Belgium, and the Republic of Georgia formed as the ADL LMS Developer's Group to design and develop the PfP Learning Management System (PfP LMS). The PfP LMS was tailored and customized to the learning environment needs of its targeted users, instructors, and developers. An ADL LMS working group was formed to provide user's input into the development and refinement of the PfP LMS. Unlike commercial learning management systems, the PfP LMS is a completely free and open-source system. Since the release of the first prototype, the PfP LMS has been deployed to other NATO and PfP Consortium organizations, where it is actively in use today. Two prototypes have been released, and a new Sharable Content Object Reference Model (SCORM) conformant version is expected to be released in 2004.

The important contributions of the CDTs in developing and converting traditional learning material into media rich, internet-enabled interactive courseware cannot be overstated. Additionally, new international CDTs continue to be formed and trained.

Milestones

The success of the Swiss and U.S. - MoU efforts are well documented, and the demand for quality products and services provided by the CDTs has quickly grown beyond PfP to NATO and others.

A good example of multinational collaboration in ADL is demonstrated in the George C. Marshall European Center (GCMC) for Security Studies course, '*Introduction to Human Rights.*' It is a good example of how an instructor in a geographically separate location (Australia) can successfully administer a course to students throughout Europe using the interactive capabilities of the PfP LMS.

Another course, *English Skills for Staff Officers 2 (ESSO 2),* recently created by the Ukrainian CDT, is used to engage officers in language learning and to facilitate the language learning process by the use of modern technologies.[2] The course is primarily intended for self-study and is expected to be used by military officers to prepare for classroom training sessions, as an instrument to help keep language skills current, and as a reference book containing templates, examples and guidelines for applying English writing and speaking skills.

Recognizing and leveraging off the success of the Swiss – U.S. MoU, NATO requested the establishment and execution of a NATO/PfP ADL Programme prototype to determine if NATO might benefit from ADL. The primary course in that prototype was the *Introduction to NATO* course.

In January of 2001, multinational collaboration in ADL was demonstrated when CDTs from Canada, Switzerland, and the U.S. began collaborations with four Subject Matter Experts (SMEs) from NATO Defense College (NDC), the United States National Defense University (NDU), the NATO School, and Headquarters, and the NATO Office of Information and Press. The course, typically given by NDC to NATO and PfP officers, was intended to teach the basics about NATO prior to the officers' enrollment at the school. The *Introduction to NATO* course is an introductory online course, primarily used to level the playing field for in-coming NATO students. Additionally, it is used as a NATO refresher for students after departure, and as a NATO introduction for individuals assigned to NATO, but unable to attend an onsite course. It is an excellent example of international cooperation and collaboration. In 2003, the course was updated, and expanded from five to nine modules, and is currently being translated into Russian by the Russian CDT.

Feedback analysis from a test-bed of approximately 400 NATO members revealed that over 90 percent of them rated the original *Introduction to NATO* course as either useful or very useful. In March of 2003, Allied Command Transformation (ACT) prepared and presented a NATO/PfP ADL Programme Evaluation Report to the

NATO Military Committee. Based on the success of the *Introduction to NATO* ADL prototype, direction was given to develop NATO/PfP ADL initial operational capability.

PfP LMS Course Access

To date, more than twenty courses have been developed in the PfP LMS and are available to a multinational audience. Completed courses currently in the PfP LMS include:

English Skills for Staff Officers 2	Conflict Management and Negotiation
Bulgaria in South Eastern Europe Politics, Security, Economy	Overview of the Inter-American System (English, Spanish, and Portuguese versions)
Ethnic Conflict and Peace Operations	Combined Joint Task Force training Modules
Terrorism and Its Implications for Democratic States	Combating Terrorism and Illegal Trafficking
SPIRIT: Security, International Relations, and Information Technology	Peace Support Operations Staff Officer Orientation Course
Introduction to Human Rights	NATO Standardization Module
Introduction to International Humanitarian Law	Civil Military Cooperation in NATO
Introduction to Microsoft Office Applications	PfP Programme Module
Introduction to NATO	Civil Emergency Planning Module
Bulgarian Participation in Peace Support Operations	NATO Modelling and Simulation Orientation
International Security Risks	Conducting a Computer Assisted Exercise

Currently, over twenty additional courses are scheduled, proposed, or in various stages of completion.

While there are several websites from which various courses may be accessed, one of the more comprehensive sites is the *NATO PfP Advanced Distributed Learning Website*.[3] Selecting a course title will link to an instance of the PfP LMS, wherein a first-time user must register, thereby establishing a *Username* and *Password*. While each LMS instance requires a separate registration, only restricted or limited access courses require a waiting period for password assignment. Upon accessing the PfP LMS courses, online guides are available as well as course specific instructions.

Vision

The Vision for the future expanded implementation of the Swiss – U.S. MoU (2001-2006) is to create, operate, and maintain an open source, standards based system, providing multi-sensory, universal access to a knowledge portal in support of international security cooperation.

To that end, plans have been developed to include strategic, collaborative, educational, and technological goals. These strategies will foster reusable, modular, quality content that responds to user defined information and learning requirements. To meet these goals and requirements, the Consortium, industry, government, educational and other sources will be leveraged to incorporate leading edge technologies.

The way ahead includes development of the next (SCORM conformant) version of the PfP LMS, continued course conversions to web-based instruction, and the implementation of the "*Vision*" for the future of the program. All efforts are intended to enhance the work of the Consortium and to benefit other willing participants.

Notes:

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2 The ESSO development is described in detail in the accompanying article: Olga Danylova, Peggy Garza, Bonnie Mihalka, Kateryna Synytsya, and Olexiy Voychenko, "English Skills for Staff Officers: Collaborative Development of the Distance Course," *Information & Security: An International Journal* 14 (2004): 32-44.

3 The reader may refer to the "ADL Course Archives" section at https://adl.act.nato.int.

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ENGLISH SKILLS FOR STAFF OFFICERS: COLLABORATIVE DEVELOPMENT OF THE DISTANCE COURSE

Olga DANYLOVA, Peggy GARZA, Bonnie MIHALKA, Kateryna SYNYTSYA, and Olexiy VOYCHENKO

Introduction

With the advent of the NATO Partnership for Peace (PfP) program, English has become increasingly important as the operational language for multinational activities. One common language, English, is essential for interoperability within NATO/PfP. As multinational activities with the new Partner nations began, a language problem came to light. Not all the key military personnel participating in these activities had the necessary language skills to function effectively and this, in turn, had a negative impact on the success of NATO/PfP operations. Also troubling was the observation that some staff officers working in NATO headquarters lacked the language skills to perform independently in their assigned tasks, without the assistance of a native English-speaking colleague. A significant part of the "language problem" was determined to be a deficiency in "operational" English, or the language skills and vocabulary required for a specific purpose, such as multinational operations or staff work. This, in turn, had a negative impact on the success of NATO/PfP operations.

In 1996, representatives from the Defense Language Institute English Language Center (DLIELC) conducted a detailed needs analysis in close cooperation with the NATO School in Oberammergau, Germany, and the Partnership for Peace Co-ordination Cell in Mons, Belguim. This analysis showed that the language skills required for military professionals in NATO/PfP contexts included memo and report writing, group discussion, and oral presentations or briefings. Also important was the terminology commonly associated with the topics of NATO, NATO Standardization Agreements (STANAG), peace support operations, and interoperability. In response to the needs analysis findings, the DLIELC then developed the English Skills for

Staff Officers (ESSO) course to address this operational language gap for the target audience of professional military personnel functioning in a multinational NATO environment.

The ESSO course is aimed at individuals who already have a high intermediate or advanced level of proficiency in English. It is not a basic course in English; rather it is intended to polish or refine an already existing knowledge of English while simultaneously providing practice in the specific language skills required in a professional multinational military context. The original course was paper-based with supporting audio cassettes. The student package included a paper textbook, a paper dictionary and several audio cassettes. Answers to the activities were provided for self-correction. Student packages had to be mailed to students enrolled in the course.

Growing participation in multinational operations and the extent of international collaboration in security issues was a driving force in the search for advanced ways of delivering content and supporting self-study. Thus, distance learning technologies that had already proven to be effective for distributed audiences, adult training and retraining and individual learning support came into focus.[1]

A survey conducted by the Working Group on Individual Training and Education Developments of NATO's Joint Services Subgroup identified English and NATO terminology as critical content areas for on-line distance learning. Thus the on-line ESSO course focusing on English language proficiency and acquisition of NATO terminology was created. The purpose of the on-line course is to engage officers in language learning and to facilitate the language learning process by the use of modern technologies. The course is primarily intended for self-study and may be followed or accompanied by instructor-led activities either in a classroom or on-line. It is expected that the course will be used by officers to prepare for their classroom training sessions, as an instrument for helping to keep language skills current, or as a reference book containing templates, examples and guidelines for applying their writing and speaking skills.

Planning

Language learning is one of the areas where distance courses are successfully offered both in a self-study and instructor-led mode.[2] Computer-based learning may facilitate language learning by supporting traditional exercises, adding automatic feedback, providing supplementary materials, enhancing visualization, and extending activities performed in language learning. A number of approaches were studied and tested, covering a range from small, narrowly focused projects (enhancing vocabulary, mastering a specific grammar topic, etc.) to elaborate learning environments based on advanced technologies (speech recognition, in-depth text analysis, video-materials,

annotation, etc.) The results bear witness to the fact that the success of the project depends on understanding the needs of the audience and their restricted technical capacities as well as clearly stated goals, rather than on scale or technical advancements.

Another factor important for successful accomplishment of the project is effective communication among the members of the development team. Multimedia distance courses are usually implemented by a group of professionals representing different areas of expertise, including subject matter, instructional design, multimedia design, human-computer interaction, and programming. Although a significant part of the ESSO content development has been already done, a close cooperation among the language course instructors and distance course designers was necessary to set up priorities and evaluate proposed design decisions.

All team members should understand the goal, requirements and framework within which they may employ their creativity and expertise. In an international team, different native languages add complexity to the communication among experts who tend to use their respective professional languages and terminology. Although most of the communication on ESSO was done by email, a couple of short meetings were essential in establishing a common framework of understanding and clarifying issues that were difficult to verbalize.

The initial needs analysis gave birth to a modular, paper-based ESSO course based on rich learning content, diverse exercises, and extensive self-assessments. It was a good starting point to explore a potential of multimedia and information technologies to support the entire spectrum of language learning activities, including reading, writing, listening, and speaking.

The course is intended for an international audience, which should be able to access it from different locations using various computer platforms. As there was no detailed information on software or bandwidth of the channels, the developers aimed at the Internet browsers, Netscape Navigator starting from version 4.73, and MS Explorer 5.0 and higher. This corresponds to the low end of personal computer configurations and is consistent with the requirements of the Partnership for Peace Learning Management System (PfP LMS) – a free software tool widely used by the members of the PfP Consortium.[3] Interactive multimedia courses usually place a higher demand on the quality of the Internet connection. Based on a survey of the Internet infrastructure in CIS [4] countries, the target was set up at a dial up access with 33.6 modem (average speed 4K per second), and a download time of at most 2 minutes for large audio files. Supportive multimedia are displayed at the same speed as the main body of the lesson.

Another decision made by the team was on the use of special software to vary learning activities and make feedback to the user more intelligent. There are a number of related issues:

- Availability of free software for users' platforms;
- Administrative policy on installation of new software (when using a course from a public or office computer);
- Complexity of software installation;
- Availability of user's manuals corresponding to the computer literacy level of ESSO users.

Thus, at the first stage no additional software (such as speech recognition or audio speed regulation tools) was recommended for ESSO. However, some provisions were made to make multimedia fragments designed in Macromedia Flash 5.0 available for users without respective plug-ins by storing alternative formats (gifs and java-script based).

To simplify course maintenance and further updates, the course was developed using the authoring tools of the PfP LMS.[5] As with any tool, this puts certain limitations on the course presentation and features, but the benefits of a systematic tool-based approach were expected to be significant in the long run.

Instructional Design Issues

On-line delivery cuts the expense of reproducing and mailing student packages but increases the burden on the student's side. Internet access is still expensive in many countries, whether it is paid by an organization or the student, it is still not as common as the TV or VCR, and requires certain skills to operate efficiently. The key question to be answered by the developers was: "What features of the distance course will justify the on-line delivery of ESSO?".

To answer this question, the team studied a variety of language courses on the web, compared them to other on-line courses, identified typical learning activities and mapped them to the learning objectives of the original ESSO course. Although most contemporary distance courses are oriented to support learning activities, one can still find presentation-based courses, especially those that are intended for familiarization with or factual understanding of a subject. Language courses are primarily focused on the development of skills, whereas acquisition of knowledge and attitudes is considered rather as a basis for skills acquisition. ESSO represents both of these content areas, skills acquisition and subject matter instruction, together in one course. Thus, it is essential to sequence activity-based learning and create a learning environment with timely and focused feedback and performance-based assessments.[6]

It is also important to establish a communication medium, as communication in a foreign language is a goal for students of ESSO, as well as a tool for knowledge and skills acquisition. Finally, it is desirable to provide a spectrum of tasks and exercises for reinforcement of the acquired skills and additional activities that may be helpful to keep skills current. For example, since one of the purposes of ESSO is to develop professional communication skills, the guidelines and templates for taking notes, preparing a briefing, summarizing, etc., should be available for further reference.

In the ESSO course, one can distinguish typical language learning activities (vocabulary development, grammar rules mastery, understanding speech and text fragments, etc.) and professional language activities (preparing documents of a certain type, developing presentation skills, etc.).

In both cases, there is a significant amount of material to be internalized.[7] To facilitate learning and retention, instructional designers should create some motivation to keep the learner's senses active and provide the same information in multiple ways, so that it is perceived through several channels. This will also address diversity in learning styles and support learners who have strong preferences with regard to the way information is presented (text vs. audio, visual structures vs. text, etc.). Another way to make self-learning more effective is to properly structure learning material and select the appropriate presentation for each fragment depending on its purpose. Important information should be clearly identified and supplementary material should be separated and presented rather on-demand to keep the learner focused.

Critical success factors for self-learning include supplying the learner with the necessary information for learning control, providing timely feedback, hints and help, informing him/her about strategies that may make learning more effective, supporting navigation, and ensuring clarity of the learning objectives. It is essential that the environment be arranged in a way to facilitate focusing on learning activities by establishing an authentic context and eliminating uncertainties. Learning activities should vary to capture interest and challenge the learner; they should allow for mastering skills at one's own pace and provide opportunities for practicing and gaining experience.

To summarize the desired features of the on-line implementation of ESSO, a brief comparison is given in Table 1.

In subsequent sections we will give some examples of ESSO's on-line implement-tation to illustrate our approach.

Table 1. Comparison between the original and the on-line ESSO course

Feature	**Original ESSO**	**On-line implementation**
Presentation media	Text, illustrations, audio	Enhanced by animation, video fragments, and interactive multimedia
Information arrangement	Structured by units and activities; answers and supplementary information provided in the annexes	Enhanced by availability of supplementary information in separate windows, visual indication of learning content type, provision of additional on-line sources
Motivation	Supported by learning objectives, content, and exercises.	Enhanced by variety in presentation and activities, interactive feedback, live language sources available on-line
Learning activities	Typical for self-study, some answers and hints are provided	Several types of exercises are offered on-line with interactive feedback

Information arrangement and presentation

Although skills acquisition is mostly based on the learner's activities, an enhanced presentation of the course also plays an important role in facilitating understanding and retention, and making learning more efficient. Due to certain limitations in layout and extensive multimedia use, the designers focused on structuring the information in an appealing way, presenting it in a variety of ways, and separating information to be learned from supplementary information and instructor's guidelines. In the on-line ESSO implementation, the following issues were addressed:

- *Grammar*. Static and animated pictures are especially useful to illustrate grammatical constructions and transformations (passive to active voice, direct to indirect question, etc.);
- *Objective vocabulary*. New vocabulary words, which are highlighted at their first occurrence in the text, are linked to the respective vocabulary information including spelling and audio (see Figure 1). Vocabulary for each unit is also available from the supplementary lessons containing handout information;
- *Military acronyms and abbreviations*. Every unit contains 15-20 NATO acronyms and abbreviations that should be remembered. Some of them are formed from the first letters of the constituent words and are relatively easy;

others may contain several letters from a particular word or words. The construction of the latter is illustrated by animation;

- Large text *readings* may be downloaded as PDF files to be available offline for further references. Supplementary information normally given in annexes is available for download but may also be opened as a guide in a separate window. Thus a learner may collect all necessary sources and tools at his/her virtual desk, creating a personal environment for language learning.

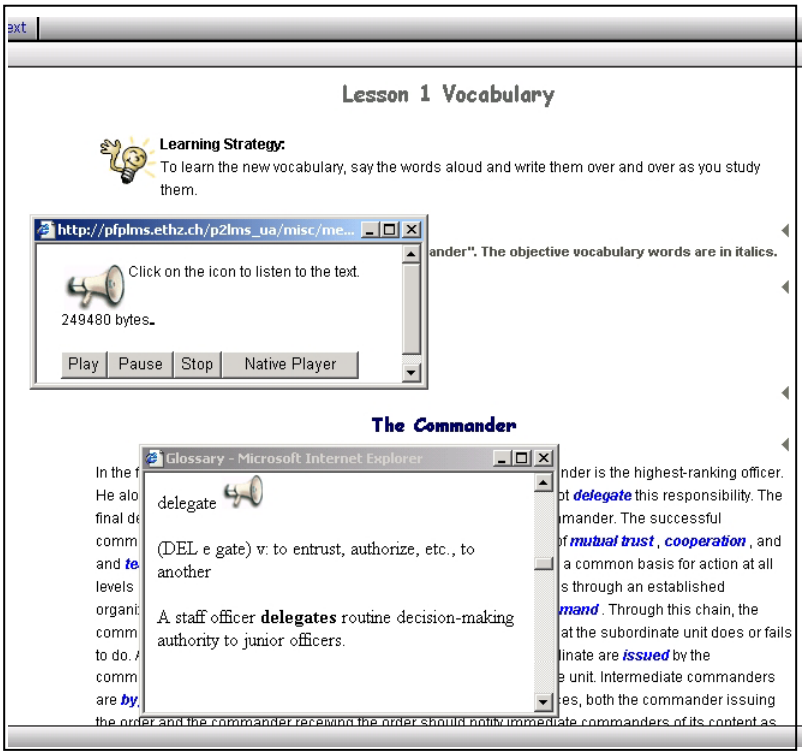

Figure 1: Implementing Objective Vocabulary.

Motivational support

There is a high probability that the main reason the early application of computers in education showed good results is that it was something new and exciting. Computers and IT in general are not a novelty anymore; moreover, there are certain expectations about the look and feel of the computer-based materials that are often inspired by

entertainment, games, and news sites. Although the potential users of the ESSO course are no doubt highly motivated, the developers decided to add some minor details that may make language learning more exciting, such as on-line crosswords or funny animations. Some animated explanations are not only functional but also humorous and relaxing, which may serve to move some of the conscious learning efforts to the unconscious level (Figure 2).

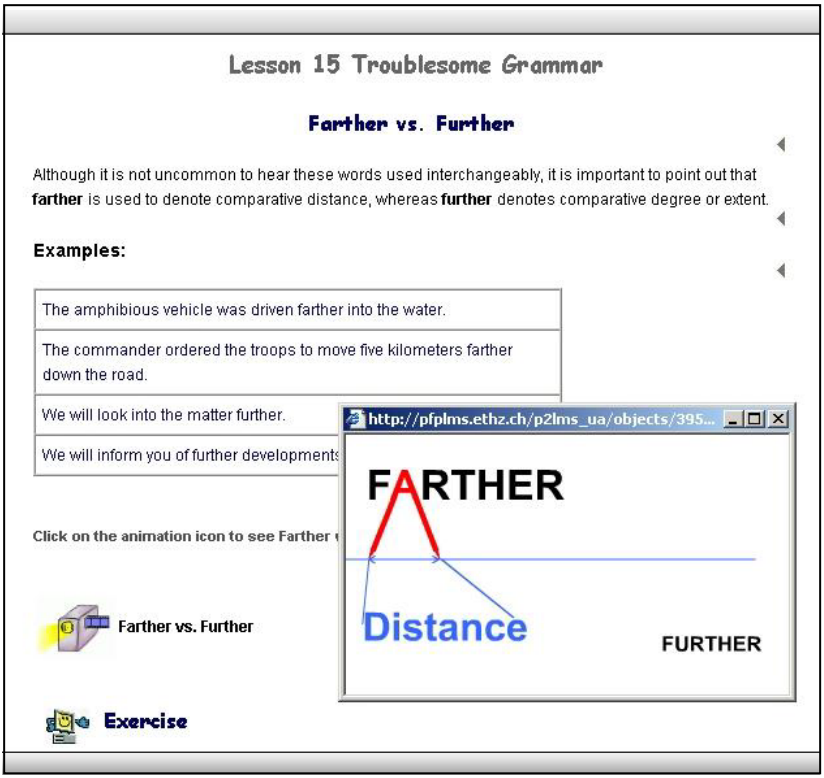

Figure 2: Motivational support.

For those who wish to enrich their language beyond the course requirements, a number of Internet links are offered, including news sites and NATO's site, which includes a large multimedia library. The variety of materials offered in English there, including publications, speeches, video records and current news allows the student to find both interesting and professionally beneficial content. Thus professional

motivation is enhanced by natural curiosity, and the learning experience is extended by authentic multimedia.

Exercises and activities

There are three types of learning activities offered in the on-line ESSO course. The first type comprises multiple-choice tests and other exercises where a correct result is specified and assessment of the learner's answer is done automatically. In the second type of activity, answers may vary significantly, so their complete assessment may be reliably done by a human only, however some correct sample answers are offered to the learner for comparison purposes. The third group of exercises is intended solely for human evaluation.

Some examples of the first type include automatically assessed exercises, typical multiple-choice questions with or without a menu, fill in the blank, selection of certain parts of the sentence, and ordering. For the types of exercises that require user input rather than the selection of the correct answer, the program is capable of recognizing more than one correct answer, and the answer may be either typed or copied from the text on which the exercise is based.

Answers to the second type of exercise may be typed either in an input field and compared with a sample answer given under this field upon request or entered as a Note to the course. The student uses the Note function to record an observation, summary or an overview, either on his own initiative or when prompted to do so in response to a request. This written material may easily be copied to a local file for future reference. Sample answers for this case, by contrast, are demonstrated in a separate window to facilitate comparison with the answer proposed by the learner.

The third type of exercise currently does not require any input into the system, since the student's local environment may provide more services for language learning. For instance, one can use a built-in spell-checker or locally installed dictionaries, a presentation may be created in MS PowerPoint, or some text-to-speech or dictation software used to evaluate the results. For the instructor-led mode, the course will offer individual and group activities that may be evaluated by the instructor. An example of individual learning is a dialogue exercise. The dialogue is presented to a student both by audio and written text as a whole, then he/she may select a role and a speed at which his/her part of the dialogue will be spoken (Figure 3). There is an indication of the remaining time, and the student's text is displayed as in karaoke. This activity may be further elaborated by use of sound-recording software and comparison of the student's speech with a sample audio. This feature however may require additional software installation on the students' computers.

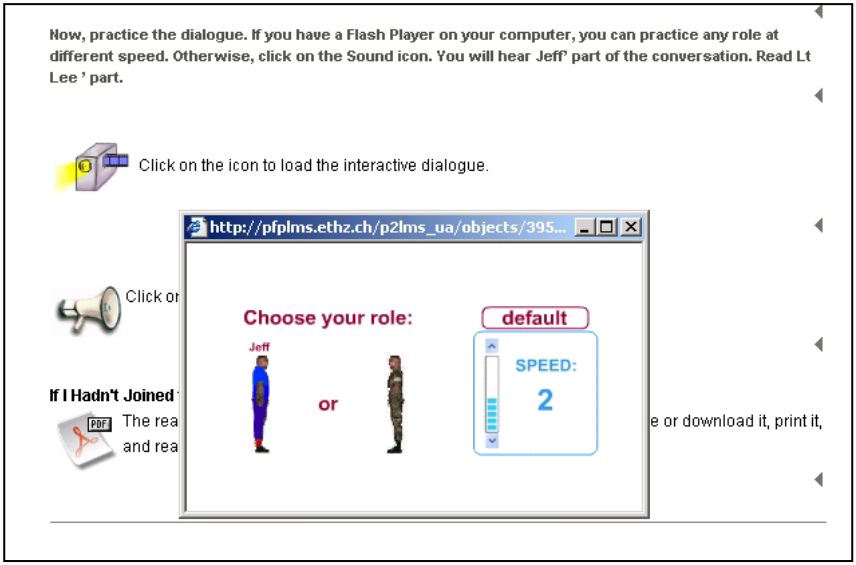

Figure 3: Interactive dialogue exercise.

Pilot Testing

The George C. Marshall European Center for Security Studies offers programs focused on the democratic transition and international security to government officials from over forty countries at its site in Garmisch-Partenkirchen, Germany. Forty-five Marshall Center course participants were asked to test pilot ESSO and provide feedback on its design and content as part of their English as a Foreign Language (EFL) classes at the Marshall Center. All forty-five were high intermediate or advanced students of English.

The participants spent one or more hours working through the units which comprise ESSO with prior guidance from their language instructor. Some twenty test piloted ESSO on their computers in private and reported back to the instructor, while the remainder worked through the course units in a computer language lab with the instructor present. The quality of the feedback varied somewhat depending on the linguistic and technical sophistication of the individual participants. Specific feedback was solicited about the potential benefits and problems of accessing and working with ESSO in their home countries.

Overall, the participants were very enthusiastic about the course. Each of them wanted assurances that ESSO would be available on-line in the future and they would have access to it from their home countries. In particular, they responded positively to

the multimedia features, including animation and opportunities for role-play. Certain design elements were cited as quite useful. For example, ESSO offers several options for finding definitions to unknown words quickly, obviating the distraction of looking up new words in a paper-based dictionary. The audio function allows participants to hear and read certain texts simultaneously, certainly a helpful feature in learning English, in which the spoken and written word can be so dissimilar. Finally, the use of targeted content, e.g., information staff officers need to know about NATO and multinational operations, as a basis for focused language-learning makes the effort of working through the course seem worthy of the participant's time and effort.

Participants were eager, but uncertain, about continuing to work with ESSO from their home countries. Thus the developers had to postpone implementation of bandwidth-critical features of the course, such as video, as even some audio materials were slow to load and participants assumed such features would tax the capabilities of their computers at home. Those participants with lower levels of computer literacy had less confidence in their ability to work through ESSO on their own, without access to expert advice.

The process of getting started in ESSO and proceeding through the units is self-evident. While feedback from the test piloting was used to correct errors, clarify instructions to exercises and make changes to help facilitate working through the course material independently, there is still a need for an instructor to be on call to help explain, direct and support the participant. At certain points, for example, ESSO prompts participants to produce written text, which cannot be adequately evaluated except by an instructor. Other exercises suggest that the participant have a partner to communicate with. Technical problems with the computer may also make access to expert advice an important element in completing ESSO successfully.

Conclusion

The feedback obtained during pilot testing has reinforced the decisions on future enhancements of ESSO. Students shared some doubts related to the capacity of the environment back in their home countries to be appropriate for download and storage of large files. In addition, there is the issue of Internet traffic fees, especially when using streaming media that cannot be saved locally, and of the performance of additional software, such as audio players, which varies from one system to another. Observing students' behaviors, we found that they may benefit from some knowledge of the technical side of distance learning, which could help them manipulate the system in case of transmission delays and other undesirable situations. Therefore, future versions of ESSO may include both an enhanced introductory section of the course and context-related help.

One of the stated benefits of distance courses is their potential to stay current by being updated on a regular basis. This is especially important for ESSO, which is based on current NATO and PfP materials and presents not only a lexical part but also a current vision of multinational collaboration. A framework for consistent updates will be based on a SCORM approach to learning content aggregation, sharing and reuse. Both the significant amount of multimedia content that may be reused and the need for continuous updates suggest the benefits of sophisticated content authoring and management.

Future plans include provisions for a CD-ROM version of the course for individual use to save on Internet fees. For those who would like to benefit from communication with an instructor and classmates, a number of classroom activities will be prepared. The students expressed interest in being exposed to authentic multimedia, though at the same time they recognized the usefulness of a tutor's explanations and guidance. These needs for instructor-mediated authentic multimedia—news, sample presentations, reports, and dialogues—may be addressed by creating a collection of respective materials that will be accessible within the course.

During the enhancement of the course, the developers plan to continue pilots and monitoring of students' needs, including infrastructure development in their countries. This would allow the developers to focus on the current priorities and at the same time plan for long-term use of the course.

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ADVANCED DISTANCE LEARNING FOR TRAINING NATIONAL PEACEKEEPING FORCES

Andrij Ivashchenko and Kateryna Synytsya

Ukraine and Peacekeeping

Ukraine takes an active part in peace support activities since June 1992. Since then, more than 20 000 Ukrainians participated in conflict regulations in various parts of the world, which was important to strengthen the good political image of the country.

In general, the scale of Ukrainian participation in peacekeeping is steadily growing, covering more countries and regions, involving more militaries and military observers, and setting up more complex and challenging tasks for participants. Currently, more than 3 000 Ukrainian peacekeepers are participating in ten different missions around the world (see Figure 1), including operation in Republic of Moldova, Kosovo, Georgia, Lebanon, Sierra-Leone, Democratic Republic of Congo, Ethiopia, Eritrea, Liberia, and Republic of Iraq. Due to its active position, Ukraine is now among the top 10 countries that contribute to the UN peacekeeping missions; Ukraine is the largest "exporter" of peacekeeping forces among European countries.

Unfortunately, peacekeeping operations may lead to casualties. In the last years, Ukraine lost 27 peacekeepers, including four persons in Iraq.

Readiness to act in dangerous situations depends on personnel experience and preparatory professional and psychological training. Thus, it is critical to provide appropriate training, including study of mission-specific and region-specific issues. To this purpose traditional training may and should be enhanced through use of modern tools, including information and communications technologies for learning, training, and assessment.

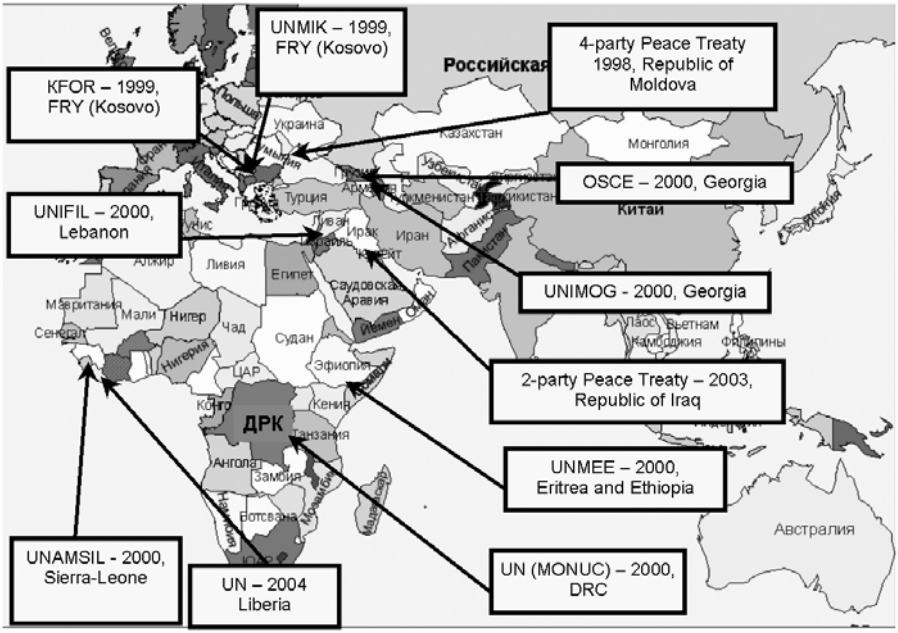

Figure 1: Participation of Ukraine in peacekeeping operations (as of February 1, 2004).

More and more personnel are involved in the international operations. According to our forecasts, the number of Ukrainian peacekeepers participating in various missions may amount up to 5 000 in 2007. To meet the UN [1] and NATO [2] recommendations on training personnel to ensure rotation every six months, Ukraine needs to have no less than 15 000 trained peacekeepers in its active reserve.

A close study of the rotations of the national contingent demonstrated that under current contractual terms, only 25-30 percent of all peacekeepers volunteered to continue their participation in the mission upon rotation. In case of regions with unusual climate conditions, such as Central Africa, this amount is lower than 5 percent. These numbers show that most of the volunteers that should be prepared for a mission do not have any peacekeeping experience. There may be also insufficient number of experts to share their experience in performing a specific mission in a certain region. Due to the limited secondary involvement of the peacekeepers and inability to offer better financial, insurance, social and other conditions under the contract, it is necessary to find new technologies and approaches to ensure effective training.

Thus, main reasons to explore ADL-based approach for training peacekeepers are:

- Growing participation in peacekeeping operations and the need to simultaneously train personnel located in different regions of Ukraine;
- Variety of trainee's experience and its relevancy, in particular, large percentage of personnel with no relevant experience;
- Need to ensure readiness to unforeseen situations, were competence is life-critical.

Technology-supported Training Approach

To transform unique experience, acquired in years, into systemic knowledge that may be shared among the parties involved, including peacekeepers, decision-makers, and politicians, to determine new forms of participation in peacekeeping operations in the future, one needs to go beyond military and political aspects of peacekeeping.[3] It is critical to consider other issues in more detail, such as organization and management of efficient and purposeful personnel training of those who are intended for participation in a peacekeeping mission. In particular, the issues of formation and training of specific (sub-) units and their officers, reducing learning cycles, simulation and modeling of personnel activities in new and unforeseen situations. The capability to find effective solutions is important during the whole operation, starting from forwarding reconnaissance groups, further during deployment of main forces and rotations, and up to transfer of functions to local authorities and mission completion. So, training methodology should be aimed at continuous experience building.

The ideas of using learning technologies in peacekeepers' training were first piloted during the training of the 6th Separate Mechanized Brigade to participate in the operation of the international forces to support stability and ensure security in Iraq. 1 600 trained peacekeepers started their mission in February 2004 as part of the multinational division "Higher South" in the Polish responsibility sector.

The suggested approach to ADL-supported training was aimed to answer the needs of this specific mission, thus all notations are taken from this particular case. Hence, the brigade corresponds to a total number of trainees. It consists of 4 battalions, that represent separate operational units to be located in different positions during the mission, and a military staff that coordinates and controls the mission activities.

To ensure accelerated training of large number of participants it was suggested to use information technologies at all stages during both preliminary training for the peacekeeping mission and actual participation in the operation. In the core of technological support were the ADL approach and distance learning technologies. Ukraine has a certain experience in developing and using e-learning technologies for University courses and retraining.[4] However, most of the past projects were devoted

to the transformation of one or more traditional courses from a stable curriculum to a distance mode. Instructional designers worked with materials that were prepared for students who took a correspondence course, and issues of possible course updates or reconfiguration were not taken into account. Thus, the current project was challenging and innovative for both civilian and military experts in education and training.

Several organizations were involved in the project devoted to IT-supported training for peacekeeping forces. The overall schema of work and interaction is presented on Figure 2, which depicts logical phases of project development. The sequence of these phases corresponds to the training cycle and, thus, the output of each phase of the project is aimed to support a certain training period. Content development and instructional design for each training phase may be performed in parallel; however, it is worth to envisage modifications of the learning material, activities and didactics based on feedback obtained from the course participants and their supervisors during and after the mission. Potential feedback is shown by thin arrows; it corresponds to minor and immediate adjustments, whereas systematic changes and complex upgrades are implemented through the main cycle.

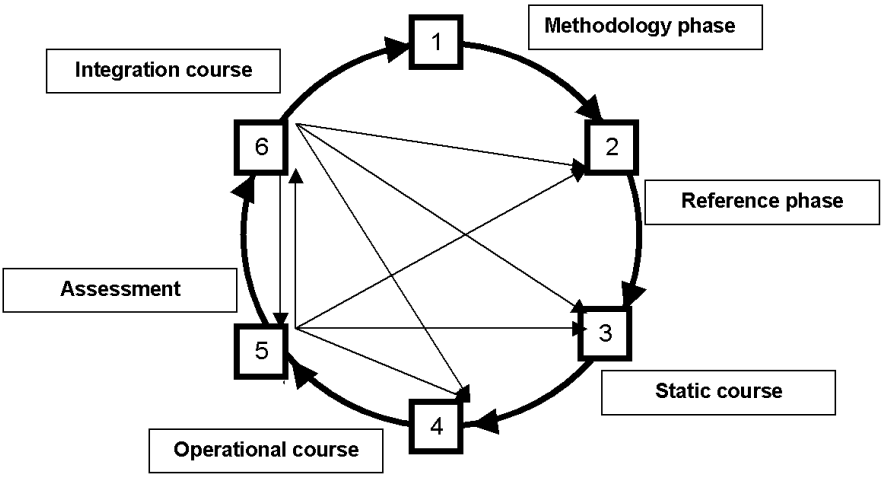

Figure2: Phases of project development.

The first phase of the project was devoted to creation of general methodology approach and thus required participation of all interested parties. At this phase, the project members defined the problem, structured it into specific tasks, determined the final goal and objectives to be achieved at each stage of the project, proposed some technology solutions and outlined expected results.

Besides, each working group responsible for some specific task of the project presented its approach to the learning material structure, learning activities, assessments, and overall vision of possible interaction with other parts of the project. Based on that, a common scenario for brigade-level training was developed to facilitate specific course creation (Figure 3). At the schema, the brigade-wide learning is indicated by yellow, battalion learning activities are given in blue and training of various specialists for each battalion are shown by violet.

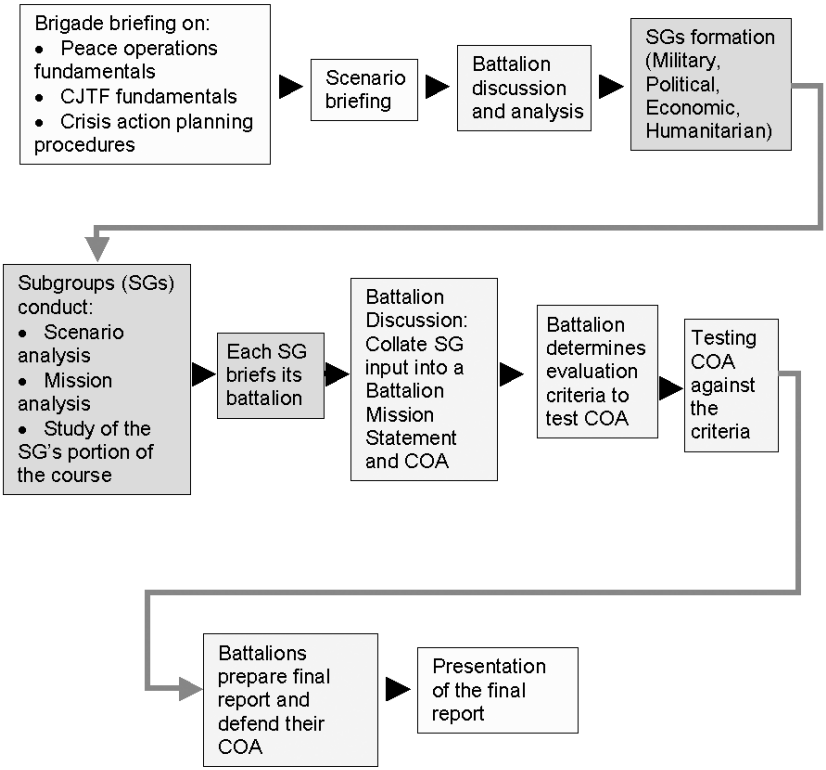

Figure 3: Common scenario for brigade-level training.

Main Training Phases

The second (reference) phase of the project was devoted to the development of the distributed database that can be accessed via the Internet or by using military mirror servers within the firewall. The database contains a set of national documents on peacekeeping activities, history of participation of Ukraine in peacekeeping operations, legislative base, requirements to the peacekeeping personnel, etc.[5] Each candidate for participation in the peacekeeping mission obtained a list of topics to be studied using the database. This recommended study facilitates basic understanding by the potential peacekeepers of their roles and responsibilities, regulations and requirements, and ensure informed decision of the applicants. From the technology viewpoint, this phase was based on existing electronic materials and proven database solutions.

The next two phases address training of the selected applicants for participation in the peacekeeping operation. The need for distance learning technologies at these phases may be better understood when one is aware of the approach to the peacekeepers' selection and training. Let's turn to the 6th Brigade example.

Within the period of preparation of the 6th Brigade for its mission, the longest time was devoted to the selection of volunteers. In fact, Ukraine faced an inevitable transition from traditional methods of recruiting to the use of mobile focal points, as is the experience of countries with fully professional military. Currently, performance of military duties by males over 18 years old is ensured by a permanent network of military contact points, which issue calls for duties, register participants and transport them to the place of duty in coordination with local authorities. This network has been used in the past to attract volunteers for the peacekeeping operations.

The scale of participation of Ukraine in peacekeeping required a new approach and the need for methodological support, advertisement and marketing, as well as participation of legal and military contract experts became obvious. Lack of experience and timely support slowed down the recruiting process, and peacekeeping candidates were arriving irregularly.

Phases "Static course" and "Operational course" are named after types of experience specific for a mission, which may be acquired in a distance mode by selected peacekeeping participants from their locations. It is envisaged that instructors who have participated in the current or in a similar mission will lead distance courses. The courses would start when two thirds of the target personnel has been recruited.

The *static course* focuses on simple situations, which are considered "static" in a sense that they take place in a specific region, additional external factors are not taken into account and situation does not change until some actions are suggested. The

content of the course is focused on learning standard recommended procedures. Its purpose is to facilitate acquisition of knowledge and skills to resolve a situation by performing one of the pre-defined roles.

Table 1. Sample topics to be covered by the Static and Operational courses

Static course (30% of time)	Operational course (70% of time)
Strategic Background to PSO	Planning for PSO
Changing Nature of PSO	Operational Tasks
Conceptual Approach to PSO	Operational Techniques
Fundamentals and Principles of PSO	Lessons and conclusions from the deployment of the multinational forces; Recommendations on Preventing Military Conflicts and on Training and Employing Multinational Peacekeeping Forces

At the next training phases the trainees consider complex situations. Sample topics that may be covered by *Static* and *Operational courses* are listed in Table 1. We should mention that it is not only topics, but rather a kind of competence that should be acquired and learning activities arranged to facilitate acquisition process that differentiate these two courses. Whereas the *Static course* may be implemented as a typical distance course with interactions limited to the menu-based or elements-combination activities, the operational phase requires communication with instructor, as well as multimedia-rich and interactive material.

The *operational course* is intended for training participants to resolve complex situations, consider consequences and all related factors, envisage dynamics of the situation, and offer solutions adequate to their resources and timeframe within which the situation should be resolved. It may be viewed as a kind of a game, which covers the dynamics of the situation within several months, and reacts to the participant's actions by changing the situation according to the heuristic rules based on cumulative experience gained by the experts who led the development in similar situations. Each action taken by a participant is a step in this game, and thus requires permanent monitoring of the situation and looking forward for the next step. Unlike the computer-based action games, there is no "safe mode" or possibility to return back to the saved results – the players need to cope with the consequences of their actions. The purpose of this course is to prepare a participant to take responsibility and understand that his own life and the life of his team members may depend on his

decisions. It is also planned to include some psychological training to help participants cope with realities of the mission.

Thus, the operational course is rather complex and may require longer time for its development. The general schema of training by the *Operational course* is demonstrated at Figure 4. Participants are presented with description of the situation and are required to offer a plan and its stepwise implementation. During implementation, the situation may change and require correction of plan and actions. The trainee's actions are evaluated and a feedback mechanism offers some complication to the current situation or a next task to solve.

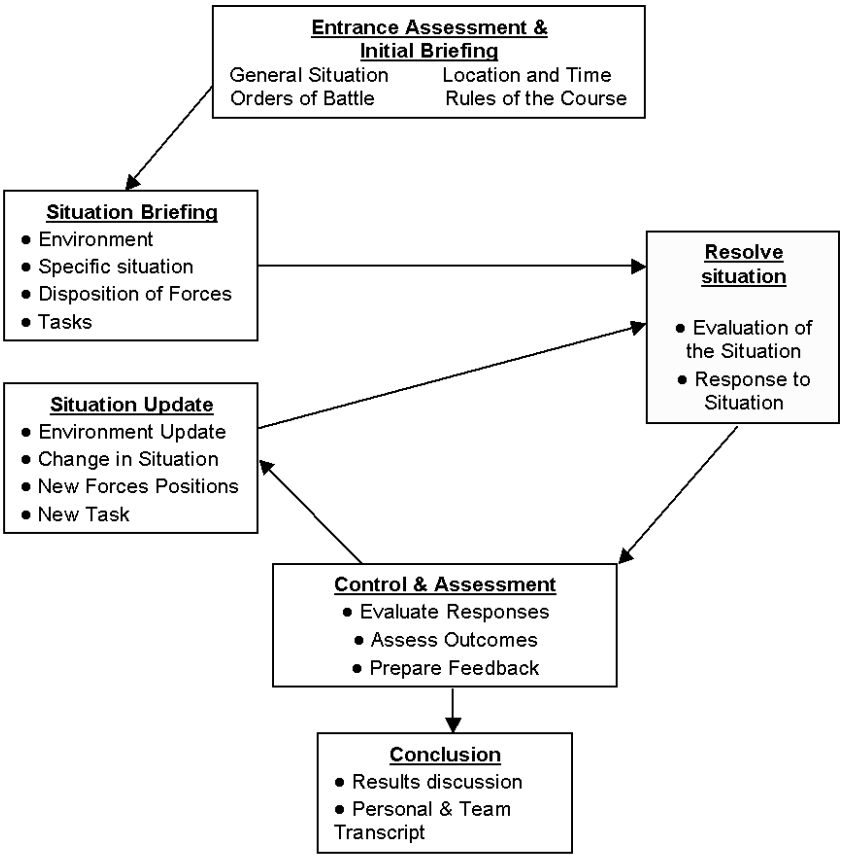

Figure 4: General schema of the Operational course.

The next training phase is performed at the Yavoriv Training Center in the western part of Ukraine, where future peacekeepers are gathered for team exercises after being trained locally. The focus of training at this phase is on authentic peacekeeping activities and specifically on the coordination of subunits' actions.

Prior to authentic exercises at this stage, the participants are pre-tested to determine the level of their readiness and potential training deficiencies. Thus, IT-based assessments and evaluations may help schedule training activities in the most efficient way. The main goal at this stage is to assess readiness to participate in the peacekeeping mission both for each individual and a team as a whole.[6] Thus, the assessment should cover 100 percent of the personnel, including those who participated in the initial *Static* and *Operational courses*, volunteers who have experience in peacekeeping operations and those who did not complete the initial course and need to catch up with the group. This is the most intensive part of the preparatory stage in a sense of training and feedback on training results. As indicated on Figure 2, assessment results are reported back to the learning content and course developers of phases 2-4 to enhance learning and training.

ICT-based Mission Support

Upon successful training, the peacekeepers are transferred to the region of their mission. Traditional communication channels delay transformation of the mission information into training examples. The tight rotation schedule restricts exchange of the specific experience between the groups; thus it is important to ensure mechanisms to support decision-making and continuous learning and training of the peacekeepers to enhance their mission performance. The purpose of this support mechanism is twofold. First, it should ensure communication channels, expert evaluation, and registration of all information related to a conflict situation for current decision-making and further incorporation of the situation into the bank of mission examples. Second, it should ensure access of the peacekeepers to the learning and training materials to address issues revealed during the Assessment phase and to get training updates on the mission goals, specific situation, international legislative changes, current mandate requirements, etc., thus serving as just-in-time training support.

At this phase of training, which is named "Integration course," participants need to apply all knowledge and skills they acquired to solve authentic tasks. In some cases, similar situations have occurred in the past and necessary procedures to resolve conflict were elaborated and tested. In other cases, expert evaluation and prognostic methods may be applied to novel situations were trusted solutions do not exist.

We expect that at this phase it is important to organize communication and collect feedback from expert groups. Sample group structure is shown at Figure 5. These

groups provide feedback essential to resolve a conflict situation, and consider it from different viewpoints. Proven solutions as well as potential traps may be recorded and further used in training at the preparatory stage.

Although battalions are distributed over a large territory, they maintain communication, and their experts may take part in the decision-making process. Internet connection via satellite ensures timely access to information and may be used for distance training and support.

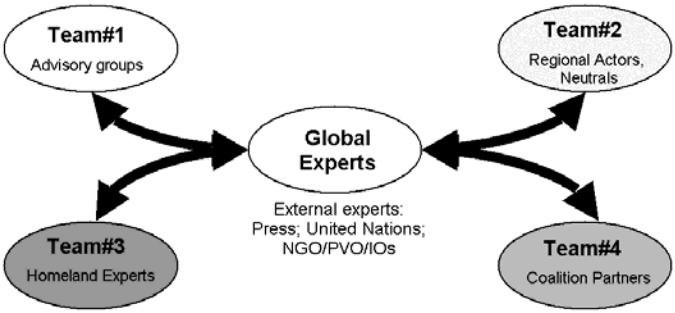

Figure 5: Expert groups supporting decision-making.

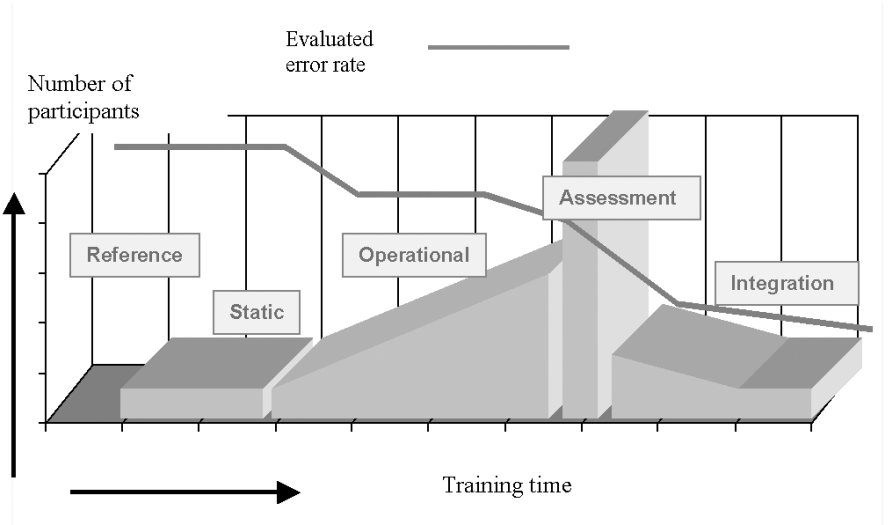

Figure 6: Dynamics of key training features.

Conclusion

Although first piloting revealed many technical, management, and administration issues at different layers, preliminary estimations are promising (Figure 6). To be successful this project had to rely on pragmatic approach, extensive reuse of existing materials, and proven technologies. Its modular structure allows for stepwise enlargement and updates, and developers made all efforts to follow technical standards, and specifically the SCORM framework, in order to ensure reusability of specific learning materials.

At the planning stage, the project members indicated general part of the training that is addressed to all peacekeepers, and specific parts, depending on qualification of the trainee, or on specific features of the mission. Specific parts are labeled according to their position in Profession x Mission Region x Mission type cube to facilitate their reuse for future mission training. Information pertained to the situations resolved in current mission is also classified and stored for use in training examples. During development of specific modules and elements of the courses, the developers indicated necessary entrance competencies and learning objectives, which facilitate their reuse at the course advancement stage.

Notes:

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2 *Bi-MNC Directive for NATO Doctrine for Peace Support Operations* (Brussels, NATO HQ, October 1998).

3 Timothy L. Thomas, "Preventing Conflict Through Information Technology," *Military Review* 78, 6 (December 1998 - February 1999): 44-57.

4 Andrij Ivashchenko and Kateryna Sinitsa, "Information Technology for Training Forces of Peacekeeping Operations," in *Telematics and Life-Long Learning. Proceeding of the International Workshop TLLL-2001* (Kyiv, Ukraine: IRTC, 2001), pp. 102-104.

5 Some were drawn from documents like *Peace Support Operations*, Joint Warfare Publication 3-50 (London: Ministry of Defence, 2001).

6 *Peace Operations*, Field Manual No. 100-23 (Washington, DC: Department of the Army, December 1994), <http://www.dtic.mil/doctrine/jel/service_pubs/fm100_23.pdf> (6 May 2004); *Information Operations*, Field Manual No. 100-6 (Washington, DC: Headquarters, Department of the Army, August 1996), <http://www.fas.org/irp/doddir/army/fm100-6/> (6 May 2004).

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KATERYNA SYNYTSYA, see page 44.

THE COALITION INFORMATION SYSTEMS AND OPERATIONS (CISO) LEARNING NETWORK: AN EMERGING CONCEPT FOR MULTINATIONAL C4 INTEROPERABILITY

Walter L. CHRISTMAN and Tom HAZARD

Introduction

Current and future military missions involve multi-national coalition forces that must be rapidly drawn together, flexibly led, responsively deployed and agile to address a wide variety of dynamically evolving tasks. Synchronization of air, land and sea campaigns will remain the cornerstone of Joint Operations as we move to confront the next generation of warfare. In all of these missions there is a need for agility, responsiveness and effectiveness in the use of limited resources to achieve complex and multiple objectives. Within this context, the primary challenges to effective integration of command, control, communications, and computers (C4) in attaining "Coalition Interoperability" and increased effectiveness are [1]:

- Different doctrine, decision making, rules of engagement and mission "agendas";
- Different technology skill and equipment levels;
- Questionable compatibility of respective national information systems;
- Limited information systems resource sharing agreements and capacity;
- Different interpretation of situational information;
- Lack of compatible security architectures.

To help address these challenges, the Coalition Information Systems and Operations (CISO) Learning Network is developing in collaboration with NATO and Partnership for Peace (PfP) nations an Internet-based online repository of e-Learning materials for enhanced coalition interoperability. Once fully implemented, it will promote net-centricity in coalition command and control through a global, Web-enabled

environment that leverages existing and emerging technologies in a "smart-pull" fashion as part of the NATO transformation agenda.[2] For those wishing to certify their learning experiences for recognition and validation by national authorities, the CISO Learning Network is expected to include the award of a Coalition Information Officer Certificate by an appropriate NATO organization in collaboration with several potential nationally sponsored academic institutions. In addition, the CISO Learning Network can serve as a continuous education resource that will assist in guiding the planning and execution of combatant command strategy, as well as joint operations.

The next generation of warfare, often referred to as "fourth generation warfare," will not only challenge the traditional views of how we operate "jointly" in the battle space, but will also greatly effect how we integrate those actions taken to affect adversary information and information systems, while defending coalition information and information systems. This new generation of warfare will shake the traditional warfighting concepts to the core and require all nations to fundamentally revisit current joint doctrinal philosophies on conducting joint operations and to seek new means for educating and training coalition forces.

The CISO Learning Network initiative is in response to the fact that Information Operations (IO), Information Warfare (IW) and Command and Control Warfare (C2W) may become the dominant operational and strategic weapons in combating nation-state or non-state actors, who may be engaging in destructive overt or provocative behavior. The identification of "coalition interoperability" has been deemed a critical success factor and one of the fundamental challenges to mission success in the post-Cold War security environment. It continues to rank as a top priority issue, as revealed in numerous internal US Defense Department after action reviews.

Moving beyond issues of technical interoperability, the CISO Learning Network addresses what might be called "cognitive interoperability." Effective integration of C4 is a core competence and task among and between foreign militaries in addressing the challenge. The CISO Learning Network specifically addresses the problem of how to provide e-Learning capabilities (right time/right place educational opportunities, with on-demand potential) to a multinational audience. Primary target audiences include US and coalition personnel engaged in operational-level multinational command and staff tasks (e.g., Combined Joint Task Force). In addition, the CISO learning community includes a wider audience concerned with operational and strategic level C4 cooperation in a wide array of complex contingencies. It further covers the use of Information Assurance as a reliable enabler that should be included in the developing of Information Operations doctrine.

Fully developed, the CISO Learning Network will include:

- A permanent network dedicated to coalition forces and 'continuous learning';
- A SCORM "conformant" platform to support education and training on demand;
- A conduit for emerging advances in distributed learning & modeling and simulation;
- A means to build a global cooperative security community and to support it anytime, anywhere;
- Professional certification in collaboration with accredited academic institutions.

The CISO initiative's initial priority for content development is to focus on creating a sustainable learning environment that will allow the development of advanced 'critical thinking skills' in the Information Operations (IO) domain. The payoff will be improved technical and "human" interoperability between US military forces and their foreign counterparts, as well as a reduction in the OPTEMPO of US forces, as a consequence of improved performance among the planning staffs of a wide array of coalition partner nations. The end-result is expected to dramatically expand US and multinational learning opportunities in the domain areas of Coalition Information Operations (CIO) and planning for the Combined Joint Task Force (CJTF).

Getting Started

The initial impetus for the CISO Learning Network emerged in collaboration with experts from over 30 NATO and PfP nations at the US European Command Exercise *Combined Endeavor'02*. The Chairman of the NATO NC3 Board Working Group on Strategy and Policy, representing the Joint Staff J6, subsequently endorsed the CISO concept to the NATO Training Group as a promising pilot effort to improve coalition interoperability. The CISO Learning Network is the foundational database component of the C3 cooperative topic in the Partnership for Peace Information Management System (PIMS). The program's mission statement provides the overall guiding context for initial steps:

The Coalition Information Systems and Operations Learning Network will provide the essential familiarization of C4 planning skills necessary to integrate information technologies and command & control processes among and between NATO Allies and the Partnership for Peace nations.

As a prototype effort being tested within the NATO-PfP arena for eventual application worldwide, the CISO Learning Network is a joint project of the US Navy Space and Naval Warfare Systems Center - Charleston (SPAWAR SSC) and the

Naval Postgraduate School (NPS). A 'prototype' CISO knowledge portal has been established to administer the initial project at https://www.eur.spawar.navy.mil/ciso/. NPS Learning content borrowed with minor adaptation from previous investments by Naval Education and Training Command (NETC) for US Navy and Joint Service application is already under evaluation and being revised for coalition partners in the Euro-Atlantic region. A complete portal will be established as a result of funding to support development of a strategic plan and series of conferences and workshops involving PfP Partner and NATO representatives in the test and evaluation process. Foundation topics will include human interoperability, cognition and decision-making, command and control structures, joint planning process, and Information Operations (IO). All of the elements associated with IO are envisioned, including Information Warfare, Electronic Warfare, PSYOPs, Deception, OPSEC, Information Assurance, and Infrastructure Protection/Security.

To give further definition to the effort, the CISO Learning Network managers have adopted the following project goals:

- Develop with the C4 community of NATO and PfP nations an Internet-based online repository of e-Learning content/ materials to further C4 education opportunities and support enhanced coalition interoperability planning and exercises.
- Develop planning skills in support of the coalition command and control environment for future collaborative and coalition planning efforts based upon the CJTF concept.

At end state, the program will establish a full spectrum capability to support C4 distributed learning requirements throughout the Euro-Atlantic community of nations. The value to the European theater, and eventually other regional geographic Combatant Commands, will be the development of a better educated and trained cadre of coalition officers and civilians. These forces will better understand that the new battle space will be non-linear and more likely without definable boundaries, borders or battlefields. Success or failure in the Joint Operations arena will rely heavily on these newly educated forces and their efforts to ensure there is no insurmountable 'fog of war' by gaining the knowledge necessary to increase the effectiveness of joint operations through coalition interoperability across the C4 domain.

Principles for Establishing the CISO Learning Network

The CISO Learning Network is a "technology solution" to a coalition education and training need and should be aligned and implemented in accord with four basic principles [3]:

1. *"Focus on coalition-based interoperability."* US allies and partners need to shift their interoperability focus from one almost exclusively devoted to technical interoperability in favor of a balanced treatment of the technical, cognitive, organizational, doctrinal and "human" aspects of interoperability and multi-national cooperation.
2. *"Incorporate a 'transformational' perspective."* A "transformational" perspective accepts current baseline interoperability characteristics as the initial benchmark. This means that CISO's effective contribution is to help to establish the point of departure for national efforts for continuing coalition interoperability improvements.
3. *"Foster cooperation in C4I infrastructure."* Fostering cooperation in C4ISR research, development, and acquisition of systems, doctrine, and procedures for multinational operations will help ensure the transfer of "lessons learned" into the coalition partner's actual military capability.
4. "*Conduct experimental programs."* An experimental program, using different levels of complexity and reality (collaboration, war games, simulations, command post exercises, and true lessons learned efforts) CISO will ensure a process to build systematic and empirical knowledge about what actually works in multinational operations.

Focus on Coalition-Based Interoperability

The CISO Learning Network program is intended to provide participating nations with tangible measures and evidence of the benefits that can be expected from investments in coalition interoperability. To be effective, the CISO Learning Network program must:

- *Develop a common methodology*, which requires agreement with participants on the relevant representative mission areas (e.g., regional conflict, peacekeeping, and peace support operations) as well as the appropriate C4 interoperability learning objectives;
- *Build upon existing efforts*, which requires the application of web-based, Internet e-Learning technologies necessary to help counterpart foreign military organizations to "co-evolve" with US forces as part of the transformation experience. By taking advantage of existing laboratories, networks, and currently planned experiments, the CISO Learning Network may afford the initiation of a broadened interoperability effort with little added infrastructure costs to the participating nations;
- *Employ a cooperative process*, which will lay the foundation for enhanced security cooperation among the participating countries. In its implementation, NAVEUR and EUCOM employment of the CISO Learning

Network will be enable them to:

1. Take as the end-state goal with each individual partner nation a degree of joint responsibility in the co-evolution of operational concepts, command approaches, organizations, doctrine, and systems;
2. Incorporate other nations and non-governmental organizations as appropriate;
3. Foster a collective shared awareness and efficient, collaborative learning environment within which future coalition-based knowledge may be shared among and between all participants.

Incorporate a Transformational Perspective

The CISO Learning Network concept is based upon the assumption that Advanced Distributed Learning (ADL) through multinational education and training is a vital part of the *transformation* experience. NATO has already adopted ADL as its first priority project within the NATO Concept Development and Experimentation (CDE) arena. Therefore, as the NATO lead in this critical area of multinational education and training, the US is assured of participation in the co-evolution of a foreign nation's operational concepts, command approaches, organizations, doctrine, and systems. This program focuses on the *integration* of technology development efforts, organizational concepts, and doctrine development. E-Learning, employed through the CISO Learning Network program, is an essential part of the process of discovery, exploration, testing, assessment, and demonstration that are the engines of co-evolution in foreign military capability. The CISO Learning Network program will work best if it helps to facilitate the *transformation* of coalition education and training through the use of emerging technologies and over the Internet. Where required, it will incorporate and build upon existing initiatives with individual and systemic improvements in order to better achieve the theater-defined coalition-based training objectives.

Foster Cooperation in C4I Infrastructure

When building upon existing architecture, the emerging future architecture must be tailored to the needs of the nation or region with whom we are engaged. The following are among the range of specific technical solutions, which could be facilitated through the CISO Learning Network:

- Conduct multinational distributed computer-assisted exercises using high fidelity simulations;
- Collaborate in technical groups through the use of web-based technology services;

- Share lessons learned and knowledge resources through interconnected repositories of digital technical information;
- Increase interoperability through real time technical applications.

Conduct Experimental Programs

In support of conducting experimental programs, the CISO Learning Network program will provide a repository for lessons learned. Properly developed, it can serve as a clearinghouse for the continuing refinement of requirements and the continuing identification/ evaluation of viable technology. In order to take full advantage of all emerging technology and to ensure that the CISO concept is well positioned to optimize its value to the coalition forces, the CISO Learning Network will, as applicable:

- Capitalize on existing laboratories, networks, research networks and planned experiments where possible;
- Adopt a confederated approach to building the "system of systems" that will support a wide array of European C4 and IT platforms;
- Base interoperability on open systems architecture and de facto marketplace standards to the greatest extent possible, adding the military unique requirement only when essential;
- Undertake a program to assist foreign military officers better to understand emerging technologies and their significance.

Scoping the Effort and Defining the Task

In exploring CISO implementation, the US Navy SPAWAR and Naval Post Graduate School Team analyzed appropriate pedagogies, performance-based outcome measures and the overall efficacy of web-based learning. It was concluded that a properly developed 'anytime, anywhere' approach to delivering learning has the potential to substantially improve coalition interoperability by providing access to education across a "learning continuum" of the entire C4 requirement spectrum (i.e., in terms of content and audience). Specifically, Asynchronous Learning, through a variety of web-based tools, can provide a wide variety of 'anytime, anywhere' benefits while still accommodating the interactivity that may be required between faculty, instructors and learners. It was determined that the best approach to implementation would be the "crawl, walk, run" strategy carried out in three overlapping phases.

Phase I: Gap Analysis

Information Operations and Information Warfare (IO/IW) managers face infinite choices when they contemplate strategies for IO/IW applications and dealing with

requisite changes in technology. Like the 'private sector,' if they do not know their destination, they may chose paths which are fraught with risk, or paths which lead to failure due to inadequate problem solving or decision making. It is essential then, that US and coalition leaders who plan to move from "here to there" in the IO/IW world are clear where "there" is. By knowing what the desired end state looks like, the leadership can compare that to the current state, identify the size and nature of the "gap" between the two, and take action to close the gap.

This first stage of the gap analysis was to evaluate the possibility of adapting the NPS IO content developed for US purposes to a coalition or multinational application. This required that all content domain factors be identified. With assistance from the Bulgarian Rakovsky Military Academy, the NATO School in Germany, and international students at NPS in Monterey, California, an initial gap analysis using NPS developed content is underway.

This process involves a highly interdisciplinary approach consisting of *foundational knowledge domains* drawn from several IO/IW areas of study. The resulting CISO Learning Network application is a baseline for coalition IO/C4 learning outcomes worldwide. It provides a foundation for further study in IO/C4 that will allow the coalition learners to be able to:

- Understand and create interoperable Information Operations strategies and policies;
- Understand and create agile organizational structures and decision processes responsive to real time mission and situation requirements;
- Understand information technology and systems as a provider of opportunities to gain information and knowledge superiority and perform information operations;
- Integrate technology, organization, policy and strategy into an Information Operations framework and use it in deliberate and crisis planning and execution across the range of military operations.

With respect to the 'learning continuum,' this gap analysis should aid in determining not only present needs but also serve to forecast future education needs based on emerging technologies or operational contingencies. The purpose of this 'gap analysis' process is to help ensure that institutional priorities are self-consciously factored into choices made related to the coalition IO/C4 courses. In identifying the types of training and education needed for the information officers of the workforce of the future, decisions must be made in areas such as:

- Type of courses;
- Number of courses;
- Delivery methods;

- Audience;
- Timing;
- Length;
- Sequence;
- Content.

Phase II: Course Development and Establishing a Community of Learners

With today's military environment being characterized by the emergence of assorted and complex contingencies, the requirement for effective multinational technical and 'human' interoperability has become increasingly apparent. Theater commanders are also finding that the inability of coalition partners to rapidly plan and coordinate with each other results in a default situation whereby the US forces must often become the lead responder in order to ensure success. Consequently, one objective of the CISO Learning Network is to certify the professional accomplishment of foreign military officers in acquiring C4 skills necessary to interoperate with US forces.

The SPAWAR/NPS team proposes to create a variety of learning modules/ courses, leading to professional development, certificate programs that are based upon a tightly knit set of coalition 'learning domains' resulting in a Coalition Information Officer (CIO) certificate. The first CIO modules would be an innovative education pursuit, which leverages the graduate degree program level content already being developed at NPS. Key domains areas to be examined are broken down into "knowledge domains" focused on general Information Operations issues and "problem domains" focused on practical application issues most likely to be faced within the coalition and multinational interoperability arena. Sub-elements of each are identified below.

The Foundational Knowledge Domains are:

Computer Technology
Networks
Information Assurance
Database Technology
Decision Support Systems and Artificial Intelligence
Sensor and Signal Processing
Communications Systems
Space Systems
Software Technology
Information Systems, Architectures, and Integration
Combat Systems
Probability and Statistics
Operations Analysis
Systems Evaluation
Information Operations
Command and Control
C4ISR Systems
Enterprise Integration
Mathematics

Example Information Operations Problem Domains are:

- Planning and Execution Processes
- Battle Staffs Decision Processes
- Psychological Operations
- Electronic Warfare
- Computer Network Attack
- Computer Network Defense
- Socio-Political Issues
- Command & Control Challenges
- Media
- Diplomacy
- Public Affairs
- Civil Affairs
- OPSEC / Deception

With assistance from the Bulgarian Rakovsky Military Academy, the NATO School, and International students from NPS, an initial set of 'pilot' web based Coalition Information Officer (CIO) modules have been completed and are ready for test and evaluation. In the web-based (online) version, learner engagement within these two major domains is largely asynchronous (anytime/anywhere), but not totally self-paced. Eventually, the online courses will feature access to a wide range of open source information resources, significant interactivity (faculty/student and peer/peer), substantial control of the learning environment by the individual coalition learner, and extensive modularization of content.

Phase III: Finalize and Maintain the CISO Learning Network

The development of a comprehensive international security cooperation e-Learning activity will also need to be supported by a coherent technology vision and strategy. Higher order capabilities are achieved by combining these basic user and content capabilities into interoperable and interacting systems. The following is a brief list of examples of higher order capabilities and systems. An infinite number of higher order capabilities are possible.

- *Traditional Learning Example*. To use the CISO Learning Network for learning, the student must find the appropriate course/ module, register for the course/ module, access the course content, provide information such as homework, papers, and exams, interact with the instructor, interact with other students, and track performance, progress, and status. Some opportunities for totally self-paced exploration will also be provided.

- *Teaching Example*. To use the CISO Learning Network for teaching, the instructor must develop the content, store the content, keep the content current, manage student enrollment, interact with the students, interact with other instructors, evaluate student performance, and track and report on student performance, progress, and status.
- *Digital Library and Reference Example*. To use the CISO Learning Network for accessing reference materials, the user must be able to find and access the desired content. This requires access functions such as search and discovery and retrieval. Also, the user may want to place certain content into one of the digital libraries. Here they may require creation and development functions, manipulation and modification functions, as well as access functions.
- *Distributed Simulation Example*. Because the CISO Learning Network is a Web-based system of capabilities, it would be possible for users to access and execute distributed simulations through the CISO portal itself. A properly integrated application interconnection from the portal to the distributed simulation system would be required. The users could then use the communication and collaboration functions provided by the CISO to contact each other and establish their parameters for a distributed simulation event.
- *Cooperative Security Community Example.* The CISO concept lends itself very well to establishing "communities of interest." In this example, users would use the communication and collaboration functions to contact other users to determine if they would be interested in forming a cooperative security community. Notices could be posted on the CISO learning network home page along with contact information for the organizers. The users establishing this community could develop content to stimulate and facilitate discussions. The users could establish on-line seminars and use the CISO portal knowledge pool to facilitate face-to-face events. This would become a community of people who could share ideas and concepts across many political borders.

It is clear from these examples that the functions already found in the CISO learning management system and digital libraries can be expanded and developed. Then it becomes a straightforward process to reuse them in these higher order systems. It is also clear from these examples that a properly integrated CISO Learning Network environment would provide a catalyst for developing an infinite number of higher order capabilities, limited only by imagination and bandwidth. These higher order and more complex capabilities would fuel further development of on-line communities and provide more opportunities for users across the globe to interact with, exchange, and create knowledge. The development of human interfaces and

expanded functionality (e.g. multilingual, multi-sensory interface) greatly facilitates the use and accessibility of these high order systems.

Summary

The Coalition Information Systems and Operations Learning Network at fully developed end state is a web-based cooperative security forum or "knowledge portal" and, thus, by definition is an open-ended quest for intellectual and pedagogical modes of international cooperation. The benefit of an open system of knowledge is that it allows for wider participation in the processes of experimentation in which promising approaches to international security cooperation are subjected to the rigors of experimentation, simulations, gaming, exercises, and other forms of interaction. This methodology facilitates, among other things, the use of "test laboratories" to promote coalition interoperability and political-military cooperation.

It should be recognized that this entire process is predominantly about establishing a multinational learning community within an entirely new concept of international security cooperation. It incorporates emerging technologies in support of emerging concepts. The development process associated with the CISO Learning Network is therefore decidedly experimental in its approach. The CISO concept is to bring together NATO and PfP Partners, C4 educators, researchers, developers, and military professionals to jointly develop commonly agreed upon C4 educational approaches/ content leading to academic certification. Efforts focus on the integration of technology development efforts, organizational concepts, and doctrine development.

In summary, we believe the CISO Learning Network and the proposed Coalition Information Officer Certificate is a major step forward in recognizing the need for integrating, on a coalition and multinational basis, the essential component of knowledge centric people, adaptive organizations and architecture with doctrine, standards and networks. The process of creating and translating existing e-Learning courses developed for US purposes for a foreign, multinational purpose is not trivial and will involve the participation of IO/C4 domain experts and experienced e-Learning instructional designers from many nations around the world. The net-centric approach enables discovery, exploration, testing, assessment, and demonstration of transformational approaches co-developed with coalition partners.

With all the burdens attributed to operating in joint environment, providing requisite knowledge for coalition leaders to manage a volatile, rapidly changing C4 landscape—without losing sight of the Commanders Intent or Coalition objectives—is a challenge of the greatest magnitude. The CISO Learning Network concept provides another tool for meeting this challenge while also promoting cooperative

development in multinational education and training as a vital part of the transformation imperative.

Notes:

[1] Among the key findings of the *International Workshop on Knowledge-Based Planning for Coalition Forces* (Artificial Intelligence Applications Institute, University of Edinburgh, 10-11 May 1999), <http://www.aiai.ed.ac.uk/project/coalition/ksco/ksco-1999/index.html> (14 April 2004). List derived from elements identified by Dr. LeRoy Pearce, Canadian Ministry of Defense.

[2] CISO technical concept supports the net-centric, edge-enabled vision best identified in David S. Alberts and Richard E. Hayes, *Power to the Edge: Command and Control in the Information Age*, with a Foreword by John Stenbit (Washington, DC: DoD Command and Control Research Program, June 2003), <http://www.dodccrp.org/publications/pdf/Alberts_Power.pdf> (14 April 2004).

[3] These operational principles were developed in accordance with the recommendations outlined in the Report of a French-German-UK-U.S Working Group: *Coalition Military Operations: The Way Ahead Through Cooperability* (Arlington, VA: US-CREST, 2000).

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STANDARDS INTEGRATION IN E-LEARNING, SIMULATIONS, AND TECHNICAL MANUALS

Jeffrey A. KRINOCK

Distance Learning (DL), Computer Based Training (CBT) and e-Learning today encompass a broad range of technologies and teaching theories and practices, all of which are being aggressively explored by various groups, enterprises, industries and interests around the world. This huge arena of exploration involves incalculable combinations of technologies and learning theories. Where all of this will lead cannot be clearly projected, neither in terms of the technologies that will apply tomorrow, nor how the teaching methods encompassed and affected by those technologies will be shaped and altered.

Standards for E-learning, CBT and DL, of course, bring at least some degree of organization to this milieu. We have seen this in recent years, as when military leadership of various nations has pushed heavily for the use of the Sharable Content Object Reference Model (SCORM) in the development of Web-based learning content. No single standard, however, spans even a significant portion of the range of teaching and learning technologies in growing use. Even a cursory listing of today's computer and Web-based Training (WBT) technologies includes simulations, gaming, technologies for peer-to-peer and student-to-instructor communication (chat rooms, threaded discussions, white boards, virtual classrooms, instant messaging, etc.), Electronic Performance Support Systems (including Intelligent Tutoring Systems, job aids, and Interactive Electronic Technical Manuals), and of course ongoing research with the Semantic Web and the search and discovery technologies it necessarily spawns.

Standards covering these technologies include many areas of overlap and even, in some cases, standards appear to be in competition. Take the area of simulations as an example. In the last ten years or so, just prior to the emergence of the High Level Architecture as the simulation standard of choice, the US military focused on at least two other standards for simulations. This has led to a period in which those generating military simulations had to consider all three simulation standards.

This brings us to a point at which making sense of standards, to include analyzing their areas of overlap, may be a necessary starting point for those participating in the development and deployment of e-Learning, CBT, or DL content. Since analyzing all the various standards would require volumes, we shall start by taking a look at three of the more widely employed standards: HLA,[1] S1000D,[2] and the SCORM.[3]

A Closer Look

Each of these three standards—the SCORM, HLA, and S1000D—targets different segments of learning technology. Table 1 lists both the source of each standard, and the general objective of its standardization.

Table 1. Distance learning, simulation, and interactive manuals standards

Standard	Original Sponsoring Agency	Sources of Contribution	Targeted Technology
SCORM	Office of the Secretary of Defense (US OSD)	Primary input comes from segments of the e-Learning industry such as authoring tool vendors and Learning Management System vendors and academia.	In general, e-Learning; the types of computer (and now, Web-based) training materials typically covered by Computer Based Training (CBT) in recent years.
High Level Archi-tecture	Defense Modeling and Simulation Office (DMSO)	Combination of US DoD input (various military services) and the industry groups supporting them.	Simulations, to include complex military simulations involving multiple participants in diverse locations. Can include anything from a simple desktop software simulation to complex, full-hydraulic-motion jet aircraft simulators.
S1000D	European Association of Aerospace Industries (AECMA)	Broadly based group of both hardware vendors (e.g., jet aircraft and naval ship builders) and the military services and academic interests of multiple nations. Started in Europe, but is expanding its scope of influence to both Asia and the US.	Interactive Electronic Technical Manuals (IETMs). These are the follow-ons to paper-based manuals in growing use for support of everything from microwave ovens to fighter jets.

On the surface there may not appear to be much overlap among these three standards. After all, what does a technical manual for maintenance of a fighter jet have directly in common with a Web-based course on military aviation weather? Or what does a simulation-laden Computer Assisted Exercise (CAX) have in common with either fighter jet maintenance or military aviation weather? The answers to the above are slightly complex, but in some cases these are potentially crucial questions for those interested in using computer technology to its fullest potential in support of military training and general security preparedness.

In a recent interview, Tim Tate, director of the Advanced Distributed Learning initiative's Job Performance Technology Center (JPTC) discussed the issue of overlap between the SCORM and S1000D.[4] When describing military training of jet pilots, for instance, he described certain aspects of it almost in terms of a "hierarchy" of information flow. Training content may be the desired end of the SCORM's standardization of e-Learning material, but the source material, the essential data around which the training is built, is usually technical data and specifications.

A use case involving military aviation provides a good example. A pilot contemplating a takeoff at heavy gross aircraft weight at a high elevation airport will need to call on extensive knowledge about what are known as Category I, Category II, and Category III takeoffs. The real-world decision the pilot faces in such a situation is critical in the event of the need to abort a takeoff. Depending on the category of the takeoff (Cat 1, II, or III), the decision to abort can mean the difference between sliding off the end of the runway into a fiery ball or a safe and uneventful roll to a stop on the runway. The decision involves knowledge of everything from aviation weather to aircraft aerodynamics to the basics of an individual aircraft's performance capabilities.

Specifically, a pilot facing a critical go/no-go decision for takeoff in marginal conditions is trained to consider at least the following:

- Aircraft acceleration abilities at various altitudes, gross weights, and runway conditions;
- Aircraft braking distance on dry, wet, and slush-covered runways;
- Rated aircraft capabilities in icing conditions, as applicable;
- Equipment assisting emergency stopping in addition to braking (such as engine reverse thrust and tail hooks).

The training a pilot needs regarding Category I, II, and III takeoffs is certainly a candidate for SCORM-conformant content – perhaps even Web-delivered training content. (Also likely, of course, is the possibility to use a computerized aircraft

simulator to practice special procedures, such as dropping a tail hook if the end of a runway is approaching during an aborted takeoff.)

Tim Tate's point is that the bulk of the information involved *in creating appropriate SCORM-conformant training content or simulations* will likely come from technical specifications and data and the technical manuals the jet manufacturer created and delivered with the jet.

Fifteen years ago, when technical manuals were typically paper based, an instructional designer assembling CBT about Category I, II, and III takeoffs had a relatively straightforward path to negotiate; a Subject Matter Expert (SME), likely a pilot, would have been consulted. The SME in turn would have accessed and perhaps excerpted appropriate portions of paper-based manuals to supply to the instructional designer, whose job it would be to turn the technical information into useable chunks of instruction for inclusion in the CBT.

Technical manuals today introduce an entirely new twist into the CBT design scenario. Today's Interactive Electronic Technical Manuals (IETMs) are increasingly likely to *integrate training material*, in addition to their traditional coverage of technical data, charts, and operating procedures. In other words, yesterday's standalone CBT—considered to be a completely separate matter from the technical manual on which it was largely based—*may now be a part of the electronic version of the technical manual itself.*

Standards, Functionality, and Potential Areas of Overlap

Should standards such as the SCORM, S1000D, and HLA adjust to areas of overlap such as those just described? Those of us involved in building and disseminating standards for e-Learning, CBT, and DL are well aware that "simple" is usually "better." Generating the support of multiple stakeholders—many of whom have massive investments in existing content and development processes and platforms—is challenging even when the goals of standardization are relatively modest, as they were, for instance, for early versions of the SCORM.

Nonetheless, the Advanced Distributed Learning (ADL) initiative, creators and editors of the SCORM, has recently sought to secure a Memorandum of Understanding (MOU) with AECMA, creators and editors of S1000D. ADL has also for several years been meeting and talking with the Defense Modeling and Simulation Office (DMSO), creators and editors of HLA.

To better grasp the need for collaboration between standards bodies, let's return to our use case involving marginal-weather takeoffs. An Air Force squadron commander might be interested on a day-to-day basis in tracking and assessing the following:

- Rates of successful sortie launch (normal conditions);
- Effects of weather on launch rates;
- Individual pilot decision-making abilities (charted in part, perhaps, by how many aborted takeoffs result in tail-hook stops).

To take our use case a step further, if our marginal weather conditions were embedded as part of a CAX, the following information might be of interest to a wing commander:

- Successful sortie launch rates by squadron;
- Overall effects of emergency stops (tail hooks, hot brakes) on wing-wide sortie launch rates, maintenance operations, and aircraft turnaround;
- Rates of no-go decisions and emergency stops, wing-wide, charted by aircraft type and squadron;
- Effects of pilot decision-making abilities, tracked by squadron.

In short, our marginal weather scenario involves at least two main categories of information: *technical information* (e.g., overall rates of aborted takeoffs and efficiency of aircraft turnaround procedures, compared from aircraft A to aircraft B) and *human performance considerations*.

In addition, feedback is required and useful at three different levels, as a minimum:

1. *Individual pilot:* Were takeoff decisions rushed in the face of poor weather? During aborted takeoffs, did the pilot apply the right procedure, and were procedures executed correctly?
2. *Squadron commander:* Do takeoff go/no go procedures make sense as applied? Are there performance discrepancies from flight-to-flight, and from aircraft type to aircraft type (depending on the makeup of the squadron)?
3. *Wing commander:* Were performance discrepancies of a technical, procedural, or human nature? (e.g., Do technical variations from aircraft type to aircraft type make a difference in sortie success rate? Do training and procedures accurately reflect technical considerations? How many aborted takeoffs and related lost sorties were due to poor decision making?) How do support aircraft (e.g., AWACS or tankers), when affected by marginal weather, impact overall mission success?

Table 2 sheds light on our three standard's abilities to meet these various needs. Clearly, the standards—even as they exist today—help all involved in our scenario.

For example, a pilot with LMS access could have available not only Air Force-specific takeoff training, but might find additional information available from a sister service or even from the aviation training programs of allied services. If the LMS and

relevant WBT were SCORM conformant, the pilot might both participate in training and also be assured of access to real-time reporting of his performance in any WBT-embedded assessments, since assessment reporting is one of the areas standardized by the SCORM.

In addition, the pilot may find ready access to a wide variety of valuable technical information – perhaps online, or perhaps in his deployment kit. Did the pilot "take a cable" (i.e., have to use the jet's tail hook to stop) while deployed, leading to the need for technical details about tow vehicle compatibility at an unfamiliar airport? Maybe a CD-ROM (or DVD) full of deployment-related S1000D-conformant IETMs supplies all the information needed to the remote air base's aircraft launch teams and maintenance crews.

Similarly, squadron and wing commanders participating in HLA-based distributed simulations might learn valuable lessons about the impact of weather on tanker availability, and in turn, on go/no-go decisions for their own units. HLA standardization opens the door for wide participation of squadrons, wings, and ground support units in broadly distributed exercises and simulations. HLA data sharing opens the door for deeper assessment of synergistic effects of diverse units working together, at a fraction of the cost of bringing them physically together in an exercise deployment.

In short, our three standards, as they stand today, offer the foundation for a wide variety of computer and Net-based mission support, at a variety of levels.

But what about the limitations listed in Table 2? Without question, the groups responsible for each of our three standards are aware of these limitations. In some cases, direct efforts to address them are already underway.

Table 2. Strengths and limitations of the SCORM, S1000D, and HLA

Standard	**Support Orientation**	**Support Strengths**	**Limitations**
SCORM	Human Performance	Simplifies and standardizes assessment reporting features of broad base of e-Learning tools and devices. Clearly identifies the Web and Learning Management Systems as the delivery mode for training material. Provides for content labeling and packaging.	Applies to *individual* performance only. Specifically targets only traditional CBT/WBT. Dependant on Web browsers for both content presentation and performance assessment reporting.

S1000D	Technical	Standardizes numerous aspects of technical manual presentation, to include addressing some "look and feel" issues.	No embedded standard for integrating SCORM-conformant training.
HLA	Mixed	Provides integration of simple to highly complex simulations in a heavily distributed environment. Enables broad and deep data exchange between all types of computer-based and computer-supported simulations.	No embedded standard for SCORM-based performance assessment and reporting (individual or group).

For instance, within the last year various working groups looked at combining SCORM's ability to assess individual performance with HLA's ability to exchange data between simulations. Immediate hurdles presented themselves; SCORM specifically mandates that LMSs launch SCORM-conformant content and track individual performance in the content's embedded interactions and assessments. A typical LMS, however, does not have the ability to launch, coordinate, and track performance within a widely distributed simulation. This issue raised many legitimate questions, such as which application or object should have simulation launch responsibility? The LMS? The Sharable Content Object (SCO) launched by the LMS? The simulation itself?

Also, when simulations are suspended, how is assessment reporting handled, and where is the simulation suspension data stored? Relatively simple simulations, such as the desktop flight of a PC-based flight simulator, may not overtax the data storage abilities of the SCORM data model. Even the simplest of military-style flight simulators, however, generate massive quantities of simulation state data when a flight or mission is suspended. The SCORM data model, as a potential vehicle for storing the simulation suspension data on an LMS, is immediately and convincingly overwhelmed.

In addition, distributed simulations supporting a wing (or larger units), as in our use case, would involve performance assessment of multiple individuals and groups (squadrons, flights, etc.). Today, the SCORM is not equipped to provide for group performance and assessment tracking, so even an integrated HLA/SCORM standard would not currently provide for standardized reporting of group performance.

Coordinated Standards – Use Case Revisited

The point of this paper, however, and the reason for the ADL/AECMA MOU and ongoing collaboration between ADL and DMSO is that focusing on jointly derived solutions among the standards development organizations could lead to greatly expanded opportunities to enhance computer and Net-based mission support.

What if, for example, the SCORM and HLA had an established mechanism for data exchange – both at the individual assessment level currently covered by the SCORM and at the simulation-state level of interest in most HLA-based simulations? Then further expand our standards interoperability to include S1000D-based IETMs. What if an online technical manual could adjust levels of technical detail presented based on analysis of SCORM-based assessment results, or, conversely, recommend SCORM-based training material on the basis of technical topics researched within the IETM? Or what if an IETM could be integrated into an HLA-based aircraft simulator so that appropriate technical manuals—and perhaps even SCORM-based procedure training—could be presented according to the situational needs of various emergency and non-standard procedures being practiced?

If we return to our use case involving marginal weather and a CAX, the possibilities inherent in an integrated-standards environment become more evident. Individual pilots and maintenance and ground support crews, of course, always benefit from readily available technical information. Pilots seeking optimized flight training and mission readiness could undoubtedly benefit as well from simulations that adjust scenarios based on active tracking of their performance, both for individual sorties and on a multi-sortie basis.

Putting it all together—HLA/SCORM enabled simulations and S1000D/SCORM enabled technical manuals—opens quite a few opportunities within a training exercise. Deployed pilots and their ground support crews in need of technical information find themselves able to gain access to both the required technical data and job aid types of training material. Take a cable while deployed in your jet to a foreign base? The IETM in your deployment kit might enable ground crews unfamiliar with your aircraft to understand and perform certain procedures that today requires the time and expense of flying in specialized ground crews.

Wing commanders tracking year-to-year performance in an exercise, able to collect and collate individual and squadron-level simulator training and assessment trends, can suggest tweaks to training regimens and then observe the results of those adjustments. Perhaps the mission checkout programs in the wing's squadrons call for three emergency abort practice sorties, but exercises conducted in marginal weather indicate unacceptable levels of pilot error in go/no-go decisions and takeoff abort procedures. The wing commander, with access to SCORM-based assessment results

from simulators, can prescribe changes to mission readiness training, and then track the results of those changes on anything from a daily to yearly basis.

Next Steps

So often the impetus for progress in standards building comes from either apparent cost savings or from the desire for ever-increasing centralized control of operations and training. That finding points of collaboration for HLA, the SCORM, and S1000D would provide or enable both of these is evident.

Gathering input from end-users is just as viable an approach, and just as likely to generate movement in the appropriate direction. What do pilots need to improve their understanding and execution of emergency procedures in simulators? Would pausing a simulation to review a five or ten minute training module enhance the efficacy of solo simulator rides? And what do ground crews need to help them efficiently turn around deployed aircraft? Would access to training embedded in IETMs enable crews to better respond to an expanded list of ground emergencies and unusual situations?

Needless to say, the possibilities opened by coordinating standards apply to far more than aviation. Technical manuals and Web-based training now effectively cover the globe. Simulations, covering as they do the most expensive of real-world operations and equipment, are growing in pervasiveness and usefulness each year as well. To unleash the effectiveness of coordinated standards, command-level input, user-level input, and the best ideas and dreams of the technical and advisory teams behind each of the three standards bodies should be brought together soon and significantly. MOUs are a start; joint projects based on meeting real-world training and operations needs are an even better beginning.

Notes:

[1] https://www.dmso.mil/public/transition/hla/

[2] http://www.s1000d.org/

[3] http://www.adlnet.org/index.cfm?fuseaction=scormabt

[4] Tim Tate, "Standards Status," Job Performance Action Team (JPAT) Meeting (Alexandria, VA: 20 February 2004).

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NOTES ON THE EXPERIENCE OF TRANSFORMING DISTRIBUTED LEARNING MATERIALS INTO SCORM STANDARD SPECIFICATIONS

Ján KOLLÁR, Ladislav SAMUELIS, and Peter RAJCHMAN

Introduction

At present more than 90 percent of the higher education institutions support e-learning. This process explodes in Slovakia, too. The Technical University (TU) of Košice, Slovak Republic, has approximately 13 000 students. Currently, there is no concrete data on the number of available web-based teaching materials. We estimate that there are dozens of complete teaching courses at the university.[1] Of course, they are being prepared on various platforms in various formats and design. As the number of web-based courses exponentially grows, we are facing the issue of incompatibility. Standardized delivery of the offered courses becomes a necessity and we are seeking effective ways to tackle this task. This article aims to describe the actual situation and the experience gained during the customization of web-based courses into the SCORM compatible format. We conclude with a summary on the obstacles, which the university management has to consider in order to transform efficiently already available web-based courses and materials into SCORM compatible format.

Background

The University established its *Local Center of Distance Education* as an independent body in the framework of a PHARE project in 1994. The Center is part of the *Slovak National Network of Distance Education*. The main aims are: co-ordination of open and distance learning in the region, development of open and distance education courses and provision of consultancy services, guidance and information. This Center provides variety of courses, e.g. in "Banking and Financing" and "Human Resource Development." No browsers and Internet were available at the time of its establishment and simple Unix based discussion forums supported the communication. Computer mediated asynchronous communication tools like BSCW [2] were used. Already in 1996, using Java environment students made first attempts to

introduce dynamic visualization into the learning process. Later the wider availability of advanced information and communication technologies (ICT) improved the educational opportunities. These opportunities were actively pursued in order:

- To join successful training programs with worldwide implementation, e.g. the comprehensive opportunities for education and training of ICT experts offered by Cisco Systems [3] and IBM;
- To join EU-supported programs, devoted to e-learning;
- To develop own distance-education supporting environment for limited number of students and to cooperate with already existing infrastructure in Europe.

In August 1999, the Cisco Systems Company established its first regional academy in Slovakia at the Faculty of Electrical Engineering and Informatics (FEI), TU of Košice. This program provides modules, dedicated to the delivery of basic knowledge of computer networking. This goal is achieved through web-learning and practical labs. The exams are centrally assessed. This program is partly integrated into the curricula of the FEI-TU. In 2001, the University joined the IBM Academic Initiative. IBM academic courses were also integrated into the university's curricula.

FEI TU joined early the *Leonardo da Vinci* and *Socrates* programs. The output courses were embedded in heterogeneous Learning Management Systems (LMS). At present, it is difficult to maintain these heterogeneous courses and the LMSs.

In 2002, FEI launched an institutional project, based on Microsoft products. The aim of this initiative is the continuous support for e-learning. Faculty members developed approximately 46 courses. The implementation of this project continues.

This experience may be summarized highlighting several features of these approaches. The Cisco's learning LMS is proprietary and closed. For example, tracking of the progress of the student is monitored and archived centrally. The advantage is that tutors could pay more attention to the pedagogical process and the syllabi are centrally controlled. The main disadvantage of the Cisco's LMS is the fact that it does not support communication among students in a study group. The TU has developed recently several PHP [4]-based programs devoted to the administration of the pedagogical process. These programs are practical but difficult to maintain. That is why in the next step we developed several systems based on Java J2EE technology.[5] This allows to customize the systems according to the always-changing requirements. This technology is supported also by the SCORM related testing products like SCORM 1.3 (or SCORM 2004) Sample RTE.

Incompatibility of web-based courses means that the content of the course is tightly connected to one specific LMS and the reuse of the same courses in another LMS

requires additional processing and effort. Several international standardization bodies aims to standardize the interface of the delivered courses in order to raise their reusability in various LMSs. The following brief characteristics were intensively consulted with Dr. Kateryna Synytsya (Co-chair of the PfP Consortium ADL working group):

The Aviation Industry CBT Committee (AICC) has developed a number of Guidelines and Recommendations covering a range of topics including interaction between learning content and systems that deliver it to learners and track their success. Some ideas and approaches of AICC were further elaborated by IEEE LTSC and SCORM developers.[6]

The IEEE Learning Technology Standards (LTCS) address a range of issues related to interoperability for learning technologies.[7] Focus of the work has been changing since this committee's launch in 1996, and currently it includes learning object metadata, content model and API for content interaction with run-time environment (usually referred as learning management system), competency definitions, digital rights language. The first international standard in learning technologies—Learning Object Metadata—has its origin there.

Significant efforts in developing international standards and their acceptance by the international community are made by Subcommittee 36 "*Information Technologies for Learning, Education, and Training*" of the ISO/IEC Joint Technical Committee 1.[8] It is also worth to mention Learning Technology Workshop that unites European efforts [9] and the IMS consortium.[10] The LTSC coordinates formally and informally with other organizations that produce specifications and standards for similar purposes.

ARIADNE is European Association open to the World, for Knowledge Sharing and Reuse, E-Learning for all, International Cooperation in Teaching, Serving the Learning Citizen.[11] The ARIADNE Foundation was created to exploit and further develop the results of the ARIADNE and ARIADNE II European Projects, which created tools and methodologies for producing, managing and reusing computer-based pedagogical elements and telematics supported training curricula. Validation of the tools and concepts took place in various academic and corporate sites across Europe and was encouraging enough to go ahead with this idea of non-commercial exploitation. The FEI TU has obtained permission to entry the ARIADNE knowledge pool for testing purposes.

Advanced Distributed Learning is an initiative, sponsored by the Office of the Secretary of Defense (OSD). Its aim is to establish a new distributed learning environment that permits the interoperability of learning tools and course content on a global scale. The ADL's vision is "to provide access to the highest quality education

and training, tailored to individual needs, delivered cost-effectively anywhere and anytime." [12]

The Sharable Content Object Reference Model (SCORM) is "a collection of specifications adapted from multiple sources to provide a comprehensive suite of e-learning capabilities that enable interoperability, accessibility and reusability of Web-based learning content."[13] According to the ADL "this reference model aims to coordinate emerging technologies with commercial and/or public implementations." The SCORM includes aspects that affect learning management systems and content authoring tool vendors, instructional designers and content developers, training providers and others.

Experiences with the free SCORM converter

The consortium of universities in Bolton, Glasgow and North Wales supports the open source project "RELOAD Editor," which transforms courses also into SCORM compatible format.[14] We began the transformation of university courses with this product. It has user-friendly interface and the source Java code is free. These features are advantageous in our university environment. In order to test the product, we have chosen standard regular HTML pages (i.e. pages, which are prepared by our university colleagues in some "html editor"). During the transformation process we observed that the web-based course (an "asset" in the SCORM notation) has to be processed in several ways in order to comply with the SCORM standard.

One common problem of the web-based courses is the fact that the authors in their pages point to external files and web pages. If the offered web-course contains links to external files (not stored in the local file system), they are accessible only if the client has access to the Internet. This feature has to be carefully corrected and maintained (it is necessary to replace the remote link with the local bookmark or file name). The corrected file will provide compact information, which is one "asset." In addition, when the asset contains external links, the control leaves the LMS and the student is unable to use the navigation tools of the LMS later. The navigation of the LMS is important, because it supports, for example, the analysis of the progress of the student (data obtained from the student's progress is stored in a database). This fact must be forwarded to the creators of the web-based courses, too.

Another problem relates to the supplementary data of the assets. If the page is downloaded, the pictures are stored in multiple directories. The SCORM standard requires locating the pictures in one directory. This also requires correction of the source "asset." Correction involves replacement of the appropriate links and the replacement of the required files into one directory. This process is tedious and

requires careful work with the namespace of the files. The RELOAD editor is working correctly after making these changes in the source asset.

The resulting assets (corrected manually and processed by the RELOAD too) were tested in the ADL Sample RTE1.2 environment.

Conclusions

The experience points to a great amount of work to be done before the present web-based materials (prepared by enthusiastic colleagues, teachers) will be transformed into SCORM compatible courses. These experiments identified only several of the required corrections. The aim of the university management is to create a more efficient workflow while isolating the developer from the often complicated details of e-learning standards specifications. This requires requirements specification for developers, who generate also tests, evaluate assignments, deal with the layout and the format of the learning assets.

The compliance to the SCORM specifications will be the foundation of the competency center, which will provide consistent representation and communication of data used throughout the design, development, delivery and maintenance phases of an e-learning project. In order to identify further obstacles, we will continue towards the implementation of more complex web-based materials. At present, we are testing the transformed courses in the ADL Sample RTE1.3 environment. And finally, we recently joined the new Academic ADL (AADL) activity that aims at converting current SCOs to reflect the SCORM 2004 changes.

ACKNOWLEDGEMENT. The authors are grateful to Dr. Kateryna M. Synytsya (International Research and Training Center for Information Technologies and Systems, Kiev, Ukraine) for her valuable help in the explanation of the work of the standardization bodies.

Notes:

1 Ladislav Samuelis, "Experiences in Teaching Information Technology in Slovakian Multilingual Region," in *Proceedings from the European Open and Distance Learning Liaison Committee*, the Lisbon 2000 European Conference (Lisbon, 19-21 June 2000), pp. 100-105.

2 BSCW - Basic Support for Cooperative Work, <http://bscw.gmd.de/> (8 March 2004).

3 Cisco Networking Academy Program, <http://cisco.netacad.net/> (8 March 2004).

4 PHP is a widely-used general-purpose scripting language that is especially suited for Web development and can be embedded into HTML.

5 Java 2 Platform, Enterprise Edition, defines standard for developing component-based multitier enterprise applications.

[6] Additional information is available at the Aviation Industry CBT Committee (AICC) Web Site, <http://www.aicc.org/> (8 March 2004)

[7] IEEE Learning Technology Standards Committee, <http://ltsc.ieee.org> (18 February 2004).

[8] ISO/IEC JTC1 SC36 Home Page: Standards for Information Technology for Learning, Education, and Training <http://jtc1sc36.org> (22 March 2004).

[9] Information Society Standardization System, European Committee for Standardization, <http://www.cenorm.be/isss/lt-ws> (22 March 2004).

[10] IMS Global Learning Consortium, <http://imsglobal.org> (22 March 2004).

[11] ARIADNE Foundation for the European Knowledge Pool, <http://www.ariadne-eu.org> (18 February 2004).

[12] Judy Brown (Academic ADL Co-Lab, University of Wisconsin), "A Shared View from the Academic ADL Co-Lab," online presentation and videoconference in *International Conference on Emerging Telecommunications Applications* (Košice, Slovak Republic, 11-13 September 2003). A number of articles in this volume provide further information on the ADL initiative.

[13] See *Advanced Distributed Learning (ADL) Initiative* <http://www.adlnet.org> (18 Feb. 2004).

[14] *RELOAD: Reusable eLearning Object Authoring & Delivery*, <http://www.reload.ac.uk> (18 Feb. 2004).

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EKS: OPEN-SOURCE WEB-BASED DISTRIBUTED LEARNING TOOL

Wasana NGAOGATE

University Needs

As common requirements of a computer assisted learning system, we want a tool that is easy to use –for the teacher to organize the teaching material, and for students to learn individually or in a group. Not only for the current teaching material but also for further developments. LMS (Learning Management System) aims to develop a system that presents the teaching material in the correct form and sequence, helps students to get the proper content that meets their needs, and suggests for further steps in the learning processes.[1]

In a university, there are some faculties that provide courses serving students from different faculties. For example, a mathematics department provides mathematics courses for engineering students, computer science students, or physics students. Students from different faculties have been registered as users in the department, whereas their personal information has already been recorded in their original department.

Repeated information still occurs as long as there is no cooperation between faculties, or there is no central department such as a computer centre that takes the responsibility of maintaining students' information. Moreover, students may want to access some teaching material across the servers in different faculties. For example, engineering students want to process MatLab software on the science faculty server, computer science students want to study in-depth in electronics at physics department.

Therefore, providing the teaching material, which works on a single computer system, is not flexible in practice. A university needs infrastructure that allows servers to communicate with each other in order to share, or exchange students' information and teaching material.

The Pilot Prototype: EKS Tool

As the teaching material can be kept on heterogeneous servers, each topic in the teaching material can refer to different servers in the system and has clearly self-contained objective. A single server might be easier to manage but it involves higher risks in terms of data security. Therefore, the pilot prototype is designed to be a distributed system.

Each server in the system is independent and has either the same or different function from others. Servers are classified into two types:

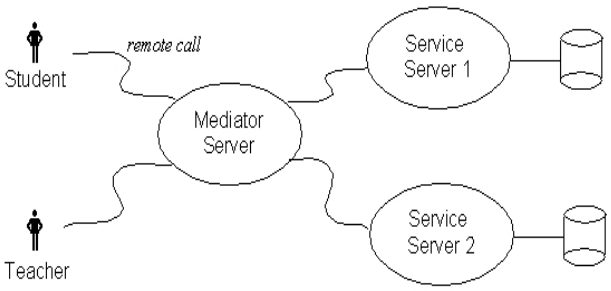
1. *Mediator server* that acts as a portal for all users and passes a service function number and parameters to service servers;
2. *Service servers* that serve as the service functions specified; they are further classified into two types:

   2.1 *Content servers* that contain teaching material and also maintain the changing of the content and keep records of events in learning process;

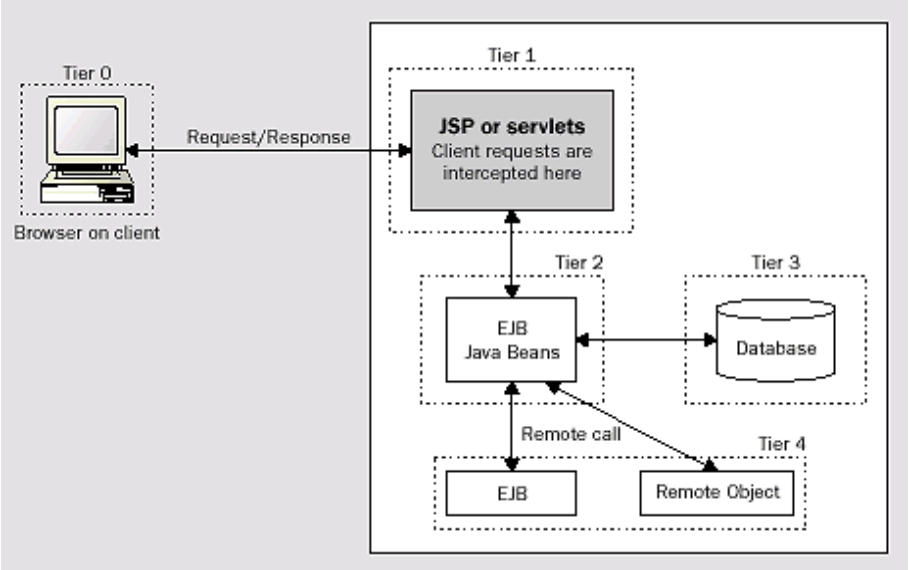
   2.2 *Query server* that processes records of events and produces useful reports for the teacher.

Because of the transport layer of the Java RMI architecture, each server can communicate to others by calling the service name that has been registered as a remote object. Once the remote object is called, it means it is invoked to serve its client. In other words, all servers in the system communicate to each other through the middle mediator or a middleware.

System Architecture



Initially, all servers have registered their services to the distributed system. Then the user interface for the teacher and students calls the mediator server remotely. Each service server has its own local database. It is a 3-tier architecture implemented by JSP, Java Beans, and MySQL as shown on the figure below.[2]

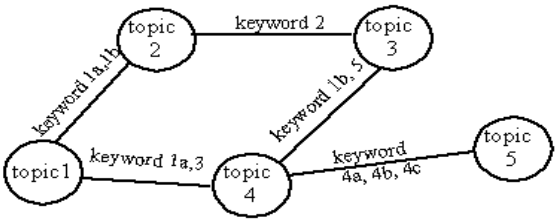


The Teaching Material

The EKS tool aims to provide a web-based tool that encourages and supports the teacher to improve and enlarge the teaching material. Therefore, we start our examination with the way teaching material is organized.

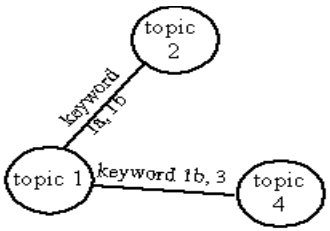
How to organize the material?

In order to organize the teaching material, if one topic is considered as the smallest unit of teaching material, one lecture might compose of one topic or several topics and each topic has clearly self-contained objective. There might be one keyword or more that link two topics together. A keyword is part of the topic.



Each topic semantically links to one or many topics by keyword. This structure allows students to select the topic in two ways:

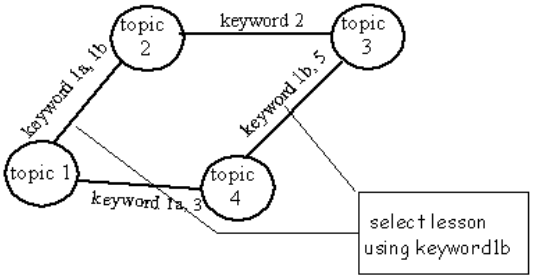
1) Selecting the topic using topic name



Topic 1 is related to topic 2 and topic 4.

If the student selects topic 1, the system will also suggest other topics which are related to topic 1; these are topic 2 and topic 4.

2) Selecting the topic using keyword



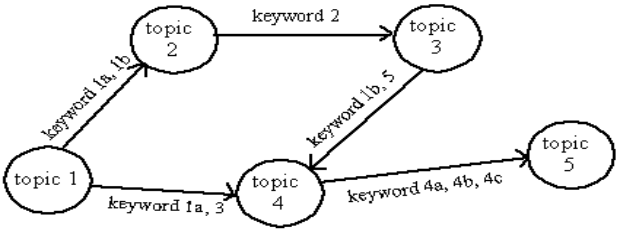
If the student selects lesson using keyword1b, as shown on the diagram, he or she will get choices: topic 1, topic 2, topic 3, and topic 4 because all of them are related to keyword1b.

The diagram can be organized according to the relationship of topics and can be reorganized again and again after the teacher has made a decision using reports, generated by the system.

Learning Dependency

Even though students are allowed to pick up any topic independently, there are some topics that have to be learned before moving to others, because they will be applied in the later topics.

A learning flow is defined by a transition diagram as in the example below.

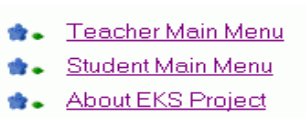


Therefore, students are suggested what topic(s) they should study before studying the topic they want. Also, the teacher is warned if the student tries to create a dependency loop.

Screen Shots

Web-based Interface

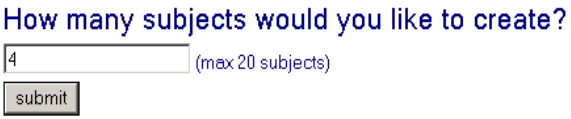
EKS contains teaching material of module CS123 Functional Programming taught by Dr. Steve Matthews, Department of Computer Science, The University of Warwick, in 2002. A module is a course that consists of several subjects. A subject consists of several topics, which are self-contained learning units. At the main page, there are menus for the teacher and the students.

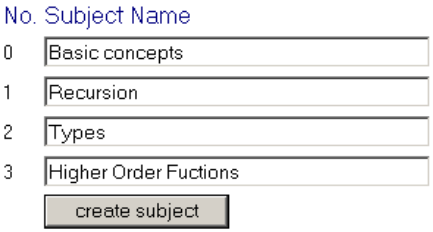


Teacher Menus

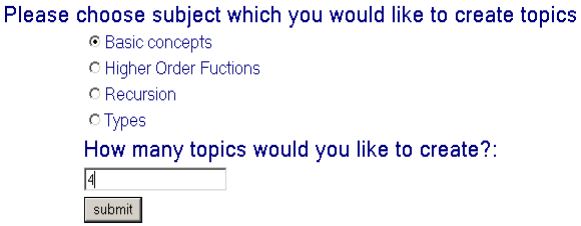
There are three main menus for the teacher.

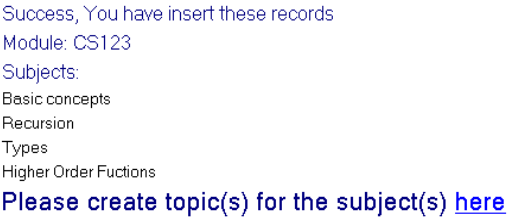
Module Management. The teacher starts to prepare the teaching material from creating the subjects and topics.



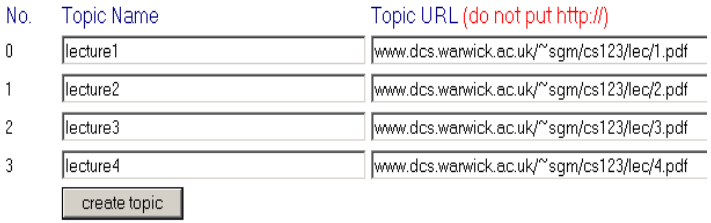


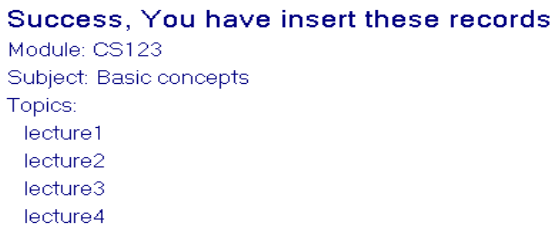
For each subject, the teacher creates topics.





The teacher inputs the URL of the topic web page.

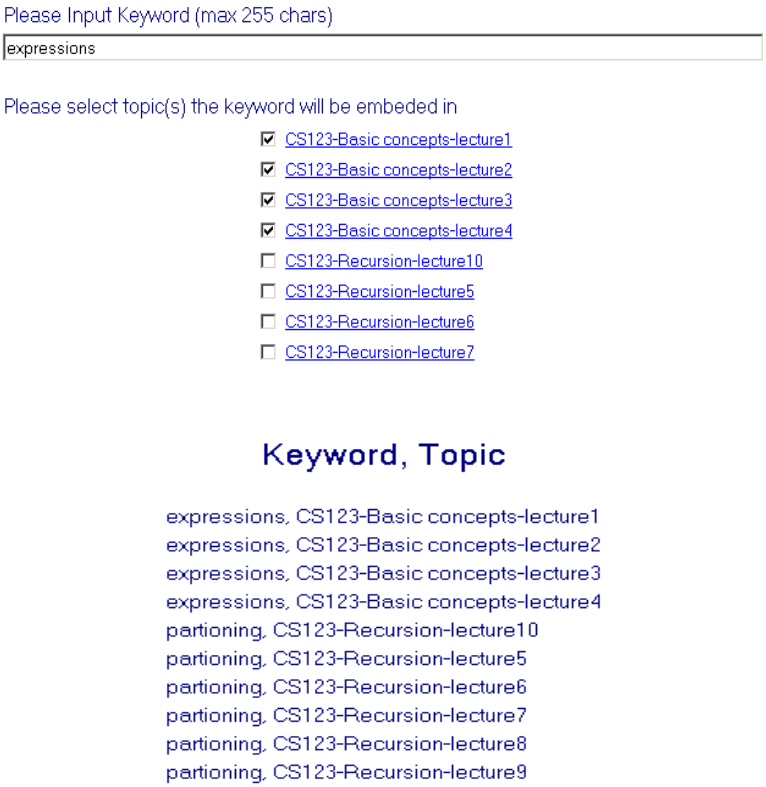




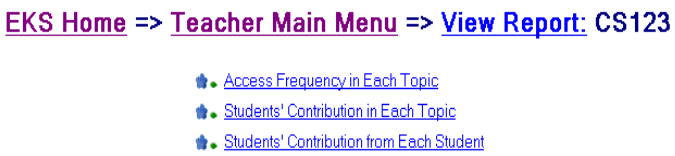
Then the teacher defines prerequisite topic(s). There is one or more prerequisite topic(s) of one particular topic.

If the teacher tries to make a loop of dependency, the system will give the message.

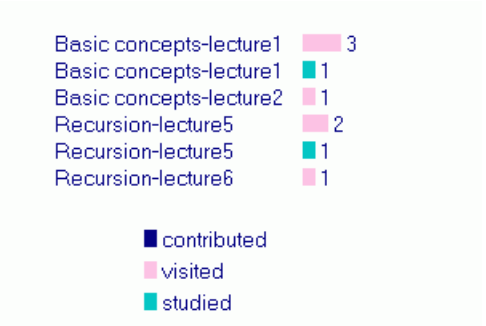
Keyword Management. The teacher creates a keyword and defines topic(s) that the keyword is embedded in.



View Reports. In the pilot prototype, the system provides reports of access frequency of each topic, students' contribution in each topic and from each student.



After managing teaching material and allowing students to study online, the teacher can view reports provided by the system.



The teacher gives points to students' contribution.

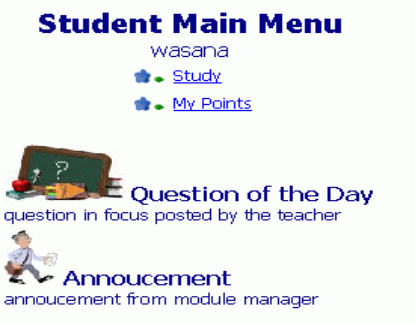
usrId	date/time	contribution text	
student	2003-11-10 13:26:56	what is relationship between expression and type?	give points
student	2003-11-10 13:33:47	I do not understand the meaning of recursion	give points
wasana	2003-11-10 13:58:36	What is types?	give points

usrId: student
contribution: I do not understand the meaning of recursion
Please give point:

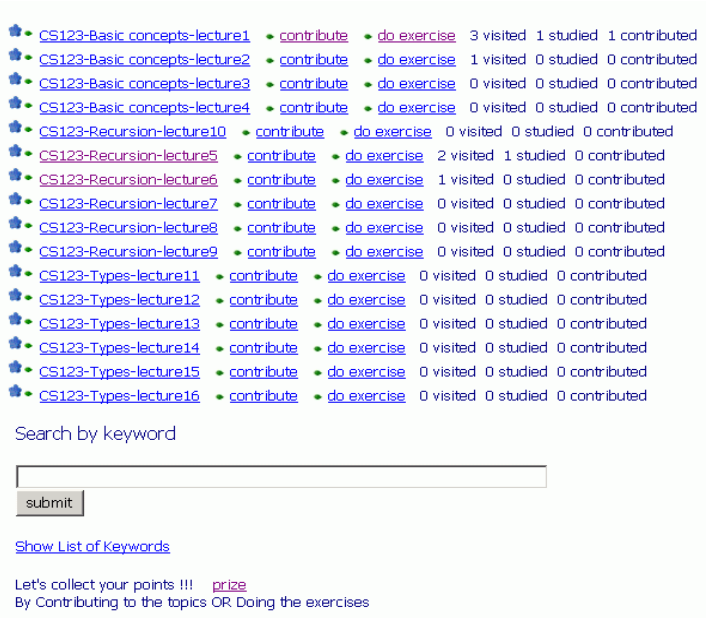
5
submit

Student Menus

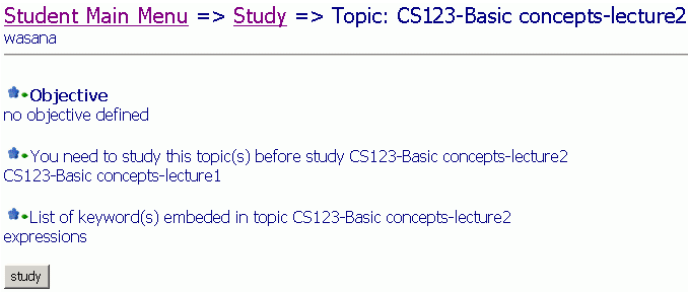
Students have to login to the system so that the system can keep track on what students have done and also that the system knows what machine students are using.



Student Study Main Page. Students can visit the page, contribute, or do exercise. If they have no idea which topic should be picked up, they can input a keyword and search for topic(s) related to the keyword.

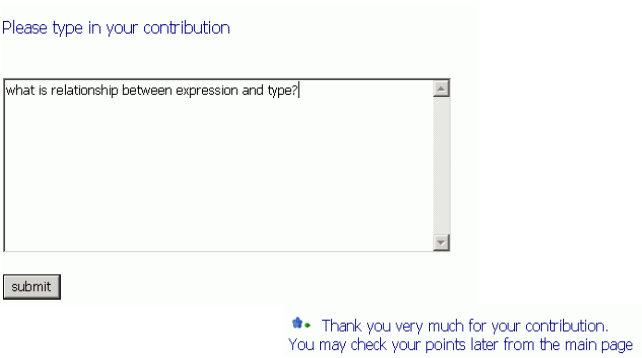


Students look at the topic page which is composed of objective, prerequisite, and keyword(s) embedded in the topic. If they are interested to study this topic, they will click the 'study' button.



At the topic page, students' activity was recorded as “visited.” After clicking the 'study' button, the activity is “studied.” All activities are recorded by the system.

Students' Contribution. If students contribute to the system, they can check their points later after the teacher has checked their contribution and has given them points.



The prize might be a bar of chocolate.

Conclusions and Further Work

EKS is a pilot prototype implemented by JSP, Java Beans, and MySQL in a distributed system that aims to demonstrate how teacher and students work together in order to improve teaching material. EKS is based on a distributed computing technology that makes the system flexible in the sense of adding more functions to the system by other developers because the EKS architecture allows that, for example, adding more service servers or even mediator servers.

The system allows students to study independently on their own pace and provides useful reports to the teacher so that he or she knows what has happened in the learning process and makes decision on how to adjust the teaching material according to students' needs.

The system needs to be further improved by adding more functions for both the teacher and students. Also, security should be further considered.

Notes:

1 For basic definitions the reader may refer to the ADL section of the *International Relations and Security Network* website, <http://www.isn.ethz.ch/elearning/adl/> (7 May 2004).

2 "The 'Dispatcher' Approach," Architecture Part 5, in Karl Avedal, et al., *Professional JSP: Using JavaServer Pages, Servlets, EJB, JNDI, JDBC, XML, XSLT, and WML* (Visualsoft UK, 2000), <http://tutorials.beginners.co.uk/read/id/239> (7 May 2004).

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LEARNING CHOICES: GENERATING AND INTEGRATING INFORMAL KNOWLEDGE

Márcia PEREIRA and Effie LAW

Introduction

New forms of information technologies (IT) are growingly made available worldwide and also increasingly being used in education and training. Specifically, IT offer unprecedented opportunities and advantages for their users: access to a vast source of information, communicating ideas effectively and efficiently with different people independent of geographical and temporal barriers, externalising thoughts in various modes of representations, to name just a few. We live in a prevalent knowledge society,[1] and rapid changes in our lives make the need for lifelong and just-in-time learning [2] evident. Not only in educational institutions, but also at the workplace, learning is ever more a necessity to keep up with the new technological changes and socio-economic demands. Within this context, it becomes ever clearer the need to form creative and sensitive professionals, who are able to effectively respond to the context of a problematic situation. Indeed, inventive thinking, digital literacy, effective communication, and high productivity are the four 21st Century skills [3] deemed essential for the personal and professional development of people from almost every walk of life.

This paper discusses the need to go beyond the traditional delivery method in education and to adopt a socio-constructivist approach on the design of a learning environment, which can help to deal with this emergent need and challenge. We propose a Learning Management System (LMS)—HyperChoice—that offers the learner a series of learning choices. This variety of choices aim at stimulating the generation and capture of the knowledge produced by learners - Informal Knowledge. The HyperChoice model is presented and its applications are discussed.

Need to go beyond traditional models of teaching

Despite the large availability of educational technologies, educators and trainers have difficulties to go beyond the traditional 'delivery' model of teaching.[4] Most

applications of these technologies impart knowledge to students, without fully exploring the Informal Knowledge that can be generated by the students during the learning process. Several so-called e-learning courses do not go beyond the publication of learning content made available in different formats.

However, the emergent needs of the contemporary society demand people not only with wider skills in different disciplines, but also with adequate awareness and sensitivity to make the most of these skills according to the situation they are in at a specific moment. One should be able to make the best use of her/his own experiences as well as of the experiences of others and apply them to solve specific problems in specific contexts, with creativity and coherence. In order to acquire this ability one has to learn in a different way, not only through ready-made content, but, more importantly, in a learning environment which supports choices in addition to individual and collaborative challenging experiences.

To foster this type of learning, it is necessary to better consider the contribution of the learner during the whole educational process. More people are becoming aware of this need. Companies, for example, are increasingly investing considerable sums in continuous professional development. They recognize that there is a type of knowledge within their institutions, which is widespread and unstructured [5] – "Informal Knowledge." This type of knowledge is a valuable resource within an organisation. Both higher education and continuous professional development (CPD) can improve learning quality by exploring and integrating Informal Knowledge.

The impact of Informal Knowledge has also been acknowledged by designers of information and communication technologies (ICT).[6] Despite their observation, the coding of tacit knowledge is still hardly explored in system design.[7] Hence, there is a need for new design concepts and solutions. Two such solutions are offered by Knowledge Management Systems (KMSs) and Learning Management Systems (LMSs). Both KMS and LMS are expected to improve the construction, collection, and sharing of Formal and Informal Knowledge. Particularly, LMSs are expected to do that with the explicit function of facilitating the learning process. They are supposed to be able to minimise insecurity problems generated by constant technological changes. Besides, LMSs have the potential to provide secure spaces where users can develop a sense of community, share ideas and resources, and learn from each other, via the interaction with content, tools, and other users.

Furthermore, the educational theories also demonstrate a clear move from the positivist view of knowledge as *deliverable* to the constructivist view of knowledge as *constructed* by learners, moving from the behaviourist to the constructivist paradigm.

Giving learners 'choice' and 'voice': HyperChoice

Having all these issues in mind, we propose the design of a Learning Management System (LMS)—HyperChoice—which meet the needs presented above: giving learners the choice of several learning possibilities via interactions with the learning content and with tutors and other learners, via several tools. HyperChoice will encourage the generation and capture of "Informal Knowledge," making it possible to store it in a repository and a Learning Content Management System (LCMS), facilitating its re-use.

HyperChoice Pedagogical Model

HyperChoice is based on the *socio-constructivist* approach, which is coherent with the use of networked learning environments,[8] favouring learner-oriented processes and collaborative learning.[9] Within this approach, it is important to provide learners with a choice of learning activities, enabling them to interact with the content in a manner suited to their individual style and needs. Moreover, it is important to provide learning activities that can be developed by the learner alone and in collaboration. That is, to support individual and social cognition.[10]

User Interaction in HyperChoice

It is important to have high quality and reliable learning content, but that is not enough. The way the learner will make use of this learning content is paramount to determine the quality of the learning process. The learner's interaction with the learning content and the learning environment has significant importance. Thus, the learning content needs to be accessed via a coherent navigational approach, and within a coherent user interaction model. The learner's interaction with the content via the use of appropriate tools in the context of different learning activities will generate Informal Knowledge (Figure 1).

Learning choices and tools

Taking into account the chosen pedagogical approach—socio-constructivist—and the need for a coherent user interaction model, we suggest a set of four distinct *learning modes* (see Table 1 for more details). These learning modes are called 'learning hub,' 'learning by doing,' 'learning by playing,' and 'learning by reflection':

- *Learning hub*: In this mode learners choose between individual and shared views. Modal tools are offered to handle learning units (LUs) or whole courses. Operating on LUs or courses, modal tools allow users to browse, trace path, annotate, flag, and rate. The Informal Knowledge obtained as a result of using the modal tools takes the form of course path, annotations,

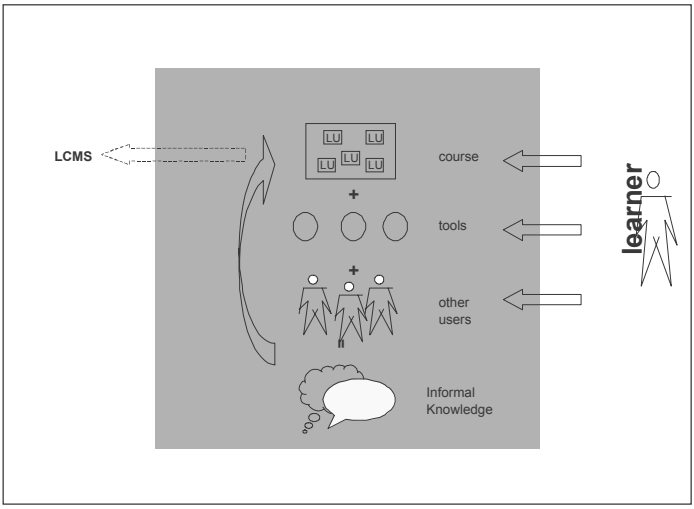

Figure 1: Learner's interactions.

ratings, and marks. The following items are necessary for the implementation of this mode: a LMS database; students' private folders; a mechanism for the generation of didactical metadata; and a course editor in the learning design module of the LMS. In the learning design module, which is closely linked to this mode, teachers will prepare typical learning sequences, define learning targets, motivational issues, embedded questions and answers, and links to problems to be solved in the 'learning by doing' mode and to games in the 'learning by playing' mode.

- *Learning by doing*: In this mode learners choose between individual and cooperative views. Modal tools are chat, web conferencing, simulation, and a whiteboard. In the whiteboard, learners have modal tools such as open/close, draw, sketch, and annotate.
- *Learning by playing*: In this mode learners choose between individual and multi-user competition and/or collaborative games. Modal tools will vary according to the specific game, but examples of typical tools are throwing dice, drawing question, checking answer, undoing, and replaying. This mode allows its users to develop reasoning processes and to reinforce learning through individual or competitive play. The user's steps and decisions are recorded and can thus be undone or replayed.
- *Learning by reflection*: In this mode learners choose between individual and shared views, having the opportunity to develop individual and social

cognition. In this mode, metacognitive skills—considered to be fundamental in any learning process [11]—can be developed. Modal tools help learners to reflect upon and plan the learning process. The modal tools are notepad, learning portfolio, concept mapping, image-based forum, and text-based forum. Individual ideas can be shared by adding them to the forums or generating public links to learning units.

Common to all of these four modes are some general functions: *login/logout, search*, *my info*, *my notes*, *site map*, *help*, and *save. My info* gives the user access to her/his private folder. *My notes* enable annotation, which can be saved in the learner's private folder, be accessed in the 'learning by reflection' mode, or be linked to learning units (LUs) in the learning path.

In the learning hub, learning units can be presented in a sequential way, from introductory sections to concluding ones as assembled by a teacher or an author. Learners can choose their own paths through the learning content and navigate through different layers of the content structure. There will be various forms of navigation, which can be grouped into two main types: one, which is text-based (e.g. expandable list of contents, alphabetical order, keyword-based search) and another, which is image-based (e.g. metaphorical representation of the knowledge domain).

Navigation possibilities shall consider *learners' preferences*. For example, those learners, who prefer having a general view of the information before choosing to go deeper into a specific part of the content, can choose to see all the *overviews* or *summaries* of a course. Alternatively, those learners who are more *visually oriented* should have the option of browsing all the images of a learning theme, looking at pictures, diagrams, simulations, and video clips. These assets will be used as search filters.

Discussion on HyperChoice use and applications

In order to fully develop HyperChoice and implement its integration with a LCMS and applying its full potential, several issues need to be further investigated. When using HyperChoice, reacting to and interacting with learning content, learners will produce their own interpretation of it. Using the modal tools, they will produce Informal Knowledge. In the context of such an interaction, a set of research questions call for detailed investigation:

- How will this Informal Knowledge be integrated?
- Will there be a database within the LMS to store these contributions?
- Should the content be revised and then be transformed into Formal Knowledge?

Table 1: HyperChoice learning modes

Mode	Content	Usage	Tool	Informal Knowledge[12]	Implementation
Learning hub	Course	Individual and shared view	Browse Trace path Annotate Flag Rate	Course path Annotations Ratings Marks	LMS database Students' private folders Didactical metadata Course editor of the Learning design module
Learning by doing	Tasks with useful links	Individual and cooperative work	Chat Web conference Simulate Whiteboard open / close draw sketch annotate	Solutions Products Sketches Drawings Annotations	LMS database Students' private folders Didactical metadata Task editor of the Learning design module
Learning by playing	Games with useful links	Individual and multi-user competition	Throw dice Draw questions Check answers Undo Replay	Game logs	LMS database Students' private folders Didactical metadata Game editor of the Learning design module
Learning by reflection	Triggers	Individual and social cognition	Notepad Learning portfolio Concept mapping Image-based forum Text-based forum	Notes Individual portfolio logs Collaborative portfolio logs Individual concept maps Collaborative concept maps Forum discussion	LMS database Students' private folders Didactical metadata Portfolio editor of the Learning design module

HyperChoice could be applied within different disciplinary contexts and ideally all the available modes and tools could be used in the deployment of a course. However, in order to allow the progressive adaptation of existing course material and the gradual acquaintance with the system, course designers should be allowed to choose which modes they want to make use of during a specific course. Learning objects stored in the LCMS can be combined into learning units (LUs), using an *assembly tool* within the LCMS itself. However, within the LMS there will be a *learning design module,* where learning designers or teachers should be able to personalise their courses and reorganise the content to be accessed by the different modes:

- Courses, composed by LUs;
- Tasks with useful links to the appropriate Lus;
- Games with useful links to the appropriate Lus; and
- Reflection triggers.

Learning objects consisting of questions and answers, for example, can be combined into a 'game template,' to generate a game to be played in the 'learning by playing' mode, while other learning objects such as case studies can be transformed into tasks to be solved in the 'learning by doing' mode.

Finally, HyperChoice represents a possibility to change the e-learning scenario, giving the user/learner more options to learn according to her/his own learning style and motivation, facilitating the learning process and making it more enjoyable. It also encourages the generation of Informal Knowledge and facilitates its capture and storage for future re-use. Obviously, such a development demands the investigation of a series of issues, such as the degree of re-use of Informal Knowledge, its selection process and classification, its possible integration within a LCMS. These and other issues are interesting questions, which need to be further explored.

Conclusion

This paper discussed the need to go beyond the traditional 'delivery model' of education and emphasised the need to offer a variety of learning choices to learners, giving them the opportunity to be more active and efficient during the learning process. The model of HyperChoice, a Learning Management System that aims at encouraging the production of informal knowledge and at facilitating its capture and re-use, was presented. Details about the HyperChoice structure, technology and tools were discussed.

HyperChoice contains four different distinct learning modes: 'learning hub,' 'learning by doing,' 'learning by playing,' and 'learning by reflection.' These modes allow learners to explore different learning alternatives and also to develop different skills.

The interactions with learning content, tutors and other fellow learners can take several forms. The results of these interactions, in the form of Informal Knowledge, can be captured and re-used. Issues necessitating closer investigations in the future research and development activities were also discussed.

Presumably, the HyperChoice LMS model could effectively improve the education and training processes by generating a learning environment that is more conducive to the formation of communities of learners, be they competitive players or reflective thinkers. These learners are sensitive to and aware of the specificities of the context in which they are embedded and also conscious of the needs and ideas of their fellow learners, being able to take creative and efficient decisions when necessary. Nonetheless, the purported benefits of the HyperChoice LMS model entail empirical verifications, which are hopefully to be implemented in the near future.

ACKNOWLEDGEMENTS. The ideas presented in this paper have been extensively discussed with colleagues at the Swiss Federal Institute of Technology and have considerably benefited from their criticism and input. We are thankful to Timo Staub (Centre for Policy Studies, ISN), Christian Schorno and Wilfried Elspass (Centre of Product Design), Sissel Guttormsen and Samuel Schluep (Institute of Hygiene and Applied Physiology).

Notes:

[1] Ron Dearing and the National Committee for Inquiry into Higher Education, *Higher Education in the Learning Society* (Secretaries of State for Education and Employment, Wales, Scotland, and Northern Ireland, 1997), <http://www.leeds.ac.uk/educol/ncihe/natrep.htm> (5 May 2004). For the response—*Higher Education for the 21st Century*—to the Dearing Report refer to <http://www.lifelonglearning.co.uk/dearing/> (5 May 2004).

[2] Laura L. Hall, "Just-in-Time Learning: Web-Based/Internet Delivered Instruction," Paper presented at *Americas Conference on Information Systems AMCIS 99* (Milwaukee, WI: 13 – 15 August 1999), <http://aisel.isworld.org/password.asp?Vpath=AMCIS/1999&PDFpath=319.pdf> (25 Feb. 2004).

[3] *The* enGauge *21st Century Skills* (North Central Regional Educational Laboratory), <http://www.ncrel.org/engauge/skills/skill21.htm> (7 May 2004).

[4] Julia Gaimster and David A. Gray, "From Transmitted Knowledge to Constructed Knowledge – e-Learning as Independent Inquiry," Paper presented at the *European Conference on Educational Research* (Lisbon: EERA, 11 - 14 September 2002).

[5] Nikos Drakos and Ross Moore, *Frodo vision and project goals* (DFKI Knowledge Management Group, 1998), <http://www.dfki.uni-kl.de/frodo/ Proposal/index.html> (7 April 2003); Andrew Wileman, *A Capital Idea* (Cambridge, MA: MIT Press, 1999); Luiz Carlos de Sá Carvalho, Mônica Esteves Rodrigues, and Benito Diaz Paret, "Tacit and Formal Knowledge and Learning in Small Business: An Exploratory Study on the Perceptions of Successful Businessmen," in *Proceedings of the 4th International Conference on Technology Policy and Innovation* (Curitiba, Brazil, 2000), <http://in3.dem.ist.utl.pt/downloads/cur2000/papers/S17P06.PDF> (5 May 2004).

[6] Eliat Aram and Dorothea Noble, "Educating prospective managers in the complexity of organizational life". *Management Learning* 30, 3 (September 1999): 321-342; Geoff Walsham, *Making a World of Difference: IT in a Global Context* (New York, NY: Wiley, 2001).

[7] Ashley D. Lloyd, Jenny Ure, R.J. Pooley, R.G. Dewar, and A. Cranmore, "Designing Enterprise Systems: Leveraging knowledge in a distributed pattern-building community," in Ricardo Gonçalves, Rajkumar Roy and A. Steiger-Garçao, eds., *Advances in Concurrent Engineering,* Proceedings of the 9th ISPE International Conference on Concurrent Engineering (Cranfield, UK, 27-31 July 2002).

[8] Márcia A. Pereira, "Designing Collaboration," Paper presented at the *European Conference on Educational Research ECER2001, Symposium on Networked Learning in Higher Education* (Lille, France, 5-8 September 2001); Márcia A. Pereira, "Pedagogical principles in web-based learning," in *Proceedings of the Telematica 2001 Web-Based Education Conference* (St. Petersburg, Russia, 18 – 21 June 2001).

[9] Lev S. Vygotsky, *Thought and Language* (Cambridge, MA: MIT Press, 1962).

[10] Márcia A. Pereira, *ArchCAL: a conceptual basis for the application of information technology into learning and teaching technical subjects in architectural education*, PhD Thesis (Sheffield: Department of Architectural Studies, University of Sheffield, 2000); Charles Crook, *Computers and the Collaborative Experience of Learning* (London: Routledge, 1996).

[11] Donald A. Schön, *The Reflective Practitioner: How Professionals Think in Action* (Aldershot, UK: Arena, 1991); John Dewey, "How we think," in Jo Ann Boydston, ed., *John Dewey: The later works, 1925-1953,* Vol. 8 (Carbondale, IL: Southern Illinois University Press, 1986), pp. 105-352.

[12] The Informal Knowledge obtained as a result of the learners' interaction with tools, via learning activities, can be linked to the course content, in an individual or collective basis.

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PLAGIARISM, CHEATING AND ACADEMIC DISHONESTY – HAVE YOU BEEN THERE?

Matthew FAWKNER and Greta KEREMIDCHIEVA

Let's Set the Scene

> "This is superior work," wrote a professor on a student's paper. It was excellent when Saint Thomas Aquinas wrote it just as it is today. Saint Thomas gets an A. You get an F.[1]

Just Reflect on This Position?

The past five years haven't been easy. Ned's studies have been intensive. He'll be glad to ditch that part-time job which has left him with little sleep, practically no energy and poor concentration that has dogged him through his law lectures for years. Without that night job Ned would never have made it through, but the money covered the cost of his studies. Ned wonders what it will be like to enjoy social occasions again free from that nagging thought of study. He has used every available minute to complete those 'damned assignments' and the never-ending readings that seem to have always been part of his law degree. It certainly hasn't been easy for him.

On top of all of his problems, living away from home has created stressors that he had not experienced before – like living in student quarters, managing a pile of washing (when did he ever last iron something?), eating regularly and just being himself. Just surviving has taken all of his wits and available 'living skills.' Thank God that Ned's final examinations are only weeks away. He reflects on the possibilities – Ned Smith, BA, LLB, DipGradLawPrac – Legal Practitioner. It all sounds very nice to him.

Lining-up in the queue to collect his final 24-hour 'take-home exam' Ned's stomach aches as he ponders whether he has prepared adequately. Finally, he collects his paper and as he scans the questions a wry smile comes to his face. He recognises a question that was part of his preparatory studies. 'Oh dear' he mutters, 'the remainder of the paper involves those time consuming and complex questions – the ones that I

have slogged through before in this type of exam.' As Ned rushes back to his room he mentally analyses his exam tactics – do the more difficult questions first and leave the easiest until last.

As the early hours of the morning rush by, Ned remembers that he hasn't eaten. About eight hours remain until 'hand-in time'. Time has got away from him. He has taken too long on the more difficult questions and all of the questions must be answered. Now to the easiest part. Suddenly, Ned is consumed by fatigue. He needs to 'put your head down' for a few hours. Four hours sleep will refresh his tired brain.

A split second after the alarm rings Ned finds that his calculations were wrong. Panic runs through his mind as he realises that he has overslept. Three hours until 'hand-in time.' Suddenly, a possible solution comes to him. He scrambles through files in his laptop. Finally a solution is at hand. Ned finds the essay on the internet that he had mentally recalled earlier. It has been written by a small-time academic from a distant overseas university. He ponders: 'Is this answer my saviour'? Who will know? Only 2¾ hours remains before 'hand-in' time. The lethargy from little sleep and no food is proving to be a powerful stimulant. The ethics of 'cheating' tugs at Ned's tied 'grey matter.' He recalls the rules on 'Academic Dishonesty' which were part of his 'Learning Contract' which he signed in first year almost five years ago. His eyes close as he dreams: "I don't have much time. Surely no one will find out? Yes, just a few small changes – after all, it is written in my style…"

Our Aim

Our aim in this essay is to discuss the domain of cheating, plagiarism and academic dishonesty and the sources of this misbehaviour. Various approaches to this behaviour will be explored so that educators and academic leaders better understand why those students who cheat and plagiarise risk their study future by choosing this unfortunate path. An attempt will be made to look at approaches to encourage and promote original cognition, quality research and academic honesty. The suggestions made here should be of benefit to the Partnership for Peace (PfP) Learning Management System (LMS) as they would be to any equivalent LMS.

Have You Been There?

Anyone who has undertaken complex tertiary studies, perhaps mixed with other demands on life, i.e. the need to work to support their studies, have all probably suffered like Ned Smith. Those of us who have studied using the luxury provided by the array of learning available on the Internet will know the plethora of information that is available. Thousands upon thousands of files all accessible through web providers such as 'Google,' 'Altavista' and 'Excite' (to name only a few) provide an

almost limitless source of information, data, figures and research. Perhaps the very fact that you cannot access any information in these computer-based web sites without making a copy adds to the temptation to cheat, or plagiarise.[2] One must also ask whether there needs to be some sort of international treaty regulation imposed on the acquisition of information from Internet sources. Are the 'self-regulatory' mechanisms suggested by McCloskey to produce doctrine on the 'Law of the Internet' sufficient to ensure that ethical standards will be maintained by Internet users? [3] We will explore this area a little later in this essay.

Apart from the Internet, almost all academic institutions are supported by libraries which are crammed with reference material – books, magazines, journals, newspapers, databases, on-line services, etc. The assembled throng of research material just goes on and on, as does the lure to use it illegally.

Academic dishonesty is not simply the pursuit of devious students. It abounds in all areas of academia. A case involving a six-month inquiry headed by a former Chief Justice of the Australian High Court has found a senior Australian university Head-of-Department guilty of serious academic misconduct. This misconduct had contravened 'research' guidelines provided by the Australian National Health and Medical Research Council and the Australian Vice-Chancellors' Committee.[4]

Is Cheating Part of Our Culture?

Starting to Learn – A Proposition

It has never been easier for a student to source information and to use it constructively to support his or her studies. Likewise, it has never been easier for a student to employ dishonest practices by cheating, or plagiarising the work of others. However, in making this statement we must ask ourselves whether we have been taught, from the very start, to be independent with our cognitive skills.[5] As children, were we capable of autonomous thought? Were we coached, or mentored to be 'independent thinkers'? Or, were we simply caught-up in the rush to learn without being taught how to achieve independent thought? As we grew into adolescents, how self-reliant were we when it came to expressing ourselves in our own natural way? Did we rely on our juvenile conditioning of mimicry, imitation and learning 'parrot-fashion' (indeed, can some of us remember that far back)? Haven't we been taught to rely on the information of others and to build on that source as a reservoir for our acquired knowledge?

While the term 'plagiarism' conjures-up improper practices in our minds, recall that we were all once taught to use 'rote-learning'[6] very early-on in our lives. Our parents, as our foremost mentors, taught us as babies to 'learn by saying' or 'learn by doing'.

The events of 'acquiring, processing, storing and retrieving information' were the very basis of our early cognitive behaviour. In short, we were sub-consciously 'conditioned' to intake sensory information through the use of cognitive skills employing rhymes, visual patterns, mnemonics, and repetition. Therefore, our thinking functions and knowledge processes relied heavily on a 'schema' designed to instil 'thinking,' 'problem solving,' 'creating' and 'remembering' patterns for the remainder of our lives.

The 1968 work of Atkinson and Shiffrin concluded that the human information storage system relied on: "*...a short term memory (sometimes also referred to as a "working memory") and a long term memory*."[7] All of this formed the way in which we 'organised' and 'stored' information. Lefrancois was of the opinion that we all employed a process of 'chunking,' that is, storing related items of information in useable chunks into our short-term memory. Here, through 'conditioning', we would process the information into our long-term memory for later recall and use.[8] However, when it came to children Lefrancois concluded that "…one of the most serious limitations on a young child's ability to understand and solve problems is simply a limitation in the number of items that can be retained in working memory for immediate availability."[9]

The point that we make here is that we, as adults, were conditioned as children to use special skills such as 'learning to learn'[10] which was later subconsciously adapted in our adult lives as 'metacognition'[11] and subsequently translated into our 'metamemory.'[12] In other words, our early cognitive strategies depended largely on the notions of repetition, visual imagery, rehearsal and mnemonics, all designed to implant the 'information of others' into our very receptive, juvenile brains. If this is the case, has our cognitive skill been conditioned to use the work of others as the basis of our learning patterns? Do we, as adults, subconsciously rely on the learning strategies that we absorbed as children? If this is the case, then are we 'prepared to fail' in our metacognition from a plagiarism point-of-view?

Later, as we developed with age, the pressures and competitiveness imbued by educational systems caused our coping capacities to overload. Good exam results became imperative. We just had to attain high standards. For some of us the stakes become so high that if we were to progress into our wanted field of endeavour, the need for success became intense. One must ask whether this demand placed a further strain on our sub-conscious desire for success.

For some, the anxiety and stress caused by study became too much. Those caught-up in deceptive practice became entrapped in a strategy of academic craftiness with the underlying hope that no one would become aware of their actions. Unknowingly, the

plight of these individuals was that often the additional work taken to become a successful plagiarist was normally far beyond that required for honest study.

Co-operative Learning

Today, the contemporary approach to learning utilises many co-operative techniques. The 'buddy system' is one; 'small team exercises' is another. Here, we are encouraged to work together to find solutions and answers to many different quests. We balanced our ideas, we discussed likely effects and we rationalised required results. Our applied effort was known by the term 'synergism.' This exertion, according to Gordon *et al.*, was "… the co-operative action of two or more people working together to accomplish more than they would working separately. It applies the possibility of accomplishing tasks that could not have been done by two people working alone."[13]

Let's take 'synergism' further. In many successful businesses, 'group related norms,' or 'teamwork,' is considered preferable to individual, or 'self-orientated' effort. Take any organisational structure where teamwork is important. For example, the military and security forces all depend upon a standard of behaviour that encourages group interaction. Many other areas of endeavour rely on group practice.

If we are so reliant in our daily practice on group methods, then shouldn't we examine co-operative evaluation processes, rather than the authoritarian regime of individual testing? For instance, if you were required to undergo a complex medical operation wouldn't you feel better if you knew that a team of surgeons were going to work on you rather than just one, lone, surgeon? This may be an extreme example, but it does relate to the very practice that we all seem to perform every day – co-operative learning and performance. The very same effort that our mothers and fathers urged us to adopt as babies, i.e. group cognition.

Knowing this and understanding that humans are gregarious by nature, should we not facilitate learning (and hence formative assessment systems) that relies on designing collaborative norms and evaluating participatory competencies? Is the somewhat 'autocratic' practice of individual summative testing ambiguous in the majority of our social and workplace circumstances? Let's tie this into the subject of this essay – 'cheating and plagiarism.'

Cultural Patterns

In an investigation conducted by the Australian Press Council into claims by the Australian Chinese Forum that a press report on student plagiarism had been biased, an analysis of the reasons behind the alleged plagiarism led to a number of conclusions [14]:

- … "the slavish respect for authority" in some of the student's countries of origin which was said to encourage a "repetition of approved solutions" in academic work;
- limited library resources in these countries, so that "one way of coping is to duplicate what the teachers say";
- English language difficulties amongst students which prompt the "development of groups around a marginally more competent linguist whose lectures notes are shared by all"; and
- Student's fear of failure, especially when their families have made great sacrifices to send them to Australia.

Those ethical norms adopted by wealthy families are also no bar to incidents involving cheating. In August, 2002 the son of the Prime Minister of Thailand was accused of cheating in university exams, reports Ananova [15]:

> The son of Thailand's prime minister has been caught cheating during a university exam and faces severe disciplinary punishment. Panthongthae Shinawatra, 22, enrolled at Bangkok's Ramkhamhaeng University, was found using "cheat sheets" he had hidden in his pockets, Wiwatchai Kulamat, (sic) according to an examiner. He is the only son of Prime Minister Thaksin Shinawatra, a successful tycoon and the founder of Thailand's biggest telecommunications conglomerate. The prime minister (sic) has refused to comment on his son's actions. The examiner says Panthongthae was removed from the examination room and barred from taking further tests pending an investigation. If he is found guilty, he will be failed in all subjects that he has taken tests for this semester, Wiwatchai says. Panthongthae is studying for a bachelor's degree with political science as major. He became one of the richest men in Thailand after his parents transferred 73.4 million shares or a 25 percent stake in Shin Corp into his name.

Cultural Strains

The pressure to succeed is often the root cause behind student cheating. Heather Bird discovered the outcome of 'cheating' for 30 law students found-out by the University of Toronto [16]:

> Nobody probably knows this better now than the dirty 30, the University of Toronto law students who gussied up their mid-term marks in order to land prime jobs at big Bay St. firms. They've cheated themselves out of a year of school, a summer job and quite possibly a lucrative career. That seductive shortcut is going to mean a long march back for those who have the stomach to

> stick it out. While the university won't say for sure what's been happening, word has leaked out that a number of these cheaters have already been told they will face one-year suspensions for their duplicity. If they return, the deceit will be noted on their transcripts, which will expose them to their teachers. And even if they do complete their law degree, there's no guarantee they will be called to the bar because the Law Society of Upper Canada requires that candidates be "of good character." Lying, presumably, is not a quality which will stand them in good stead.

Misuse of Modern Technology

There is little doubt that the use of modern technology has aided individuals who wish to plagiarise and cheat. A report in the well respected South-East Asian newspaper 'The Straight Times' gave this account: "…students have sent questions to friends outside school by e-mail, SMS, and even by photograph using third-generation mobile phones. They receive answers the same way, or through hidden earpieces. As a preventive measure, electronic scanners will be used to stop students cheating in O-level and A-level exams by using Internet-enabled mobile phones which can receive answers through e-mail, pictures and text messages."[17]

This is not an isolated case. Further investigation into the use of the SMS messaging system revealed a report in the on-line version of the US newspaper 'The Wall Street Journal': "Twelve students were accused of cheating during an exam at the University of Maryland by receiving the answers by SMS from friends outside the classroom. They were reading off the answer keys posted on the Internet by a professor once the exam began."[18]

Using the Work of Others

Like plagiarism, the deceitful practice of cheating is part of the continuum of academic dishonesty. Within the academic sphere, cheating is normally associated with the dishonest substitution of work as one's own in exams, tests, or in assessment systems. If we were to be very truthful, we all might have been accused of this practice, at one time or another, in our younger days. If you agree with this proposition, then ask yourself this: 'Why did I do it?' Let's go back to our younger days.

The legal term *'mens rea'* deals with the 'guilty mind,' or the 'mental element' that is involved in a particular illegal act or crime. In addition, the principal convention relating to children, i.e. the United Nations 'Convention on the Rights of the Child,' specifies that: '*a child is any person below the age of 18 years*.'[19] Knowing this we must also understand that in many jurisdictions there is a presumption that any child

under the age of 14 years of age [20] is *'incapable of any culpability,'* that is, the notion of *'doli incapax'* concerns the fact that a child does not have the mental capacity to bear the weight of wrongdoing, or criminal acts. Using this argument it can then be assumed that in most cultures children do not necessarily know that substituting the work of others, or cheating, is wrong. Quite the opposite. They are often imbued with the idea that using the work of others will sustain and foster their knowledge. In other words, any learning situation in which there is a system of continued reinforcement will induce 'imitative behaviour.'[21] Is it then possible that we coach our children to be imitators and then once we believe that they have attained independent thought. We then say that they cannot replicate the work of others? Is this psychology correct?

The act of cheating has been studied by Noah and Eckstein and it is their tenet that it is so prevalent within academic institutions that: *'Cheating on important exams occurs in every country of the World'*.[22] Such wayward activity is agreed with by Professor John Croucher, an Australian academic who is also of the opinion that *'cheating in exams has become epidemic'*.[23] In a recorded interview with the Perth offices of the Australian Broadcasting Commission [24] Professor Croucher postulated that cheating has become so rife within universities that efforts to stem its practice were beyond most universities capacity to deal with it. In some areas he conceded that the very credibility of many universities was in doubt because of this practice. Like Noah and Eckstein, he is of the belief that if exams are to be genuine tests of achievement by individuals, then exams must be *'guarantees of competence'*.[25] It is difficult to refute this opinion. How do we know this? A US survey conducted on 3000 college aspirants in 1998 revealed this level of academic dishonesty [26]:

- 80 percent of the country's best students cheated to get to the tops of their classes;
- more than half the students surveyed said that they did not think that cheating was a big deal;
- 95 percent of cheaters said they were not caught;
- 40 percent cheated on a quiz or a test;
- 67 percent copied someone else's homework.

This level of academic dishonesty is confirmed by 'The Center of Academic Integrity' which has also established that: '…80% of college students admit to cheating at least once.'[27]

One must ask whether errant 'cheating' and 'plagiarism' (which we all may have been involved in during our earlier life) can remain in our subconscious thoughts to emerge later on as adults. Some evidence suggests that this may be the case. The founder of

the 'JCT Center for Business Ethics and Social Responsibility' Dr. Tamari reveals that:

> Evidence seems to be mounting that cheating on exams in schools has reached epidemic proportions in almost all Western countries. A recent issue of the READERS' DIGEST describes in gory details the extent of cheating in the United States, and other countries have similar records. It is perhaps easy to dismiss cheating on exams as a form of youthful pranks or misdemeanours. Yet even a cursory examination will show, that in actual fact the mind frame behind such cheating is a preparation for dishonesty in business. The motivation, the evaluation of the action, and the spiritual framework within which cheating on exams exists, all promote unethical behaviour by workers, by employers, and by consumers. From the seemingly small beginnings of such cheating ultimately grow the white collar criminals of the future as well as the dishonest behaviour regarding money and wealth. Any concerted effort in the field of ethical education in business must, of necessity, therefore concern itself also with this phenomenon in the school systems.[28]

Further, Jay Kelman believes that "The problem … goes beyond the personal desire for money" and that while "We have compartmentalized our lives into religious and secular components"[29] such behaviour has commenced to permeate the code of Jewish law and hence the Jewish faith:

> Unfortunately all too often (once is too often) we hear about ritually observant Jews involved in white collar crime; tax evasion, money laundering, embezzlement, and fraud. Perhaps even worse is the attitude that one so often hears in casual conversation. 'I am only an employee so I can't write off any personal expenses', or 'of course I pay my contractor in cash' thereby helping him evade his tax responsibility and thus stealing from the honest taxpayer. In an era where increased stringency has become the norm in so many ritual areas why is it that it is leniency that is the norm in our money dealings? … Our society idolizes material success. Hence even people who don't need the money to make ends meet are tempted to cheat. Even our religious institutions unwittingly contribute to this problem.[30]

However, for the cheat or plagiarist to successfully mould the work of others so that it adopts their individual style can involve additional tedious and time-consuming effort. More often than not, this additional effort far outweighs the requirement to remain upright and truthful.

What then is Plagiarism and Academic Dishonesty?

'Plagiarism' and 'Cheating' Defined

Lisa Hinchcliffe admits that "Plagiarism is a difficult concept to define. It includes a range of actions from failure to use proper citation to wholesale cheating. A student who plagiarizes may do so unintentionally, or with planful deliberation."[31]

How do we differentiate between the two acts of academic dishonesty? In making a simple comparison between cheating and plagiarism Bricault has likened *'cheating to stealing'*, whereas *'plagiarism is likened to forgery.'*[32]

Cheating

In defining the act of 'cheating,' Bricault is of the opinion that cheating is '*a fraud committed by deception; a trick, imposition, or imposture.*'[33] Likening the practice of cheating to *'the academic equivalent of urban crime,'* Bricault agrees with the 1997 Oakton Community College study which found that 'cheating' is:

> …copying or attempting to copy from another student's work, [or] using or attempting ti use unauthorised information, notes, [and] study aids.[34]

Cheating, or substituting another's work for one's own, is certainly not confined to the academic arena. It is much broader than that. This dishonest action occurs right throughout all levels of society. In many countries legislation has been enacted to prevent such practice. As we have established earlier the fraudulent act of cheating has become an art in some countries.

Consequently, the Bulgarian Copyright Law in its Administrative Regulations states the penalties:

> Art 97. Whoever, breaching the regulations in this law, publishes or disseminates products already published … will be fined … and the subject of violation will be confiscated.[35]

Plagiarism

What then is 'plagiarism'? In defining the term 'plagiarism' many differing interpretations are taken, according to the institution concerned. In general terms, 'plagiarism' is:

> The intentional submission or application of another individual's work without providing the credit, or acknowledgment for that work in order to profit or gain academic advantage.

According to Home:

> Plagiarism is the conscious manipulation of pre-existing elements in the creation of "aesthetic" work. Plagiarism is inherent in all "artistic" activity, since both pictorial and literary "arts" function with an inherited language, even when their practitioners aim at overthrowing this received syntax (as happened with modernism and post-modernism).[36]

If we accept the above definitions of plagiarism, how then does it apply in practice? While there will always be many forms of plagiarism, the generally accepted examples concern students who submit work as their own which is [37]:

- A direct copy or duplication (or allowing work to be copied or duplicated) of the intellectual pursuit of another;
- The paraphrasing, or re-wording of work submitted by another in order to substitute the concept, notion or meaning of that work;
- Work that has already been submitted or presented for credit in another academic discipline or subject;
- The collusion or conspiracy to collude with others through the presentation of work in order to gain recognition or profit from such submission or presentation.

As an indication to students on how to avoid plagiarism the Indiana University Bloomington Writing Tutorial Services webpage has provided this clear, simple and effective guidance [38]:

To avoid plagiarism, you must give credit whenever you use:

- Another person's idea, opinion, or theory;
- Any facts, statistics, graphs, drawings – any pieces of information – that are not common knowledge;
- Quotations of another person's actual spoken or written words; or
- Paraphrase of another person's spoken or written words.

Plagiarism will range from the simplest substitution to the most sophisticated and subtle rearrangement of ideas and concepts. Of course plagiarists range from the dull, unwitting student to the most shrewd and skilful of individuals. Those who are devoid of any original ideas are often the smartest in rearranging the work of others. The rather sad point here is that those who fit into this category are usually those intellectually bright students who have the requisite capability to do well, but are pressured into plagiarising work because of other outside demands.

Detection of Academic Dishonesty

Oddly, the very use of computers, which is probably the primary source of information for the plagiarist, is also the plagiarists' nemesis. Sophisticated algorithmic software has been designed to assist in the detection of plagiarism. However, despite this, the fact is that only a very small percentage of plagiarised work is ever detected. There are various reasons for this, from the want to maintain high academic standards by some institutions, to the general laissez-faire displayed by lax academics and assessors. If the systems available to detect plagiarised work were more effective, the resultant discovery of academic dishonesty would be much higher, as would the consequent failure rate for those who are involved with this dishonest practice.

Perhaps the easiest plagiarised work to detect is that work which is copied or reproduced directly from a known source 'word-for-word' without quotation marks and without acknowledgment. Such word-for-word copying is usually quite obvious. Either the standard of the work is far beyond the student's intellectual capacity, or the style, grammatical usage or academic character far outweighs the student's past standards. Despite this, it may also be that the student is not cheating, but is simply unaware of how to correctly acknowledge sourced information.

More subtle plagiarism commences with the re-paraphrased work of others. Here, a student may simply rearrange words and phrases in a text, again without acknowledgement to provide the same conceptual idea produced by the original writer.

Further subtlety occurs when a student may acknowledge a source, but in doing so that student has never actually sourced the information from the original book, article, etc. Again, this may be blatant plagiarism, or it may simply be that the student is unaware how to acknowledge secondary sources. Often it can be detected through minor errors in punctuation or citation which are copied from the secondary source.

The most subtle and difficult to detect work is where a student uses the structure or argument of a source, again without acknowledgment but with the idea to indicate original reasoning as one's own.

A Policy on Academic Dishonesty

The University Council of the highly respected University of Melbourne has instituted this policy in respect to academic dishonesty and plagiarism:

> …that cheating by students in any form is not permitted, and that work submitted for assessment purposes must be the independent work of the

> student concerned (or, where joint work is permitted, of the students concerned).[39]

Similarly, the very notion of academic dishonesty is viewed by the conservative Canadian 'Queens University' as being a most serious academic offence. In 'Academic Regulation 26a' their view of academic dishonesty is:

> All forms of academic dishonesty are considered serious offenses within the University community and a student who commits such an offense runs the risk of a range of sanctions including a failure in the course or a requirement to withdraw from the University. Academic dishonesty includes plagiarism as well as any deliberate attempt to gain unfair advantage academically for oneself or others. Dishonest practices include fabrication of data, cheating, or the uttering of false statements related to academic work by a student. Plagiarism means presenting work done (in whole or in part) by someone else as if it were one's own. Plagiarism should be distinguished from co-operation and collaboration. Often, students may be permitted or expected to work on assignments collectively or separately. This is not a problem so long as it is clearly understood whose work is being presented, for example, by way of formal acknowledgment or by footnoting.[40]

Academic Accountability

Following substantial allegations of plagiarism committed within the University of Newcastle, Australia, both the Chancellor and Vice-Chancellor are set to resign after an incriminating report submitted by the St. James Ethics Centre.[41] The critical St. James Report commissioned by the university to investigate allegations of plagiarism looked at how the university handled four separate cases involving:

> …16 overseas students from Institut WIRA in Malaysia who allegedly copied material from the Internet; a senior academic who allegedly failed to credit one of his honours students when applying for a research grant; and honours student who allegedly plagiarised two other honours students from the same school; and a professor who allegedly plagiarised her own Masters degree and the work of others in a PhD.[42]

The university's governing council, responding to the St. James Centre's report acknowledged that it *'lacked an ethical foundation'* for its plagiarism policies, that its policies had been *'applied with a lack of consistency'* and that some 35 new initiatives were required in *'…developing new and consistent guidelines across the university'*.[43] Clearly, the two highest university executives had shown that they were responsible and accountable for the actions of their subordinates and the failure by

their staff to institute satisfactory policy guidelines on the matter of plagiarism and academic dishonesty.[44]

Academic Dishonesty and the Cyberspace

The 'World Wide Net'

The manner in which the World has embraced the Internet is astounding. In little more than one decade, e-mail and the Internet have become a preferred source of communication, contact, interaction, exploration, research and study source. Everyday, those who have the privilege of using the Internet will form part of the 'virtual community' – a community which stretches throughout the globe via the 'World Wide Web.' As Ryan has observed:

> Before the World was linked by the Internet, hard-to-detect plagiarism required ingenuity and skill. But today, with the click of a mouse, even technologically inept students have access to vast information resources in cyberspace without having to leave the comfort of their dorm rooms.[45]

One Commercial Solution

One of many available Internet-based approaches to counter cheating and plagiarism is taken by 'Turnitin.com' who believes that *'pre-emptive education is the best means for preventing plagiarism.'*[46] According to Turnitin.com, their research "… is designed to help educators and students develop a better understanding of the complex issues surrounding plagiarism in the information age, and to teach the planning, organizational, and citation skills essential for producing quality writing and research."[47]

Unfortunately, these solutions come at a price. No evaluation has been made of the worth of Turnitin.com. It is further recognised that like most other similar Internet-based organisations, answers to specific problems like cheating and plagiarism will almost inevitably require a financial response from either the individual or the academic institution.

Visit 'Schoolsucks.com'

In discussing novel approaches to plagiarism Emeritus Professor Bruce Leland of Western Illinois University provides a humorous anecdote concerning an on-line web-based organisation which, although it suggests that it is '100% against plagiarism,' is an open web-site *'repository for plagiarizable* (sic) *papers'* available to students.[48] Leland says:

> In June 1996 a message was emailed to fraternity and sorority chapters across the country advertising a new electronic repository for downloadable college papers. The site was called schoolsucks.com and featured the slogan "Download your Workload." Members of the Alliance for Computers and Writing (ACW) listserve list fumed and argued about plagiarism in general and schoolsucks.com in particular. Kenny Sahr, the author of the site, joined the discussion for a while, defending his work and adding a page for professors to his site, challenging them to join in the fight against plagiarism.[49]

Access to Schoolsucks.com [50] does indeed show that it uses the slogan *'Download your Workload'* in order for you to gain entry to its web- site. Once there, a user must hit a tab labelled *'I hereby agree that School Sucks'* in order to progress. On entering this site, an almost unlimited supply of material can be found on a vast array of subjects. The catch is of course that only few students could ever take advantage of this due to the hefty cost that is put against the material.[51]

Copyright

The rather 'ticklish' issue of copyright needs to be briefly examined if we consider plagiarism. While every nation exercises control over its sovereignty and territory, the international mechanisms which 'control the Cyberspace' are few in number.[52] This of course raises issues concerning 'copyright.' As Ginsburg points out:

> The key feature of the GII (Global Information Infrastructure) is its ability to render works of authorship pervasively and simultaneously accessible throughout the world. The principle of territoriality becomes problematic if it means that posting a work on the GII calls into play the laws of every country in which the work may be received when … these laws may differ substantively.[53]

While almost all instances of plagiarism breach the very notion of 'copyright'[54] it should be understood that copyright does not protect ideas, or information, rather, it protects the way in which an idea, or information is expressed in a material form.[55] The Bulgarian Law of Copyright in its first chapter states under the title '*Subject of the law*':

> Article 1. This law regulates the relations connected with the creation and dissemination of products of literature, art and science.'
>
> Article 2 'Copyright over products of literature, art and science comes into force for the author with the creation of the product.[56]

The well respected Australian copyright lawyer Nick Dilanchian also says this:

> To understand the legal boundary between the lawful use and plagiarism it is best to start by considering the components of the "form of expression." … Wholesale copying does not pay. But even partial copying has its dangers. You might delete obviously original aspects of a source of work, change the wording of its sentences and rearrange its paragraphs. But considerable changes that have to be made to wipe out all evidence. In lots of cases breach has been found where remaining trace elements have revealed a plagiarist ancestry.[57]

But given that snippets of concepts, ideas and notions will always remain secreted in an individual's short and/or long term memory, is it not possible that some element of another's original idea will almost always emerge by recall? Dilanchian agrees somewhat by saying that "*...the point is that in copyright the difference between permitted free use and theft is a question of degree.*"[58] But in approaching the dilemma from a writer's viewpoint, Johnson and Post take this approach:

> …even in the "real world" … the author's primary reward has more to do with acceptance in a community and the accumulation of reputational capital through wide dissemination than it does with the licensing and sale of individual copies of works.[59]

While the initial explosion of the Internet was largely without regulation or control, that position is changing.[60] Putting the international law of 'Comity'[61] aside, a new area of legal precedent is commencing to emerge as jurisdictional issues arise from breaches of national laws on the Internet. As Fitzgerald suggests in his coverage of the case *Dow Jones & Company Inc. v Gutnick* [62] Cyberspace '*...is the epitome of the transnational.*'[63] Here, defamatory material which was created in New York and uploaded to a server in New Jersey was available for access on the on-line website of 'The Wall Street Journal' newspaper (a subsidiary of Dow Jones).[64] It was subsequently found proven that an Australian citizen had been defamed in the Wall Street Journal article as the defamatory materiel could be accessed over the Internet in Melbourne, Australia. The result of this case is that the Internet may not be an open source of materiel as some people think. Certainly, with the matter of defamation, the *Gutnick* case has shown that individuals may be subject to national jurisdiction if they breach local laws and practices.[65]

The underlying issue is of course the very fact that Cyberspace has made the opportunity to cheat and plagiarise much more easily because information is readily accessible. If one is to follow some sort of 'checklist' on this issue, the guidance given by Dilanchian is worth repeating:

1. Is there copyright in the work being copied?

2. Is an expression of an idea being copied, not just an idea?
3. Is a substantial part being copied?
4. Is one of the exclusive rights of the copyright owner involved?
5. Is there a defence for copying – fair dealing, an express or implied licence, giving professional legal advice, judicial proceedings, parliamentary library copying, or other defence? [66]

Countering the Problem of Academic Dishonesty

As with any misconduct which involves breaches of academic policy and rules, clear remedies and guidelines need to be instituted in order to reduce the likelihood of cheating and plagiarism. Few will ever argue that such malpractice will ever be stamped out - such idealism cannot be replicated in today's modern society. Noah and Eckstein have identified *four* '*major approaches to the task of countering academic misconduct.*'[67] These are:

1. Reducing incentives for fraud;
2. Reducing opportunities for fraud and maximizing the probability of detection;
3. Defining and publicizing the limits of acceptable conduct and clarifying, advertising and reinforcing sanctions;
4. Building an academic community that regards cheating, plagiarism and the like as simply unthinkable.

Using the guidance given by Noah and Eckstein, we will reduce the above approaches to three brief proposals to counter cheating and plagiarism. These are: 'Reduce the Need,' 'Provide Alternatives' and 'Lead By Example.' Each will be examined in turn.

Reducing the Need

The continued upward spiral towards perfection has required both students and academic institutions to pursue academic egoism. Can either party sustain this rush? Is it necessary that every student achieve 99.9 percent in order to be admitted to a higher academic institution? Must academic institutions continually embellish their standards so that they can compete for government based educational grants? Who is at fault here? Is it those who set the standards? Surely it must be. Have educators lost sight of normalcy? What now is average? Is average acceptable?

The point here is that this increase in academic standards forces pressure on students to do well – they must succeed. No one wants to fail. Academia has created a 'scared cow.' While we must accept that competition is healthy, have we gone too far in

expecting our students to reach almost unattainable heights? Surely this must have a direct correlation on student cheating and plagiarism. Noah and Eckstein think so. They claim that "…inducements to cheat and cut corners are strong, for not only are the potential rewards of doing well great, the penalties for failure are severe. Any successful program to reduce misconduct needs to tackle the prevalence and intensity of competition – no easy task in a society suffused with the spirit of competition."[68]

Is it then possible that some academic institutions quietly condone academic misconduct in order to achieve these spiralling standards? After all, brainpower is still brainpower – it has been that way for centuries!

One final point on 'reducing the need' is that students in most Western academic institutions are forced to pay huge fees for their studies. This in effect is a 'contract for learning' between a student and an academic institution so that a student achieves a predetermined outcome. When a student fails, one must ask whether it was the student who failed, or the teacher/ instructor/ professor who failed to get that student to the required knowledge level to pass the test or exam in the first place. While the study burden will always be with the student, it must be accepted that those who are responsible for imparting knowledge on that student must share part of that study burden. Our point here is that it is no longer satisfactory for teachers, lecturers, professors, etc. to simply rely on dull, boring and lifeless modes to impart learning. Surely, with the vast array of 'pedagogical'[69] and 'andragogical'[70] methods of instruction that are available today, student instructional material must be of the highest standard which reflects all contemporary notions of learning. Academic institutions also must evaluate instruction. Quite often insufficient notice is taken of 'bottom-up feedback,' that is, feedback provided by students themselves. After all, who is now paying for their learning?

Provide Alternatives

From our earlier discussion it must be evident that students have a greater fear of failing, than they do of getting caught for academic misconduct. Social and even family pressures exist. Even though the penalty for cheating and plagiarism is drummed into students early on in their learning, it still exists. Why? Many teachers, who consider themselves to 'be of the old breed,' will tell you that the attention to grammar and writing skills has declined in recent decades (in favour of other aesthetic subjects). Their view may very well be correct. Have we lost the skill to demonstrate those most important 'writing skills' on our high school students? Are they adequately prepared before they reach university standard? Just think of those students with poor English language skills, or those who use English as a second language. Did the university that you attended have a special department to assist these students? If not, why not?

No academic with lecturing responsibilities can assume that first year students under their control will be aware how to correctly use citations and to acknowledge another person's work.[71] Certainly every academic institution that wishes to maintain a high level of academic integrity will need to establish specific style guides for their students. If nothing else, such style guides will lay down writing standards and guidelines to be adopted by both students and the academic staff themselves.

One other alternative to reduce the likelihood of cheating and plagiarism concerns the issuing of 'Learning Contracts.' In effect, a learning contract is "… an agreement negotiated between a learner and a staff supervisor to ensure that certain activities will be undertaken in order to achieve a learning goal and that specific evidence will be produced to demonstrate that the goal has been achieved."[72]

Such learning contracts would clearly delineate a student's responsibility in respect to academic honesty. By formulating such a contractual arrangement, a student would not only be aware of his/her responsibilities, but also understand that if he/she transgressed and perpetrated academic dishonesty, then certain disciplinary action may result.

In respect to exams, while every attempt must be made to assist students to prepare for exams (such as trial exams, past papers, exam blueprints, etc.), tests and exams should be set as closely as possible to contemporary 'workplace' specifications. For example, 'open book exams' suit disciplines where students would use reference material in their chosen careers (this follows on from the adage *'never commit to memory anything that you can read in a book'*). Such contemporary notions reduce the likelihood of cheating as students know that they can rely on a source of information, providing they have the skills and mastery to find it and apply it.

Teaching and therefore exams should be set to evaluate student knowledge at the higher end of Blooms Taxonomy of Learning.[73] Tests and exams are, in effect, measuring instruments, and not only should they be competency based in design, but they should reflect workplace practice. Further, tests and exams must have 'face and content validity,' that is, they must measure 'what they are designed to measure' and 'what they are purported to measure.'[74] How often have you come across questions in tests and exams which simply can't be answered?

Lastly, recall the pressure that you were under when you had to 'cram' for exams which were designed to be 'memory tests,' rather than tests of skill, or mastery. Did this place undue pressure on you? Did this pressure ever cause you to consider cheating?

Lead by Example

The notion here is that those given the responsibility to teach/ instruct/ tutor students should 'lead by example' and set the acceptable standards in all matters relating to academic honesty. Not only should guidelines be provided which show students how to correctly acknowledge the work of others and how to use citations in written work, but example papers must form part of those guidelines. Given that all academics (certainly those within a university setting) are expected to publish a certain quota of articles, papers and books in their subject area, these writings (which must reflect accepted academic guidelines) should be passed to all students as examples of 'approved work.'

Naturally, students need to be mentored and tutored throughout their studies to ensure that they rise to, and maintain the required standard. This, when coupled with the notion of 'learning contracts,' should set the accepted criterion for academic honesty within any academic institution.

Finally, those responsible for the formulation of academic policy concerning cheating, plagiarism and academic dishonesty must be accountable to their governing boards should they fail to ensure that proper policies exist within their institution. Like both the Chancellor and Vice-Chancellor of the University of Newcastle, Australia, they must be fully accountable to their governing superiors and their actions (or lack thereof), be totally transparent in the event that their academic management and leadership is found wanting.

Conclusion

The problem of cheating and plagiarism plainly exists. It is present not only in the academic sphere, but also in every circle of society where students, institutional staff and other persons are challenged with high-stake tests, examinations and career betterment. Often, severe competition places these individuals under pressure to succeed. The option, that some resort to, is cheating, plagiarism and academic dishonesty.

Faced with the fear of failure, in order to sustain their present or future status, some individuals are tempted by the abundance of source materials such as those available on the Internet. Here free access and the temptation to copy information provide a ready temptation for some. In addition, the likelihood of being detected and subsequently punished is remote.

Where academic study involves distance learning the appeal to use the work of others is even greater due to the physical remoteness between the student and the instructor, or tutor. One preventive strategy and hence an aid to credibility is that assessment in

distance learning courses should be conducted under residential conditions where the students are required to meet their assessment criteria under controlled conditions such as in the physical presence of their instructor, where they must answer questions about their study or research, or to comment or defend their written dissertations or presentations. Although these physical requirements are not always easy to administer, if a distance learning course does deliver some form of 'recognition of learning,' then the assessment practices used must be credible and capable of being defended against accusations of cheating and academic dishonesty.

To prevent cheating, plagiarism and academic dishonesty, it is important that students be made aware that this misbehaviour is a serious breach of academic honesty. Every worthwhile academic institution must elaborate an institutional policy on academic dishonesty, including clear guidelines on cheating and plagiarism and the correct academic procedures to acknowledge sourced information. Some of the measures discussed to counter the problem of academic dishonesty should be considered by educators and institutional leaders in order to promote quality research and cognition and thereby reduce the likelihood of academic dishonesty.

Notes:

1. Gregory S. Blimling and Alfred S. Alschuler, "Curbing Epidemic Cheating Through Systemic Change," *College Teaching* 43, 4 (1995): 123-126.
2. David R. Johnson and David G. Post, "Law and Borders--The Rise of Law in Cyber-space," *Stanford Law Review* 48 (1996): 1367, <http://www.cli.org/X0025_ LBFIN. html> (27 January 2004).
3. See *Internet Self-Regulation*, <http://www.endispute.co.uk/cliff/israem.htm> (27 January 2004), and the extract of Matthew J. McCloskey, "Introduction to Bibliography of Internet Self-Regulation" (1998).
4. Gerard Noonan and Matthew Thompson, "Professor Guilty of Misconduct," *The Sydney Morning Herald* (24 December 2003), <http://www.smh.com.au/articles/2003/12/23/ 1071941728753.html?from=storyrhs>.
5. 'Cognition' means 'thinking about thinking.'
6. 'Rote learning' is repetitive learning, i.e. learning where our short-term memories were continually reinforced until we could flawlessly recite facts or figures (but did we know, or understand what we were regurgitating?)
7. Richard C. Atkinson and Richard M. Shiffrin, "Human Memory: A Proposed System and Its Control Processes," in *The Psychology of Learning and Motivation*, vol. 2, ed. Kenneth W. Spence and Janet T. Spence (New York: Academic Press, 1968), pp. 89-195.
8. Guy R. Lefrancois, *Psychology for Teaching*, Seventh edition (Belmont: Wadsworth Publishing Company, 1991), p. 63.

9. Lefrancois, *Psychology for Teaching*, p. 64.
10. Lefrancois, *Psychology for Teaching*, p. 69.
11. 'Metacognition' refers to 'knowing about knowing.'
12. 'Metamemory' refers to 'knowing about remembering.'
13. Judith R. Gordon, R. Wayne Mondy, Arthur Shaplin and Shane R. Premeaux, *Management and Organizational Behavior* (Boston: Allyn and Bacon, 1990), p. 521.
14. Australian Press Council *Adjudication No.628* <http://www.austlii.edu.au/cgi-bin/disp.pl/au/other/apc/628.html?query=%7e+plagiarism> (27 January 2004).
15. See the report by Ananova, *Thai PM's son caught cheating in exams* <http://www.ananova.com/news/story/sm_659940.html?menu=> (27 January, 2004).
16. Heather Bird, "The Law Won: Cheating on Exams Isn't a Mistake, It's a Character Flaw," *Toronto Sun* (3 May 2001), <http://www.geocities.com/CapitolHill/2381/ Lawschoolscase/cheatingscanfaltosun.html> (27 January 2004).
17. "Cheating on Exams with Picture Phones," *Straight Times* (30 June 2003), <http://www.textually.org/picturephoning/archives/000982.htm> (27 January 2004).
18. "Maryland University students caught cheating by SMS," *The Wall Street Journal* (22 February 2003), Available at <http://www.textually.org/textually/archives/000026.htm> (28 January 2004).
19. See Article 1, *Convention on the Rights of the Child* (UN, 1989), <http://www.unhchr.ch/html/menu3/b/k2crc.htm> (12 April 2004).
20. In other jurisdiction this age has been lowered to 10 years of age, e.g. the State of New South Wales.
21. Lefrancois, *Psychology for Teaching*, p. 186.
22. Harold J. Noah and Max A. Eckstein, *Fraud and Education – The Worm in the Apple* (Lanham, MD: Rowman and Littlefield, 2001), p. 25.
23. John S. Croucher, *Exam Scams: Best Cheating Stories and Excuses from Around the World* (London: Allen and Unwin, 1997); Noah and Eckstein, Fraud and Education, p. 33.
24. *ABC Perth*, <http://www.abc.net.au/perth/stories/s411658.htm> (27 January 2004).
25. Noah and Eckstein, *Fraud and Education*, p. 21.
26. "Cheating and Succeeding: Record Numbers of Top High School Students Take Ethical Shortcut," *29th Annual Survey of High Achievers* (1998), in Noah and Eckstein, *Fraud and Education*, p. 29.
27. See http://www.turnitin.com.
28. Meir Tamari, *All I Need to Know about Business Dishonesty I Learned at School* (Jerusalem: Business Ethics Center), <http://www.besr.org/library/dishonesty.html> (12 April 2004).
29. Rabbi Jay Kelman, *Why People Cheat*, <http://www.besr.org/library/whypeoplecheat.html> (14 April 2004).
30. Kelman, *Why People Cheat*.
31. Lisa Hinchcliffe, *Cut-and-Paste Plagiarism: Preventing, Detecting and Tracking Online Plagiarism* (May 1998), <http://alexia.lis.uiuc.edu/~janicke/plagiary.htm> (14 April 2004).

32. Dennis Bricault, *Legal Aspects of Academic Dishonesty: Policies, Perceptions, and Realities* (March 1998), <http://campus.northpark.edu/esl/dishnst.html> (28 April 2004).
33. *The New Webster Dictionary* (1971), p. 140.
34. Bricault, *Legal Aspects of Academic Dishonesty*, p. 2.
35. Bulgarian Copyright Law, 2001.
36. Stewart Home, *Neoism, Plagiarism and Praxis* (Edinburgh: AK Press, 1995), p. 51.
37. *Avoiding Plagiarism*, Virtual Writing Center, <http://matcmadison.edu/is/writingcenter/plagarism.htm> (15 November 2003).
38. *Plagiarism: What It is and How to Recognize and Avoid It*, Indiana University Bloomington Writing Tutorial Services, <http://www.indiana.edu/~wts/wts/plagiarism.html> (15 November 2003).
39. *University Policy on Academic Honesty and Plagiarism*, University of Melbourne, <http://www.services.unimelb.edu.au/plagiarism/policy.html>; See also Regulation 12.2.10, <http://www.unimelb.edu.au/ExecServ/Statutes/r12210r1.htm> (28 April 2004).
40. Excerpt from Queen's University *Academic Regulation 26a* in the 1999-2000 Arts and Science Calendar, <http://qsilver.queensu.ca/~hist121/plagaris.htm> (27 January, 2004).
41. I. Kirkwood, "Chiefs Set to Go," *Newcastle and Hunter Herald* (Saturday, 14 February 2004), p. 1 & p. 4.
42. Kirkwood, "Chiefs Set to Go."
43. Kirkwood, "Chiefs Set to Go."
44. At the time of submission of this essay, the report by the St. James Ethics Centre had not been made public.
45. Julie J.C.H. Ryan, "Student Plagiarism in an On-line World," *ASEE Prism Magazine* (December 1998), <http://www.asee.org/prism/december/html/student_plagiarism_in_an_onlin.htm> (28 April 2004).
46. 'Turnitin.com' claims to be '…the world's leading online plagiarism prevention resource…' which offers '…innovative online learning products like Digital Portfolio and Peer Review.', <http://plagiarism.org/education.html> (27 January 2004).
47. <http://plagiarism.org/education.html>.
48. Bruce H. Leland, *Plagiarism and the Web*, <http://www.wiu.edu/users/mfbhl/wiu/plagiarism.htm> (29 January 2004).
49. Leland, *Plagiarism and the Web*.
50. <http://www.schoolsucks.com>
51. Access to http://www.ra-schoolsucks.com/cgi-bin/hazel-cgi/hazel.cgi?theme=schoolsucks&action=serve&item=schoolsucks/subjects.html&refid=schoolsucks will show the huge array of subjects and the cost for the material..
52. Johnson and Post, "Law and Borders."
53. Jane C. Ginsburg, "Global Use/Territorial Rights: Private International Law questions of the Global Information Infrastructure," *Journal of the Copyright Society of the USA* 42, (1995): 318, 319-320; as quoted in Johnson and Post, "Law and Borders," p. 10.
54. 'Copyright' is the intangible property which allows the copyright owner, or those authorised by the copyright owner, the exclusive right to prohibit, or to do certain acts. The rights comprised in copyright are distinct from any rights adhering in the medium in,

or upon which the relevant work or subject matter is recorded. See Peter E. Nygh, ed., *Butterworths Concise Australian Legal Dictionary* (Sydney: Butterworths, 1997), p. 91.

55. Nygh, *Butterworths Concise Australian Legal Dictionary*, p. 91.

56. *Bulgarian Copyright Law*, 2001.

57. Nicholas Dilanchian, *How Much Can You Copy*, undated, <http://www.dilanchian.com.au> (15 November 2003).

58. Dilanchian, *How Much Can You Copy*, p. 2.

59. Johnson and Post, "Law and Borders," p. 10.

60. McCloskey, "Introduction to Bibliography of Internet Self-Regulation."

61. The international law of 'Comity' concerns that body of rules developed in international law by which the courts of a State demonstrate respect for the rules, customs and laws of another State. Non-observance of comity does not give rise to strict legal consequences, however, the State affected by the non-observance may reciprocate by retracting its own courteous practices. See Nygh, *Butterworths Concise Australian Legal Dictionary*, p. 70.

62. *Dow Jones & Company Inc. v Gutnick* [2002] HCA 56 (10 December 2002).

63. Brian Fitzgerald, "Dow Jones & Co Inc v Gutnick: Negotiating 'American Legal Hegemony' in the Transnational World of Cyberspace," *Melbourne University Law Review* 21 (2003), p. 590, <http://www.austlii.edu.au/cgi-bin/disp.pl/au/journals/MULR/2003/21.html?query=%7e+dow+jones+and+gutnick> (14 April 2004).

64. *The Wall Street Journal*, <http://online.wsj.com/public/us>.

65. Fitzgerald, "Dow Jones," p. 14.

66. Dilanchian, *How Much Can You Copy*, p. 4.

67. Noah and Eckstein, *Fraud and Education*, pp. 136-141.

68. Noah and Eckstein, *Fraud and Education*.

69. 'Pedagogy' is the art and science of teaching, or education. See Nygh, *Butterworths Concise Australian Legal Dictionary*, p. 1584.

70. The notion of 'Andragogy' concerns specific needs related to 'adult learning.' See Stephen D. Brookfield, *Understanding and Facilitating Adult Learning: A Comprehensive Analysis of Principles and Effective Practices* (San Francisco, CA; Jossey Bass Publishers, 1986), pp. 121-122.

71. Noah and Eckstein, *Fraud and Education*.

72. The Teaching and Learning Centre, *Learning Contracts* (Perth: University of Western Australia, 2000).

73. Blooms Taxonomy of Learning referred to a cognitive domain which commenced at 'Knowledge, Comprehension and Application' and rose to 'Analysis, Synthesis and Evaluation' – see Lefrancois, *Psychology for Teaching*, p. 370.

74. Lefrancois, *Psychology for Teaching*, p. 374.

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INFORMATION SECURITY OF DISTANCE LEARNING

Konstantin ARKHIPOV and Vasiliy OVODKOV

In the beginning of the 21st Century, an educated person may feel protected only when his or her social status and rights are guaranteed. A person knowing his rights and standing up for them is able to react flexibly to changes in life. In this context, distance learning may be used for continuous education, thus contributing to the personal security. It allows to organize continuous education for almost all social groups. The development of world-wide cooperation makes distance learning independent from users' location. Related projects not only equip one with new knowledge but also open new horizons in self-education and make a participant understand the need for continuous learning. Besides, distance learning provides an opportunity to use different information sources. The current state of information technologies and their development allows us to consider international educational projects that will be able to establish a direct connection between a tutor and a learner and, thus, implement a genuine feature of traditional full-time tuition. Moreover, through international projects one may discuss different concepts; this is especially important for topics such as international security problems, combating terrorism, and building community to develop common strategies.

At present, distance courses on these problems are widely worked out by leading military educational institutions. The weak point of such courses is that they are created independently and without connection to each other. To solve the problem of international security, it is necessary to set some collaboration not only in the military sphere, but also in education and culture. It is important to provide examples of collaboration at the early stages of new knowledge acquisition.[1] One should take into account the fact that present-day students tomorrow will protect our society from terrorism. So, collaborative efforts in establishing international programs and courses are the first steps towards the international collaboration and creation of institutions working at security problems and combating terrorism. However, first of all it is

necessary to solve several organizational problems. The list of issues depends on educational, technological and legal situation in a particular country. Distance courses for military institutions where it is impossible to disclose secret information may serve as an example. Therefore, it is important to study the issue of information security in distance learning. But first let's analyze the term "security."[2]

Security is the condition of protection from threats; it reflects imaginary substance of security and is the form of a subject's emotions. Security is not the state of protecting one's interests. Security in its wide sense is not somebody's state. It is the conditions of someone's existence under his or her control. As a result, we may conclude that security of distance learning includes not only security of soft- and hardware but also control of all the basic learning process functions. Besides, it is necessary to take into account that international educational programs are more vulnerable. Here is an example. A national (regional) university has an opportunity to control statistics of a distance course attendance in a form of its learners' IP-addresses, etc. It is difficult to provide a permanent monitoring and system configuring in case of international collaboration as this system should posses two contradictory features – it should be available for students from every point and should be protected from any threat from anywhere. The solution of this task lays in the control of the whole life cycle of the distance course, not only creation but also the stages of its usage.

To introduce a new form of knowledge acquisition, one should take into account that methods of education, content preparation and a lesson conducting style significantly differ from other methods used in educational institutions. The main problem of all universities is a lack of skillful and specialized staff. It is usually assumed that the author of a course is able to transfer it into the appropriate electronic format, to maintain and support a learning process as well. The practice turned out not to be so easy. In case of international collaboration, the situation becomes even more complicated. It is necessary for the tutor to be free of any national, cultural, or religious prejudices. It is absolutely prohibited to propagate knowledge that is not envisaged in curriculum and lesson plans. The ethical issues as well as special knowledge and skills are subject of some special courses to train tutors, to facilitate their acquaintance with some peculiarities of different nations and ethnic etiquette. A qualified tutor is characterized by the following basic features [3]:

1. Openness to consideration of a new problem;
2. Skillfulness to evaluate scalability and actualization of a problem aiming at discussing the issues that are most interesting for most of the participants;
3. Ability to choose the most accessible and secure way of communication depending upon the character of the problem and its solution;

4. Informing the participants in a dialogue about prehistory of the problem and its current state. Stating a clear and objective form of the problem free from individual subjective attitude;
5. Ability to work with an adult audience whose participants are well educated but not ready psychologically to change their social role to that of pupils.

There are different norms and scientific, economic and legal rights for electronic publications in different countries. It is very important to consider intellectual property rights; otherwise these scientific publications may appear to be unprotected on the territory of other countries. As a result, it is necessary to take into account all the legislative specifics of the countries where distance learning will take place. Besides, respective legal bases should be worked out in the countries where the course will be used, and till that time geographical spreading of distance learning has to be limited. Thus, activities aimed at security of distance education, including protection of the author's rights and ensuring that a certificate obtained through distance learning will be recognized in the students' countries should be planned.

As a rule, a distance course is considered to be open. However, only that part of it that is necessary for the tutor and user's work must be open.[4] Thus, the problem is determined by security of distance learning software and hardware. It is known that content that is conveyed to the learner may be presented in three forms as data, information and knowledge.[5] Data is fixed information about objects and phenomena. Information is processed data in a suitable form for decision-making and analytical research. Knowledge is processed information used for problem solving and decisions making, as well as "meta"-information about ways of processing and transformation of information for making decisions. Security of data is mostly a technological problem, security of knowledge along with the technological aspect has a strong economic constituent, while information security includes both of them. Such dualism of information is explained by its ability to be either public goods or commercial product depending on its content. Knowledge is a final product and always can be evaluated in economic terms no matter if it is a concrete, conceptual or metaknowledge which is kept and performed in various forms.

As a result, it is necessary to single out technological (data, equipment, communication channels), semantic (information security from purposeful distortion) and economic aspects of information security. Figure 1 presents general framework of analyzing security issues of distance learning.

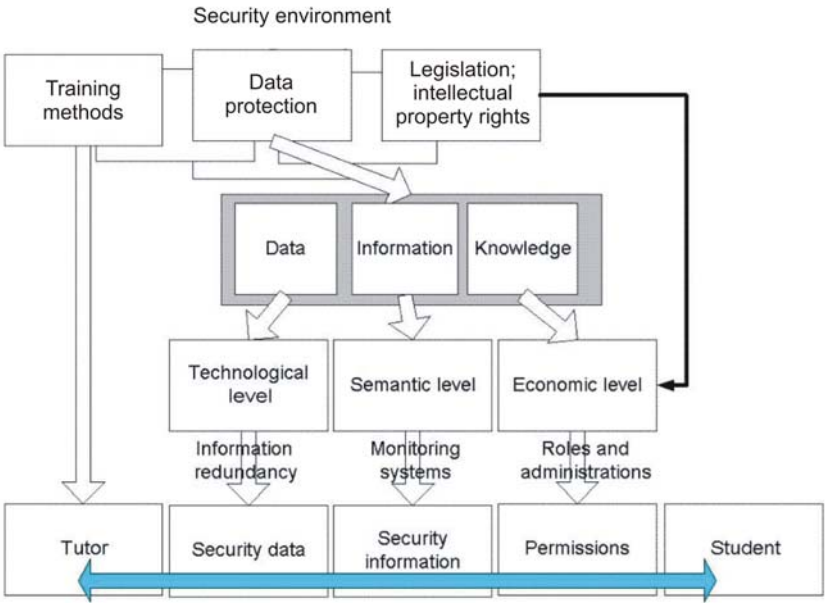

Figure 1: Monitoring tutor and student interaction by a security system.

Traditional methods to increase physical security of programs and data are based on information superfluity. Moreover, recovery and reservation methods are invariant to the information technologies applied in the data processing systems and are based on usage of redundant files (copies, damps, logs, etc.). Besides, these methods of "copying and recovery" not only ignore data processing technology and do not change it but also do not use its peculiarities. One should also note, that even terms "copy," "damp," "differential file," "system log," etc., do not bear any functional specifics of the information that is stored.

For the solution of the specified problems it is possible to introduce essentially new technological redundancy.[6] Functional-technical redundancy is understood as introduction of additional elements in data processing technology providing increase of programs' and data security. This redundancy can be of two types: procedural and file one. Procedural redundancy is understood as embedding additional procedures which take into account the specificity of the design decisions on realization of automated information-managing systems functions and intended for data security increase in data processing technology. Thus, the structure of system's information processing does not undergo changes. File redundancy is understood as introduction

of modifications in the information base of a system basing on its particular data processing technology. File redundancy can be subdivided into external and internal. Internal redundancy assumes no introduction of additional files, but adding fields and logic records in already existing files.

Within the framework of the open systems concept there are several integrated control systems, such as HP OpenView, Solstice, SunNet Manager and Unicenter TNG which are based on the management model offered by the International Organization of Standardization (ISO).[7] The ISO standard 15408-99 "Estimation criteria for information technologies security" may serve as an example. We shall consider the base features of control systems:

1. Fast localization of malfunctions - granting the information on the response time of a distance course modules and subsystems for rapid revealing of bottlenecks.

2. Detailed analysis of transactions - timing of all transaction performance stages, monitoring movement of a learner's request from a browser up to a web-server and further to applications and databases servers. The received data is automatically analyzed for revealing subsystems that may cause problems. The distance course built up on similar managing systems allows to trace and register:

- Through time of the response;
- Time of inquiry transfer through the Internet;
- Time of a web-site's response;
- Time of a request transfer from a web-server to the application server;
- Time of the application server response;
- Time of the separate COM components response;
- Time of a request transfer from one component to another;
- Time of the databases server response;
- Successful, interrupted and unsuccessful transactions of various types.

3. Automatic detection and revealing of all the web-transactions using the HTTP-protocol, independently finding out all components which participate in their processing and providing monitoring without long adjustment and control at the level of separate components. Control systems allow for tracing the distance course work at a level of separate components independently from the components implementation language.

4. Data aggregation and decomposition. By default, the speed of transaction-performance is defined by averaging the measurements received during an interval set up by the user. Control systems allow for measuring and registering

separate transactions performance time that can be useful while testing applications, searching for malfunctions or testing the adjusted configuration.

Control systems assist in locating problems in such applications, e.g. for distance learning, quickly allowing to answer the question of what is wrong: logic of the application or elements of an IT-infrastructure (networks, computers, systems of an intermediate level, etc.). Therefore, it is necessary to create products to ensure security within the framework of the open systems concept. These products should carry out intelligent control of hardware-software platforms on which applied information-telecommunications systems function.[8] Thus, this approach rejects a rigid universal scale of security classes. Instead, it is a flexible approach to the security estimation by ranging independent requirements and introducing protection profiles, allowing to define a set of necessary and sufficient requirements for each type of information technology products in view of their application conditions.

So, what is gained from ensuring security of distance learning? The first answer is – security itself. But if we return to the definition of security introduced at the beginning of this paper, the answer will be different. As a result we will have control on the process of new knowledge acquisition, thus approaching the solution of the equivalence issue of distance and local learning. By definition, distance education is just a different form of obtaining education that differs mainly by its organizational features. However, some problems may arise when a former student tries to get employed. The majority of employers do not recognize diplomas of distance universities for the reason of the absence of the control on the training process. Thus, the security of distance learning can promote problems solution for the given form of the education and its wide use.

Notes:

1 Vladimir K. Moroz, *About UNESCO Cooperation in Information Technologies of SIC Members in Distance Learning Area*, in Russian, <www.dlnet.unesco.kz/dsdc.html> (10 Dec. 2003).

2 G.V. Ivashenko, "The Main Point of Security," Presented at the 4th Annual Conference of the PfP Consortium of Defense Academies and Security Studies Institutes (Moscow, June 2001), p. 64.

[3] O. Briskina, "Network Cooperation Modeling in Tutors Distance Learning Training," Paper presented at the *Information, Technology, Education* conference (St.-Petersburg, 2003), 45-46.

[4] A.D. Danilov, N.V. Ivanova, E.I Kultishev, V.M. Kosmachev, "Integration of Open Education to Information Society," Paper presented at the *Internet and Modern Society* Conference IST-IMS'2001, in Russian (St. Petersburg, 20-23 November 2001), <http://ims2001.nw.ru/cgi-bin/one_tezis.exe?ivent=4&lang=RUS&ID_TEZ=47> (8 May 2004).

[5] M.I. Lugachev, "Information Security: Semeiotic and Economic Aspects," Presented at the 4th Annual Conference of the PfP Consortium of Defense Academies and Security Studies Institutes (Moscow, June 2001), p. 6.

[6] A. Shelkov, "Increasing Data Safety in Automated Information-Operation Systems with Functionally-Technological Superfluity," <www.sbcinfo.ru/articles> (10 Dec. 2003), in Russian.

[7] See for example Mark Timofeevich Kobzar, *Standard ISO/IEC 15408-99 and Its Implementation for Assessing IT Security* (Moscow, Center for Information Security, 2002), <http://www.fostas.ru/library/Kobzar2_e3.rtf> (8 May 2004), in Russian; Gene Troy, *Introduction to the Common Criteria for IT Security /ISO 15408/* (US National Institute of Standards and Technology, March 1999), <http://cnscenter.future.co.kr/resource/crypto/evaluation/cc/japan-brief-990318.pdf> (8 May 2004).

[8] V.V. Korneev, A.I. Masalovich, E.V. Savel'eva, A.E. Shashaev, "Recognition Program Modules and Detection of Unauthorized Actions Using Neural Nets," *Information Technologies* 2, 10 (1997), in Russian; V.V. Korneev, S.V. Sajin, "Control System for Computers Functionality and Network on Basis of Using Neural Nets," *Neural Computers: Development and Application* 1 (2000), in Russian.

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ADVANCED DISTRIBUTED LEARNING AND COMMUNITY

Ulrich GYSEL and Jeffrey A. KRINOCK

For thousands of years, learning and teaching always took place in close proximity, and this has become firmly anchored in human consciousness.

— Otto Peters [1]

Michael Moore of Penn State University identified the importance of *transactional distance* when analyzing teaching and educational strategies.[2] He described transactional distance as [roughly] being inversely related to the extent to which teachers and students can interact during and through learning processes. Several studies and reports suggest that the educational effectiveness of the type of learning process that involves the least transactional distance—face-to-face human tutoring—is unmatched by any other form of teaching. Interestingly, many of today's proponents of advanced distributed learning *emphasize mimicking the effectiveness of one-on-one human tutoring*.

In terms of improving learning outcomes for individual students, this emphasis may make sense. As the work of Moore, Otto Peters, and others collectively suggests, learning techniques involving minimal transactional distance seem to be generally more effective. Accordingly, *learning technologies that circumvent the detrimental effects of transactional distance* may indeed result in improved short-term learning results.

This possibility has been explored in the Advanced Distributed Learning (ADL) initiative's Sharable Content Object Reference Model (SCORM). The SCORM Overview, for instance, has—in multiple versions of the SCORM—suggested Intelligent Tutoring Systems (ITS) as a technology-based means for enabling mixed initiative dialogue, allowing free form discussion between the technology and the

student or user, a development that would effectively *decrease transactional distance* without directly involving a human teacher or instructor.[3]

In the near future we may indeed find students interacting with ITSs (or similar e-Learning technologies) in a manner akin to that found today in face-to-face human tutoring. Early studies of the effectiveness of ITSs suggest we can expect, if not the same learning outcomes as those found today in one-on-one human tutoring, at least "good" learning results—relative to the learning outcomes of other e-Learning technologies.

Typically, though, the studies analyzing the learning outcomes of various e-Learning strategies focus on *individual* learning outcomes. The SCORM itself—arguably the worldwide technical model for assembling and distributing e-Learning—offers extensive support for tracking and reporting on *individual* achievements in a given course of instruction, but currently contains nothing whatsoever in the way of tracking or reporting features for the learning outcomes of groups or communities.

This paper assumes that cultures and communities have always supplied essential aspects of the learning background and learning opportunities for individuals. Accordingly, when analyzing the effectiveness of e-Learning and advanced distributed learning strategies, we should consider the impact of transactional distance (and related concepts) beyond the individual. We should regard a learning strategy's effects on the general knowledge and learning environment of *cultures, subcultures and communities,* not focusing on good learning outcomes for individuals alone.

Effects of industrialization

Undoubtedly the last several centuries of industrialization affected relationships between the individual and the community—to include altering the way communities and families influence (or recently, *fail* to influence?) the learning and training of succeeding generations. Many have researched and written about the effects of industrialization on learning and training. Several books, such as Raymond Callahan's *Education and the Cult of Efficiency* and John Taylor Gatto's *The Underground History of American Education* have analyzed how industrial concepts, expressed in such phrases as "Fordism" and "Taylorism," made their way beyond the gates of the factory and into our schools and universities. Recounting the history of the many decades of this bonding of industry and academia is beyond the scope of this article. Regarding its impact on the psyche of the average first world inhabitant, however, Langdon Winner provides a poignant analysis:

> Society is composed of persons who cannot design, build, repair, or even operate most of the devices upon which their lives depend…. In the complexity of this world people are confronted with extraordinary events and functions that are literally unintelligible to them. They are unable to give an adequate explanation of man-made phenomena in their immediate experience. They are unable to form a coherent, rational picture of the whole…. Citizens of the modern age in this respect are less fortunate than children. They never escape a fundamental bewilderment in the face of the complex world that their senses report. An objection might be raised that difficulties of the sort I have mentioned soon will have remedies. Systems theory, artificial intelligence, or some new modern way of knowing will alleviate the burdens…. Soon there will exist tools of intellectual synthesis. I must report I found no such tools in practice. I have surveyed the various candidates for this honor, systems theory and systems analysis, computer sciences and artificial intelligence, new methods of coding great masses of information, the strategy of disjointed incrementalism and so forth. As relief for the difficulties raised here none of these offers much help….[4]

Umberto Eco, sounding similarly alarmed, describes an imminent media and computer-based dichotomy of society—in effect, the creation of a two-class society—as follows:

> Frequently I think that our societies will be split in a short time (or they are already split) into two classes of citizens: those who only watch TV, who will receive pre-fabricated images and therefore prefabricated definitions of the world, without any power to critically choose the kind of information they receive, and those who know how to deal with the computer, who will be able to select and to elaborate information.[5]

Another issue—slightly different from Eco's "class" concerns—is that the direct and intentional *effects* of technology (e.g., the ability to create transportation independent of the need for animal power or wind, or the ability to create bombs fearsome enough to bend the will of entire nations) are only one part of the equation. The *side effects* of technology often seem to be just as powerful, but far less evident or understood.

Recently, into this milieu has stepped ADL and its most hopeful motto, "Anytime, anyplace." For those of us who have enjoyed the Internet's early years of unlimited and lightly restricted access to a world full of resources (ranging from the mundane to the greatest works ever compiled) it appears that the antidote to the ennui just described may be at hand. Assuming this ennui stems at least in part from our mandatory participation in systems of systems too massive to be readily

comprehended, it is not beyond reason to hope that *broad, deep, and ready access to information* might provide a means for bewildered individuals to find their way out of the darkness described by Winner, Eco, and others. If families and communities have grown far too small or simple to provide understanding of, say, the risks of radon gas in the basements of homes, or the possible effects of industrial waste runoff on the family well, the Internet may indeed come to the rescue.

Many, however, have suggested (including, of course, Eco) that successful learning involves more than ready access to "empirical data" and "objective information." Hans Georg Gadamer, for example, acknowledged the role of subjectivity in even the most scientific attempts to understand the world. He emphasized linguistically encoded cultural traditions and their function in a Hegelian melding of horizons of individual understanding. In short, his philosophy taken as a whole suggests that the value of community in generating genuine learning and understanding can scarcely be overestimated. Human-to-human discourse, on a continual basis, may be an essential element of real learning, if Gadamer's understanding of how we learn is accurate.

Similarly, and more explicitly, John Taylor Gatto asserts that community and face-to-face dialogue are essential to real learning. He devotes entire chapters of *The Underground History of American Education* to exploring what he deems to be the tragedy of a behaviorist and programmatic hijacking of the type of learning common to 1800's America, in which education was rooted in genuine (naturally occurring?) small communities, in real, voluntary and meaningful literacy directly handed from parent (or grandparent, or neighbor) to child, of understanding handed from master to apprentice. Gatto explores the value of moral and ethical grounding, generated in close-knit families and communities, as a foundation for free individuals to launch into real literacy and genuine understanding of the world. His thesis, in part, is that community-, church-, and family-grounded upbringing very effectively prepares the individual learner for an *autonomous* (free?) approach to lifelong learning. To say that reducing *transactional distance* in learning is important to Gatto would be a significant understatement.

At a crossroads: Enabling versus controlling?

Gareth Morgan, in *Images of Organization*, suggests the use of metaphors to help us focus how we view organizations. A useful extract of that approach would be to employ metaphors in analyzing how we propose presenting our learning content and training within our organizations. If, for example, we deem our workers and soldiers to need training *only at the point of need,* and we define the point of need narrowly—for instance, *solely* in terms of mission accomplishment or immediate production goals—have we perhaps leaned a bit too far in the direction of the "man as machine" and "society as system" metaphors?

The best of advanced distributed learning concepts and technologies, employed properly, can undoubtedly provide some means to mitigate the negative effects of industrialization on our collective abilities to learn about and understand the post-industrial world, in all its complexity. That advanced distributed learning technology *could likewise be used in ways that will exacerbate the problems and general ennui* described by Winner, Eco, and many others, is also certainly true.

Motivations, as always, will play a central role in determining where and when ADL eases or exacerbates these problems. For instance, fiscal responsibility and efficiency—commonly advanced motivations for an ever-expanding role for advanced distributed learning—are certainly "easy sells." In the United States, the pervasiveness of defense and security concerns mandate maintenance of a vast standing army of highly trained individuals, familiar with a daunting array of technologies and fields of study. The majority of funding to keep this army highly trained, of course, comes from public coffers. (Seen from that perspective, the public education system of the US does not, perhaps, end at grade 12 (age 18) as is commonly perceived, but extends—at least for many US citizens—well into adulthood.)

If we accept that much of the DoD-provided training in the US might be viewed as a form of public education, the crucial question of motivations, the question of "controlling versus enabling," becomes even more central. In that case, H. L. Mencken's viewpoint about motivations, expressed in *The American Mercury* in 1924, is perhaps worth revisiting. He suggested that neither fiscal responsibility, nor much less so, an altruistic concern for enlightened individuals, are the motivations behind *any* push for public education:

> That erroneous assumption is to the effect that the aim of public education is to fill the young of the species with knowledge and awaken their intelligence…. Nothing could be further from the truth. The aim of public education is not to spread enlightenment at all; it is simply to reduce as many individuals as possible to the same safe level, to breed and train a standardized citizenry, to put down dissent and originality. That is its aim in the United States, whatever the pretensions of politicians, pedagogues, and other such mountebanks, and that is its aim everywhere else.[6]

Again, however, as a counter to Mencken's pessimism, ADL's motto of "Anytime, anyplace" offers an apparent ray of hope. Even if Mencken's pessimistic observation is correct, and the motivations behind the administration and funding of public education cannot be trusted, who is to stop the effectiveness of a Worldwide Web full

of data, information, research, and training and educational materials from "spreading enlightenment"?

The issue of potential motivation shines through in a somewhat different light when we consider other ideas currently associated with ADL. What, for example, are the implications for popular enlightenment behind the concept of "Just-in-Time Training" (JITT)? If we explore JITT's unmistakable potential to supply procedural know-how to perhaps even illiterate workers, if we continue down that path of squeezing production from a body of workers ("personnel," "recruits," "staff") ever less aware of the "big picture," what motivations will continue to move advanced distributed learning in the direction of providing enlightenment? Will we not inevitably find access to the Internet and untold numbers of *intranets* more and more tightly controlled in the interest of preserving productivity?

Are we willing to be superfluous? The value of autonomous learning

Many have observed that real learning takes place when learners wish to learn. Immanuel Kant took this idea perhaps to its apex, when he said, "Those who educate use actions whose aim is to be no longer necessary."[7] Kant's maxim suggests important questions about JITT and any other advanced distributed learning technology *that emphasizes performance within isolated portions of processes* without granting mental access and understanding to those processes as a whole. Are learners who are dependant upon task instructions provided at the last minute, devoid of all but the absolute essential details about a larger process, actually *learning?* And what are the broader messages that accompany a hypothetical system-wide dependence upon JITT? That Just-in-Time-Training has a place in the world is understandable; if we think of clearly written and illustrated instructions on a fire extinguisher as a form of JITT, its value in selected situations is easily evident.

What happens, however, if we are careless or excessive in our application of JITT and related technologies? What about system-wide dependence upon JITT to, for example, "improve the bottom line" without regarding JITT's effect on *communities of learners*. Would such carelessness be a way of saying to soldiers and workers, intentionally or not, that they need not understand the larger picture, that their input in shaping the landscape of tomorrow is not really needed? Richard Weaver, as far back as the 1940's, warned about the effects of "enforced irresponsibility" in a typical industrial worker: "Unaccustomed to determining anything about the purpose and the relationships of his work, he cannot even think in terms large enough to embrace the total situation."[8]

If advanced distributed learning is *not* to become the digital foundation of the poorly cloaked world of control described by Mencken, Gatto, and others, we should

perhaps find ways to analyze *needs of learners* (as distinguished from over-analyzing the learners themselves),[9] the type of learning approach being utilized to meet those needs, and *the overall effect of teaching and instructional approaches on the communities in which learning takes place.* Armed with that type of "big picture" ourselves, a valuable self-awareness about both our own motivations—and perhaps the unintended consequences of the learning strategies we employ—may emerge and guide.

Otto Peters and autonomous learners

In the course of his analysis of learning in *Learning and Teaching in Distance Education,* Otto Peters loosely implies that promoting and nurturing *autonomous learning* is a sort of mark of success among distance learning strategies. Along the way to describing *autonomous learning,* however, he uncovers several mild (apparent) contradictions.

He quotes Schleiermacher, for instance, as saying that what "some scientifically-minded person has worked out for himself in seclusion" is "an empty shell," but later discusses how in a post-industrial society "learning is much more determined by students themselves."[10]

Likewise, he discusses books as an example of some of the oldest formally structured tools of learning—perhaps implying to some that books and texts might have a limited role in promoting *autonomy*—but later extols the Jewish book- and literacy-centric learning culture with its focused emphasis on the ability "to manage and understand texts."

These mild contradictions bring us again to consideration of the role of families and communities, in short, *learning foundations and backgrounds*, in creating learners capable of graduating to forms of autonomous learning. If combining basic literacy with broad access to well-structured texts was the simple formula for learning success, bright young children could, figuratively speaking, be locked into libraries and emerge years later as PhD equivalents. This has never been the case, and newly available "Anytime, anyplace" digital access to books and texts via advanced distributed learning will not change this.

Returning to ADL's illuminating interest in finding a technology-based means to emulate the type of human discourse found in one-on-one tutoring, Peters' analysis of distance learning again provides an interesting insight. He mentions that early progress in reducing *transactional distance* in distance learning involved altering texts so that they *simulated a conversation* between a teacher and a student. Later, addressing this idea from a somewhat different angle while discussing the *Tutor*

model of distance learning, he describes the original function of a tutor (which he notes, came from England, "the mother country of the tutorial tradition"):

> A *tutor* was typically not someone who was responsible for teaching but a *fellow* attached to a university who advised students on general questions concerning their studies, integrated them into college life and provided other support. Quite often there was a personal relationship between student and tutor. Tutors were therefore not teachers but advisers, and in the most favourable cases something like an older friend. One of the original meanings of the word in Latin is in fact 'protector.'
>
> Nowadays, the term tutor is also used to define a person who provides help with learning in the narrow sense, but in contrast to the teacher model, in which the student is kept on a reasonably tight rein, this model presupposes basically that the amounts to be learnt will be learnt *independently.*[11]

An important consideration here is that that the value of tutors may not be so much their *expository* abilities. An even more interesting possibility is that it may not strictly be the *opportunities for discourse* tutors provide that is of greatest value. What if the original meaning and role of the *tutor,* as being one involved in mapping out the pitfalls and opportunities in a learning environment (the "protector" aspect of tutoring) is the crux of the matter? In that case, what we may be touching upon in the well-documented success of tutoring as a learning strategy is the value and role of learning *foundations and backgrounds,* as expressed and fulfilled in learning communities. If tutors have been part of successful learning systems without actively engaging in the "teacher" role, if they have served to "integrate students into college life," then perhaps traditional tutors, as friends and advisors, have provided college-aged students with an important continuation of the role of family, church, and community. Tutors may create successful learners because they continue moving the student along the path to *autonomous learning*, providing young students—much as their parents may have done throughout childhood—with valuable informal information about the social and community aspects of a college that help maintain the college campus as a type of successful learning community.

This could help explain why *tutoring*—not the provision of ever-better lecturers or finer and finer texts—repeatedly comes to the forefront when comparing effectiveness of teaching and learning strategies. It may be that tutoring contributes to the health and maintenance of *community*—an element of learning success too easily ignored—in ways that amplify the effectiveness of other learning and teaching elements of the college environment.

Where from here?

> *Thus the shift from speculative inquiry to investigation of experience has left modern man so swamped with multiplicities that he no longer sees his way.*
>
> — Richard M. Weaver*, Ideas Have Consequences* [12]

If there is a "trap" hidden within our opportunities to integrate computers ever more deeply into our training and educational systems, the trap is probably related to the criticisms of recent years, heard in legion, about the too widely used "sage on the stage" approach to teaching in our universities and colleges. Over-reliance on exposition—the pronouncing of ideas, concepts, and facts in the hope that hearing will equate to real learning and understanding—does not really work well. Carried over into e-Learning, more cleverly delivered facts, a repackaging of details and information about the "multiplicities," Weaver laments, often does little or nothing to deepen our understanding of how to live and learn, let alone why.

Computers that regurgitate in a non-human way (the only they possibly can) pre-recorded information, will be repeating a form of that mistake. In effect, they will be locking instruction once again into a form of exposition, no matter how clever the algorithms and models used to sequence that exposition.[13]

That computers (and more to the point, *networks*) can enable new types of human-to-human discourse (chat rooms, threaded discussions, and so forth) certainly offers a ray of hope in that the human element is retained. The tutor's ability to use human understanding and adjust dialogue, perhaps even with "genuine human care for the learner" as the underlying motivation, may have the best chance to re-emerge in Computer-Based Training (CBT) and Web-Based Training (WBT) not via the intelligent tutoring systems of so much hope to ADL, but in a new form of tutoring with *the human retained as the source, and the computer network as the medium*.

There may be evidence within fields other than e-Learning that revaluing (retaining or restoring?) the human element reaps benefits. For example, industrial management theory has in recent years embraced *situational leadership.* Loosely interpreted, situational leadership acknowledges that corporate environments and the individuals that form and comprise those environments have varying levels of maturity and experience calling for different management styles and approaches in different situations. Thus summarized, the concept of situational leadership sounds nearly too obvious to be of value. But today, of course, it is of value; today's managers often find advantage in applying the concepts of situational leadership. Could this be in part because situational leadership provides the manager with flexible responses that reflect the community aspects of post-industrial corporate life, overlooked and

forgotten because nurture and growth of individuals by the corporation is at best a distant concern, if it is a concern at all?

Situational leadership may be valuable to a manager because it supplies leadership techniques that acknowledge that humans, no matter how constrained by production processes, deadlines, and accounting, still have—just as they did in yesterday's small towns and communities—varying maturity levels, different levels of experience and, in many cases, diverse understanding of the "big picture." Those variations are rooted, as they were yesterday, in how individuals integrate and react—how they *learn*—as they live among their peers, colleagues, and superiors.

In years past, parents, grandparents, friends and neighbors adjusted responses—thereby adjusting *their families and communities*—one small change at a time because they understood how individual actions, how the moral fiber and choices of their offspring and neighbors impacted the milieu in which all lived, worked and flourished (or not). In industry today, when situational leadership is insightfully applied, similar responses are possible on the part of managers and leaders. Leaders—even mid-level managers who have enough of the "big picture" regarding their industrial environments—can make leadership choices appropriate to the maturity and experience levels of individual workers, in light of the overall goals and objectives of a corporation or enterprise.

Do we indeed stand on the threshold of being able to provide digital equivalents of tutors and mentors to workers and soldiers? As we contemplate when and where to deploy such a truly advanced type of distributed learning, we should consider the value of retaining the human element, as reflected in the flexibility of situational leadership, and any other management and leadership approach that acknowledges, even tacitly, that individual workers are *always* part of, influenced by, *and influencing* the corporate community in which they labor.

Notes:

1 Otto Peters, *Learning and Teaching in Distance Education: Pedagogical Analyses and Interpretations in an International Perspective* (Sterling, VA: Stylus Publishing, 2000), 18.

2 Peters, *Learning and Teaching in Distance Education*, 18.

3 Philip Dodds, et al., *The Sharable Content Object Reference Model*, Version 1.1, Version 1.2 and SCORM 2004, Overview sections (Advanced Distributed Learning, 2001, 2002, and 2004), <http://www.adlnet.org/index.cfm?fuseaction=scormabt> (28 April 2004).

[4] Langdon Winner, *Autonomous Technology: Technics-out-of-Control* (1989). Quotation adapted from John Taylor Gatto, *An Underground History of American Education* (New York, NY: The Oxford Village Press, 2003), 314. Robert W. Roycroft and Don E. Kash describe a similar phenomenon in their *The Complexity Challenge: Technological Innovation in the 21st Century* (London: Pinter, 1999).

[5] Umberto Eco, *From Internet to Gutenberg*, Part IV, Lecture at the Italian Academy for Advanced Studies in America (November 1996), <http://www.hf.ntnu.no/anv/Finnbo/tekster/Eco/internt4.htm> (28 April 2004).

[6] As quoted in Gatto, *The Underground History of American Education,* 1.

[7] As quoted in Peters, *Learning and Teaching in Distance Education*, 47.

[8] Richard M. Weaver, *Ideas Have Consequences* (Chicago: University of Chicago Press, 1948), 66.

[9] Gatto describes the Chinese Dangan, a lifelong learning record, as an extreme method for cataloguing, for purposes of controlling, learners. Some see the *mis*-application of ADL as leading to the same end: control thinly cloaked beneath a veil of *standardized opportunity.*

[10] Peters, *Learning and Teaching in Distance Education,* 35, 36.

[11] Peters, *Learning and Teaching in Distance Education*, 25, emphasis added.

[12] Weaver, *Ideas Have Consequences*, 13.

[13] Gaming and simulations are, of course, another matter, introducing uses of computers that ignore exposition altogether. Comments about exposition and e-Learning reflect the sad reality of much of the CBT and WBT available in recent years—that it is too often a high-tech recycling of lectures, a repackaging of exposition, that was not all that effective originally, and only marginally improved, perhaps, by conversion to a computer-based delivery.

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JEFF KRINOCK, see page 80.

ADL WEBSITES - USEFUL SITES, PORTALS, AND FORUMS

Advanced Distributed Learning Network (ADL)

http://www.adlnet.org/

US-government sponsored initiative to "accelerate large-scale development of dynamic and cost-effective learning software and to stimulate an efficient market for these products in order to meet the education and training needs of the military and the nation's workforce of the future." The site contains recent news, information about Plugfests, links to ADL Co-Labs, Downloads section that among other include SCORM documents and Test Suite tools.

AICC

http://www.aicc.org/

The Aviation Industry CBT (Computer-Based Training) Committee (AICC) is an international association that develops guidelines for the aviation industry in the development, delivery, and evaluation of CBT and related training technologies. The first organization which raised interoperability issues and started develop specifications. Offers free Test Suite to test conformity to specifications.

The centre for educational technology interoperability standards (CETIS)

http://www.cetis.ac.uk/

CETIS represents UK higher-education and further-education institutions on international learning technology standards initiatives. The portal contains articles, including referenced articles published elsewhere, news, events and learning technology products matrix in relation to standards. There are several Special Interest Groups.

EDEN (European distance and e-learning network)

http://www.eden-online.org/eden.php

A forum for open, distance and e-learning community in Europe. Built around membership, runs annual conferences.

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European Quality Observatory

http://www.eqo.info/

A portal that comprises information related to quality issues in e-learning. Recently launched.

IEEE LTSC (IEEE Learning Technology Standards Committee) (1484)

http://ltsc.ieee.org

Standards development organization with individual participation. The work is based on group activities. Draft standards are publicly available.

IMS

http://www.imsglobal.org/

The IMS Global Learning Consortium develops learning technology interoperability specifications and provides guidelines for their implementation. Among IMS members Universities, companies, corporations and regional educational bodies. Started in the USA, currently has wide international representation. Specifications are publicly available.

International Forum of Educational Technology & Society

http://ifets.ieee.org/

The oldest virtual forum for educators involved in technology-enriched learning. Supported by IEEE Computer Society Technical Committee on Learning Technology (former Learning Technology Task Force), publishes quarterly international peer-reviewed journal. Has a number of partner forums in several languages.

Learning Technology Standards Observatory (LTSO)

http://www.cen-ltso.net/

CEDEFOP and European SchoolNet-sponsored project Aimed to provide a focal access point to projects, results, activities and organizations that are relevant to the development and adoption of e-learning technology standards. Forum and subscription-based notification about updates.

IEEE Computer Society Technical Committee on Learning Technology (LTTC)

http://lttf.ieee.org/

Grown up from a Task Force, the Technical Committee facilitates communication between standards-setting organizations and research and practitioners. It supports Educational Technology and Society Journal and Learning Technology Newsletter as well as some professional Workshops and Conferences in the field of learning technologies.

ISO/IEC JTC1 SC36

http://jtc1sc36.org/

Standards subcommittee on Information Technologies for Learning, Education, and Training. Standards organization based on national membership. Standards are aimed at enabling interoperability and reusability of resources and tools and are developed in working groups taking into account existing work – specifications, draft standards or technical reports.

WS-LT CEN/ISSS Learning Technologies Workshop

http://www.cenorm.be/sh/lt

Organization supported by EC and CEN, which is tasked to ensure that European interests are reflected in standards and specifications of learning technologies. It is project-based and creates guidelines, recommendations, and technical reports.

FREELY ACCESSIBLE ON-LINE JOURNALS

Australasian Journal of Educational Technology

http://www.ascilite.org.au/ajet/ajet.html

The *Australasian (*former *Australian) Journal of Educational Technology* is a refereed journal publishing research and review articles in educational technology, instructional design, educational applications of computer technologies, educational telecommunications and related areas. AJET is supported by the following societies: Australasian Society for Computers in Learning in Tertiary Education (ASCILITE), Australian Society for Educational Technology (ASET), International Society for Performance Improvement, Melbourne Chapter.

Canadian Journal of Learning and Technology

http://www.cjlt.ca/index.html

Peer-reviewed, scholarly journal published three times per year by the Association for Media and Technology in Education in Canada (AMTEC). Formerly called the *Canadian Journal of Educational Communication* (CJEC). Papers in English or French.

Educational Technology and Society

http://ifets.ieee.org/periodical/

Quarterly peer-reviewed journal published by IFETS under IEEE LTTC auspices. Contains regular papers, overviews, and discussion summaries. Special issues are guest edited by leading researchers and often are based on best papers from workshops and conferences.
Local IFETS forums publish their journals in national languages.

ELearn Magazine

http://elearnmag.org/

Published by ACM, the Magazine contains two types of materials: (1) News and features by professional journalists with expertise in education and technology; and (2) columns and tutorials by industry leaders and stars of academia. Maintains a discussion forum.

Interactive Educational Multimedia

http://www.ub.es/multimedia/iem/

Biannual international journal sponsored by the University of Barcelona. Publishes peer reviewed, guest articles and reviews in English. Some publications are also available in Spain.

Journal of Distance Education

http://cade.athabascau.ca/

Free access to the electronic copy of all journal issues published since 1986. Papers are in English or French.

Learning Circuits

http://www.learningcircuits.org/

Free source initiated by ASTD. The aim is "to promote and aid the use of e-learning, creating a body of knowledge about how to use technology efficiently and effectively for learning." Articles do not require professional knowledge to understand and cover many aspects of selecting and using technology.

Learning Technology Newsletter

http://lttf.ieee.org/learn_tech/index.html

The *Learning Technology* publishes short papers, work in progress, description of research projects, as well as conferences and workshops announcements. This is a quarterly source sponsored by IEEE LTTC.

The Turkish Online Journal of Distance Education

http://tojde.anadolu.edu.tr/

Free online international journal supported by Anadolu University, Turkey. Peer-reviewed, publishes original research papers and reviews in English.

CONFERENCES AND SYMPOSIA

ADL Plugfests
Events for learning tools and content developers, which conform to SCORM specification. Scheduled in the USA several times a year, from 2004 also internationally.

http://www.adlnet.org/

e-Society'04 (IADIS International Conference)
Lisbon, Portugal
June 3 - 6, 2004

http://www.iadis.org/es2003/

EDEN 2004 (Annual conference)
Theme: New Challenges and Partnerships in an Enlarged European Union. Open, Distance and e-Learning in Support of Modernisation, Capacity Building and Regional Development

Budapest, Hungary
June 16-19, 2004

http://www.eden-online.org/eden.php

ED-MEDIA 2004 (Educational Multimedia)
Lugano, Switzerland
June 21 - 26, 2004

http://www.aace.org/conf/edmedia/default.htm

CATE 2004 (Computers and Advanced Technologies in Education)
Kauai, Hawaii, USA
August 16-18, 2004

http://www.iasted.com/conferences/2004/hawaii/cate.htm

ICALT'04 - (IEEE Int. Conf. on Advanced Learning Technologies)
Theme: Crafting Learning Within Context
Joensuu, Finland
Aug 30 - Sept 1, 2004

http://lttf.ieee.org/icalt2004/

ITS 2004 (Intelligent Tutoring Systems)
Maceió-Alagoas, Brazil
Aug 30 - Sept 3, 2004

http://www.itsconference.org/2004/

ICCE 2004 (International Conference on Computers in Education)
Melbourne, Australia
Nov 30 - Dec 3, 2004

http://www.icms.com.au/icce2004/

Interact 2005 (Former HCI – Human-computer interaction)
Roma, Italy
September 12 - 16, 2005

http://giove.cnuce.cnr.it/interact2005.html

The Case for Advanced Distributed Learning

Robert A. Wisher and J. Dexter Fletcher

Keywords: distributed learning, sharable content objects, SCORM, learning objects, training effectiveness, cost effectiveness

Abstract: The Advanced Distributed Learning (ADL) initiative represents a global effort to accelerate large-scale development of dynamic and cost-effective learning environments. The brief history of ADL is described, its current status if reviewed, and its future are considered in this paper. The goal of the ADL initiative is to ensure access to high quality education and training, tailored to individual needs, developed and delivered cost-effectively, available anytime and anywhere. This goal is viewed as something that can be achieved affordably, and thereby made feasible, only through the use of technology – specifically computer technology. ADL is establishing a common technical framework for computer and Web-based learning, called the SCORM (Sharable Content Object Reference Model). The application of SCORM fosters the creation of reusable learning content as "instructional objects." It also seeks to stimulate a vigorous global market for these products. ADL is preparing for a world where communications networks and personal delivery devices are pervasive and inexpensive, as well as transparent to the users in terms of ease of use, bandwidth and portability. Much current ADL effort is an attempt to understand how best to utilize the next generation technology infrastructure for learning anytime, anywhere, either within the SCORM model or with technologies that can converse with SCORM.

Multinational Collaboration in Advanced Distributed Learning

Jannie W. Barrett

Keywords: Cooperative development team, ADL, Learning Management System, LMS, open source, Partnership for Peace, PfP Consortium, e-learning, SCORM

Abstract: The signing of the Switzerland - United States Memorandum of Understanding (Swiss – U.S. MoU) on April 25, 1999, was the inauguration of a collaborative multinational effort to develop and facilitate the development of open-source Advanced Distributed Learning (ADL) amongst Partnership for Peace (PfP)

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nations. This multinational effort has since expanded to include contributions and participants from many other countries. To this end, a Joint Planning Document (JPD) was developed and published to implement the Swiss – U.S. MoU, a free and open-source Learning Management System (LMS) was developed and continues to be refined, numerous Cooperative Development Teams (CDTs) have been trained, and many courses have been developed and converted to internet-interactive courseware. Many of these courses are used in support of, and to train multinational military audiences in preparation for exercises and real-world events. The successes of the Swiss – U.S. MoU efforts are well documented, and the demand for the quality products and services provided by the CDTs have rapidly grown beyond PfP to NATO and others. This article underlines many of the accomplishments resulting from the ADL vision.

English Skills for Staff Officers: Collaborative Development of the Distance Course

Olga Danylova, Peggy Garza, Bonnie Mihalka,
Kateryna Synytsya and Olexiy Voychenko

Keywords: Distance course, language learning, learning activities, collaborative development, ADL, Partnership for Peace, ESSO, CALL

Abstract: ESSO is an English language training course for NATO and PfP staff officers. The purpose of conversion of the original paper/audio cassette format into an on-line course is to address the needs of officers participating in multinational missions in operational English and to facilitate the language learning process by the use of modern technologies. The paper discusses course planning and design and presents features available in the on-line version, such as automatic feedback to the student, links to related sites and supplementary materials, animation, and electronic dictionaries. Pilot testing confirmed usefulness of the course, but at the same time brought some students' concerns about potential technical difficulties and availability of instructor's support.

Advanced Distance Learning for Training National Peacekeeping Forces

Andrij Ivashchenko and Kateryna Synytsya

Keywords: Peacekeeping operations, ADL, technology-supported training

Abstract: The paper discusses the potential of distance learning technologies to support training of the national peacekeeping contingent for its efficient participation in activities of the coalition forces. The overall training period is represented as a sequence of phases, each with specific learning goals and activities. Each phase may be supported by respective learning and training technologies, including personalized access to electronic documents, testing, interactive multimedia instruction, simulations, etc. The suggested approach envisages tailoring learning materials and activities to current mission requirements, course updates based on the participants' performance results, enhancements and upgrades taking into account feedback from experts. The examples are based on the experience in training Ukrainian military units for participation in the multinational operation in Iraq.

The Coalition Information Systems and Operations Learning Network: An Emerging Concept for Multinational C4 Interoperability

Walter Christman and Tom Hazard

Keywords: Command and control, C4, coalition interoperability, CJTF, transformation, security cooperation, advanced distributed learning, e-Learning, PfP

Abstract: The Coalition Information Systems and Operations (CISO) Learning Network is developing in collaboration with NATO and Partnership for Peace (PfP) nations an Internet-based online repository of e-Learning materials for enhanced coalition interoperability, in order to promote agility and flexibility, as well as increased knowledge and better understanding. Once fully implemented, it will promote net-centricity in coalition command and control through a global, Web-enabled environment that leverages existing and emerging technologies in a "smart-pull" fashion as part of the NATO transformation agenda.

Moving beyond issues of technical interoperability, the CISO Learning Network addresses what might be called "cognitive interoperability." It responds to the need for current and future military missions to involve multi-national coalition forces that must be rapidly drawn together, flexibly led, responsively deployed and agile to address a wide variety of dynamically evolving tasks. In all of these missions there is a need for agility, responsiveness and effectiveness in the use of limited resources to achieve complex and multiple objectives. Effective integration of command, control, communications, and computers (C4) is a core competence and task among and between foreign militaries in addressing the challenges of both Asymmetric and Fourth Generation Warfare.

The CISO response is to bring together NATO and PfP Partner C4 educators, researchers, developers, and military professionals to jointly develop commonly agreed upon educational approaches for the C4 domain, leading to appropriate academic achievement and certification. CISO will focus on aiding the integration of technology development efforts, organizational concepts, and the development of Joint Doctrine. The net-centric approach enables discovery, exploration, testing, assessment, and demonstration of transformational approaches co-developed with coalition partners. The CISO Learning Network concept promotes cooperative development in multinational education and training as a vital part of the transformation experience and will serve as an enabler for better understanding by Joint Commanders on the configuration, deployment and employment of C4 Systems.

Standards Integration in E-Learning, Simulations, and Technical Manuals

Jeffrey A. Krinock

Keywords: SCORM, High Level Architecture, Advanced Distributed Learning, S1000D, technical manuals, Interactive Electronic Technical Manuals (IETMs), SCORM-conformance

Abstract:. Individually, three standards—the Sharable Content Object Reference Model (SCORM), the High Level Architecture (HLA), and S1000D—provide vital standardization to their respective areas of coverage. The SCORM provides standardization to e-learning content, HLA provides standardization to simulations, and S1000D to Interactive Electronic Technical Manuals (IETMs). Talks and Memorandums of Understanding (MOUs) are under way among the various groups responsible for these standards to find areas of overlap that might make good candidates for collaboration. For instance, recent collaboration between the Advanced Distributed Learning initiative (ADL) and the Defense Modeling and Simulation Office (DMSO) focused on finding ways to use the SCORM data model to assess and record performance within an HLA-based simulation. Similarly, ongoing research between ADL and the European Association of Aerospace Industries (AECMA) recently looked at ways to integrate SCORM-conformant training material into S1000D-based IETMs.

Beyond MOUs and general research and talks about collaboration, the standards bodies involved should consider undertaking collaborative projects that target actual operations and training needs. Solving real-world problems based on end-user needs and input can help illuminate portions of each standard that are the strongest candidates for joint and collaborative coverage.

Notes on the Experience of Transforming Distributed Learning Materials into SCORM Standard Specifications

Ján Kollár, Ladislav Samuelis and Peter Rajchman

Keywords: ADL, Java, learning management system, learning technology standards, SCORM, LMS

Abstract: This article briefly describes the technical background of the e-learning activities at the Faculty of Electrical Engineering and Informatics, Technical University of Košice, Slovakia, summarizes experiences gained during the transformation of web-based materials into SCORM standard specifications, and highlights observed obstacles for the university management

EKS: Open-source Web-based Distributed Learning Tool

Wasana Ngaogate

Keywords: Extensible knowledge space, EKS, web-based learning, learning tool, LMS

Abstract: Depending on the variety of servers in a university, servers are located in different faculties and/or departments. The computer system administrators maintain the servers separately and each server may contain different specialised software in order to serve academic staffs' and students' needs. However, it is possible that they want to use some special software in other servers. Therefore, all servers should be able to communicate to each other. Users interact with the system via web browsers using a simple computer. Using current free technologies, the EKS (Extensible Knowledge Space) tool is designed and implemented based on a distributed system as a pilot prototype of a doctoral student thesis. EKS monitors students' learning from the online teaching material, feeding back to the teacher essential information that can in turn be used to continuously upgrade or extend the knowledge space. The final system will be able to serve students' needs at the right time with the right material.

Learning Choices: Generating and Integrating Informal Knowledge

Márcia Pereira and Effie Law

Keywords: Informal knowledge integration, web-based learning, learning tools and activities, socio-constructivism, collaborative learning

Abstract: One of the most important challenges faced by e-learning nowadays is the need to go beyond the traditional transmission models of teaching and effectively consider learners' contributions to the learning process. This article presents the concept of a Learning Management System (LMS) named HyperChoice, which proposes to promote the integration of the 'informal knowledge' generated by users' interaction with the learning environment and among themselves, making it re-usable by others. The relevance of this approach, mainly in higher education and professional training, is discussed and a model for its implementation is presented.

Plagiarism, Cheating and Academic Dishonesty – Have You Been There?

Matthew Fawkner and Greta Keremidchieva

Keywords: plagiarism, copyright, web sources, academic dishonesty, advanced distributed learning, ADL, e-learning

Abstract: It has never been easier for a student, or indeed any other writer, to plagiarise, steal, or cheat from another's work. The Internet itself is almost a limitless source of information to support this practice. The wholesale copying of data and material has become a simple exercise. Libraries abound with books and publications all of which provide particular ideas, concepts and theories which can be copied, reproduced, or substituted as one's own. There is little doubt that plagiarism and cheating is 'academic dishonesty' which itself is considered by all reputable learning institutions as a serious transgression of academic integrity.

In this essay the subject of plagiarism and cheating are discussed within the broader term 'academic dishonesty.' Both breaches of academic policy include the deliberate fabrication, falsification, or passing-off and using of someone else's data, material, concepts, or intellectual property to represent one's own. To understand what is plagiarism (and hence cheating) there needs to be an accurate definition of the term. This is not so easy to arrive at as plagiarism can range from a writer's failure to use correct referencing to outright cheating and fraud.

So, what controls need to be instituted to thwart plagiarism and cheating? What policies need to be established within an academic institution to outlaw such practices? Are positive rules and procedures required, or is an advisory policy better to encourage students to maintain ethical standards and personal academic discipline? Research has established that plagiarists (and cheats) are aware that their academic dishonesty is counter to institutional norms and practices. Yet what causes an individual to plagiarism, or cheat? Is the academic institution at fault? Should a policy of better academic guidance and ethical motivation be encouraged and

advocated to avoid, or minimise plagiarism and cheating and promote original thinking by students? Has the Internet helped to make cheats and plagiarists prosper?

This essay is not intended to be provocative. It examines both cheating and plagiarism and the sources of academic dishonesty. Various examples will be considered to alert educators to the need to promote quality research and cognition in an attempt to reduce the likelihood of academic dishonesty by students under their control. The matters that apply in this essay apply equally to the learning environment created through the Partnership for Peace (PfP) Advanced Distributed Learning (ADL) network, as they do in any equivalent 'Learning Management System' (LMS).

Information Security of Distance Learning

Konstantin Arkhipov and Vasiliy Ovodkov

Keywords: Information security, distance learning, transactions control

Abstract: The problem of information security in distance learning is analyzed based on extended definition of security, which is based on a personal attitude and apprehension. To feel safe, a person needs to be able to obtain necessary information and to control a situation. Thus, security of distance learning includes not only security of maintaining hardware and software (as it is often considered to be), but also the control over basic functions and the process of training. Methods of increasing security and fault-tolerance on information systems are briefly discussed; links between security issues and raising quality of communication are traced.

Advanced Distributed Learning and Community

Ulrich Gysel and Jeffrey A. Krinock

Keywords: SCORM, community, Advanced Distributed Learning, ADL, "anytime, anyplace", just-in-time, autonomy, transactional distance, distance learning, e-Learning

Abstract: E-learning and Advanced Distributed Learning (ADL) display the potential to provide a wide variety of information, training, and educational material to people around the world, as did the advent of television several decades ago. The subsequent development and uses of television showed that it could be applied to both inform, educate, and uplift people and to placate, distract, and manipulate; similarly, the leaders and forward thinkers in using ADL technology should consider whether or not their motivations and their strategies for implementing ADL concepts

lay the foundation to free workers and soldiers to pursue autonomous learning and to deepen their understanding of "the big picture," and their role in the communities in which they live and work.

Two current "buzz words" or phrases associated with ADL include "anytime, anyplace" and "just-in-time training." Analyzing the application of ADL strategies in light of the implications of these phrases can help illuminate motivations and unmask side effects of various e-Learning and distance learning strategies. The Internet makes vast resources available that can free autonomous learners to broaden and deepen their understanding of their communities and the roles they have within those communities.

ADL strategies and technology implementations may be pursued in two different manners. Keeping workers and soldiers grounded in the larger picture of the enterprises in which they live and work will realize the liberating potential inherent in "anytime, anyplace." Likewise, pursuit of implementations that channel workers and soldiers to task or mission completion in a time-critical manner, blocking opportunities for reflection and genuine learning, may encompass the worst aspects inherent in the concept of "just-in-time training." In short, ADL can enhance or further destroy community. The way ADL technologies and concepts are implemented will deeply impact which of these two directions prevails.