Please cite as Ip, A., & Naidu, S.(2001) **Experienced-Based Pedagogical Designs for eLearning** in *Education Technology* vol XLI No 5, September-October 2001 pp53-58 *Magazine for Managers of Change in Education*, Publisher: Educational Technology Publications

Experienced-Based Pedagogical Designs for eLearning

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Abstract

In this paper, we discuss a selection of experience-based pedagogical designs, which stand to make the most of the opportunities afforded by information and communications technology. In the literature on experience-based pedagogical designs there is no clear distinction made between first person experience and third person experience (also seen as stories). In an information and communications technology-based learning (ICT) environment, reference to the first person is inherent in the design, and stories are seen as learning resources. Hence, in this paper we examine the potential role of ICT from two angles:

- the sources of experience and stories, and
- the need for peers to support the building of experience and whether such peer group support can be organized in a technological environment.

Keywords

elearning, distributed problem-based learning, computer-supported collaborative learning, computer-supported (critical incident-based) learning, learning by designing, web-based role-play simulation, experience, stories, case studies, rule-based simulation, goal-based scenario.

Pedagogical designs for optimizing elearning

In this paper, we discuss a selection of experience-based pedagogical designs, which stand to make the most of the opportunities afforded by information and communications technology. We have roughly grouped the use of experience in pedagogical designs into first-person-experience-based design (ExB1) and third-person-experienced-based design (ExB3).

People think in terms of experience and stories. New events or problems are understood by reference to previously understood stories and experiences. Therefore the issue with experience and stories is this: We know them, find them, reconsider them, manipulate them, use them to understand the world and to operate in the world, adapt them to new purposes, tell them in new ways, and we invent them. We live in a world of experience and stories. Our ability to utilize these experience and stories in novel ways is a hallmark of what we consider to be intelligence. There are numerous ways in which stories can be usefully employed to build powerful learning environments.

Stories and experiences are an important component of memory and reasoning (Schank, 1990) However, in the design of learning environments, Schank does not explicitly discriminate between the source of the experience. Unlike Schank, in this paper though we discriminate between the source of the experience. . We refer to first-hand experience as "experience" and third-hand experience as a "story".

First-hand-experience-based designs (labeled as ExB1) are learning environments that provide a safe and authentic environment for learners for thinking, reflection, decision-making, making mistakes and learning from their own experience. Learning environments with ExB1 include role-play simulation and rule-based simulation.

Third-person-experience-based designs (labeled as ExB3) are learning environments that make extensive use of real-life stories to support the learning and teaching process. These designs are grounded in the belief that stories and experience comprise not only the most authentic repository of knowledge but also serve as a strong motivator of learning.

While the pedagogical designs we examine below can be used in a non-technologically supported environment, our interest is more on how ICT can support these designs. Hence, we examine here the potential role ICT from two angles:

- its ability to present experience and stories, and
- its ability to support the building of experience by peers.

In the rest of this paper, we consider some of these attempts at using experience and stories to build such elearning environments and discuss the relationship of stories and experience.

Goal-Based Learning (ExB3)

These are educational environments in which goal-based scenarios are used to anchor learning. The intent of these environments is to place learners in a contrived but an authentic situation within which they have the opportunity to learn by doing and by making mistakes in a safe environment (Naidu, Oliver, & Koronios, 1999). Goal-based scenarios (GBS) are essentially simulations in which there is a problem to resolve, or a mission to complete. They

require learners to assume the main role in the resolution of the problem or the pursuit of their mission (Schank, 1997; Schank, 1990) Hence, goals in this context refer to the successful completion of the task at hand, and not the achievement of grades. In order to achieve this goal the learner needs to acquire particular skills and knowledge and make informed decisions.

To design learning environments based on the pedagogical foundations of GBS, a convincing problem (the scenario) is created. Learners are supported by stories as told by actors within the scenarios. Such stories are typically made available to the learners at the time when the stories will meet the immediate need of the task at hand. (Schank & Cleary, 1995) A GBS serves both, to motivate learners and also provide them with the opportunity to learn by doing, by making mistakes, and receiving feedback. The use of third person experience in GBSs is to enable learners make decisions based on the experiences of expert practitioners. GBSs also afford learners first person experience. These environments are safe since learners are likely to use the environment in a solo manner such that their actions are not scrutinized by peers and any mistake made will not result in a degradation of their assessment of learning outcome.

Type of Design	**Goal-Based Learning**
Key features	• Goal-based scenarios • Learning by doing
Source of experience	ExB3 Third person experience told as stories by actor in the scenario
Role of experience	Used to enable learners to make an informed judgement on action that is required.
Nature of support	None required

Web-Based Role-Play Simulation (ExB1)

Role-play simulations (RPS) are situations in which learners take on the role-profiles of specific characters in a contrived educational game. As a result of playing out these roles, learners are expected to acquire the intended learning outcomes as well as make learning enjoyable. While role-play is a commonly used strategy in conventional educational settings, it is less widely used in distributed web-based learning environments. The technology is available now to support the conduct of role-play simulations on the Web (Ip & Linser, 1999; Ip, Linser, & Naidu, 2001). The essential ingredients of a web-based RPS are a) dynamic goal-based learning; b) role-play simulation; and c) online web-based communication and collaboration. Let us consider each one of these in turn.

First, goal-based learning is acknowledged as a strong motivator of learning. Typically, goal-based learning comprises a scenario or context, which includes a trigger or a precipitating event. This event may be presented as a critical event and usually requires an immediate response from students. In RPS, each learner assumes the persona of different stakeholders in the scenario and may pursuit different goals as constructed by the learners and negotiated with the moderator. Furthermore, during the "game play", the goals of the learners may evolve as the game environment changes. Hence, we referred the environment to as "dynamic goal-based" (Naidu, Ip, & Linser, 2000). The *second* critical ingredient of this learning architecture is role-play, both in the sense of playing a role, playing with possibilities and alternative worlds, and playing to "have fun." Students are organized into teams to play out

particular roles within the context of a given crises or situation. In order to play out their roles effectively they need to investigate and carry out research. The *third* critical ingredient of this learning architecture is the Web. The Web houses the virtual space for the role-play, enables communication and collaboration among students, and between the students and the facilitators. The role play simulation generator (Fablusi™) enables the creator of the simulation to specify the roles that are central to the operation and the success of the RPS. This generator also enables the simulation creator to define tasks, create conferences, assign rights to participants in these conferences, as well as provide specific information and scaffolds to support the simulation.

Unlike GBSs where the designer concentrates on finding appropriate stories to be told to the learners at appropriate time, the task of finding relevant stories in role-play simulation has shifted to become the responsibility of the learners in this environment. For example, live news (such as that in political science role play simulation (Linser, 1999) is treated as history in the RPS. The use of stories (and perceived experience of stakeholders in the scenario) is part of the game play, which commands understanding and careful analysis by the learner in a rather lonely manner (as compared to case method, see below). RPS is designed primarily to build first person experience in a safe and supportive environment. The role of the moderator is especially critical. The moderator acts as an "angel", looking over the shoulder of the learner and provides support, guidance and hint in a just in time fashion.

Type of Design	**Web-Based Role-Play Simulation**
Key features	Role-play
Source of experience	ExB1 First person experience as acquired during the game play
Role of experience	Integrate into learners' repertoire during game play by different levels of reflection and testing in action during the game.
Nature of support	Peers: as competitors, partners or collaborators in the game Moderator: as an angel providing just in time support

Rule-Based Simulations (ExB1)

Rule-based computer simulations (RBS) are educational programs that model real systems. The learner's basic actions are changing values of input variables and observing the resulting changes in values of output variables. (de Jong & Joolingen, 1996) Rule-based systems are either conceptual or operational models (van Berkum & de Jong, 1991). Conceptual models contain principles, concepts, and facts related to the (class of) system(s) being simulated. Operational models include sequences of cognitive and/or non-cognitive operations (procedures) that can be applied to the (class of) simulated system(s). Examples of conceptual models can be found in economics (Shute & Glaser, 1990) or in physics (e.g. electrical circuits, (White & Frederiksen, 1989; 1990). Operational models can be further divided into models where timing of actions is not relevant (e.g. troubleshooting of avionics, (Lesgold, Lajoie, Bunzo, & Eggan, 1992), or troubleshooting of complex devices, (Towne et. al., 1990)), or where timing is critical (e.g. radar control, (Munro, Fehling, & Towne, 1985), flight simulation). In many cases, real operational proficiency includes knowledge of an associated conceptual model ((de Jong, Swaak, Scott, & Brough, 1995, August); (Kieras & Bovair, 1984)). For example, operational knowledge on fault diagnosis can be related to conceptual knowledge of the device that is to be diagnosed. The value of RBS is the

opportunity provided to the learners to try out different scenario in a safe and economical environment.

Type of Design	**Rule Based Simulation**
Key features	Students try different scenarios by changing values of input variables and observing the resulting changes in values of output variables
Source of experience	ExB1 Computer simulated responses to students' action.
Role of experience	To efficiently acquired skills which may be unsafe to try in real world or uneconomical
Nature of support	Computer pre-programmed responses

Case Study (ExB3)

A teaching case is a story describing, or based on, actual events, that justifies careful study and analysis by students. In other words, a teaching case is a story about the "real world" told with a definite teaching purpose in mind. A teaching case is a way of bringing the real world into a classroom so that students can "practice" on actual or realistic problems under the guidance of their teacher. Case teaching, unlike conventional lecturing, is discussion-based and experiential. The teaching case replaces the lecture as the vehicle for learning, and the case becomes the basis for discussion, exchange of ideas, knowledge and experience among participants. (Lynn, 1996; Rangan, 1995)

The case study method has been practiced for many decades. It was made famous, first, by Harvard University's Business School and, later, by Harvard University's John F. Kennedy School of Government. Now cases are widely available from these two schools as well as via the World Wide Web.

Unlike the previous pedagogical designs, focussed discussion, debate and analysis are applied to the teaching of a case. The art of running effective case method is the selection of teaching cases so that learners may induce, from these different case studies, the overall pattern and theory, and construct an understanding that may be applied in other novel situations later in life. Cases are obviously third-person experience. The transfer of such third-person experience into learners' own first-person experience is carried out by discussion and debate. During the discussion and debate, unlike role-play simulation, the learners are not protected by the anonymity usually available in role-play simulation or goal-based learning. Learners are directly confronted by their peers to the intellectual articulation they put forward. In a suitable friendly supportive atmosphere, however, case study method can provide a stimulating environment to learners. The RPS, while demanding co-operation from other players in order to move the game forward, does not necessarily provide a collaborative environment. In RPS, each player pursues individual objectives making frank exchanges of learning experience difficult. A collaborative learning environment, outside of the RPS, is possible by grouping several learners to play the same role in the simulation.

The conversion of multiple cases into a holistic understanding is a demanding preposition. Any first person experience gained during this process can be memorable.

Type of Design	**Case Study Based Learning**
Key features	Cases to be study and analysis by students
Source of experience	ExB3 Stories describing, or based on, actual events
Role of experience	Focal point of debate, discussion and analysis
Nature of support	Peers: debates, discussion and analysis

Distributed Problem-Based Learning (ExB1)

Problem-based learning (PBL) is a widely used approach to learning and teaching that uses an instructional problem as the principle vehicle for learning and teaching. In this case, the selected instructional problem comprises the object of study. This design draw experience from individuals in the target group or contrived from common experience.

The analysis and study of this problem comprises several phases that are spread over periods of group work and individual study ((Barrows & Tamblyn, 1980); (Evensen & Hmelo, 2000); (Schmidt, 1983)). *Distributed* problem-based learning refers to the use of this strategy in a networked computer-supported collaborative learning environment where face-to-face communication among participants is not essential. The process starts with the presentation of a problem via a case or vignette that could be presented to learners via the network. Next, learners work individually to engage in problem analysis. During this phase they attempt to generate explanations for the occurrence of the problem in this case. Based on this exercise they identify what they know and do not know about the problem and make decisions about undertaking individual research. This activity may be carried out individually and its results reported to the group via the collaborative learning network. Following this, a re-evaluation of the problem takes place and the first perceptions of participants are probably revised. All of this may be followed up with the preparation and presentation of a critical reflection, which is a personal synthesis of the discussion and engagement over the network.

The bulk of the learning task in this model takes place in an electronic environment, which is supported by computer mediated communications technology. (Naidu & Oliver, 1996) For each one of the topics addressed in the course, the learning experience in this electronic environment may unfold in stages over a defined period such as four weeks. In the first week students are required to articulate their first perceptions of the problem as presented to them. They develop some hypotheses which are their conjectures regarding the problem including its causes, effects and possible solutions, outline how they were going to go about searching for evidence to support their hypotheses and then collect that evidence. They "post" these comments on the electronic environment so that everyone can read others' approach to the understanding and resolution of the same problem. In the second week, after reading the initial reactions and comments of others on their own thoughts, students re-examine their first perceptions of the problem. They expand and refocus their conjectures regarding the problem and if necessary revise their hypotheses and data gathering strategies, and post these on the electronic environment. In the third week, as a result of the online discussions students would be able to identify new or related issues, revise their conjectures regarding the problem and perhaps make modifications to their problem resolution strategies. In the fourth week they prepare and present their own "critical reflection record" on the electronic environment. This comprises their final comment on the problem situation and how they sought to resolve it.

Type of Design	**Distributed Problem-Based Learning**
Key features	Problem solving with a task structure to support computer-mediated problem solving
Source of experience	ExB3 a problem via a case or vignette ExB1 experience among the learners
Role of experience	Utilization of learners experience to solve a problem and learn new thing during the process
Nature of support	Peer support in a structured sequence

Critical Incident-Based Computer Supported Learning (ExB1)

There has been growing interest in building learning environments that focus on supporting groups of learners engaged in reflection on critical incidents from their workplace ((Wilson, 1996)). Reports of knowledge sharing during the afternoon tea-break conversation of a group of maintenance technicians, supports the effectiveness of sharing of experiences. During these informal causal conversations, these technicians shared their "war stories" about how they solved problems daily. In the casual and friendly environment over the afternoon tea, the third-person experience, as told in first person, quickly transformed into the repertoire of the listeners. This gives rise to the premise that there is much potential for the storyteller for supporting learning.

A model of learning and instruction that embodies the essence of this focus as in the "Critical incident-based computer supported collaborative learning" (Naidu & Oliver, 1999). It is so called because the model integrates reflection on and in action, collaborative learning, and computer mediated communication into a model of learning and instruction. It is inspired, *inter alia,* by knowledge of the fact that practitioners regularly encounter in the workplace critical incidences, which present them with learning opportunities. It serves to teach learners to recognize these critical incidences as learning opportunities, reflect on them critically while in action, and then finally share these reflections in a computer supported collaborative learning environment.

A critical incident (from the workplace) presents a learner with a learning opportunity to reflect *in* and *on* action. Learners can do this by keeping *learning logs,* which is a record of learning opportunities presented. The log records how one approaches the incident, their successes and failures with it, and any issues that need to be resolved (e.g., things not fully understood or concepts that didn't make sense). The critical attribute of the learning log is that it concentrates on the process of learning. It is not a diary of events nor is it a record of work undertaken, rather it is a personal record of the occasions when learning occurred or could have occurred. The learning log also relates prior learning to current practice and is retrospective and reactive in action.

Learners engage in this process of critical incident-based learning in a phased manner. Phase one in the process comprises identifying a critical incident. Learners do this by identifying an incident from their workplace, which they consider as being significant to their roles. They describe the "what, when, where and how" of this critical incident including its special attributes and more importantly the learning gain they derived from this incident. Phase two comprises the presentation of the learning log via the computer mediated communication system. This log outlines to the group the critical nature of the incident and the reasons for the actions taken by the practitioner during the encounter with the incident. It includes

reference to what should or shouldn't have been done and the learning gain derived from the incident. Phase three comprises the discussion of the learning logs posted on the systems by all students. Learners attempt to make insightful comments and observations about other's learning logs with the explicit intention of learning from the pool of experience that lies there in front of them in this shared electronic space.

Finally, phase four is about the coalescence of theory and practice, that is, bringing theory to bear upon practice and practice to inform theory. This last phase in the process has to do with learners making the connection between what they are being presented as part of their formal education and what they are being confronted with as a part of their daily work. This process leads to a summary reflection, which seeks to identify the extent to which learners feel that the theory enabled them to cope with the critical incident they encountered at their workplace. It also reflects the adequacies and inadequacies of their theoretical knowledge, and any enlightenment they may have gained from reflecting on the learning logs of their peers and from the reflections of others on their own learning logs.

An interesting area worthy of exploring is this notion of learning logs. How the learning logs supported the reflective process in consolidating these isolated first person experience (incidences) into a holistic repertoire of the worker? And how the learning logs can support the "war stories" told during afternoon tea breaks?

Type of Design	**Critical incident-based computer supported collaborative learning**
Key features	• Critical incidents • Collaborative learning
Source of experience	ExB1 First person experience to be recorded in learning log ExB3 Sharing of learning logs of group member
Role of experience	Learning log helps to contextualise the learning experiences and encourage reflection.
Nature of support	Learning log - casual discourse with peer workers

Implications for the Design of Learning Environments

These examples illustrated how experience can be integrated into powerful and effective elearning designs.

Two main observations help to inform further design of elearning environments which support optimal use of both first person and third person experience:

1. Utilization of first person experience is an inherent design of powerful pedagogy designs. Explicit design consideration of elearning environment for first person experience is an independent process of supporting third person experience
2. We can roughly group third person experience into two categories: specially edited, reworded versions and original authentic versions.

Designs to support first person experience vary too much to identify common element for generalization. The reviewed designs (Goal-based Scenario, role-play simulation and Case Method) are different environments from a technical point of view. We have experience in designing role-play simulation and that experience can be applied to design the other environment.

The provision of third person experience - a learning resource - demands special consideration. Traditionally, the major effort in creating packaged learning based on any of these designs has been placed on creating the learning resources - selecting the material, re-editting the material, reworking the content. Such approaches are obviously preferred by many designers. However, the comforting notion of everything is in control has to be weighted against the cost of production.

The web is a huge resource and is still mostly free. The ability to tap into this resource has potential to improve the learning experience. When properly designed, the Web can provide the most up-to-date information in a most authentic manner. We have identified designs that can use such resource in a powerful and effective way. We have also articulated the need to acknowledge the potential use of resources which are not originally created for educational use (NEF resources) (Ip, Morrison, Currie, & Mason, 2000; Ip & Naidu, 2001). The next task would be devising a mechanism to support the discovery of appropriate NEF stories to meet the need of the various designs, to enhance the transfer to third person experience into first person experience and into the repertoire of the learners.

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