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Submitted Proposal

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Learning Objects Technology: Implications for Educational Research and Practice

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RATIONALE

This proposed alternative session is focused on a critical review of the Learning Objects Movement and its likely impact on educational research and practice. The basic premise underlying the proposed discussion is that the Learning Objects Movement so fundamentally challenges the current methods of educational content design and delivery that there is virtually no educational area which shall not be affected by the new paradigm's implementation. With such a massive proposed paradigm shift, much of it still unclear and non-standardized, it is of critical import that educational researchers and technical specialists alike improve their understanding of the implications of such a technology, carefully consider both the potential rewards and the possible risks of such a movement, and ask difficult questions within the educational community BEFORE such a paradigm shift is firmly established as a pedagogical model. It is through such informed, critical discourse that such any such new paradigm is most likely to succeed.

BACKGROUND – ORIGINS OF OBJECT ORIENTATION

The notion of object orientation is not new. As far back as the mid-1960's, object orientation principles were put into use by Ole-Johan Dahl and Kristen Nygaard at the Norwegian Computing Centre in Oslo, Norway in an early attempt to simulate real-world objects. Later, as the so-called "software crisis" of the 1970's and 80's firmly took hold, and software companies struggled with unmaintanable and unreadable programming code, object orientation (which had been in continuous development with the development of the Smalltalk and C++ programming languages) was looked upon as a possible "silver bullet" which would permit and foster the dream of software engineers: reusability, portability, lowered costs, and reduced maintenance of programming code. Software companies began to slowly implement object oriented programming principles in hopes of alleviating and overcoming the problems associated with the "software crisis."

In an interesting and somewhat unexpected turn, it eventually became apparent that object oriented programming required a highly radical change in thinking within the programmer. It was found that simple understanding of the software structures and rules pronounced by object orientation were insufficient for writing good code: the programmer not only had to obey the rules of object orientation, but she had to change her cognitive processes from a procedural model to an object model. No longer was a program constructed by saying, "first do this, then do that." Now, the programmer had to think in terms more pertinent to an object-based, non-procedural paradigm. This, in turn, lead to an even further evolution in the object oriented saga, that of object oriented DESIGN. In order to successfully create an object oriented solution, one must start out with the mindset of object oriented design, and then follow with the actual implementation of object oriented programming.

WHAT DOES THIS MEAN TO THE EDUCATIONAL WORLD?

The educational world has experienced a developmental history that in many ways rivals the challenges faced by the software community. Lack of reuse of existing training materials, the re-invention of instructional content which varies only in the slightest of ways from existing instructional materials, high development costs, and lack of access to instructional content have created inefficiencies that are strikingly similar to the software crisis of the 1970's. Further, as technology began to impact the instructional world with such advances as computer aided instruction, the gap between the educational and technological worlds tightened. Educators began to run into the same limitations and issues faces by software designers: can instructional content be reused? Can content be shared among disparate geographical areas? Can existing instruction be combined with other instructional components to create entirely new instruction? As an added item on the wish list, developers began to ask themselves if these goals could be accomplished efficiently and at reduced costs.

LEARNING OBJECTS AS AN INSTRUCTIONAL TECHNOLOGY

With this background in mind, it can be readily understood why the notion of some of the principles of object orientation could potentially be beneficial to the educational community at large. If instruction can be "quantified," or divided into discrete components, then "packaged" in some format so as to make those individual units easily accessible by anyone from a library of such components, it might be possible to rapidly and inexpensively develop instructional materials from pre-existing instructional content, combining components at will at a moment's notice to easily develop an entire instructional system. Creating such an instructional system might not differ greatly from a person walking into a library, selecting only the desired books (instructional units), placing them in her "book bag" (the course or lesson outline), and quickly assemble them to form a complete learning system. Further, others can use these same books in combination with other books to create entirely different instructional systems. This is the promise of a so-called "object economy" applied to an educational world: fast, efficient, and inexpensive instructional systems built of reusable instructional modules. Spoken in more formalized language, "objects" (discreet items of instructional content) are stored in a "repository" (the library of objects), which are then combined and presented using an LMS (Learning Management System, a software program which contains the functionality necessary to carry out this duty) to users anytime, anywhere.

The potential benefits of such an approach appear so great that there has developed a large-scale effort to standardize such an object-based instructional delivery system. The ADL (Advanced Distributed Learning Network) is a salient example of such a massive effort seeking to standardize such a system. An initiative launched by the White House Office of Science and Technology (OSTP) in 1997, ADL works with a vast consortium of government agencies and private corporations, and is developing SCORM, the "Shareable Content Object Reference Model," which provides the object functionality previously described. ADL has worked closely with standards organizations such as the Learning Technology Standards Committee of the IEEE, the Instruction Management Project, and the Aviation Industry CBT Committee. SCORM, the content model for object use, is currently at the version 1.2 level.

In spite of the seemingly great promise of such systems, many questions concerning the development and implementation of such systems remain open to debate. Because such an approach has never before been applied to instructional systems to so large a scale, we have no previous experiences upon which to draw for guidance. Some of the greatest difficulties in defining a standard for such an object based instructional system may not even be in the detailed technical issues surrounding such a system, but rather in attempting to arrive at a definition of an instructional object: its size, its scope, its attributes. How is existing instructional content made "discreet," that is, broken into objects, which can be used

interchangeably with other objects? And how can content be shared across cultures and language barriers? Further, does the metaphor of objects even fit the social act of learning at all?

This session will examine these and other issues surrounding the development and implementation of such an object-based instructional technology. Because of the wide range of views and backgrounds of the distinguished panelists, a lively discussion concerning these topics is expected. Some of the specific topics panelists will discuss include:

- How does the object-oriented design paradigm as applied to the design of learning objects impact our understanding of the meaning of learning and teaching?

- What effect does the application of technical, object-based specifications have upon the quality and usability of instructional content placed into this paradigm? 3. What fundamental changes in thinking are required to achieve a successful collaboration between technical professionals and learning?

- Can the sharing and combining of learning objects create new knowledge?

- Does the learning objects paradigm fit into our understanding of planned learning and instruction, and can such a paradigm be successfully adopted by learning specialists?

- Tangible objects, e.g., rulers, abacuses, and so on, have been an integral part of learning throughout time. The new learning objects metaphor views objects as content-oriented and software based. What lessons from the conventional use traditional learning objects can be applied in the development of the new leaning objects metaphor? Are the fundamental attributes of these object types really different?

- What are the implications of the division of instructional content into "objects", and how might these affect the holistic development of individuals and learning communities?

NATURE OF THE PROPOSED SESSION

This proposed session will gather a wide array of specialists active in the area of learning objects representing a variety of views concerning the use of learning objects technology and its impact on learning and instruction. There are additionally a number of prominent researchers active in the learning objects movement who will be attending the session outside of the panel. All session attendees will be strongly encouraged to actively participate in the discussions, which will be started by the moderator, and then turned over in sections to the panelists. The role of the moderator will be to ask many of the pertinent questions concerning the subject area and to draw out differing views and opinions on both specific and general aspects of the subject.

No paper presentations will be presented by the panelist members. Panelists will, however, provide a brief written position statement which will be published at the Learning Development Institute's website (http://www.learndev.org). The coordinators of the panel will also provide a document that presents an overview of the subject, pertinent research and findings, and a resource list for further study. This document will be published at the LDI website, and will also be available in printed format to all session attendees.

PANELISTS

Panelists for this session include some of the most outstanding leaders in the field related to learning theory, instructional design, and learning object design.

Dr. Ron Burnett
Emily Carr Institute of Art and Design
President
More information at http://www.eciad.bc.ca/~rburnett/

Dr. Edmond Gaible
Educational Object Economy Foundation
Executive Director
More information at http://www.eoe.org

Dr. Michael Hannafin
University of Georgia.
Professor and Researcher, Eminent Scholar in Technology-Enhanced Education,
More information at http://lpsl.coe.uga.edu/Hannafin/default.html

Dr. David Merrill
Utah State University and ID2.
Professor and Researcher in Instructional Technology a Utah State University.
More information at http://www.id2.usu.edu/MDavidMerrill/

Dr. Michael Spector
Syracuse University
Professor, Researcher, and Department Chair for the Instructional Design, Development & Evaluation department at Syracuse University.
More information at http://soeweb.syr.edu/faculty/Spector/.

Dr. Robert Tinker
Concord Consortium
Executive Director and Researcher
More information at: http://www.concord.org (continued, next page)

Dr. Jan Visser
Learning Development Institute
President and Researcher
More information at http://www.learndev.org

Dr. David Wiley
Utah State University
Professor and Researcher
More information at http://reusability.org/read/

PURPOSE OF THE SESSION

The purpose of this session includes the following goals:

1. To contribute to the knowledge base on the topic of learning objects technology

2. To identify research needs concerning the impact of learning object technology to the instructional domain

3. To investigate the appropriateness and feasibility of the learning object paradigm to the educational world

4. To present a wide array of perspectives on the conceptual foundations of learning objects, the current state of research on the theme area, and the implications this technology has on the holistic development individual learners and learning communities

SESSION PROCEDURES

Due to the nature of the session, emphasis will be placed on an interactive, participatory approach among panelists and attendees alike. Panelists will be provided a forum for presentation of individual views which can then be responded to by other panelists and session participants. The moderator will assist in focusing the discussions along the broad themes of the session, but due to the scope and complexity of the topic, it is expected that many new themes and questions will be raised and discussed as the session progresses. Such new themes may stir additional response among participants, which achieves one of the major goals of the session, the adding of new information to the knowledge base of

LONG-TERM ISSUE

This session is designed to be the start of a long-term investigation into the nature of the impact of learning objects technology within the instructional community. Because the educational community is truly transdisciplinary in the sense that it is practiced in all other disciplines, the importance of the impact of this technology cannot easily be overstated. It is this large potential impact that speaks to the need for continued involvement in the critical analysis of this technology.

DIVISION/SECTION/SIG SPONSORSHIP

This discussion is being submitted, in accordance with set procedures, to Section Six of Division C only. Because of the topic's great importance and high interest, however, sponsorship from any other additional Sections is welcomed.

Submitted to: AERA Division C, Section 6: Technology Research, 8/1/2001