

THE MULTIMEDIA DATABASE INITIATIVE

THE HEALTH/EDUCATION CLUSTER PROJECT- Year 2

FINAL REPORT

December 24, 2001

Submitted by the Health/Education Cluster Representatives:

Penny Jennett- Faculty of Medicine

Larry Katz- Faculty of Kinesiology

Bill Hunter- Faculty of Education

Dave Hawes- Faculty of Nursing

cc Dr. R.B. Bond
Vice-President (Academic) and Provost
Dean G. Gall- Medicine
Dean R. Zernicke- Kinesiology
Dean A. LaGrange-Education
Dean D. Tamlyn - Nursing

© 2001 University of Calgary

All rights reserved

No part of this report may be reproduced by any means, or transmitted, or translated into a machine language without the written permission of the authors

TABLE OF CONTENTS

1. Executive Summary	1
2. Background	3
3. Implementation and Evaluation Phase	3
3.1. Project Activities and Deliverables	3
3.2. Evaluation - Methods and Results	5
3.3. Collaboration and Leverage of Expertise and Funding	7
4. Budget	9
5. Dissemination Activities	10
6. Recommendations	10
7. Acknowledgements	11
8. References	11
Appendices	13
Appendix A- Collaborative Letters	14
Appendix B- Learning Objects Matrix	16
Appendix C – Learning Objects List (100 objects)	19
Appendix D- Full Evaluation Report	23
Appendix E – Evaluation Questionnaire	43
Appendix F- CAREO Summary	45
Appendix G – Allectra Summary	46
Appendix H – ALOHA Summary	47
Appendix I – Repository Evaluation Report	50
Appendix J — PERL-JAVA Allectra/CAREO Database Conversion	62

The Multimedia Database/Interface Initiative

The Health/Education Cluster Project- Year 2

1. Executive Summary

In 2001, the Health/Education Cluster (HEC) collaborative team received further funding from the Cluster Initiative Grant to move the multimedia prototype of 20 anatomy learning objects from the pilot stage to the implementation and evaluation stage. This initiative had three objectives: 1) to implement an operational cross-faculty shared multimedia repository on teaching/learning; 2) to develop and execute an evaluation of this multimedia database; and 3) to prepare a final report for dissemination purposes. The delivered product and its interface offers the faculties of Kinesiology, Medicine, Nursing, and Education the opportunity to share resource elements that can be used for lectures, labs assignments, live and electronic courses, course development, and self study. The project represents the collaborative merging of knowledge, expertise, and resources across faculties, and has provided those involved with experience in building and using learning objects and repositories, and facilitated the sharing of this experience with other international, national, provincial, and local e-health learning initiatives. The project has allowed the HEC team and its collaborators to collectively reach into the future and to move into the forefront of e-learning research.

Specifically, this project delivered:

- 1.1. An operational cross-faculty shared multimedia central repository, linking resources to teachers. This repository is a CAREO database housing the HEC anatomy multimedia objects. Development included: the preparation, tagging and content re-purposing of an additional 80 anatomy learning objects (e.g., video clips, texts, stills, graphics, animation, and audio clips); the conversion of the Perl Version of Electra Database to a Java Version and the porting of this software to a CAREO platform; the development of a cross-platform advanced Learning Object Hub Application (ALOHA); 4) the development of an IMS Metadata Mark-Up

prototype, including editing and automatic ingestion; and the insertion of the MESH metadata browser into the IMS keyword .

1.2. The development and execution of an evaluation of the central repository. Using direct observation and questionnaire methods, the evaluation assessed the effectiveness of the technical/user interface of the repository and also the perceived impact of the multimedia repository on teaching/learning. Overall, participants were impressed with the quality of the CAREO repository, its layout, and ease of access. Despite some limitations, the CAREO database appears to be a valuable tool for the sharing of educational objects with others.

1.3. The preparation of this Project's Final Report.

The HEC collaborative team expresses appreciation to the Cluster Initiative Grant, University of Calgary for the funding and support of this project.

The Multimedia Database/Interface Initiative The Health/Education Cluster Project- Year 2

2. Background

In 2000, the Health/Education Cluster (HEC) was awarded a University of Calgary Cluster Initiative Grant to develop a multimedia database to permit the Faculties of Kinesiology, Medicine, Nursing, and Education to store, search and deliver educational learning objects within the field of anatomy. The 12-month pilot phase, with a prototype of 20 learning objects, was completed in December 2000 and the pilot phase final report was delivered in January 2001. In 2001, the HEC collaborative team received further funding from the Cluster Initiative Grant to move the multimedia prototype from the pilot stage to implementation and evaluation stage. This initiative had three objectives: 1) to implement an operational cross-faculty shared multimedia repository on teaching/learning; 2) to develop and execute an evaluation of this multimedia database; and 3) to prepare a final report for dissemination purposes. These activities have now been completed. (<http://www.kin.ucalgary.ca/cluster>). The delivered product and its interface offers Cluster members (and faculty generally) the opportunity to share resource elements that can be used for lectures, lab assignments, live and electronic courses, course development, and self study. It is scalable and transferable. The evaluation findings are informative for current and future user activities.

3. Implementation and Evaluation Phase

3.1. Project Activities and Deliverables:

The Cluster team members and their collaborators met regularly during the 12-month period. Specific tasks were carried out on an ongoing basis throughout the project timeline. The project deliverables are as follows:

3.1.1. An operational cross-faculty shared multimedia repository, linking resources to teachers. This repository is a CAREO database housing the HEC anatomy multimedia objects. Steps in this development included:

- a) The preparation of an additional 80 anatomy learning objects (e.g., video clips, texts, stills, graphics, animation, and audio clips), including the required tagging and content re-purposing.
- b) The modification of the Perl version of Allectra. This development involved taking the flat text-file database of the Perl Allectra and converting this to MySQL. It included the porting of the Allectra front end to the flexible back ends being used in the Learning Commons.
- c) The development of Java version of the database. This Java version is XML compliant and allows for the display of XML documents by an on-the-fly conversion to HTML with Stylesheets.
- d) The development of a cross-platform advanced Learning Object Hub Application (ALOHA). This resulted in improved usability and features including the searching and adding of learning objects, content management, and an administrative utility (e.g., authoring, editing, authentication).
- e) The development of an IMS Metadata Mark-Up prototype, including editing and automatic ingestion. This prototype automates and facilitates mark-up of metadata for the HEC database and future IMS Metadata compliant databases.
- f) The insertion of the MESH metadata browser into the IMS keyword. Details of this development along with accompanying features are found in Appendix D.

3.1.2. The development and execution of an evaluation of the central repository. The evaluation strategy is outlined below and detailed in Appendix C. The evaluation frameworks and rating scales that were developed in Phase I were applied. The evaluation activity assessed the effectiveness of the technical/user interface of the repository and also the perceived impact of the multimedia repository on teaching/learning. Specifically, the questions addressed ease of use, efficiency (Does the database enable better access to more materials?), and preferences (Would instructors expect to use the product in their own work?), and visual design (Is the interface

pleasing? Does it welcome use?). The strengths and weaknesses of the product, as it now exists, were also documented.

3.1.3. The preparation of this Final Report.

3.2. Evaluation - Methods and Results:

A usability evaluation of the database (repository) was conducted using two data collection methods: direct observation and questionnaire. Nine experienced and knowledgeable faculty members were interviewed using a conversational analysis approach that involved direct observations of users interacting with the software database. Affiliations of the faculty included Medicine (2), Kinesiology (1), Nursing (1), Education (1) and the Library (2). In addition, faculty members from two external institutions were observed (nursing and kinesiology). The direct observation sessions were recorded and transcribed. Content analysis of the transcripts took place. Questionnaire data were descriptively analyzed and reported. Evaluators commented upon access to the database (Login); front page, layout and menu; links; search capability; and the ability to add, subscribe, or unsubscribe to objects; the browse capability; and plug-ins.

Participants were impressed with the quality of the CAREO repository. They responded enthusiastically to the objects they found. The following comment illustrates this finding:

“As a front-end reviewer, I was very pleased. Overall the effectiveness is great. Very nice layout and easy to follow. I would give it 95%. (I have) more positive comment and a few changes that would make it a couple percent better. I like the designer colors and the fresh easy to follow layout.”

The average rating (along with the range) of content, instructional value, technical merit, and benefits were as follows:

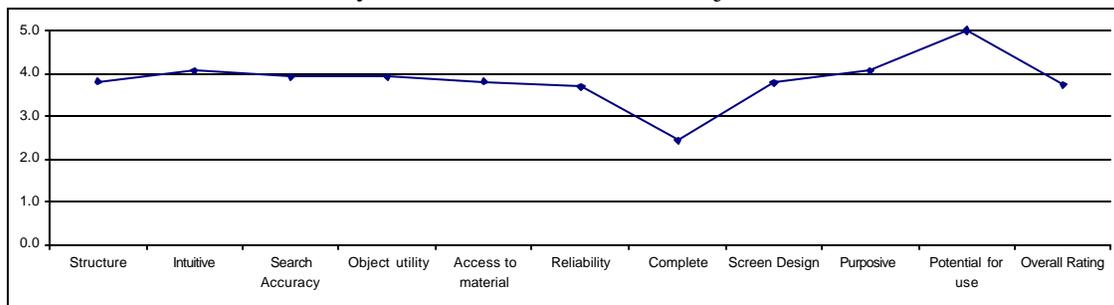
Table 1 - Participants rating of content, instructional value, technical merit, and benefits of the HEC anatomy database of multimedia objects. (*)

	A	B	C	D	E	F	G	H	I	Total	Average
Content											
Structure	2.5	4		4	3	3	5	5	4	30.5	3.8
Intuitive	2.5	4		5	5	3	4	4	5	32.5	4.1
Instructional Value											
Search Accuracy	4.5	4		2	4	2.5	4.5	5	5	31.5	3.9
Object Utility	5	5		4		5	4.5	5	3	31.5	3.9
Access to Material	2	5		2	5	4	4.5	5	3	30.5	3.8
Technical Merit											
Reliability	3	4	3	4	5	4	4	2	4	33	3.7
Complete	1	1		2	2	3	4.5	2	4	19.5	2.4
Screen Design	2	3	4	5	4	2	4	5	5	34	3.8
Purposive	5	3	3	5	3	3	4.5	5	5	36.5	4.1
Benefits											
Potential for Use	5	5	5	5	5	5	5	5	5	45	5.0
Overall Rating	2.5	3	4	4	4	3	5	4	4	33.5	3.7

* Values range from 1(poor) to 5 (optimal)

A graphical representation of the participants' average rating of content, instructional value, technical merit, and benefits of the database are outlined in Figure 1.

Figure1 - Participants average rating of content, instructional value, technical merit, and benefits of the HEC anatomy database of multimedia objects.



The complete evaluation report is provided in Appendix C.

Specific comments with respect to the limitations of the database are summarized below:

- There should be greater adherence to some established web design standards (e.g., underlining links and not underlining other text).
- The opening page should make clearer the purpose of the site and some of its key features.
- The terminology chosen to describe some features and label some buttons needs re-consideration, as it tended to confuse users.
- The “My Objects” listing is a useful and valuable feature but the implementation needs some specific polishing.
- Both browse and search features were valued, but the advanced search did not perform to expectations and the “disciplines tree” in the browse section needs various refinements.
- It is valuable that users may add objects to the database, but authors also want to be able to edit and delete their contributions.

In sum, the CAREO database appears to be a strong tool for the sharing of educational objects. It provides a powerful package of features for instructors interested in sharing with others their work of finding educational objects. The enthusiastic response of the evaluation participants validates the need for such a tool and indicates the value of making the system as usable as possible for as large a group of faculty as possible.

3.3. Collaboration and Leverage of Expertise and Funding Sources

The project represents the collaborative merging of knowledge, expertise, and resources. Those involved in this educational objects initiative (i.e., the HEC multimedia data base project) have gained first hand experience in building and using objects and repositories. As well, through this research work, they have informed much broader international, national, provincial, and local e-health learning initiatives which are searching for similar solutions (e.g., The Merlot International Activity, The National Belle Project, The Alberta Campus Initiative, The Alberta CAREO Project, the National Portal for Online Objects in Learning (Poole) Activity and the local Allectra Activity). The HEC team and

its collaborators have collectively reached into the future and are at the forefront of e-learning research.

The following paragraphs detail the collaborative areas of expertise, which were pooled for this research activity.

- BELLE/NETERA/ LEARNING COMMONS- metatagging, content re-purposing, intellectual property, and server expertise. This included access to the Canadian Core Learning Resource Metadata Specification (CANCORE): the development of the cross-platform version of the advanced Learning Object Hub (ALOHA)- the central repository database; links to the developmental work of the Portal for Online Objects in Learning (Pool) project; links to the Merlot project (an international initiative on the development, evaluation, and sharing of postsecondary teaching resources); as well as the Campus Alberta project. Lastly, the HEC deliverable product is now located on a server within the Netera/BELLE/ Learning Commons infrastructure.
- LIBRARY- outstanding support and guidance for Year 1, including the use of their Allectra software in the development of the prototype, along with the ability to leverage funds and expertise from the Library Lee project. Further, the library provided programming and MESH Heading expertise.
- In its evolution, this HEC research activity was also able to obtain funds from the Alberta Learning Enhancement Allectra Fund, <http://allectra.ucalgary.ca>, and from the National BELLE CANARIE funded project. Not only did the HEC project benefit, but so did the Allectra and BELLE initiatives. The BELLE initiative was able to report the HEC funds as part of their required matched funding for CANARIE.

4. Budget

Revenue :

Balance from Phase I	\$17,927.57
Phase II - waiting to receive	\$40,000.00
Total Revenue:	\$57,927.57

Expenditures:

Broadbent Enterprises Inv. 2013	\$900.00
Elisia Teixeira (Oct - Dec)	\$1700.00
Kinesiology	\$4000.00
Medicine	\$4000.00
Education	\$3000.00
Nursing (Base fee)	\$2000.00
Multimedia Budget – Analysis - Stage I*, Stage II	\$32,861.00
Publications/Presentations/Poster pres.	\$3500.00
Final Report Preparation	\$4200.00
Financial Services	\$1000.00
Transcription	\$731.57
Travel - Dr. Hunter	\$35.00
Total Expenditures:	\$57,927.57

5. Dissemination Activities

a) Presentations

- SMART 2000- Demo/presentation, November 2000, Calgary, Alberta
- Association of Canadian Medical Colleges` (ACMC) Medical Informatics Group- April.2001, Toronto

b) Abstract

- COACH Conference- e-Health 2002: A new Era of Health Care Delivery, April 2002, Vancouver. The focus of this abstract is on the Evaluation phase of the project.

c) Publication

- A minimum of one publication is a work in progress. Dr. Larry Katz, Kinesiology, is playing the lead in this activity.

6. Recommendations

- That the University of Calgary teams, undertaking or conducting database related work, be made aware of this project so that they can build upon it and benefit from the lessons learned.
- That the Cluster representatives make a formal presentation/demonstration to our respective deans collectively and to Deans Council to facilitate that the study findings are disseminated and shared through the Campus community.
- That the University consider policies specific to such issues as intellectual property, copyright, merit considerations, and quality control (peer review) as additional shared repositories evolve.

7. Acknowledgements

Funding support- The University of Calgary- Cluster Initiative Grant. The HEC team representatives wish to express their appreciation for this funding and support.

The HEC project team wishes to acknowledge the expertise, and assistance of the following Groups and individuals. Without this support this Cluster Initiative would not have succeeded in achieving its goals.

Information Resources (Library) - Mary Westell , Linda Pearce, Donald Vandebeld, and Dan Woods.

Library Consultant for medical meta-tagging- Shirley Thistledown

Learning Commons, Netera, Belle, CAREO - Trevor Doerksen, Mike Magee, Darcy Norman, Mike Mattson, Julian Wood, Robert Purdy, Doug MacLeod, Doug Bowman, Janice Bakal

Mount Royal College- Mark Lefave

Education- Elisia Teixeira, research assistant extraordinaire

Kinesiology- Bill Richardson, Murray Maitland, Veronica Everton-Williams

Medicine-Richard Hannah, Mark Atkinson

The Health Telematics Unit- Judy Hunter, Neera Datta

Appreciation is also expressed to those who volunteered their time and expertise to contribute learning objects or for the evaluation activity.

8. References

Dobson, M., McCracken, J. & Hunter, W. (1998). A formative evaluation planning guide: Teaching and learning with technology. An internal guide produced to support the LEE projects.

Pearce, L. (2001) Lessons Learned: The Development of Electronic Reserves at the University of Calgary, D-Lib Magazine, 7(11), web address - www.dlib.org/dlib/november01/11contents.html

Health/Education Cluster website (2000) – www.kin.ucalgary.ca/cluster

APPENDICES

Appendix A- Collaborative Letters	14
Appendix B- Learning Objects Matrix	16
Appendix C – Learning Objects List (100 objects)	19
Appendix D- Full Evaluation Report	23
Appendix E – Evaluation Questionnaire	43
Appendix F- CAREO Summary	45
Appendix G – Allectra Summary	46
Appendix H – ALOHA Summary	47
Appendix I – Repository Evaluation Report	50
Appendix J — PERL-JAVA Allectra/CAREO Database Conversion	62



CAMPUS ALBERTA REPOSITORY OF EDUCATIONAL OBJECTS

www.careo.org

Michael Magee
CAREO project
B1 525, 2500 University Drive NW
Calgary, AB
T2N 1N4

To: The University of Calgary Health Cluster
Re: CAREO and Health Cluster collaboration

I would like to write to thank the Health Cluster for its dedication and support of the CAREO project during the development and implementation of their own Health Cluster repository. The CAREO project recognized early on that it was critical that we develop a community of users around our educational object repository and the Health Cluster provided an ideal group.

The community that surrounded the repository is a priority. It is critical that there be a group of educators to inform the design of the project and provide feedback when the repository prototype was finished. The Health Cluster group was involved in the CAREO project from the beginning as they looked for solutions to serve up their own multimedia content among the group. As the CAREO repository began development the Health Cluster offered to assist the project by providing financial support, volunteering their multimedia content and allowing CAREO to become part of their project evaluation. Their users became integrated in the first round of prototyping and evaluation of the CAREO repository. The process provided invaluable information to the CAREO project about the kinds of issues that will need to be resolved in order for educational object repositories to be adopted at the post-secondary level. The feedback also informed decisions about the features and capabilities of the next round of prototype development for the CAREO project. It will also prove invaluable to the BELLE project as it starts to implement a national educational object repository in the New Year.

Sincerely,

Michael Magee
CAREO Project
Appendix A

Appendix A- Collaborative Letters

To: Dr. Penny Jennett, Head, Telehealth Program From: Mary Westell, Assistant Director, Technology – Information Resources Re: Collaboration on Allectra Object Repository

This is to thank the Health/Education Cluster for your contributions to our Allectra project. We are now in the final testing phases of the database conversion to MySQL and anticipate that the new database will provide a more robust and scalable platform for the Allectra software. This project allowed us to further develop our Allectra software, originally funded by LEE, thus building on a previous project to benefit a wider group. It also enhanced our collaboration with the Learning Commons and allowed us to share expertise, particularly in the area of metadata. Without the funding provided by the Health Education Cluster, we would not have been able to move to MySQL for some time.

Information Resources has been pleased to work with the Cluster during both phases of your project. There are many areas that overlap in the work we are doing, and we were especially appreciative of your understanding of the role of librarians in the development of object repositories (catalogues!) and metadata standards. There is much yet to be done as we adopt overall standards for repositories of educational objects in all formats that support teaching and learning and ensure that these objects are appropriately accessible. Cluster members also provided us with rich and diverse input on the question of copyright - an issue that we deal with daily in Information Resources.

Congratulations on your important work with the teaching object repository. We would be pleased to work with you on future projects, particularly the integration of such repositories with other information access tools.

Mary Westell

Appendix B- Learning Objects Matrix

Object #	URL of Main Application (7.2)	Module Title (7.2.2)	Related URL	Object (4.3)	Title (1.2)	Description (1.5)
64				http://www.netera.ca/~aloha/HEC/atria_morph.mov	Embryology of atrial septum	Animation demonstrating the transformation of the common atrium into right and left atria
65				http://www.netera.ca/~aloha/HEC/atria_sept.mov	Embryology of atrium	Animation detailing origin of vessels entering and leaving the atria
66				http://www.netera.ca/~aloha/HEC/vshunt1.swf	Blood flow and the erection mechanism - Part 1 & 2	Schematic animated representation and description with voice over describing the penis erection mechanism: Part 1: shows the involvement of the arterial blood inflow and venous blood outflow. Part 2: shows the increase/decrease in the blood flow and press

Appendix B- Learning Objects Matrix

Discipline	Subdiscipline	Keywords (1.6)	MeSH (9.4)	CINAHL (9.4)	Pictorial (9.4)
Physiology	Embryology	Embryology, heart, atrium	Cardiovascular System:Heart:Heart Atrium;; Cardiovascular System:Heart:Fetal Heart;; Embryology		
Physiology	Embryology	Embryology, heart, atrium	Cardiovascular System:Heart:Heart Atrium;; Cardiovascular System:Heart:Fetal Heart;; Embryology		
Physiology	Reproductive System	Histology, Physiology, erectile tissue : corpora cavernosa : arteriovenous shunt : AV-shunt	Urogenital System:Genitalia:Genitalia, Male:Penis;; Reproductive and Urinary Physiology:Reproduction:Sex:Penile Erection:		Animation :

Appendix B- Learning Objects Matrix

Contribute (2.3)	Role (2.3.1)		Interactivitytype (5.1)	Description (6.3)	Type (4.1)	Contribute (3.3)	Role (3.3.1)	Contribute (3.3)	Role (3.3.1)	Date (3.3.3)
Richard S Hannah, PhD	Author	QT Movie	mixed		Quicktime plugin	Shirley Thistlewood	Metatagging - MeSH Keyword Indexing	Richard S Hannah, PhD	Metatagging	31-Oct-01
Richard S Hannah, PhD	Author	QT Movie	mixed		Quicktime plugin	Shirley Thistlewood	Metatagging - MeSH Keyword Indexing	Richard S Hannah, PhD	Metatagging	31-Oct-01
Richard S Hannah, PhD	Author	Flash animation	mixed		shockwave for flash	Shirley Thistlewood	Metatagging - MeSH Keyword Indexing	Elisia Teixeira	Metatagging	31-Oct-01

Appendix C- Learning Objects List

Object #	Title (1.2)	Description (1.5)
1	Ball and Socket Joint	Description and demonstration of a ball and socket joint in movement.
2	Condilar Joint	Description and demonstration of a condilar joint in movement.
3	Fulcrum	Description and demonsrtation of fulcrum in movement.
4	Hinge Joint	Description and demonstration of a hinge joint in movement.
5	Immovable joint	Description and demonstration of an immovable joint.
6	Pivot Joint	Description and demonstration of a pivot joint.
7	Plane or Gliding Joint	Description and demonstration of a plane and gliding joint.
8	Saddle Joint	Description and demonstration of a saddle joint.
9	Slightly Movable Joint	Description and demonstration of a slightly movable joint.
10	Synovial Joint	Description and demonstration of a synovial joint.
11	Agonist Muscle	Description and demonstration of an agonist muscle.
12	Antagonist Muscle	Description and demonstration of an antagonist muscle.
13	Shoulder Girdle: Elevation / Depression	Picture of thoracic region, posterior view, with rt girdle bones in movement showing elevation and depression
14	Shoulder Girdle: Protraction / Retraction	Picture of thoracic region, posterior view, with rt shoulder girdle bones in movement showing protraction and retraction
15	Shoulder: Flexion / Extension	Picture of upper body, lateral view, with rt shoulder bones in movement showing flexion and extension
16	Shoulder Girdle: Abduction / Adduction	Picture of upper body, anterior view, with rt shoulder bones in movement showing abduction and adduction
17	Shoulder: Rotation	Picture of thoracic region, anterior view, with rt shoulder bones in movement showing rotation
18	Shoulder Circumduction	Picture of upper body, lateral view, with rt shoulder bones in movement showing circumduction
19	Elbow: Flexion / Extension	Picture of upper body, lateral view, with rt elbow bones in movement showing flexion and extension
20	Forearm: Pronation / Supination	Picture of forearm with bones in movement showing pronation and supination
21	Wrist: Flexion / Extension	Picture of hand in movement showing wrist flexion and extension
22	Wrist: Abduction / Adduction	Picture of hand in movement showing wrist abduction and adduction
23	Finger: Flexion / Extension	Picture of hand in movement showing fingers flexion and extension
24	Finger: Abduction / Adduction	Picture of hand in movement showing fingers abduction and adduction
25	Finger: Lumbrical Flexion	Picture of hand in movement showing finger: lumbrical flexion
26	Thumb: Flexion / Extension	Picture of hand in movement showing thumb flexion and extension
27	Thumb: Abduction / Adduction	Picture of hand in movement showing thumb abduction and adduction
28	Thumb: Opposition	Picture of hand in movement showing thumb opposition
29	Surface Anatomy	Graphical menu for selection of thoracic region or forearm for more detailed views of the muscles and bones of those areas
30	Anatomical regions terminology of the human body	Anterior and posterior views of woman figure used for displaying the different anatomical regions of the body, accompanying the movement of the mouse over the figures.
31	Muscles and Bones of the lower arm and hand areas	Forearm region of a human body with optional anterior and posterior views of surface, muscle and bones, and respective names upon mouse over the figure.
32	Muscles and Bones of the thoracic and upper arm areas	Thoracic region of a human body with optional anterior and posterior views of surface, muscle and bones, and respective names upon mouse over the figure.
33	Lower extremity graphic menu for related muscles and bones	Picture of human body under waist down to feet, used as graphical meny with mouse over showing muscles
34	Muscles and Bones of the lower extremity, leg and feet areas	Leg region of a human body with optional anterior and posterior views of surface, muscle and bones, and respective names upon mouse over the figure.

Appendix C- Learning Objects List

Object #	Title (1.2)	Description (1.5)
35	Muscles and Bones of the lower extremity, gluteous, thigh and feet areas	Under waist to below knee region of a human body with optional anterior and posterior views of surface, muscle and bones, and respective names upon mouse over the figure.
36	Hip: Flexion / Extension	Lateral view of human body from waist line to below knee, showing extension and flexion movement with the right leg, and bones superimposed
37	Hip: External / Internal Lateral Rotation	Anterior view of human body from waist line to below knee, showing external / Internal lateral rotation movement with the right leg, and bones superimposed
38	Hip: Abduction / Adduction	Anterior view of human body from waist line to below knee, showing abduction / adduction movement with the right leg, and bones superimposed
39	Knee: Flexion / Extension	Lateral view of human body from waist line to feet, showing flexion / extension of the right knee movement, with bones superimposed
40	Knee: Valgus/Varus (Abnormal)	Anterior view of knee bones showing valgus/varus (abnormal) movement
41	Ankle: Dorsiflexion / Plantarflexion	Lateral view of the foot showing dorsiflexion / plantarflexion movement with bones superimposed
42	Lower extremity graphic menu for related muscles and bones	Graphical menu for selection of thoracic region or forearm for more detailed views of the muscles and bones and organs of the torso
43	Jaw: Elevation / Depression	Lateral view of human face from nose to neck showing movement of jaw elevation / depression
44	Jaw: Protraction / Retraction	Lateral view of human face from nose to neck showing movement of jaw protraction / retraction
45	Neck: Flexion / Extention	Lateral view of human head and neck showing movement of neck flexion and extention
46	Neck: C1-C2 Occipital Hexion	Posterior view of head cervical bones showing C1-C2 Occipital Hexion
47	Neck: C1-C2 Occipital Rotation	Posterior view of head cervical bones showing C1-C2 Occipital rotation
48	Neck: C1-C2 Side Flexion	Posterior view of head cervical bones showing C1-C2 Occipital flexion
49	Ribs: Elevation / Depression	Anterior view of the thoracic region showing elevation and depression movement of the ribs
50	Whatever moves you - Opening	Opening views of the video: "Whatever moves you" created by Access TV
51	Why is functional anatomy important?	Dr. Murray Muitland explains why functional anatomy is important.
52	Common Anatomical Terms	Clip of person climbing with voice over describing proximal and distal direction with muscles superimposed
53	How does movement occur?	Clip of person lifting weight with upper extremities with voice over describing agonists and antagonists muscles and images superimposed
54	Analysis of Movement	Clip of bones of hip joint in movement showing abduction / adduction and rotation with voice
55	Tools for analysing the movement	Image of human body running in a track plotted by a computer demoing the use of technology applied to the analysis of movement
56	CHQR-AM Calgary 10/1998	Dr. Muitland statement on the use of computer for teaching antomy
57	CIBC-AM Calgary 10/1998	Dr. Muitland statement on the use of computer for teaching antomy
58	A Channel Calgary 10/1998	Dr. Muitland statement on the use of computer for teaching antomy
59	Channel 7 Calgary 10/1998	Teaching at the UofC of the layers of the human body through computers (autopsy), in preparation for dissection of real cadavers
60	CJEZ-FM Toronto 10/1998	U of C teaching anatomy with computers might help initiate those who find hard to deal with real cadavers
61	CFTR-AM Toronto 10/1998	Dr. Muitland statement on the use of computer for teaching antomy
62	Bone integrity	Demonstrates smashing of bone exposed to high temperature, ie role of collagen in bone stability

Appendix C- Learning Objects List

Object #	Title (1.2)	Description (1.5)
63	Histopatology: Asthma: Introductory Animation	Asthma histopatology: reaction to an alergen by a sensitive person showing the involvement of lumen bronchiole, goblet, ciliated columnar, mast cell, IGE antibodies, histamine, bradykinin, prostraglandin, PMNs, eosinoplils, efferent and afferent nerves, capillary and smooth muscle with voice over describing the process.
64	Embryology of atrial septum	Animation demonstrating the transformation of the common atrium into right and left atria
65	Embryology of atrium	Animation detailing origin of vessels entering and leaving the atria
66	Blood flow and the erection mechanism - Part 1 & 2	Schematic animated representation and description with voice over describing the penis erection mechanism: Part 1: shows the involvement of the arterial blood inflow and venous blood outflow. Part 2: shows the increase/decrease in the blood flow and pressure and the regulatory mechanism those into the penis
67	Cartilage and appositional growth	Animated graphical representation of the cartilage showing mechanism of new matrix secretion by the mesenchymal cells in the inner layer of the perichondrium that differentiate into chondroblasts.
68	Histopatology: Emphysema: Introductory Animation	Schematic animated representation and description with voice over of healthy lungs and the basic processes caused by tobacco smoking and other pollutants, including the protease (elastase) and anti-protease (anti elastase / alpha antitripsin), related to emphysema.
69	Histopathology: Emphysema: Bronchiole	Schematic animated representation and description with voice over of the normal bronchiole and the mechanism related to the elastic fibres. Also shows the imbalance mechanism of the ratio of the elastase and anti-elastase causing it to collapse, which explains the decrease in airflow in patients with emphysema.
70	Histopathology: Emphysema: Kinds of Emphysema	Schematic animated representation and description with voice over of the normal configuration of the lungs function, showing respiratory and terminal bronchiole, alveolar duct and sac, and alveolus. Emphysema Types: Centrilobular or Centriaciner Emphysema and Panlobular or Panacinar Emphysema are described
71	Hypertrophy of Chondrocytes, Formation of Bone Collar, Primary Center Ossification, Expansion of Primary Center, Secondary Center Ossification	Schematic animated representation and description with voice over of the following processes Hypertrophy of Chondrocytes, Formation of Bone Collar, Primary Center Ossification, Expansion of Primary Center, Secondary Center Ossification
72	Intracellular exchange of substances, with size limitations, and substances in the extracellular compartment	Schematic animated representation of substances moving in between intracellular compartments limited by size, and movement of different substances in the extracellular compartment
73	Heart Tube formation/sagittal	Animation demonstrating heart tube fusion and pericardial sac formation
74	Heart Tube folding/ventral view	Animation of heart tube folding
75	Heart Tube folding/lateral view	Animation of heart tube folding
76	Formation of Mesenchymal Condensation, Center of Ossification, Formation of Bone Spicules	Schematic animated representation and description with voice over of the following processes: Formation of Mesenchymal Condensation, Center of Ossification, Formation of Bone Spicules
77	Lamellar Bone	Schematic animated representation of the Lamellar Bone formation through successive changes in orientation of the collagen fibers. Segments of 3 layers are illustrated.
78	Rawbone and role of collagen in bone stability	Demonstrates smashing of raw bone , ie role of collagen in bone stability. Use with ashbone.mov

Appendix C- Learning Objects List

Object #	Title (1.2)	Description (1.5)
79	Remodeling of Haversian Bone	Schematic animated representation and description with voice over of the processes involved with the Remodeling of Haversian Bone, and the Resorption of Haversian Bone.
80	Differentiation of the Spermatid	Schematic animated representation and description with voice over demonstrating the spermatid into a spermatozoon, showing the changes related to cell transformation, nucleus compactation, acrosome formation, and Tail assembly transformation
81	aorticopulmonary septum	Animation of aorticopulmonary septum formation
82	atrioventricular valve	animation of atrioventricular valve formation
83	Embryology of ventricular septation	Animation of ventricular septation
84	Small intestine Microvilli	Animation of the movement of intestinal villi
85	Virtual tour of the BACS Centre	Virtual tour of the BACS Centre of the Medical Education Resource Unit - Faculty of Medicine - University of Calgary
86	Cyclist picture	Partial view of a cyclist: feet are shown depicting being in movement
87	Muscles of the Back	(picture) TRAPEZIUS and LATISSIMUS DORSI - Muscles of the Back - Picture of dissection procedure. - Note: text for drawing / diagram
88	Multimedia Database Interface - 12 Month Initiative	Multimedia Database Interface - 12 Month Initiative - Presentation to the Deans (Nursing, Kinesiology, Education and Medicine). September 25, 2000
89	Muscles groups primarily responsible for movement.	Muscles groups primarily responsible for movement. (Video Clip) - Agonist muscles Antagonist Anatomy Movement Skeletal Neutralizer Stabilizer Syne
90	Passive posterior laxity comparison of ACL-intact and ACL-deficient knee	Instrumented measurement of passive anterior posterior laxity in the ACL-intact and ACL-deficient knee
91	Urinary Structure - Part 1 of 2	The adult urinary system consists of the: Kidneys, Ureters, Bladder, Urethra
92	Urinary Structure - Part 2 of 2	The adult urinary system consists of the: Kidneys, Ureters, Bladder, Urethra
93	Body Segments and Compartments	Body Segments and Compartments are presented in organizational schemes: structural and developmental
94	The cell cycle	Cell Cycle - animation that shows the stages in the cell cycle
95	Spine - CT scan image of a normal spine.	Axial Tomography spine CT scan Diagnostic Techniques Procedures Radiology
96	Passive posterior laxity comparison of ACL-intact and ACL-deficient knee	Instrumented measurement of passive anterior posterior laxity in the ACL-intact and ACL-deficient knee
97	Vascular response of inflammation - Animation of fluid movement	Red Blood cells flow vessels fluids capillaries cardiovascular physiology
98	Hip abduction graph	Hip abduction (Graph picture) Range of Hip abduction motion measurements in 16 NHL hockey teams.
99	Cell division	Cell division phases: original chromosome set, chromosomes
100	Shock levels and signs	Blood flow breathing emergency treatment eyes gastric mobility injuries shock

HEC - Evaluation

December 20, 2001

Introduction	24
Methods	24
Results	26
Access to the database (Login)	26
Front page, layout and menu.....	27
Links.....	29
Search capability.....	30
Adding objects	31
Subscribing to objects	33
"My objects".....	33
Browsing the Objects (disciplines).....	34
Plug-ins	34
My member account.....	35
Questionnaire responses.....	35
Table 1 - Participants rating of content, instructional value, technical merit, and benefits of the HEC anatomy database of multimedia objects.(*).....	36
Graph 1 - Graphical representation of the participants average rating of content, instructional value, technical merit, and benefits of the HEC anatomy database of multimedia objects.....	6
Table 2 - Participants responses to open-ended questions of evaluation questionnaire (Appendix 2) applied at the end of the HEC evaluation session.....	37
Analysis	38
Access to the database (Login)	38
Front Page layout and menu.....	38
Links.....	38
Search capability.....	39
Adding objects	40
Subscribing to objects	40
"My objects".....	41
Browsing the Objects (disciplines).....	41

Introduction

The Health/Education Cluster (HEC) proposal called for a usability evaluation of the database used as a repository for the cluster's learning objects. At the project's close, the CAREO database was being used as the repository for the HEC anatomy multimedia objects. This report presents the methods and results of that investigation.

Methods

The education representative on the cluster committee and a graduate assistant hired for the task carried out this evaluation study. They selected nine faculty members to serve as informed users in a type of conversational breakdown evaluation of the database structure, technical aspects, search capabilities, and layout. Affiliations of the faculty included medicine (2), kinesiology (1), nursing (1), education (1) and library (2). There were also two faculty members from external institutions (in nursing and kinesiology). Selected faculty were sent an email invitation (see Appendix I) and the planned agenda for the sessions. The roughly one-hour-long sessions were based on the conversational breakdown protocol¹ developed in the "Lessons Learned" Learning Enhancement Envelope project (Dobson, McCracken & Hunter, 1998, available online: <http://www.acs.ucalgary.ca/~pals/guide-tl.html>).

Most evaluation sessions were held in the faculty member's office or alternatively, an office with access to a computer with the capability of playing multimedia files. The flow of the sessions followed a consistent pattern. Following a brief introduction to establish

¹ So called because the user who is being observed is regarded as having a conversation with himself or herself as he/she verbalizes their reasoning. When this conversation breaks down (for example, when the

Appendix D – Full Evaluation Report

rapport, the evaluators asked the faculty to work through the CAREO website verbalizing their thoughts as they did so while the evaluators watched and listened. The faculty were generally asked to access the HEC website in order to link to the CAREO repository page. Most immediately commented on the layout, look, and feel of the front page.

Following a period of browsing, the evaluators would ask the faculty to login as a "guest" and to observe the features available through this procedure. (Later, they would be asked to log in as a registered member and compare the differences.) Once connected as a guest, the participants were asked to try the simple and advanced search, as well as to browse objects by discipline. In order to log in as a member, most had to begin by creating their membership account. They were then asked to use the extra features available for registered members (e.g., adding objects, subscribing to an object and reviewing the "My Objects" page).

The session was terminated when the faculty members indicated that they had explored the database to their satisfaction and the interviewers had no other specific aspects to cover. The faculty member was then asked to complete a short questionnaire (see Appendix II). All participants agreed to having the sessions recorded. The tapes were transcribed to provide the data for the conversational breakdown analysis. One of the external faculty resides at a great distance from Calgary; he provided comments and answers by email.

user becomes absorbed by a task, the evaluators intervene with questions to restore the flow of commentary.

Results

All participants expressed an overall positive view of the database layout, indicated that they were impressed by what the project was seeking to achieve, and demonstrated enthusiasm on participating in the evaluation process even though all were able to indicate problematic areas and to make suggestions for improvement. The following specific comment illustrates this well:

"As a front-end reviewer, I was very pleased. Overall the effectiveness is great. Very nice layout and easy to follow. I would give it 95%. (I have) more positive comments and a few changes that would make it a couple percent better. I like the designer colors and the fresh easy to follow layout."

Access to the database (Login)

Nearly all of the participants found the opening page had too much text, was “busy” or had fonts that were too small:

"Small type is difficult to read on the first page. Verbose language. The following paragraph is difficult to read. And very difficult to have impact."

Few of the participants spontaneously noticed that it was possible to login as a "guest" or to create a membership account. They expected that the interviewers were going to supply them with their membership information or a general id/pw for access to the database. This is a good example of a conversational breakdown and when it occurred, the evaluators indicated next steps to get the process back on track. Only one participant encountered some difficulty in setting up a membership account with user's choice of the desirable id and password. For others, the process seemed to work very well, with participants clearly expressing their satisfaction.

Appendix D – Full Evaluation Report

Some suggestions were provided to make the information related to login access more visible on the screen. In general, the faculty members felt that the wrong information was being provided in the text area on this screen. They thought what was needed was something short and snappy, and that it should either briefly describe the project or provide log in directions or a feature summary. One suggested there is a need to better explain the features a registered user would have:

"... So, now being someone who's a member, then I've got additional features in "my objects" in my account -- add your objects. So I wonder if it would be helpful to provide some -- or maybe the information is provided when I click on this. You know, what I was thinking was something like if you're a new member, you know, CAREO has these features, you know, and these are the features -- add objects, my objects, my account. And then just a little brief statement around what each of these things mean."

Front page, layout and menu

All but one of the faculty found the colour scheme pleasant. Suggestions for improvement include better use of top banner area for providing relevant information, or even to replace the menu, although most found the left side area of the screen appropriate for the menu. There was a general expectation that information in the banner would be "clickable."

There were a few comments about the menu area in general regarding the items being too close together or "squished".

Appendix D – Full Evaluation Report

"... my first reaction was it's really busy. So I can search here, do an advanced search, frequently asked questions. Again, maybe with the use of colours or lines or something to separate out these three areas of information."

The feature object caught too much attention of all participants. Some referred to it as not being "appealing" to them due to the discipline archaeology and the participant from the health related field.

"... I'm thinking about what am I looking at here. I see Interactive Alberta Archeology Timeline. That does not speak to me. I'm in the Health/Education sector but I'm seeing archeology stuff so now I'm starting to look to the right now what relates to what I might be interested in."

However, others showed interested on the objects even though they were not from a health related discipline. One had an immediate interest in learning more about archaeology and saw that the sight could be a useful personal learning tool. Some participants did not understand the rationale of having the objects that constitute new additions to the database displayed on the first page. Suggestions for improvement include posting of brief explanation of the objects on the first page, which could be on a "mouse over" basis, and identifying the frequency of change for the featured object, such as weekly featured object—the general idea seemed to be that there was value in having a featured object but that users needed to be quickly informed about why it was there.

None of the faculty understood "repository" as a meaningful cue that this was a link back to their starting point. To go back to the login page, they had to return to the HEC website link (the "back" button often did not work). Many called for a button explicitly labelled

Appendix D – Full Evaluation Report

“home.” A few thought that the word “CAREO” should be linked to serve the function of a home button.

When browsing, several of the faculty called attention to the need to differentially coloured (or otherwise marked) already-visited links.

The logos for the plug-ins on the first page were questioned by several of the faculty:

" Move plug-ins to a separate page to avoid looking like an advertisement."

Some thought the plug-in link should pop up when needed; others thought it unnecessary since the browser would prompt for the plug-in. Most seemed to conclude (after deliberation) that plug-in links on the front page might be useful for some people.

Links

The developers have anticipated that CAREO will include multimedia, learning objects for a wide array of disciplines and have provided a browse structure based on the disciplines (a “disciplines tree”). However, at present, many areas are empty (linked to a message that no objects exist) and the faculty involved in this study recommended that links to these areas be deleted or printed in faded text or otherwise demarcated as empty since it is discouraging to link to empty sets.

"... So then you'd go, into education and then we got these too. So I clicked on Phys. Ed., thinking that obviously the objects must be in fairly deep, right, and there was nothing there. There's a whole whack of them just under education. So that whole thing has to be, you know, fine tuned in a way that it's not going to bring something up that says no objects for us."

Appendix D – Full Evaluation Report

At the time of the evaluation, the help guide or CAREO manual was not yet available. A "not found" page was displayed when users tried to link to such objects. Here too, the faculty felt that it would be better not to have a link if there was no object to link to.

There was also a comment on some "false messages," for example apparent links due to the use of underlining (or other conventional link strategies).

"... and the convention usually is if it's underlined it's clickable"

Search capability

The search engine presented two formats for use, simple and advanced. The simple search was the most used by all participants and the results were considered satisfactory for them:

"... The search functions worked great. The indexing was like being in a library- superb" Words used included for instance: anatomy, spine, and finger. However, in the simple search, it was not possible to search for authors' names. In the advanced search interface, the faculty appreciated the possibility of combining search terms. However, the users who tried that feature were not able to retrieve objects as they were expecting. There were multiple tries by some of the participants but the accuracy of the results was questionable. They based their expectation on the results obtained from the simple search, which did not correspond. (That is, objects known to be in the database sometimes were not found in the advanced search using terms that had worked in the simple search.)

One participant thought the database search engine should recognize common abbreviations used in health care (e.g., R.A. for rheumatoid arthritis, S.L.E. for Systemic Lupus Erythematosus, and OA for osteoarthritis).

Adding objects

All participants tried this feature that is available only to a registered member. They found it very appropriated for contributing objects to the database, which all said they wanted to do.

The interface for adding objects was considered appropriate, and all saw value in the plus and minus option to add or remove entry boxes for descriptions of the item, but few recognized what the icons implied without advice from the evaluators. The ability to add a new set of keywords based on different classifications was a feature that several of the faculty clearly valued.

There were a few comments specific to some of the metadata fields, such as those for keywords. There were some questions about the MeSH database for picking the appropriate set of keywords for the object (e.g., "anatomy" does not seem to be a keyword in the MeSH system). There was also a suggestion to include an explanation of the process used for searching and the respective rules for entering keywords:

" in terms of just the syntax you're supposed to use for your keywords. Or if they're just keywords --you assume they're just words, but if you want to put in phrases and keep the phrases together, do I have to put them in quotation marks..."

Several faculty asked about the ability to upload the object that is being contributed. The only acceptable objects in the current version of the database are the ones already in a webserver, and therefore, accessible by a URL. The database takes the URL for the object, although without any validation checking for authenticity, which can be

Appendix D – Full Evaluation Report

questionable in terms of affecting the reliability of the database contents overtime. It would probably be advisable to inform users about any existing availability of storage space for learning objects they may wish to contribute.

A quality assurance aspect was also brought into discussion by one of the participants: ...the reason I would suggest that is in this computer managed learning environment stuff that I've been working in, they didn't have that (review) and people could add courses and put it in the database. That you had an English 11. I had a Kinesiology 12. But there was no quality assurance that your English 11 met any of the criteria that we want for this."

Some participants were concerned about the lack of control over the contributed object. It was expected that upon submitting the object, some instructions on how to retrieve, edit, or even remove/delete the object would follow. This lack of control was pointed out by one of the participants as an impediment to his making further contributions to the database.

A few of the participants noted that the button for "save" when adding an object precluded any option to cancel. Moreover, they noted that hitting the button "save" took the user back to the "repository" page. They suggested the use of options to "save and continue" and "save and exit."

"... The two choices were "save" and "refresh." There wasn't one there for "cancel," "quit," "do it" or whatever it is. So anyway, yeah, that knocked us right out of there."

Subscribing to objects

Our faculty evaluators did not readily find CAREO's "my objects" feature which would allow them to subscribe to an object and have it added to the "My objects" page.

However, when it was called to their attention, all thought it to be a genuinely useful feature for teaching. It was suggested that the subscriber button should also be available in the search results from the "browsing the objects" area. In addition, there were some suggestions in regards to changing the name of the button to simply "add object" along with a mouse over explanation of its meaning:

" I mean, to my mind there's a consistency of language. If you're adding objects and the purpose is objects, then the language needs to say objects."

It seems clear that there needs to be language that distinguishes between "adding objects to my list of favourites" and adding new objects to the data base."

The faculty reviewing the software regarded notification of changes the author had made to the subscribed object as a highly valuable feature of the system.

"My objects"

The "My Object" seemed to be a bonus to the participants. All participants recognized the value of this extra feature that works in combination with the "subscribe" to an object feature. It was then noted that from this interface, the user could unsubscribe to the object, or "remove" it from his/her "My Object" page. The available "filter" box was not understood by any of the participants (nor, indeed, by the evaluators). At least one of the faculty felt that this area could also be used to list objects the user had contributed to the database and to allow control over them.

Browsing the Objects (disciplines)

The option of browsing the objects by disciplines was very well received by all participants, but specially by the ones who prefer to find objects from browsing all objects available in a given database, which were a few of them.

"...so now I can log in as a Guest so I'll do that. Then I have featured object. That's pretty cool. Simple search. Advanced Search. Well, let's see. If I'm a Guest User, I can't really just do a search because I don't have any faintest, foggiest notion of what's in there so I guess I'd look at newest objects or featured objects instead. There's no kind of list lists everything that's in there or is there? So that they can see just what's -- oh, you only have browse. That's right."

Some of the participants questioned the structure used for presenting the disciplines; one of them questioned it emphatically. The argument used was that of considering anatomy a discipline, and it was not included in the tree structure for the disciplines. It was noted that there were disciplines listed that constitute faculty departments, and anatomy, which is also a department at the Faculty of Medicine, was not included.

It was also noted that the hierarchical level of the disciplines tree did not reflect the expectations of all users; for example, "education" appears as a subhead of "physical education" which in turn is a subhead of a higher order "education."

Plug-ins

Most participants considered it a good idea to have links on the opening page for downloading the necessary plug-ins. All found it invaluable that the listing of retrieved objects (the search results) indicated which plug-ins any given object required.

My member account

Participants liked the member account area not only because it provided them information on their use of the system, but also because it informed them about what the system administrator was tracking with respect to their usage (i.e., what data was being retained regarding their use). In exploring this area, one faculty member noticed that the field for phone number had a note indicating that it had not been provided, when actually the information had never been requested. Participants felt they should have access to editing the information in this area for changes and updates.

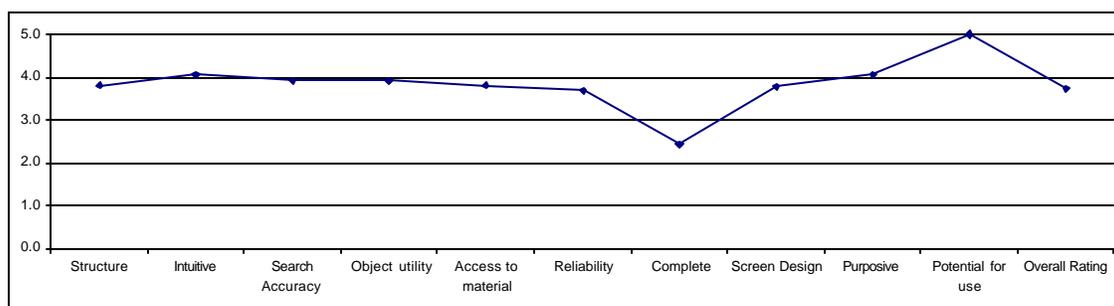
Questionnaire responses

Responses to the questionnaires are summarized below. Table 1 and 2 show the responses to the questionnaire, followed by results based on the conversation breakdown protocol evaluation session.

Appendix D – Full Evaluation Report

Table 1 - Participants rating of content, instructional value, technical merit, and benefits of the HEC anatomy database of multimedia objects.(*)

	A	B	C	D	E	F	G	H	I	Total	Average
Content											
Structure	2.5	4		4	3	3	5	5	4	30.5	3.8
Intuitive	2.5	4		5	5	3	4	4	5	32.5	4.1
Instructional Value											
Search Accuracy	4.5	4		2	4	2.5	4.5	5	5	31.5	3.9
Object Utility	5	5		4		5	4.5	5	3	31.5	3.9
Access to Material	2	5		2	5	4	4.5	5	3	30.5	3.8
Technical Merit											
Reliability	3	4	3	4	5	4	4	2	4	33	3.7
Complete	1	1		2	2	3	4.5	2	4	19.5	2.4
Screen Design	2	3	4	5	4	2	4	5	5	34	3.8
Purposive	5	3	3	5	3	3	4.5	5	5	36.5	4.1
Benefits											
Potential for Use	5	5	5	5	5	5	5	5	5	45	5.0
Overall Rating	2.5	3	4	4	4	3	5	4	4	33.5	3.7



* Values range from 1(poor) to 5 (optimal)

Figure 1 - Graphical representation of the participants average rating of content, instructional value, technical merit, and benefits of the HEC anatomy database of multimedia objects.

Appendix D – Full Evaluation Report

Table 2 - Participants responses to open-ended questions of evaluation questionnaire applied at the end of the HEC evaluation session.

	SK	LP	MW	BH	RH	JR	SC	GK	MM
Would you use the system?	yes	na	yes	Yes	yes	yes	yes	yes	yes
If contributed, object is appropriately available	na	na		would like to edit info	yes	yes	yes	yes	na
Would you contribute?	yes	na	yes	yes	yes		yes	yes	yes
Would you recommend to others?	0		yes	yes	yes	yes	yes	yes	yes
Would you use the "my objects" feature?	yes	yes	yes	yes	yes	yes	yes, but prefer bookmarks	yes	yes
Were there any labels/buttons that confused you?	Wrong messages for hot spots	many	yes	taxon, filter	0	subscribe, explanation required	subscribe consistent use of back or close	use mouse over for explanation	Contributor/author (used interchangeably)-Taxonomy
What aspects of the search process worked best?	Prefers to search by discipline		simple search			good	good database with wide range of keywords	would like to subscribe from browsing, thumbnails missing	Very smooth, attributed to proper Keywords
What aspects of the search process were more problematic?	Menu blended with other text	browsing	link objects to viewers, subscribe, etc.	simple search for author didn't work	simple search for author didn't work	Didn't take common abbreviations RA, OA,SLE	determine what pages the search buttons would be used on	crashed at times - not sure if URL or PC	Size and format of the objects.
Suggestions?	Use of colour for menu + Title/menu bar	given orally during session		control to author, save button in adding object interface doesn't allow to go back	better structure in disciplines , include anatomy	make search area clearly separated with colour/line	consistent use of terms/back key, etc more space between menu and info area	See notes	See notes

Analysis

Access to the database (Login)

The selected participants are highly experienced web users. This may have contributed to their expectation of receiving the membership information instead of being able to either login as a "guest" or setup their own account on line and on the fly. The web standard seems to be that users apply for membership and the login information is sent afterward. It may also be that the difficulty that some of the faculty had with the proximity of some menu items on this page may have contributed to their difficulty at the start of the site navigation.

Front Page layout and menu

The colour scheme is an important component of the website layout, and it is highly positive that the majority of the participants found it pleasant. However, although the colour scheme influences readability, the fact that all comments on the items of the menu being "too close together" demonstrate a problem with the readability and requires attention from designers for improvement.

The posting of a feature object and a list of the newest additions as part of the front page seemed to be considered beneficial by the participants, even though some minor changes are required as per the suggestions presented.

Links

When experienced web users hit a "not found" page they tend to draw unfavourable conclusions about the reliability of the website. Some means of communicating more accurate information to the user should be developed. Although all the participants

Appendix D – Full Evaluation Report

understood that the version being evaluated is under development, some still felt that “not found” messages should be avoided so that visitors do not feel that they are wasting time.

The use of underlining in regular text should be avoided to prevent giving false messages suggesting there are links available since underlining is generally a cue to links to other pages or pop-up windows.

Search capability

All participants recognized the accuracy of results of searches of the database, which is essential since one of the main concerns of users is being able to retrieve the best possible match for their needs. This finding certainly suggests that CAREO merits the time and effort involved in continuing to develop and test the database, and to make it available on at least a trial basis for use by faculty members.

Our reviewers valued being able to do simple searches on authors' names because they believe people commonly search for objects this way. Several of the reviewers had contributed objects themselves and acknowledged that vanity may have played a role as well (however, that may be a serious consideration for soliciting contributions—if faculty cannot readily find their own contributions, they will not likely contribute).

As noted earlier, the advanced search was well received by the participants. This makes it even more important that it be more closely analyzed to better understand the problems encountered by the participants.

Appendix D – Full Evaluation Report

The use of common abbreviations used in a specific subject area should be considered, although could be a challenge to implement, from a technical point of view, because of the number of such acronyms, their use with and without punctuation, and the possibility that similar letter chains would appear in other contexts.

Adding objects

The capability of adding objects "on the fly" was noted as a very important feature of the database, which is very opportune and certainly facilitates the contribution process.

However, the lack of control over the contributed object requires attention.

It also seems that there is a need for review of the object being submitted not only for its academic merit, but also for its technical quality. A technical review would, for instance, make it possible to avoid listing objects for which a non-functioning URL (typos, spelling errors, server changes, etc.) had been submitted. Ideally, URL authentication should be automated.

The issue of making a server available for uploading of objects is beyond the scope of this examination, but the question deserves continued attention.

Subscribing to objects

Being able to add an item to a personal list is clearly a feature that our reviewers appreciated, but CAREO needs to work out a number of kinks with respect to the label and the way it functions. One specific change would be making the "subscribe" button

Appendix D – Full Evaluation Report

also available with the search results obtained from browsing. Our reviewers were all puzzled by the availability of this feature when searching but not when browsing.

"My objects"

The "My Object" interface adds functionality to the database for its most likely uses in presentations and in teaching.

There is a need to explain the purpose of the "filter" option, as no one was able to figure out its purpose.

Using the "My Objects" interface to give users some control in managing their contributed objects seems to be appropriate and would add functionality and reliability to the database.

Browsing the Objects (disciplines)

It was clear that some of our faculty reviewers are browsers by choice and others saw browsing as a useful supplement to a search. Several indicated that their less web-experienced colleagues are likely to prefer browsing. It seems important, then, that much more be done to make the browsing interface both academically sound and intuitively appealing to most users.

An ancillary note

We were quite struck by the enthusiastic responses our faculty reviewers had to the objects they found when they searched. They would explain to us how difficult it is to find or create images of the quality they were encountering or comment on the utility that

Appendix D – Full Evaluation Report

some particular object would have in their teaching. Given that this test was done with only a large enough sample of objects to make the searching meaningful, this enthusiasm seems to be both a validation of the need for a tool like this one and an indication of the value to be obtained by making the system as usable as possible for as large a group of faculty as possible. It also may suggest that there is an important role to be played in the screening or rating of submissions since it seemed that concerns about the interface faded rapidly when one of our reviewers saw an object they liked. Evaluation of the quality of the objects in the repository was beyond the scope of this review, but the review would not be complete without noting the need to consider the question as the project continues to develop.

HEC Multimedia Database Evaluation Questions

Participant:

Date:

Content domains

Poorly structured						Well structured
Arbitrary						Intuitive

Instructional value

Low accuracy of search results						High accuracy of search results
Poor utility of object found						Good utility of object found
Problematic access to materials						Appropriate access to materials

Technical merit

Unreliable						Consistent
Incomplete						Complete
Poor screen design						Good screen design
Glitzy						Purposive

Benefits

No potential for use						High potential for use
----------------------	--	--	--	--	--	------------------------

Overall rating

Poor						Excellent
------	--	--	--	--	--	-----------

Appendix E –Evaluation Questionnaire

1-If this tool were available to you, would you use it, how often and for what purposes?

2-A - If you have contributed to the database, are you satisfied that your work would be appropriately available through this tool?

2- B - Would you be interested in contributing your own teaching materials to the database for others to use?

2-C - Would you recommend that others contribute? Search?

3 - Would you use the "my objects" feature? Would you expect others to?

4 - Were there any labels (e.g. buttons) that confused you?

5 - What aspects of the search process worked best and why?

6 - What aspects of the search process were more problematic and how could the problems be overcome?

7 - Do you have any other suggestions for improvement?

CAREO Evaluation Summary

The Health/Education Cluster (HEC) proposal called for a usability evaluation of the database used as a repository for the cluster’s learning objects. The evaluation used nine experienced, knowledgeable faculty members as participants in a conversational analysis that involved observations of their use of the software. The sessions were recorded and transcribed. Further information was obtained from a short questionnaire completed by these participants.

While all of the participants were impressed with the quality of the CAREO repository, the evaluation process proved to be a rich source of suggestions for further improvements.

A few key suggestions were:

- There should be greater adherence to some established web design standards (e.g., underlining links and not underlining other text).
- The opening page should make clearer the purpose of the site and some of its key features.
- The terminology chosen to describe some features and label some buttons needs reconsideration as it tended to confuse users.
- The “My Objects” listing is a useful and valuable feature but the implementation needs some specific polishing.
- Both browse and search features were valued, but the advanced search did not perform to expectations and the “disciplines tree” in the browse section needs various refinements.
- It is valuable that users may add objects to the database, but authors also want to be able to edit and delete their contributions.

Our reviewers responded enthusiastically to the objects they found when they searched. Their response seemed to us to be both a validation of the need for a tool like this one and an indication of the value to be obtained by making the system as usable as possible for as large a group of faculty as possible.

In short, the CAREO database appears to be a strong tool for the sharing of educational objects that has succeeded in providing a powerful package of features for instructors interested in sharing their work or finding educational objects that others will share. The improvements we suggest are small in comparison to what has already been achieved and we believe the system merits the additional work to make it more powerful, more attractive and more useful.

Allectra Overview Summary

The Allectra project, originally funded through LEE, has been very successful, resulting in new software used during the project by the Universities of Calgary and Alberta, and Red Deer College, as well the University of Calgary Health Education cluster. We have developed new relationships with CanCopy and publishers, as well as with individual faculty members at both universities and Red Deer College. We have reinforced and strengthened productive working relationships with our partners (University of Alberta and Red Deer College). Partners have acquired hardware and software to support the operation of the new service. Staff at all three institutions have developed new expertise and skills that will overflow to other projects.

Allectra is still unique in that it combines the bibliographic, full text and copyright status of material to support teaching and learning. It is meant to be flexible and to support short and long term needs for full text, both on site and at a distance. Our process and result have informed other projects, including the development of an object repository for the Health/Education cluster. We are working with the Cluster to develop an SQL database under Allectra, which will provide a more robust system for all concerned. HEC is providing funding for this aspect of the project

Advanced Learning Object Hub Application (ALOHA)

Abstract

A collaboration between the University of Calgary Health Education Cluster, [Learning Commons](#), and [Library](#) working along side the [Netera Alliance](#), and the national [Canarie-funded Broadband Enabled Life-long Learning Environment \(BELLE\)](#) and [Campus Alberta Repository of Educational Objects \(CAREO\)](#) projects contributed to this research and development project. Directed at e-learning the alliance has taken on the design and build of an educational object repository and various tools for indexing, sharing, multipurposing, and repurposing learning objects. The Advanced Learning Object Hub Application (*Aloha*) is one of these tools. ALOHA is a suite of tools used for the discovery, management, customization, and delivery of learning objects. For use by indexers, educators and learners *Aloha* includes versatile and powerful indexing tools; flexible web, peer, and repository searching; content and course management and including the ability to multipurpose content between the desktop, the web, and CD-ROM; and includes the ability to customize, or repurpose, learning objects by educators and their students. Development is ongoing and contributions from other projects are being sought.

Here is an outline of some of the *Aloha* features:

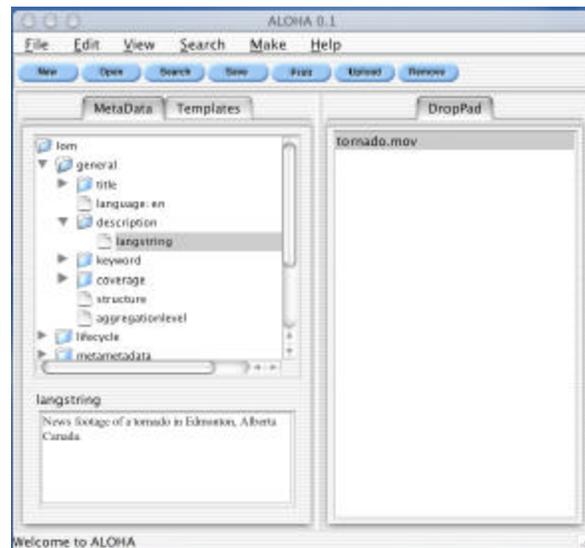
IMS, CanCore, DublinCore Metadata Indexing

Aloha is built for indexing. Its flexible interface is friendly for amateur users and customizable for the professional indexer. Easy to customize indexing templates, droplets, forms, custom tab orders, and automatic parsing of metadata from over 200 files types helps make marking up IMS or other forms of metadata a lot easier. Administration tools managing workflow issues with multiple indexers including the librarian, the educator, and the media developer are also available.

Any defined xml schema can be brought into *Aloha* and users can begin to use the *Aloha* interface to help them build productive tools for indexing tasks.

Importing IMS Metadata and exporting Dublin Core or any other metadata schema in validated xml files is a main feature.

Learning Objects and metadata can be uploaded with a touch of a button to any server handling the job of a FTP program.

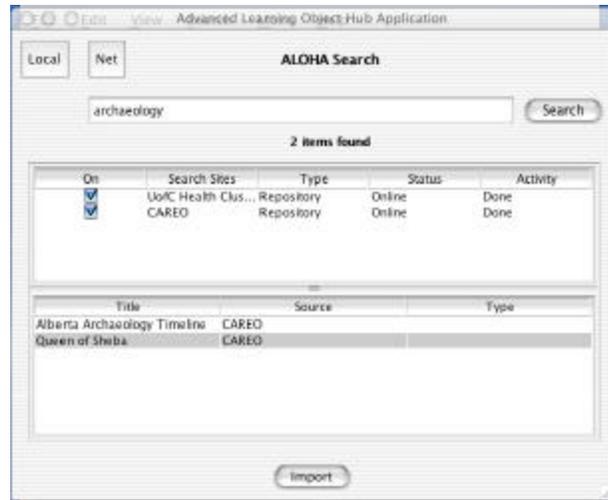


Peer-to-Peer and Inter-repository Web Searching

A stand-alone application that morphs peer-to-peer functionality and the world-wide web, *Aloha* permits local and Internet resources to be searched. Like Apple's Sherlock, its open architecture allows the addition of search-plugs to leading learning object repositories. It comes equipped with plug-ins for several learning object repositories, but even more would be great. Anybody interested in adding their repository should contact the developers. Using xml-rpc other repositories can be added with ease.

Like Napster it also searches the peer-to-peer network of users that choose to share their objects in the *Aloha* network. *Aloha's* search capabilities are simple to use, easy to expand, and more effective than standard web searches.

The best centralized learning object repositories will be vetted and restricted in their access, in so far as uploading of learning objects. Peer-to-Peer functionality is required in order to allow personal collections of learning objects to be shared amongst ad hoc communities of educators and learners. Desktop repositories can be batch uploaded to centralized repositories if desired.



Content Management and Multipurposing

Once a user has found a resource, whether it is downloaded or not, or if they have created a learning object themselves, *Aloha's* content management and multipurposing functions can be used to download objects, write CD's, manage courses, and deliver those objects in a revolutionary way. *Aloha* allows users to create *edulists* and courses and organize these for personal use or sharing with educators or students. Once arranged, *Aloha* will let users create a CD, share their *edulists*, classes, and courses with students and other educators through the web, email, or uniquely through *Aloha*. Learning objects can be visualized uniquely, customized to the users needs allowing content repurposing.

Content Repurposing and Customization

Every educator needs to customize learning objects for their unique teaching objectives. *Aloha* includes tools for building a questionnaire for webcast, annotate a 3D Animation to focus attention, provide active review for an online lecture, create a community for collaborative learning, or create an accompanying self-test. Any object in the system can be customized with simple to use standards-based tools. By simply attaching web pages, using MPEG-7 spatial and temporal annotation tools, IMS Question and Test compliant active review and self-testing tools, or the learning object chat and discussion tools, users will be able to customize and edit their learning objects for delivery.

APPENDIX H - ALOHA Summary (confidential)

Aloha also provides MPEG-4 editing of streaming video. This allows educators to edit the online resources simply and succinctly to deliver to their students. Combined with the other customization and management tools of *Aloha* this feature will revolutionize the way video is used in and outside of the classroom. *Aloha's* search features can also be directed to search within learning objects.

This paper describes *Aloha* in brief detail. The presentation will demonstrate some of its features. One of the most important principles of *Aloha* is to open its architecture even further to allow a sustainable development environment and promote its usage among educators.

High Level Evaluation of
Educational Repositories

Trevor Doerksen
Alanna Edwards
Mike Magee

August 22, 2001

APPENDIX I – Repository Evaluation Report

The purpose of this report is to describe the findings of the evaluation of education repositories on behalf of the Health Education Cluster (HEC) at the University of Calgary. Alanna Edwards, Trevor Doerksen and Mike Magee of the Learning Commons completed the report. Trevor and Mike established the evaluation criteria based on HEC documentation and background in content management, database design, and learning objects. Alanna was contracted by the Learning Commons to provide an impartial evaluation of several alternative identified in the analysis phase. Six repositories, including both existing and proposed repositories, were evaluated for this report. These were: Lydia Inc.'s Virtual Private Repository (VPR), NYUOnline, POOL Prototype, AladdinKM, the BELLE/CAREO repository, ALLECTRA and MERLOT.

The repositories were evaluated on a series of criteria including, but not limited to: metadata standard, costs, compatibility, scalability, educational approach, copyright, types of users, and various features such as indexing, multipurposing, life cycle management, automatic metadata ingestion, and asset management. For an in-depth breakdown of how each repository rates, please refer to appendix A.

A combination of methods was used to carry out this evaluation, and these included: speaking to a representative of the repository; reviewing technical reports; and searching on the Internet at the company site, and elsewhere to find information.

APPENDIX I – Repository Evaluation Report

Briefly, it was found that there were two viable options in terms of meeting the requirements of the Health Education Cluster, and two possible options if the development of the proposed repositories is carried out as planned, and in a timely manner. Finally, there are two unlikely options.

Lydia Inc.'s VPR

This system is based on the same technical foundation as the LydiaLearn repository, but is capable of being a self-contained repository. At \$10,000 USD initial cost, it is a relatively cost-effective solution. It is based on the SCORM/IMS metadata standards, and like all the others is browser-based. It has no limit to the number of developers or objects, and tracks individual Intellectual Property rights. It allows for developers who can create, locate, evaluate and modify content. All of the content needs to be in .zip format in order to be uploaded or downloaded, and it needs a mechanism to replay the content. The metadata is stored internally and presented as XML. If desired, the VPR allows for inter-repository communication amongst other Lydia VPR's.

One of Lydia's greatest assets is that its founder, and Chief Technical Officer is Dr. Tom Probert. Dr. Probert is on the SCORM/IMS committee, as well as having a research background with programs with the National Science Foundation, and the Defense Advanced Projects Agency. A drawback is that Lydia would host the Health Cluster's repository content, and could therefore be vulnerable depending on Lydia's technical competence. Overall, Lydia's VPR seems like a viable option.

NYUOnline

This repository appears to be very content-intensive with many options for courses based on New York University’s curriculum. However, it was not possible to find any further information on their web site that would indicate that there was an Enterprise solution available for sale. An e-mail requesting more information was sent, but was not responded to. Based on these limited findings, it is concluded that NYUOnline is an unlikely option, as it does not appear to meet the needs of the Health Education Cluster.

POOL

The High Level Functional Specification 1.0 document showed some promising information. It proposes to use the IMS and CanCore metadata standards, would be browser-based, and seemed to have good search capabilities. It would have a 3 MB file size limit, and a picture preview limit of 128 KB. The metadata information would be located in one central location while the content could be located in different areas across a network. Since the proposed cost is nothing, financially it seems a good deal.

However, some reservations about POOL need to be noted. At the time of writing, POOL had ended their partnership with IBM who was participating in the development of the repository. Given this, it must be questioned whether POOL will be able to deliver the proposed specifications and whether it can be done within a timeline that is suitable to the Health Education Cluster. The latter reasons cause it to be considered, if it is developed fully, a possible option.

AladdinKM

This repository, at \$50,000 USD (for educational clients) initial cost, a \$15,000 USD implementation and training cost, as well as a \$15,000 USD annual maintenance charge is the most expensive option evaluated. It follows the IMS and DublinCore metadata standards, and is browser-based. Technically, this product appears to meet the needs of the Health Education Cluster, with the promise that any additional requirements can be added, at a cost. They have four levels of contributors with different access levels to browse, submit, manage and administer. They currently do not track copyright, but this can be added. There are four ways of retrieving objects including: category search, key idea search, objective search, and attribute search.

Overall, AladdinKM seems like a system that can do all that the Health Education Cluster needs, and then some. However, given the hefty initial cost, and the annual maintenance cost, it seems doubtful that this would be the best long-term solution. If cost is not an issue, then it is rated as a viable option.

BELLE/CAREO

It is in the pre-prototype phase, it has been evaluated on its specifications list. It is another free repository, using the IMS and CanCore metadata standards. It will be browser-based, and extremely scalable. At this time, it does not propose to track copyright. It will define the users as members, non-members and administrator. Given that there was nothing tangible to evaluate it on, and

although a prototype is due out in the next several months, the likelihood of a timely delivery of the promised system causes it to be rated as a possible option.

MERLOT

It is a working system, however, when I was using it for the purpose of evaluation, I received error messages in response to the two searches I performed. It has a rather large price tag of \$25,000 USD per year. It uses the DublinCore metadata standard, is browser-based and there does not appear to be any limits on the number of objects or users. The copyright is not tracked and there is no hosting service provided. There are a large community of users who are separated into members, non-members and administrator.

Given the price, versus its performance, the MERLOT repository is rated an unlikely option as a long-term solution. It seems more reasonable to develop a repository to directly meet the Health Education Cluster's needs rather than try to adapt to the existing MERLOT system.

ALLECTRA

This is a working electronic reserve reading room used by the University of Calgary library. It is currently being ported from a flat text file to a mySQL backend. It has an extensive web based front-end administration and display system. HEC has already prototyped in ALLECTRA and found it to be deficient in features that would make it completely useful for their needs. ALLECTRA has been agreeable to making these changes to the backend and front end with their

approvals. They have committed to support the system for HEC. The Learning Commons has started working on the port and found some fundamental issues that may weaken its long-term viability. These are mainly concentrated on its back-end infrastructure. It needs to be determined whether this backend is worth building on. Even with the mySQL, port, scalability and performance are in question.

Conclusion

In conclusion, Lydia Inc.'s Virtual Private Repository and AladdinKM seem the most viable turn-key options for the Health Education Cluster's use, although Aladdin KM costs are beyond the budget for Health Education Cluster. NYUOnline and MERLOT are rated as unlikely solutions. POOL and the BELLE/CAREO prototypes look promising, but more information is required. A prototype of CAREO will be available in early September, and by mid-September it will be possible to move all HEC content to CAREO for testing.

It should also be noted that the HEC Learning Object Hub, built by the Learning Commons for adding and indexing learning objects, features efficiencies that solutions such as CAREO, POOL, and Lydia VPR are fully compatible. In addition to the adding and indexing of learning objects to a desktop repository, the Learning Object Hub currently allows the upload to IMS compliant repositories such as CAREO, searching of the desktop repository and online

APPENDIX I – Repository Evaluation Report

repositories, automatic ingestion of metadata from learning objects. Further development is required to make the Learning Object Hub even easier to use. Also, features to manage, annotate and edit learning objects are planned as part of the BELLE project. Sharing learning objects with others and providing opportunities for learners to collaborate are also slated for 2001. Full coordination of the Learning Object Hub with CAREO has already begun and perhaps as early as mid-September this can be demonstrated using HEC content.

[APPENDIX A](#)

Evaluation of Repository Options		
	PROS	CONS
Lydia Learn	<ul style="list-style-type: none"> ❖ relatively inexpensive option ❖ good fee-tracking so developers receive compensation ❖ software developer, Dr. Tom Probert on Metadata Standards ISM/SCORM committee. ❖ long-term vision seems viable 	<ul style="list-style-type: none"> ❖ objects are stored on Lydia’s server, so are vulnerable to their technical (in)competencies ❖ development of repository seems rather “reactive” rather than “proactive” ❖ metadata ingestion is time consuming
NYUOnline	<ul style="list-style-type: none"> ❖ they have a working solution 	<ul style="list-style-type: none"> ❖ they appear to be more focused on content than architecture. ❖ metadata ingestion is time consuming
POOL	<ul style="list-style-type: none"> ❖ can be developed for specific needs ❖ if development requirements match Functional Spec, it looks like a good fit. 	<ul style="list-style-type: none"> ❖ everything is hypothetical at this point ❖ will it be ready soon enough?
Aladdin KM	<ul style="list-style-type: none"> ❖ functionality is extremely flexible ❖ good search capabilities ❖ they could provide the repository that matched Client’s needs 	<ul style="list-style-type: none"> ❖ quite expensive option ❖ long-term is even more expensive ❖ metadata ingestion is time consuming
BELLE/CAREO	<ul style="list-style-type: none"> ❖ great ideas ❖ it’s FREE! 	<ul style="list-style-type: none"> ❖ was unable to find much that was tangible to evaluate on timeline for completion seems uncertain
MERLOT	<ul style="list-style-type: none"> ❖ it’s a working repository ❖ has a number of supporters both commercial and educational 	<ul style="list-style-type: none"> ❖ unattractive interface of website ❖ website not functioning properly ❖ expensive for what one gets

APPENDIX I – Repository Evaluation Report

		<ul style="list-style-type: none"> ❖ metadata ingestion is time consuming
<p>Allectra</p>	<ul style="list-style-type: none"> ❖ free ❖ partners easy to work with ❖ existing system ❖ usage tracking ❖ Dublin Core compliant 	<ul style="list-style-type: none"> ❖ costs 15-30k to customize ❖ customization on approval of partners only ❖ no open-source agreement ❖ usage tracking is no at the object level ❖ currently feature week from a education object repository ❖ no media server (BELLE has committed to provide) ❖ not IMS compliant ❖ metadata ingestion is time consuming

APPENDIX B

Repository	Metadata Standard	Costs	Compatibility	Scalability	Copyright	Users	Features
<p>Lydia Global Repository - Virtual Private Repository</p> <p>Susan P. Condon</p> <p>One Ash Street</p> <p>Hopkinton, MA 01748</p> <p>508-435-0550 ext.141</p> <p>Email: scondon@lydialearn.com</p>	SCORM/IMS /IEEE	<ul style="list-style-type: none"> • \$10, 000 initial 	<ul style="list-style-type: none"> • web-based • supports all file types 	<ul style="list-style-type: none"> • no limit to number of developers or objects • Dr. Tom Probert, creator of LydiaLearn is on the SCORM/IMS committee 	<ul style="list-style-type: none"> • individual Intellectual Property rights 	<ul style="list-style-type: none"> • authors are able to create, locate, evaluate and modify content • no templates available as of yet 	<ul style="list-style-type: none"> • all content must be in a .zip format to be uploaded or downloaded • metadata is maintained internally and presented as XML • need a mechanism for replay of content • there is inter-repository communication between other Lydia VPR's • can classify a resource in up to 10 different ways
NYU Online	SCORM		<ul style="list-style-type: none"> • web-based 		<ul style="list-style-type: none"> • tracks and manages digital asset rights 		<ul style="list-style-type: none"> • instructors can find and assemble courses (no modification capabilities) • OBDC-compatible relational database
POOL Prototype (based on High Level Functional Specification 1.0)	IMS/CanCore	<ul style="list-style-type: none"> • free (e-commerce model for Corporate Training) 	<ul style="list-style-type: none"> • web-based 	<ul style="list-style-type: none"> • 3Mb file size limit +Preview pictures limited to 128Kb 		<ul style="list-style-type: none"> • users can personalize their web-page so content is "pushed" to them 	<ul style="list-style-type: none"> • ability to browse by category and metadata • metadata information is located in one central location while content is located in different areas across the network
<p>AladdinKM Norma Richardson - VP Education Services</p> <p>602-445-3309 (Direct)</p>	DublinCore /IMS	<ul style="list-style-type: none"> • \$100,000 (\$50K for educational) • \$15, 000 implementation /training \$15,000 maintenance/ year 	<ul style="list-style-type: none"> • web-based 	<ul style="list-style-type: none"> • extremely scalable 	<ul style="list-style-type: none"> • not currently tracked, but can be added 	<ul style="list-style-type: none"> • levels of contributors with different access: browse; submit; manage; administer 	<ul style="list-style-type: none"> • 4 ways of retrieving objects: category search, key idea search, objective search, attribute search • their programmers can add virtually any feature you could wish for, at a price

APPENDIX I – Repository Evaluation Report

Repository	Metadata Standard	Costs	Compatibility	Scalability	Copyright	Users	Features
The BELLE/CAREO project	IMS/ CanCore	<ul style="list-style-type: none"> • free 	<ul style="list-style-type: none"> • web-based 	<ul style="list-style-type: none"> • very scalable 	<ul style="list-style-type: none"> • will not be tracked 	<ul style="list-style-type: none"> • members • non-members • administrators 	<ul style="list-style-type: none"> • seems like it will be a great thing, but there was nothing tangible to evaluate it on
MERLOT	IMS	<ul style="list-style-type: none"> • \$25,000 USD/year (Plus course release for 8 faculty members to become discipline leaders) 	<ul style="list-style-type: none"> • web-based 	<ul style="list-style-type: none"> • no apparent limits 	<ul style="list-style-type: none"> • not tracked 	<ul style="list-style-type: none"> • members • non-members • administrators 	<ul style="list-style-type: none"> • the Merlot website was not functioning very well • no hosting • IMS compliant • large community of users
Allectra	Dublin Core	<ul style="list-style-type: none"> • \$15,000 - \$30,000 	<ul style="list-style-type: none"> • web-based 	<ul style="list-style-type: none"> • proposed development will add scalability 	<ul style="list-style-type: none"> • tracked 	<ul style="list-style-type: none"> • administrators • members 	<ul style="list-style-type: none"> • system is limited in its metadata • no open source agreement • no hosting • usage tracking (not object oriented) • lacks appropriate features/metadata

- Functionality inherent in the PERL version and planned for the JAVA version of Allectra
 - all documents for the sociology courses digitized and stored
 - ability to log in and be authenticated at all three sites, preferably at the course level
 - ability to search documents by title, author, courses and instructor
 - ability to view the first screen before being asked to authenticate
 - ability to print copyright notices
 - ability to report to CanCopy the number of times a document had been accessed and to pay them accordingly
 - ability to view full pdf documents with Adobe Acrobat Search
 - ability to allow use of public domain materials without requiring authentication
 - links form 856's in opacs
 - ability to associate courses with more than one instructor, and documents with more than one course
 - ability to generate statistics
 - help screens

- In the JAVA version, the programmer has added:
 - instructor's request forms with wizards
 - automatic parsing of information from the above forms into metadata and copyright records
 - general announcements
 - ability to store and access different versions of documents, e.g., view and print versions, pdf and MS-Word versions, different resolutions for slides, etc.
 - two displays of bibliographic information – one brief and one with full citation
 - extended metadata support for monographics, serials and websites. Easy ability to add metadata types and fields
 - metadata also includes IMS fields, both structural and administrative
 - ability to export MARC records
 - support for resource document format (RDF)
 - full XML and XSL functionality
 - excellent navigation through multipage documents
 - resources may be aggregated into collections without duplicating image files
 - sweeping changes to staff module
 - ftp client to upload resources
 - application errors logged and reported to administrators at login
 - intelligent load balancing when delivering resources to user
 - Multilanguage support

Appendix J — PERL-JAVA Allectra/CAREO Database Conversion

- In the future:
 - to do lists for staff, automatically generated by the system
 - watermarking documents
 - flexible ability to communicate via forms/email with instructors and rights holders
 - full text searching
 - multiple objects per page
 - ability to disable printing and copy/paste for certain resources
 - links for document delivery, probably through Relais
 - better reporting and history logging
 - Z39.50 server and client
 - MyLibrary functionality