Inventory of inquiry learning programs - updated version

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kaleidoscope

concepts and methods for exploring the future of learning with digital technologies

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Inventory of inquiry learning programs - updated version

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Summary

Deliverable 18.1.2 presents the updated version of the inventory of inquiry learning programs of the Computer supported inquiry learning SIG. The aim of the inventory is to develop an exhaustive overview of applications, tools, web environments, and resources in the field of inquiry learning. The complete inventory is available on the website of the SIG(http://kaleidoscope.gw.utwente.nl/SIG.IL/).

The present Deliverable (18.1.2) provides a description the changes that have been made and the material that was added since the publication of the intermediate version of the Inventory of inquiry learning programs of the Computer supported inquiry learning SIG (18.1.1).

History

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1. INTRODUCTION

Task T18.1 – Inventory of inquiry learning programs of the Computer supported inquiry learning SIG is dedicated to designing and developing an exhaustive overview oft software and authorware in the field of inquiry learning. The list of inquiry learning programs is available on the website of the SIG and is regularly updated.

In the first year of the SIG (2004) an intermediate version of the Inventory of Inquiry Learning programs (D 18.1.1) was produced. During the second year of the SIG new information and programs have been added to the inventory. The entire updated inventory can be found on the website of the Computer supported inquiry learning SIG. This document aims to provide an overview of the information that is added to the website during the second year of the SIG.

Section 1 is an introductory chapter providing an overview of the deliverable and addresses changes made to the inventory.

Section 2 presents a short description of inquiry learning software, the various inquiry learning software tools and a list of inquiry learning tools (software and web environments) that have been added to the website during the second year of the SIG.

Section 3 presents a list of articles that have been added to the inventory to provide more background information about the listed resources.

Section 4 provides an overview of the Inquiry Learning related links and resources (besides applications and the related articles) that can be found on the SIG website.

1.1 Changes

Within in the first year of the Computer Supported Inquiry Learning SIG 34 applications were added to the inquiry learning inventory on the website. Within the past year the inventory has been extended with 22 new inquiry learning environments.

Next to the description of the inquiry learning environment we have added publications related to the listed inquiry learning applications. These publications provide extra information about the listed applications and research that has been conducted with these applications.

The inquiry learning inventory can be found in the resources section of the SIG website. Within the past year the resources section of the website has been extended and contains lists of publications, projects, laboratories, institutions, and conferences that might be interesting for the member of the inquiry learning SIG. A short overview of the information that is accessible through the resources section of the website (besides the listed inquiry learning applications) is provided in Section 4 of this deliverable.

2. INVENTORY

In this section we will present a list of the inquiry learning applications and authoring tools that have been added to the inventory during the second year of the SIG. The total list of applications (including the applications listed in the intermediate version of the inventory (D18.1.1.) can be found on the website of the SIG: http://kaleidoscope.gw.utwente.nl/SIG.IL/

2.1 Software and applications

1. Astronomy Village: Investigating the Universe

@ http://www.cet.edu/products/av1/overview.html

Astronomy village is a CD Rom based learning environment that transports students to a virtual observatory community—an "astronomy village"—where they take part in a variety of scientific investigations. This exciting multimedia program supplements high school science curricula as a culminating activity to astronomy instruction. Students work on any of the village's 10 investigations, engaging in scientific inquiry. The CD-ROM contains a variety of tools, including an image processing program and an image browser. Among the simulations featured are a star life cycle simulator, an orbital simulator, and a 3-D star simulator.

Field: Astronomy
Sort: Inquiry Learning Environment
Work: Collaborative
Age: 13+

2. BioBlast

@ http://www.cet.edu/products/bioblast/overview.html

BioBLAST is a multimedia curriculum supplement for high school biology classes that incorporates NASA's science and technology research. Students blast-off on a virtual trip to the moon where they will live and work in a fully-equipped lunar habitat. In this virtual reality setting, student researchers use the simulation tools and electronic resources available to design a biologically-regenerative life support system that can support humans in space for long periods of time. One of the key aspects of the BioBLAST program is that the simulation models are based on current data gathered from NASA life sciences research that is currently underway.

Field:	Biology
Sort:	Inquiry
Work:	Indiv./Collab.
Age:	12+

3. BioWorld

@ http://www.education.mcgill.ca/cognitionlab/bioworld/en/

Bio-World is a computer-based learning environment designed for Biology students with some knowledge of bacterial and viral infections. Bio-world provides a hospital simulation where students learn to reason about infection by visiting patients, interpreting patient symptoms, conducting diagnostic tests, and collecting appropriate information in the medical library that will assist them in their problem solving ability.

Field: Biology

Sort: Inquiry Learning Environment

Work: Indiv./Collab.

Age: 14-17

4. El Yungue

@ http://elyunque.cet.edu/

The goal of the *Journey to El Yunque: Studying the Effects of Hurricane Georges* project is to develop a Web-based inquiry-focused ecology curriculum. The *Journey to El Yunque* curriculum is designed to improve students' inquiry skills and science knowledge of ecology and changing ecosystems, specifically in the Caribbean National Rainforest in Puerto Rico, also referred to as El Yunque. Island rainforests, such as El Yunque, provide interesting examples for teaching important ecological concepts. In particular, the El Yunque curriculum is aligned to the middle-school National Science Education Standards such as "Structure and Function in Living Systems," "Populations and Ecosystems," and "Diversity and Adaptations of Organisms." In the *Journey to El Yunque* curriculum, inquiry activities include analyzing data to draw conclusions, identifying research questions and designing data analysis procedures. Technology tools provided on the Web will enable students to analyze ecological data as well as manipulate symbolic simulations of the dynamic relationships between organisms in the ecosystem.

Field: Earth science

Sort: Inquiry Learning Environment / Modeling

Work: Indiv./Collab.

Age: 11-14

5. ExploreLearning

@ http://www.explorelearning.com/

ExploreLearning offers a catalog of modular, interactive simulations in math and science for teachers and students in grades 6-12. We call these simulations Gizmos. Gizmos are fun, easy to use, and flexible enough to support many different teaching styles and contexts. Our Gizmos are designed as supplemental curriculum materials that support state and national curriculum standards; in addition, Gizmos help teachers bring research-proven instructional strategies to their classrooms.

Field: Science, Mathematics

Sort: Inquiry / Modeling

Work: Individual

Age: 11+

6. Exploring the Environment

@ http://www.cotf.edu/ete/

Exploring the Environment™ (ETE) online series, features an integrated approach to environmental earth science through modules and activities, is developed at the NASA Classroom of the Future™ at Wheeling Jesuit University. Featuring problem-based learning (PBL), the ETE series provides students with tools to investigate scientific, social, political, and cultural aspects of controversial, authentic environmental problems. Standard problem-solving models, online resources that include relevant satellite imagery and recommendations for extended inquiry are available to students.

Field: Earth science

Sort: Inquiry

Work: Indiv./Collab.

Age: 12-14

7. Exploring the Nardoo

@ http://learningteam.org/htmls/nardoo.html

Using Exploring the Nardoo, students will be asked to conduct investigations on a simulated river, the Nardoo, and then report their findings by writing newspaper articles, hosting class discussions, writing reports, or preparing multimedia presentations. The investigations are thorough. Students are asked to take physical measurements, analyze data using powerful simulators, record the evolving nature of local fauna and flora, and access TV, radio, and newspaper archives for relevant information. They will then be directed to the Water Research Center to utilize reference materials and seek the assistance of experienced mentors.

Field: Earth science

Sort: Inquiry

Work: Collaborative

Age: 13+

8. Fle3

@ http://fle3.uiah.fi/

Fle3 is a web-based learning environment. To be more specific Fle3 is a server software for computer supported collaborative learning (CSCL). Fle3 is designed for group centered work that concentrates on creating and developing expressions of knowledge (i.e. knowledge artefacts). The environment consists of 3 tools: Webtop (to store, organize and share different items (documents, files, links to web & knowledge building notes) related to the students' studies), Knowledge Building (a discussion environment for a structured knowledge building in groups) and Jamming (a tool for collaborative construction of digital artefacts; one can explore the possibilities of changing a file by making new versions of the starting artefact together with others).

Field: various
Sort: Inquiry
Work: Collaborative
Age: ?

9. GenScope

@ http://GenScope.concord.org/

GenScope created a manipulable model of genetics that has been used successfully to teach genetics in middle school, high school, and college. The program offers a new educational technology that uses the computer to bridge the gap between "facts and figures" observed in the natural world and the mental associations we construct to explain them - the gap between information and knowledge. BioLogica is an extension of GenScope.

Field: Biology
Sort: Inquiry
Work: Indiv./Collab.
Age: 12+

10.GLOBE

@ http://www.globe.gov/

GLOBE is a worldwide hands-on, primary and secondary school-based education and science program. For Students, GLOBE provides the opportunity to learn by:

- Taking scientifically valid measurements in the fields of atmosphere, hydrology, soils, and land cover/phenology - depending upon their local curricula
- Reporting their data through the Internet
- Creating maps and graphs on the free interactive Web site to analyze data sets
- Collaborating with scientists and other GLOBE students around the world

Field: Earth science
Sort: Inquiry
Work: Collaborative
Age: 8-14

11. ISIS - Instruction In Scientific Inquiry Skills

@ http://www.tutortek.com/ISIS.htm

Instruction in Scientific Inquiry Skills (ISIS) tutor focuses on developing students' critical thinking skills, scientific literacy, and scientific inquiry skills in the context of ecology and the life sciences. The over-arching goal of the science tutor ISIS is to increase the level of scientific functioning of high school students enrolled in Introductory Biology. Because this level of functioning is too broad to address in the initial design of ISIS, the tutor focuses on skills underlying scientific inquiry.

Some of the activities required in applying scientific methods are automated within ISIS; other skills constitute what the students will learn by interacting with the computer.

Field: Biology
Sort: Inquiry
Work: Indiv./Collab.
Age: 14+

12. Model-It

@ http://hi-ce.org/soft_modelit.html

Model-It ™ is a visual modeling and simulation tool for use on desktop computers. Students can easily build, test, and evaluate qualitative models without needing to know the underlying calculus driving these models. They can create models that represent their theories about the scientific phenomena studied in class, and they can run simulations in order to test their models. Model-It provides meters and graphs for data visualization. Students can change values of one aspect of the model and immediately see the effects of that change throughout their model. Icons representing the factors that go into a model can be added, allowing students to customize their representations and linking them to their own environment.

Field: Science
Sort: Simulation/Modeling
Work: Indiv./Collab.
Age: ?

13. Quest Atlantis

@ www.questatlantis.org

Quest Atlantis is a learning and teaching project that builds on strategies from online role-playing games. QA combines strategies used in the commercial gaming environment with lessons from educational research on learning and motivation. It allows users to travel to virtual places to perform educational activities (known as Quests), talk with other users and mentors, and build virtual personae. A Quest is an engaging curricular task designed to be entertaining yet educational.

Field: Various fields
Sort: Gaming Environment
Work: Collaborative
Age: 9-12

14. Rashi

@ http://ccbit.cs.umass.edu/rashihome/

Rashi is a general platform for inquiry learning and is being applied to biology, geology, plate tectonics, hydrometeorology, and civil engineering, forestry. Even questions in art history are under consideration for Rashi modules. To support students in doing inquiry Rashi provides the user with an "inquiry notebook" which is a place to record observations, measurements, inferences, hypotheses, open questions, principles, etc about a particular domain and scenario.

Field: Programming
Sort: Games
Work: Indiv./Collab.
Age: 4-8

15. Round Earth Project

@ http://www.evl.uic.edu/roundearth/

The Round Earth Project is investigating how virtual reality technology can be used to help teach concepts that are counter-intuitive to a learner's currently held mental model. Virtual reality can be used to provide an alternative cognitive starting point that does not carry the baggage of past experiences. In particular, we are comparing two strategies for using virtual reality to teach children that the Earth is round when their everyday experience tells them that it is flat. One strategy starts the children off on the Earth and attempts to transform their current mental model of the Earth into the spherical model. The second strategy starts the children off on a small asteroid where they can learn about the sphericality of the asteroid independent of their Earth-bound experiences. Bridging activities then relate their asteroid experiences back to the Earth.

Field: Earth science
Sort: Games/Simulation
Work: Individual
Age: 6-12

16. ScienceSpace

@ http://www.virtual.gmu.edu

Project ScienceSpace is a collection of immersive virtual worlds designed to aid students in mastering challenging concepts in science. ScienceSpace now consists of three worlds: NewtonWorld provides an environment for investigating the kinematics and dynamics of one-dimensional motion. MaxwellWorld supports the exploration of electrostatics, leading up to the concept of Gauss' Law. PaulingWorld enables the study of molecular structures via a variety of representations.

Field: Physics

Sort: Inquiry Learning Environment

Work: Individual

Age: 12-17

17. S'Cool

@ http://asd-www.larc.nasa.gov/SCOOL/

S'COOL is part of a real scientific study of the effect of clouds on Earth's climate. Students from all over the world add to data collected by NASA's Earth-observing satellites. Student observations — called *ground truth measurements,* are matched with, satellite readings. When the orbital path of an Earth-observing satellite — either *Aqua* or *Terra* — is over your region of the world (about once a day), students record cloud observations. These observations include *cloud level* — high, midlevel, or low; *cloud type*, such as cirrus, stratus, etc.; *cloud cover*, such as clear, partly cloudy, or overcast; and *visual opacity* — opaque, translucent, or transparent.

Field: Earth science

Sort: Inquiry

Work: Indiv./Collab.

Age: 5+

18. STORM-E Weather Simulation

@ http://storme.cet.edu/

STORM-E (Students and Teachers Observing and Recording Meteorological Events) is an exciting, culminating event to any weather unit. It not only draws upon students' content knowledge of weather, it also uses many inquiry and processing skills noted in the national science and mathematics standards.

Field: Earth science

Sort: Simulation Environment

Work: Collaborative

Age: 10-14

19. VirRAD

@ http://www.virrad.eu.org/

VirRAD aims to create a readily accessible virtual-environment where the Radiopharmacist community can meet to learn, exchange views, and discuss best practice.

VirRAD will investigate the integration of a personalised, yet social, learning environment; with technologies that explore protocols for communications between virtual reality and the facilitation of communities of learners; and learner modelling and instructional design. It will also satisfy the real needs of the specialised radio pharmacy community identified through a formal study of their user requirements. This will be translated into the functional specification for the environment. The site contains information about the project progress and will eventually link to the resulting virtual-environment.

Field: Radiopharmacy

Sort: Inquiry Learning Environment

Work: Indiv./Collab.

Age: 16+

20. Virtual Ambients

@ http://www.evl.uic.edu/correlations/

The 'virtual ambients' are worlds which investigate the effectiveness of virtual environments as simulated data collection environments for children engaged in inquiry-based science learning activities. Data collection has long been believed to be a valuable component of activity-based learning strategies, but for practical reasons is often replaced by pre-constructed databases. VR appears attractive for this purpose because it can provide access to simulated environments which might otherwise be impossible to visit in person, while still providing experiences analogous to those undertaken by a scientist in real experimental work.

Field: Earth science
Sort: Inquiry Learning Environment
Work: Indiv./Collab**.**
Age: 7-12

21. Viten.no

@ http://viten.no/

Viten.no (www.viten.no) is a web based curriculum project developed in Norway with the goal of using ICT to promote the teaching and learning of science in schools. In 2005 the viten.no project offers 13 programs free of charge to science teachers. One of the main objectives of the Viten programs is that students learn about the processes and products of science.

Field: Science
Sort: Inquiry Learning Environment
Work: Indiv./Collab.
Age: ?

22. Weather Laboratory

@ http://scijinks.jpl.nasa.gov/weather/

The National Oceanic and Atmospheric Administration, NOAA, is the agency of the United States federal government responsible for monitoring our climate and our environment, and taking steps to preserve them. NOAA's tasks include Environmental Assessment and Prediction (i.e. warning and forecasting services) and Protecting Natural Resources While Helping Develop Them (i.e. sustaining healthy coastal ecosystems). Within NOAA's SciJinks Weather Laboratory students are able to learn about the weather, its various states, possible dangers to humans, etc.

Field: Earth science
Sort: Inquiry Learning Environment
Work: Individual
Age: ?

23. ZAP

@ http://zap.psy.utwente.nl/english/

The ZAP project aims at developing interactive learning material to stimulate discovery and experiential learning in the field of psychology. The goal is to contribute to a shift in the education of psychological topics from an expository character to education that contains elements based on autonomous (guided) learning by discovery.
The product will be a collection of short, interactive modules (called 'ZAPs'), each of which concerns a psychological phenomenon or experiment. At the core of each ZAP lies a multimedia simulation of the phenomenon or experiment. In one type of ZAPs (see below for an explanation of ZAP types), the simulations allow students to manipulate the values of relevant variables and observe the result of a simulated

experiment.The goal is to have students discover the properties of a phenomenon and the underlying theory for themselves.

Field: Psychology
Sort: Simulations
Work: Individual
Age: 18+

3. PUBLICATIONS

Within the past year we have added publications (articles/ papers) discussing the listed software. In order to provide more background information concerning the listed applications.

3.1 Overview of the articles

For each listed application (if available) one or two relevant publications were added to the resources section. Bellow you will find a list of applications including the added publications. This list is also available through the SIG website: http://kaleidoscope.gw.utwente.nl/SIG.IL/

Alien Rescue

Pedersen, S., Liu, M. & Williams, D. (2002). Alien Rescue: Designing for student-centered learning. *Educational Technology, 42, 11-14.*

Liu, M, Williams, D., & Pedersen, S. (2002). Alien Rescue: A problem-based hypermedia learning environment for middle school science. *Journal of Educational Technology Systems*, 30, 255-270.

Astronomy Village: Investigating the Universe

Hong, N. S., McGee, S., & Howard, B. C. (2000). The effect of multimedia learning environments on well-structured and ill-structured problem-solving skills. Paper presented at the annual meeting of the American Educational Research Association, New Orleans.

Shin, H., Jonassen, D. H., & McGee, S. (2003). Predictors of well-structured and ill-structured problem solving in an astronomy simulation. *Journal of Research in Science Teaching, 40*.

AquaMOOSE

Elliott, J., Adams, L., & Bruckman, A. (2002). No magic bullet: 3d video games in education., *International Conference of the Learning Sciences*. Seattle: Proceedings of ICLS 2002.

Belvedere

Suthers, D., & Hundhausen, C. D. (2003). An experimental study of the effects of representational guidance on collaborative learning processes. *Journal of the Learning Sciences, 12,* 183-218.

Suthers, D., Weiner, A., Connelly, J., & Paolucci, M. (1995). *Belvedere: Engaging students in critical discussion of science and public policy issues.* Paper presented at the II-Ed 95, the 7th World Conference on Artificial Intelligence in Education, Washington, DC.

Toth, E. E., Suthers, D. D., & Lesgold, A. M. (2002). "mapping to know": The effects of representational guidance and reflective assessment on scientific inquiry. *Science Education, 86,* 264-286.

BGuile

Reiser, B. J., Tabak, I., Sandoval, W. A., Smith, B., Steinmuller, F., & Leone, T. J. (2001). Bguile: Strategic and conceptual scaffolds for scientific inquiry in biology classrooms. In S. M. Carver & D. Klahr (Eds.), *Cognition and instruction: Twenty five years of progress* (pp. 263-305). Mahwah (NJ): Lawrence Erlbaum Associates.

Sandoval, W. A., & Reiser, B. J. (2004). Explanation-driven inquiry: Integrating conceptual and epistemic scaffolds for scientific inquiry. *Science Education, 88,* 345-372.

BioBlast

Ruberg, L. F., & Baro, J. A. (1999). BioBLAST: A multimedia learning environment to support student inquiry in the biological sciences. In W. C. Bozeman (Ed.), *Educational technology: Best practices from America's schools* (2nd ed., pp. 62-71). Larchmont, NY: Eye on Education.

Carlson, P. A., Ruberg, L., Johnson, T., Kraus, J., & Sowd, A. (1998). Collaborations for learning: The experience of NASA's Classroom of the Future. *Technological Horizons in Education Journal*, 25, 50-53.

BioKids

Gotwals, A. W. and Songer, N.B. (2005) The Symbiosis of Cognition, Observation, and Interpretation in an Assessment System for BioKIDS. Paper presented at the American Education Research Association annual meeting.

Songer, N.B., Lee, H.S. and McDonald, S. (2003). Research Towards an Expanded Understanding of Inquiry Science Beyond One Idealized Standard. *Science Education*, 87, 490-516.

BioLogica

Buckley, B. C., Gobert, J. D., Kindfield, A. C. H., Horwitz, P., Tinker, R. F., Gerlits, B., Wilensky, U., Dede, C., & Willett, J. (2004). Model-based teaching and learning with biologica™: What do they learn? How do they learn? How do we know? *Journal of Science Education and Technology, 13,* 23-41.

Horwitz, P., & Christie, MA (1999). Hypermodels: Embedding curriculum and assessment in computer-based manipulatives. *Journal of Education*, 181, 1–23.

BioWorld

Lajoie, S.P. (in press) Cognitive tools for the mind: The promises of technology-cognitive amplifiers or bionic prosthetics? In R. J. Sternberg & D. Preiss (Eds.) Intelligence and technology: Impact of tools on the nature and development of human skills. Mahwah, NJ: Lawrence Erlbaum Associates.

Lajoie, S.P., Lavigne, N.C., Guerrera, C. & Munsie,S. (2001). Constructing knowledge in the context of BioWorld. *Instructional Science*, *29*, pp.155-186.

Lajoie, S. P., Faremo, S., & Wiseman, J. (2001) Tutoring strategies for effective instruction in internal medicine. *International Journal of Artificial Intelligence and Education*, *12*, 293-309.

Bugscope

Potter, C.S., Carragher, B., Carroll, L., Conway, C. , Grosser, B. , Hanlon, J., Kisseberth, N. , Robinson, S. , Thakkar, U., & Weber, D. (2001) Bugscope: A Practical Approach to Providing Remote Microscopy for Science Education Outreach. *Microscopy and Microanalysis*, 7, 249-252.

U. Thakkar, B. Carragher, L. Carroll, C. Conway, B. Grosser, N. Kisseberth, C.S. Potter, S. Robinson, J. Sinn-Hanlon, D. Stone and D. Weber, Formative Evaluation of Bugscope: A sustainable world wide laboratory for K-12, Paper prepared for the Annual Meeting of American Educational Research Association, Special Interest Group on Advanced Technologies for Learning, New Orleans, LA, April 24-28, 2000.

Co-lab

de Jong, T., van Joolingen, W. R., Savelsbergh, E., Lazonder, A., Wilhelm, P., & Ootes, S. (2002). *Co-lab specifications. Part 1 - theoretical background*. Enschede, NL: University of Twente.

van Joolingen, W. R., de Jong, T., Lazonder, A. W., Savelsbergh, E., & Manlove, S. (2005). Co-lab: Research and development of an on-line learning environment for collaborative scientific discovery learning. *Computers in Human Behavior, 21,* 671-688.

Coldex

Hoppe, H.U., Pinkwart, N., Oelinger, M, Zeini, S., Verdejo, F., Barros, B. & Mayorga, J.I. (2005). Building Bridges within Learning Communities through Ontologies and "Thematic Objects". In Proceedings of the International Conference on Computer Supported Collaborative Learning (CSCL2005), Taiwan, June 2005.

Niels Pinkwart, Marc Jansen, Maria Oelinger, Lena Korchounova, and Ulrich Hoppe (2004). Partial Generation of Contextualized Metadata in a Collaborative Modeling Environment. In Lora Aroyo and Carlo Tasso (Eds.): Workshop proceedings of the 3rd International Conference on Adaptive Hypermedia (p.372-376). Technische Universiteit Eindhoven, The Netherlands.

DiViLab

M.F. Verdejo, B. Barros (2000). Designing support for collaborative virtual laboratories in Distance Learning settings. Paper presented at the international workshop on new technologies in collaborative learning, Tokushima, Japan.

El Yunque

McGee, S., Coriss, D., & Shia, R. (2001). Using simulations to improve cognitive reasoning. Paper presented at the annual meeting of the American Educational Research Association, Seattle.

Exploring the environment

Myers, R. J. (1999). Beyond the term paper: Exploring the Environment®. In S.McGee (Chair), Changing the game: Activity structures for science education reform. Symposium conducted at the annual meeting of the American Educational Research Association, Montreal, Canada.

Myers, R. J., & Botti, J. A. (1998).Exploring the Environment®: Problem-based learning in action. Paper presented at the annual meeting of the American Educational Research Association, San Diego, CA.

Exploring the Nardoo

Corderoy, R. M., Wright, R. J., Harper, B. M., & Hedberg, J. G. (1996) Exploring the Nardoo: Simulating & Reporting on Ecological Processes. *Conference of the Australian Science Teachers' Association. CONASTA 45., July 7-12.* Canberra.

Fle3

Leinonen, T. & Kligyte, G. (2003).*Fle3-software: Bringing Knowledge Building and Collaborative Design to the Classroom.* Tutorial and poster proceedings of CSCL 2003, Computer Support for Collaborative Learning 2003 conference. Bergen, Norway, June 14-18, 2003.

Genscope

Hickey, D.T. , Kindfield, A.C.H. & Horowitz, P. (1999). Large-scale Implementation and Assessment of the GenScope ™ Learning Environment: Issue, Solutions and Results. Paper presented at the meeting of the European Association for Research on Learning and Instruction in Gotenborg, Sweden.

Geode

Edelson, D. C., Salierno, C., Matese, G., Pitts, V., & Sherin, B. (2002). Learning-for-Use in Earth science: Kids as climate modelers. Paper presented at the Annual Meeting of the National Association for Research in Science Teaching, New Orleans, LA, April 2002.

Edelson, DC, Gordin, D.N., & Pea, R.D. (1999). Addressing the challenges of inquiry-based learning through technology and curriculum design. *Journal of the Learning Sciences, 8,* 391-450.

GLOBE

Finarelli,M.G.(1998). GLOBE: A Worldwide Environmental Science and Education Partnership, *Journal of Science Education and Technology, 7,* 77-84.

ISIS

Steuck, K., & Miller, T. (1997) Evaluation of an Authentic Learning Environment for Teaching Scientific Inquiry Skills. Paper presented at *the Annual Meeting of the American Educational Research Association*, Chicago, IL March 1997.

Kinetic City

Haugland, S.W. (2005). Selecting or Upgrading Software and Web Sites in the Classroom. *Early Childhood Education Journal*, 32, 329 - 340.

Yan, Z., Heping, H., Hobbs, L. J., & Wen, N. (2003). The psychology of e-learning: A field of study. *Journal of Educational Computing Research, 29,* 285-296.

Lab of Tomorrow

Knight, J. F., Schwirtz, A., Psomadelis, F., Baber, C., Bristow, H. W., & Arvanitis, T. N. (2005). The design of the sensvest. *Personal and Ubiquitous Computing, 9,* 6-19.

Knight, J.F., Baber, C., Schwirtz, A., & Bristow, H.W. (2002). The comfort ssessment of wearable computers. *Proceedings of the Sixth International Symposium of Wearable Computers*, 65-72. October 7-10, Seattle, Washington.

L' ActiveMath

Melis, E., & Andrès, E. (2005). Global Feedback in ACTIVEMATH. *Journal of Computers in Mathematics and Science Teaching, 24*, 197-220.

Melis, E., Andrès, E., Büdenbender, J., Frischauf, A., Goguadze, G., Libbrecht, P., Pollet, M., & Ullrich, C. (2001). Activemath: A generic and adaptive web-based learning environment. *Journal of Artificial Intelligence and Education, 12,* 385-407.

MATADOR

Halvorsrud, R. (2000). Matador - medical advanced training in an artificial distributed environment. Paper presented at *The NORDUnet2000 conference*. Helsinki, Finland.

Ludvigsen, S. R. (2000). Health education in virtual environments - matador as an example. Paper presented at *Technology in Social Practice: Education, Organization, and Health Care Conference.* University of Copenhagen, Denmark.

Modeling Across the Curriculum

Gobert, J., Horwitz, P.,Tinker, B., Buckley, B., Willensky, U., Levy, S., & Dede, C. (2003). Modeling Across the Curriculum: Scalling up Modeling Using Technology. In the *Proceedings of the Twenty-fifth Annual Meeting of the Cognitive Science Society*, July 31- August 2, Boston , MA .

Modelling Space

Fidas C., Komis V., Tzanavaris S., Avouris N. (2005). Heterogeneity of learning material in synchronous computer-supported collaborative modelling, *Computers & Education*, *44*, 135-154.

Avouris N.M., Dimitracopoulou A., Komis V. (2003).On analysis of collaborative problem solving: An object-oriented approach, *Computers in Human Behavior*, *19,* 147-167.

QuestAtlantis

Barab, S. A., Arici, A., Jackson, C. (2005). Eat your vegetables and do your homework: A design-based investigation of enjoyment and meaning in learning. *Educational Technology 65*, 15-21.

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4. ADDITIONAL RESOURCES

The initial aim of the inquiry learning inventory was to provide an extensive overview of the available inquiry learning applications in Europe and beyond. The information in the resources section of the SIG website is not limited to inquiry learning applications. Next to these applications this section contains:

Publications. The resources section contains a list of relevant publications that is frequently updated. The publications include journal articles, conference papers, books, and book sections.

Projects. Links to projects within the field of Computer Supported Inquiry learning.

Examples of listed projects

PADI (http://padi.sri.com/). PADI stands for Principled Assessment Designs for Inquiry Project and aims to provide a practical, theory-based approach to developing quality assessments of science inquiry by combining developments in cognitive psychology and research on science inquiry with advances in measurement theory and technology.

Recoil (www.recoil.nl/ap). ReCoil stands for "Resources for Collaborative Inquiry Learning". The Recoil access point is portal for teachers where they can find teaching materials that can be used to support collaborative inquiry learning in their classrooms. On the site small applications (typilcally 1-4 lessons) can be found and used on line. Material originates from the Co-Lab, VITEN.no and Modelling space projects.

Laboratories, institutions, and consortia. Links to laboratories, institutions or consortia that conduct research or design materials related to computer supported inquiry learning.

Examples of laboratories, institutions, and consortia

The AAA Lab at Stanford (http://aaalab.stanford.edu/). This lab works at the intersection of cognitive science, education, and computer science. A central theme in all projects is how the facility for spatial thinking can inform and influence learning, instruction, assessment and problem solving. Example projects of the AAA lab are teachable agents.

Things That think consortium (http://ttt.media.mit.edu/). MIT's Things That Think Consortium brings together companies and researchers to explore the migration of computation and communications out of conventional computers and into everyday objects. From smart toys that let kids develop devices that are meaningful for them to automotive sensors that help eliminate driver distraction, Things That Think is moving computing off the desktop and into the world.

The Concord Consortium (http://www.concord.org/). The Concord Consortium is a nonprofit educational research and development organization based in Concord, Massachusetts. We create interactive materials that exploit the power of information technologies. Our primary goal in all our work is digital equity — improving learning opportunities for all students.

Events A list of past and future conferences and workshops relevant for research related computer supported inquiry. The events section includes Kaleidoscope meetings that might be interesting for members of the inquiry learning SIG.