

Kenneth E. Hay

School of Education
Indiana University
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EDUCATION

- 1993 The University of Michigan, Ann Arbor, Michigan.
Post-doctoral Fellow Highly Interactive Computing Environments (HiCE)
Group
- 1991 The Ohio State University, Columbus, Ohio. Doctoral degree,
- 1985 Central Michigan University, Mt. Pleasant, Michigan
Bachelor of Science in Elementary Education

EMPLOYMENT

- 2006 to present Associate Professor, Cognitive Science
Indiana University, Bloomington, IN
- 2006 to present Associate Director,
Center for Research on Learning and Technology
Indiana University, Bloomington, IN
- 2005 to present Associate Professor, The Learning Sciences Program,
Department of Counseling and Educational Psychology
Indiana University, Bloomington, IN
- 2003 to 2005 Associate Professor, Department of Instructional Technology
University of Georgia, Athens, GA
- 1998 to 2005 Research Scientist, Learning and Performance Support Laboratory.
University of Georgia, Athens, GA
- 1998 to 2003 Assistant Professor, Department of Instructional Technology
University of Georgia, Athens, GA
- 1995 to 1998 Adjunct Assistant Professor, Computer Science.
Indiana University/Purdue University at Indianapolis.
- 1993 to 1998 Assistant Professor, Instructional Systems Technology Indiana
University/Purdue University at Indianapolis
- 1992 to 1993 Research Fellow, The University of Michigan.
Highly Interactive Computing Environments (HiCE) Research Group
- 1990 to 1991 Assistant Professor, Instructional Technology
St. Cloud State University.
- 1986 to 1987 Computer Literacy & Math Instructor.
Southern Ohio College, Columbus, Ohio.

1985 to 1986 7th and 8th Grade Math and Science Teacher
Van Buren Public Schools, North Middle School. Belleville, MI.

1985 to 1986 Adult Education Instructor (Mathematics)
Van Buren Public Schools, North Middle School. Belleville, MI

PUBLICATIONS

- Hay, K.E. (2007) Building the Wrong Model: Opportunities for Game Design. in "The Design and Use of Simulation Computer Games in Education" Shelton, B.E. & Wiley, D.A. (eds), 243-272. Sense Publishers, Rotterdam, The Netherlands
- Hay, K.E. & Kim, B. (2006). *Design-Based Research - More than Formative Assessment? An Account of the Virtual Solar System Project. Educational Technology.*
- Hay, K.E. & Kim, B. (2005) Integrated Temporal Multimedia Data (ITMD) Research System. In Goldman-Segal, R. & Pea, R. *Video Research in The Learning Sciences* Hillsdale, New Jersey: Lawrence Erlbaum Associates, Inc.
- Hay, K.E. (2004) Education Brings Technology and Nature Together with Virtual Gorillas. *E-School Magazine.*
- Pea, R. & Hay, K.E. (2003). *CILT Workshop on Digital Video Inquiry in Learning and Education Report to the National Science Foundation.*
- Keating, T., Barnett, M. G., Barab, S. A., & Hay, K. E. (2002). The Virtual Solar System Project: Developing conceptual understanding of astronomical concepts through building three-dimensional computational models. *Journal of Science Education and Technology*, 11(3), 261-275.
- Hay, K. E., Elliot, D. & Kim, B. (2002). Collaborative network-based virtual reality: The past, the present, and the future of the virtual solar system. In G. Stahl (Ed.), *Proceedings of the Computer Support Collaborative Learning: Foundations for a CSCL Community* (pp. 519-520). Hillsdale, New Jersey: Lawrence Erlbaum Associates, Inc.
- Barnett, M., Barab, S. A., & Hay, K. E. (2001). The Virtual Solar System Project: Student modeling of the solar system. *The Journal of College Science Teaching*, 30(5), 300-304.
- Barab, S. A., & Hay, K. E. (2001). Doing science at the elbows of scientists: Issues related to the scientist apprentice camp. *Journal of Research in Science Teaching*, 38(1), 70-102.
- Barab, S. A., Hay, K. E., Yamagata-Lynch, L. C. (2001). Constructing networks of activity: An in-situ research methodology. *Journal of The Learning Sciences*, 10(1&2), 63-112.
- Barab, S. A., Hay, K. E., Barnett, M. G., & Squire, K. (2001). Constructing virtual worlds: Tracing the historical development of learner practices/understandings. *Cognition and Instruction*, 19(1), 47-94.
- Hay, K. E., & Barab, S. A. (2001). Constructivism in practice: A comparison and contrast between apprenticeship and constructionist learning environments. *Journal of the Learning Sciences*, 10(3), 281-322.

- Hay, K.E., Shaw, J.S., & Hauschildt, P.H. (2000). The Virtual Solar System Project: Students Building Virtual Models for scientific understanding. In D. G. Brown (Ed.), *Teaching with Technology* (pp. 66-68). Bolton, MA: Anker Publishing Co.
- Barnett, M. G., Barab, S. A., & Keating, T. Hay, K. E. (2000). Conceptual Change Through Building Three-Dimensional Virtual Models. In B. J. Fishman & S. F. O'Connor-Divelbiss (Eds.), *Proceedings of the International Conference of the Learning Sciences: Facing the Challenges of Complex Real-World Settings* (pp. 134-141). Hillsdale, New Jersey: Lawrence Erlbaum Associates, Inc
- Hay, K. E., Crozier, J., Barnett, M. G., Bashaw, M., Hoos, B., & Perkins, L. (2000). Virtual Gorilla Modeling Project: Middle School Students Constructing Virtual Models for Learning. In B. J. Fishman & S. F. O'Connor-Divelbiss (Eds.), *Proceedings of the International Conference of the Learning Sciences: Facing the Challenges of Complex Real-World Settings* (pp. 212-213). Hillsdale, New Jersey: Lawrence Erlbaum Associates, Inc.
- Hay, K. E., Marlino, M., & Holschuh, D.R. (2000). The Virtual Exploratorium: Foundational Research and Theory on the Integration of 5-D Modeling and Visualization in Undergraduate Geoscience Education. In B. J. Fishman & S. F. O'Connor-Divelbiss (Eds.), *Proceedings of the International Conference of the Learning Sciences: Facing the Challenges of Complex Real-World Settings* (pp. 214-220). Hillsdale, New Jersey: Lawrence Erlbaum Associates, Inc.
- Pandya, R, Bramer, D., Hay, K., Marlino, M., Middleton, D., Ramamurthy, M., Scheitlin, T., and Wilhelmson, R. (2000). The Virtual Exploratorium: An inquiry-based learning environment for undergraduate geoscience education. In *Proceedings of the Fall 2000 meeting of the American Geophysical Union*, (p. 300) San Francisco, CA: EOS.
- Pandya, R, Marlino, M., Wilhelmson, R., Ramamurthy, M., Hay, K., Middleton, D., and Bramer, D., (2000). A Virtual Exploratorium to support inquiry-based learning in Geoscience Courses. *Proceedings of the Ninth Symposium on Education* (pp. 129-130). Long Beach, CA: American Meteorological Society.
- Hay, K.E. (2000). John Belland: A Pioneer in 3D Graphics. In R. M. Branch & M.A. Fitzgerald (Eds.) *Educational Media and Technology Yearbook 2000, Vol. 25* (pp. 162-163). Englewood, Colorado: Libraries Unlimited, Inc.
- Barab, S. A., Hay, K. E., Squire, K., Barnett, M., Schmidt, R., Karrigan, K., Yamagata-Lynch, L., & Johnson, C. (2000). Virtual solar system project: Learning through a technology-rich, inquiry-based, participatory learning environment. *Journal of Science Education and Technology*, 9(1), 7-25.
- Barab, S. A., Hay, K. E., Barnett, M. G., & Keating, T. (2000). Virtual solar system project: Building understanding through model building. *Journal of Research in Science Teaching*, 37(7), 719-56.
- Hannafin, M., K. Hay, M. Jacobson & LPSL Faculty and Staff (2000). Learning and Performance Support Laboratory University of Georgia. In R. M. Branch & M.A. Fitzgerald (Eds.) *Educational Media and Technology Yearbook 2000, Vol. 25* (pp. 80-88). Englewood, Colorado: Libraries Unlimited, Inc

- Barab, S. A., Hay, K. E., & Duffy, T. (1998). Grounded Constructions and How Technology Can Help. *Technology Trends*, 43(2), 15-23.
- Hay, K. (1996). The Three Activities of a Student: A Reply to Tripp in Situated Learning Perspectives. In H. McLellan (Ed.), *Situated Learning Perspectives* (pp. 201-212). Englewood Cliff, New Jersey: Educational Technology Publications
- Bonk, C., Hay, K. E., & Fischler, R. (1996). Five Key Resources for an Electronic Community of Elementary Student Weather Forecasters. *Journal of Computing in Childhood Education*, 7(1/2), 93-118.
- Hay, K. E. (1996). Legitimate Peripheral Participation, Instructionism, and Constructivism: Whose Situation Is It Anyway? In H. McLellan (Ed.), *Situated Learning Perspectives* (pp. 89-99). Englewood Cliff, New Jersey: Educational Technology Publications.
- Hay, K. E. (1996). The Three Activities of a Student: A Reply to Tripp. In H. McLellan (Ed.), *Situated Learning Perspectives* (pp. 201-212). Englewood Cliff, New Jersey: Educational Technology Publications.
- Bonk, C; Appleman, R; and Hay, K. E. (1996). Electronic Conferencing Tools for Student Apprenticeship and Perspective Taking. *Educational Technology*, 36(5), 8-18.
- Hay, K. E., Hamilton, D. & King, K. (1995). Creating the Investigator's Exhibit at The Children's Museum: Toward a Learner Centered Methodology for the Design of Cognitive Technology. In K. Cox , J. Marsh, & B. Anderson (Eds.), *Proceedings of the First International Cognitive Technology Conference* (pp. 233-240). Hong Kong: Department of Computer Science, City University of Hong Kong.
- Hay, K. E., Hamilton, D. King, K & Ray, A. E. (1995). Collaboration between Research and Development Interests: The Case of The Digital Weather Station Exhibit. In D. Bearman (Ed.), *Hands on Hypermedia and Interactivity in Museums* (pp. 178-186). Pittsburgh, PA: Archives and Museum Information.
- Soloway, E., Guzdial, M. & Hay, K. E. (April, 1994). Learner-Centered Design: The Challenge for HCI in the 21st Century. *Interactions*, 1(2), 36-48.
- Hay, K. E., Wiengrad, P., Bolye, R. A., Guzdial, M., Soloway, E. (1994). Student Creation of Multimedia Documents. *Computers and Education*, 23(4) 301-317.
- Hay, K. E. (1994). The Three Activities of a Student: A Reply to Tripp. *Educational Technology*, 34(8), 22-27.
- Soloway, E., Guzdial, M., and Hay, K. E. (1993). Reading and Writing in the 21st Century. *EDUCOM Review*, 28(1), 26-29.
- Hay, K. E. (1993). Legitimate Peripheral Participation vs. Instructional Resources or Whose Situation is it Anyway? *Educational Technology*, 33(3), 33-38.
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- Hay, K. E. (1993). Visions of a Postmodern Educational Environment. In N. Estes & M. Thomas (Eds.), *Proceedings of the International Educational Technology Conference* (pp. 617-619). Boston, MA.
- Hay, K. E. (1993). A Postmodern Educational Technology. In N. Estes & M. Thomas (Eds.), *Proceedings of the International Educational Technology Conference* (pp. 913-915). Boston, MA.
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- Cambre, M. A., Grant, M. B., Hay, K. E., Mayton, G. B., & Belland, J. C. (1992). Two Models for Repurposing Instructional Television for Interaction. *Journal of Visual Literacy*, 12(1), 33-57.
- Howell, R. D. & Hay K. E. (1989). Software-based Access and Control of Robotic Manipulators for Severely Physically Disabled Students. *Journal of Artificial Intelligence in Education*, 1(1), 53-72.

PRESENTATIONS

- DEATON, B., RECESSO, A., & HAY, K.. (2004, Mar). *The implications of video case tools for preservice and inservice teachers..* Presented at the 2004 Society for Information Technology and Teacher Education's Annual Conference, Atlanta.
- Hay, K.E., Kim, B.K., Couch, T. & Abadoe, X.. (2004). *Virtual Reality Modeling-based Inquiry: Conceptual Coherence and Alternative Theories Trials.* Presented at American Educational Research Association.
- Hay, K.E., Kim, B.K., Couch, T. & Abadoe, X.. (2003). *Integrated Temporal Multimedia Data Research System: Methodological Issues in Emergent Digital Video Research.* Presented at American Educational Research Association.
- Kim, H., Recesso, A., & Hay, K.E. (2003). *Using A Web-based Video Case Tool (VCT) for Teacher Reflection in A Professional.* Presented at Association of Educational Communications and Technology.
- Tsurusaki, B.K., Deaton, B.E., Thomson, N. & Hay, K.E.. (2003). *Virtual Gorilla Modeling Project: Knowledge-in-the-Making through the Cascade of Models.* Presented at American Educational Research Associations.
- Hay, K.E. & Deaton, B. E. (2003). *Instructional Technology and The Learning Sciences: A Bibliographic Analysis of Two Scholarly Communities.* Presented at American Educational Research Association.
- Tsurusaki, B.K., Amiel, T., & Hay, K.E.. (2003). *Using Modeling-Based Inquiry in the Virtual Solar System.* Presented at EdMedia.

- Tsurusaki, B.K., Amiel, T., Deaton, B.E., Minchew, C., Recesso, A., Shaw, J.S., Thomson, N., Bryan, L.A., Thompson, S. & Hay, K.E. (2003). *Virtual Reality Modeling in Science*. Presented at EdMedia.
- Apedoe, X., Kim, B., & Hay, K.E.. (2003). *Virtual Solar System: Assessing Students Learning*. Poster session at American Educational Research Association.
- Tsurusaki, B.K., Amiel, T., Bryan, L.A., & Hay, K.E.. (2003). *Virtual Astronomy Putting the Solar System in Your Hand*. Paper presented at Georgia Science Teacher Association. [
- Kim, H. Hay, K.E; & Bryan, L.A. (2002) Collaborative Web-based Video Research Methodology for Teacher's Reflection in Professional Development Program. Paper for the International Conference of the Learning Sciences 2002, Seattle, WA.
- Hay, K.E. (Accepted) Integrated Temporal Multimedia Data Research System. Paper for the International Conference of the Learning Sciences 2002, Seattle, WA.
- Hay, K.E.; Bryan, L.A.; Thomson, N.; Elliott, D.; Foster, R.; Inyega, J.; Tsurusaki, B., & Kim, H. (2002) Apprenticeship in Cyberspace. Presentation at the Annual Meeting of the Georgia Science Teachers Association. Jekyll Island, GA.
- Bramer, D., Scheitlin, T., Elliott, D., Hay, K., Marlino, M., Middleton, D., Pandya, R., Ramamurthy, M., Weingroff, M., and Wilhelmson, R. (2002). *Using an interactive java-based environment to facilitate visualization comprehension*. Paper presented at the Eleventh Symposium on Education, American Meteorological Society, Orlando, FL.
- Hay, K. E., Hickey, D., Elliot, D. M., Kim, B. & Kaufmann, J. (2002). *Integrated Temporal Multimedia Data Research System: The Present and Future of Digital Tools for Research*. Presentation at the 15th Annual Conference on Interdisciplinary Qualitative Studies, Athens, GA.
- Pandya, R, Bramer, D., Elliott, D., Hay, K., Marlino, M., Middleton, D., Ramamurthy, M., Scheitlin, T., Weingroff, M., and Wilhelmson, R. (2002). *An inquiry-based learning strategy from the visual geophysical exploration environment (VGEE)*. Eleventh Symposium on Education, American Meteorological Society, Orlando, FL
- Bramer, D., Hay, K., Marlino, M., Middleton, D., Pandya, R., Ramamurthy, M., Scheitlin, T., and Wilhelmson, R. (2001). *The technology behind a virtual exploratorium: a resource for discovery-based learning in the geosciences*. Tenth Symposium on Education, American Meteorological Society, Albuquerque, NM.
- Hay, K. E., & Hannafin, M. (2001). *Building Understanding through Virtual World Constructing 3D Models and Visualizations for Learning*. Presentation at the First M.I.T. Conference on Computational Fluid and Solid Mechanics, Massachusetts Institute of Technology, Cambridge, MA.
- Hay, K. E., (2001). *Knowledge making with 5D visualization tools*. Paper and Presentation at the Annual Conference of the National Association of Research on Science Teaching, St. Louis, MS.
- Pandya, R, Bramer, D., Elliott, D., Hay, K., Marlino, M., Middleton, D., Ramamurthy, M., Scheitlin, T., Weingroff, M., and Wilhelmson, R. (2001). *Using Visualization to Apply*

- Theoretical Understanding: Strategies from the VGEE*. Fall 2001 meeting of the American Geophysical Union, San Francisco, CA.
- Pandya, R., Bramer, D., Hay, K., Marlino, M., Middleton, D., Ramamurthy, M., Scheitlin, T., and Wilhelmson, R. (2001). *Using the virtual exploratorium to support inquiry-based learning in introductory geoscience courses: an ENSO example*. Tenth Symposium on Education, American Meteorological Society, Albuquerque, NM.
- Pandya, R., Bramer, D., Elliott, D., Hay, K., Marlino, M., Middleton, D., Ramamurthy, M., Scheitlin, T., Weingroff, M., and Wilhelmson, R. (2001). *The Virtual Exploratorium: Connecting student-constructed visualization to fundamental geophysical principles*. Invited presentation at the Spring 2001 Meeting of the American Geophysical Union, Boston, MA.
- Barab, S. A., & Hay, K. E. (2000). *Doing Science at the Elbows of Scientists: Issues Related to the Scientist Apprentice Camp*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.
- Hay, K. E., Crozier, J., & Barnett, M. (2000). *The Virtual Gorilla Project*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.
- Barab, S. A., Hay, K. E., & Barnett, M. G., (1999). *A Vision for Learning Astronomy*. Paper presented at the annual meeting of the American Educational Research Association, Montreal, CA.
- Hay, K. E. (1999). *Computational Science Inquiry Cycle (CSIC): Students "Doing" New Science Enabled by Virtual Reality*. Paper presented at the annual conference of the American Educational Research Association, Montreal, Canada.
- Hay, K. E. & Barab, S. A. (1999). *The Virtual Solar System*. Invited presentation at the Center for Innovative Learning and Technology annual conference, Washington, D.C. [50%]
- Hay, K. E. (1999). *The Digital Weather Station: A Study of Learning with 5D Visualization*. Paper presented at the annual meeting of the American Educational Research Association, Montreal, Canada.
- Keating, T., Barnett, M., & Barab, S. A., Hay, K. E. (1999). *Student Learning Through Building Virtual Models*. Paper presented at the Annual Meeting of the American Educational Research Association, Montreal, Canada.
- Hay, K. E. & Barab, S. A. (1999). *The Digital Weather Station*. Invited presentation at the Center for Innovative Learning and Technology Annual Conference, San Jose, CA.
- Hay, K. E. (1999). *Scientific Thinking and 3D Visualization and Modeling*. Invited presentation at the International Visual Literacy Association Annual Conference, Athens, GA.
- Barab, S. A., Hay, K. E., Barnett, M. G., & Squire, K. (1998). *Constructing Knowledge and Virtual Worlds: Knowledge Diffusion in Future Camp 97*. Paper presented at the annual meeting of the American Educational Research Association, San Diego, CA.
- Hay, K. E. & Barab, S. A. (1998). *Building Worlds: Tools of Virtual Practice*. Paper presented at the annual meeting of the American Educational Research Association, San Diego, CA.

- Hay, K. E. & Barab, S. A. (1998). *Electronic Performance Support System: Supporting Science Apprenticeships*. Paper presented at the annual meeting of the American Educational Research Association, San Diego, CA.
- Hay, K. E. (1997). *Educational Application of Virtual Reality: A Rational & Four Case Studies of 3D Visualization & Worldbuilding*. Invited presentation at the Indiana University Virtual Reality/Virtual Environments Workshop, Bloomington, IN.
- Hay, K. E. (1996). *Child Meteorologists: Virtual Reality, Authentic Scientific Inquiry and Learner Centered Design*. Paper presented at the annual national conference of the Association of Educational Communications and Technology, Indianapolis, IN.
- Hay, K. E. (1996). *The Indiana Weather Project: Students Utilizing and Creating Multimedia*. Paper presented at the annual national conference of the Association of Educational Communications and Technology, Indianapolis, IN.
- Hay, K. E. (1996). *Shifting Responsibilities: Student to Technology and Back*. Paper presented at the annual national conference of the Association of Educational Communications and Technology, Indianapolis, IN.
- Bonk, C.J. Hay, K. E., & Fishler, R. (1995). *Five Key Resources for an Electronic Community of Elementary Student Weather Forecasters*. Paper presented at the 6th European Conference for Research on Learning and Instruction, University of Nijmegen, The Netherlands.
- Hay, K. E. (1995). Technology Application to Research Library Educational Programs: A Look to Situated Learning, Instructional Design, and Constructionism as Educational Theoretical Frameworks. Conference Presentation at the Association of College and Research Libraries, Pittsburgh, PA. (Paid Presentation)
- Bonk, C. J. Hay, K. E., & Bray, M (1995). *Multimedia Collaborative Composition Network Tools*. Conference Presentation at the Hoosier Educational Computer Coordinator's Annual Conference, Indianapolis, IN.
- Guzdial, M., Hay, K. E., and Soloway, E. (1992). *Architecture of Design Support Environments*. Paper presented at the American Educational Research Association Annual Meeting, San Francisco, CA.
- Howell, R.D., Hay, K. E. & Rakocy, L. (1989). *Hardware and Software Considerations in the Design of a Prototype Educational Robotic Manipulator*. Paper presented at the Rehabilitation Engineering Society of North America Annual Conference, New Orleans, LA.
- Hay, K. E. (1989, April). *Robotics as Cognitive Aids for Physically Disabled Students--Instructional Technology Across the Curriculum*. Sponsored by the Instructional Technology Services of Central Ohio and the Franklin County Technology Consortium, Columbus, OH.
- Belland J. C., Hay, K. E., Grant, M. B., Mayton, G., & Franklin, C. (1989). *Research and Design Issues Generated by the Application of Cognitive Learning Theory to Hypercard-Driven Videodiscs*. Paper presented at the American Educational Communications & Technology Nation Convention, Dallas, TX.
- Howell, R. D., Hay, K. E., & Mayton, G. B. (1988, September). *Robotic Devices and Environmental Control*. Presented at the 2nd United Cerebral Palsy Association Rehabilitation Technology Conference, Columbus, OH.

Mayton, G., Hay, K. E., & Campbell K. (1988, January). *The Use of Robotic Devices by Severely, Orthopedically Disabled Students as Cognitive Enhancement Aids*. Presented at the Technology Training Project Invitational Conference, Kent State University, Kent, OH.

FUNDING

“Preparing, Inspiring and Connecting Students to College and Opportunity: Increasing the Quality and Intensity of Professional Development for Mathematics Teachers” 2003-2006 \$3,184,101 (UGA Subcontract \$447,773) Award from the National Science Foundation’s Elementary, Informal, and Secondary Education Division. Choike, J.R., Hay, K.E., Johaneck, M., Kornstein, S., VanderVeen, A., Novak, T.

“Strong African American Families” 2001-2006 (LPSL Contract \$68,680) Award from the National Institutes of Health. McBride-Murry, V.

“Apprenticeships in Cyberspace: Professional Development Model for the Emergent Technologies of 3D Modeling.” 2001-2004 \$1,073,348 Award from the National Science Foundation’s Elementary, Informal, and Secondary Education Division. Hay, K. E., Bryan, L. & Thomson, N.

“Virtual Reality Modeling-based Inquiry: The Role of Isomorphic and Behavioral Modeling on Knowledge Construction.” 2001-2004 \$719,921 Award from the National Science Foundation’s Educational Research, Evaluation and Communications Division Hay, K. E., & Shaw, J.S

"The Virtual Solar System and Digital Weather Station Seed Grant" November 1998-May 1999. \$15,000 K.E. Hay and S.A. Barab. Seed Grant from the National Science Foundation's Center for Innovative Learning and Technology.

“Building Worlds: Tools for Interdisciplinary, Virtual Practice”, June 1998-December 1998. \$7,500 Barab S.A. & K.E. Hay Indiana University Internal Research Award.

"Educational Program and Content Development for Future Park: A Partnership between IUPUI and the White River State Park Development Commission" Proposal to the Strategic Directions Initiative Charter, an Indiana University System Program \$51,953, 1996 to 1997 Wilson, K. and Hay, K.E.

"Establishing an Educational Department at the Future Park" Project funded by the White River State Park Development Commission, \$43,000, 1996 to 1997 Wilson, K & Hay, K.E.

"Qualitative Analysis of Learner-Centered Tool Adaptations Within An Electronic Computer of Elementary Student Weather Forecasters." \$12,650, 1995- 1996, Hay, K.E. & Bonk, C.J.

"Embedding Constructive Multimedia Tools and an Electronic Community Within an Elementary Weather Unit.", \$11,186, 1994- 1995, Hay, K.E. & Bonk, C.J..

"Creating the Investigator's Exhibit at The Children's Museum: Towards a Learner Centered Design Methodology," \$11,505, 1994-1995. Hay, K. E.

"Developing a Model Robotically-Aided Science Education Environment." A one-year project funded by the Leo Yassenoff Foundation, \$11,600.00, January, 1989-1990. Howell, R.D. & Hay, K.E.

LEARNING AND RESEARCH TECHNOLOGIES

College Board Spring Board – Video Case Tools (2005)

The Teacher Video Case Tools are a set of web-based video analysis and video case development tools for teacher to conduct teacher collaborative research. The components of the VCT include:

- a video coding tool that enable teachers to identify and code clips of video,
- a video analysis tool that enables teachers to search and retrieve video clips with common characteristics and then save them for future use.
- A video case development tool that enables teachers to create a video “book” that includes pages with embedded video clips and commentary.

Teacher Video Case Tools (2002)

The predecessor to the College Board Video Case Tools - Summary URL (lpsl.coe.uga.edu/LIVE/VCT/)

Integrated Temporal Multimedia Data Research System (2001)

Integrated Temporal Multimedia Data Research System will enable researchers to record, analyze, collaborate, and disseminate findings on complex events using video data in a wide range of research applications. The system builds on the emergence of ubiquitous digital multimedia data recording devices (digital video, digital audio, etc.), developments in compression technologies, high capacity storage, and network bandwidth. Digital video should soon be as easy to capture, index, post, share, and integrate with other media as is text on a web page. This creates an entirely new set of research opportunities.

Summary URL (lpsl.coe.uga.edu/LIVE/ITMD/)

Digital Weather Station Software and Museum Exhibit (1998)

The Digital Weather Station (DWS) is an exhibit at The Children's Museum of Indianapolis. The goals of the DWS are to develop students' understanding of the weather as a three-dimensional weather system and their skills in the scientific process of visualization. The DWS runs on three high-end SGI Workstations and utilizes an interface that we designed to enable young children to manipulate sophisticated, expert level scientific visualization tools (VIS5D).

Virtual Solar System Project Software and Curriculum (1998-Present)

The Virtual Solar System Project (VSS) has built curriculum and software in an introductory astronomy course at The University of Georgia and Indiana University. This Modeling-Based Inquiry curriculum starts with fundamental questions of planetary motion. Students collect data to address these questions, then build 3D dynamic models of the planets involved with our VR software. Visualization techniques allow the students to see orbital paths and planes. Finally, the students use their model data to defend answers to the original questions. Summary URL (lpsl.coe.uga.edu/LIVE/VSS/)

The Virtual Gorilla Modeling Project (1999-Present)

The Virtual Gorilla Modeling Project (VGM), which is a partnership with Zoo Atlanta, involves a middle school curriculum where learners observe gorillas, develop biomechanical models of gorilla movement, and then develop an interactional model using a rule building system with our modeling software. This inquiry-based curriculum supports learners in developing a deeper understanding of animal behavior that goes beyond a traditional descriptive or observational level and into the deeper levels of biomechanics of animal behavior, individual interactions with the world, intra-group interactions, and inter-group interactions. Learners enter into the virtual habitat and test their models by interacting with the gorillas. The project combines the use of video experiences with on-site observations and immersive experiences to transform the descriptive nature of animal behavior education into new education where learners are developing 3D animal behavior models of gorillas. Summary URL (lpsl.coe.uga.edu/LIVE/VGOR/) The information for the project is available on the site, however the two web-based video analysis tools requires Netscape 4.7, Quicktime Plug-ins, and a media CD for operation.

The Virtual Geoscience Exploration Environment Project (2002)

The Virtual Geoscience Exploration Environment Project (VGEE), formerly known as the Virtual Exploratorium Project, involves a scientific-community based (University Corporation for Atmospheric Research) innovative educational reform initiative to integrate 3D modeling and visualization technologies into student learning tools for geoscience curriculum. The VGEE software will include learner-centered scientific modeling and visualization tools, discovery-based curricular elements that use these tools, a series of data sets of relevant atmospheric phenomena, and a virtual encyclopedia of basic scientific concepts. The immediate focus of the project will be on concepts and phenomena related to El Nino. This software is built on advanced scientific modeling and visualization tools that utilize rapidly evolving desktop computing capabilities and also use the capabilities of the Internet.

Scientist Apprentice Camp (1997)

The Scientist's Apprenticeship Camp (SAC) was a summer camp that enrolled 24 inner-city, middle school learners. Each learner selected one of six scientific projects where they worked with one practicing science teacher and one mentor scientist. SAC was designed to match middle school learners and teachers with researchers in the School of Science at a large midwestern urban university. Participants worked in groups of four as they conducted scientific research and developed a scientific presentation under the expert mentorship of a practicing scientist and with the guidance of a K-12 teacher. Learners addressed an authentic research problem and had hands-on experience with state of the art instrumentation and equipment. They learned how to state a hypothesis, conduct experiments, collect and process data, and integrate their findings into a presentation suitable for a scientific conference. SAC was collaboratively developed with two associate deans from the College of Science.

Future Camp (1997)

Future Camp 97 created an opportunity for 16 local high school students to create VR worlds as a learning experience. Future Camp 97 had several technological and academic learning goals. Integration of these technological and academic goals was key as well.

Learners worked within academically diverse projects (government, science, or drama) and engaged with state-of-the-art hardware and software to design and develop their own virtual worlds. The projects were the Virtual State House Project, the Virtual Solar System Project, and the Virtual Theater Project. Future Camp 97 was a part of a larger private, government, and university effort to bring a technology center/museum to downtown Indianapolis.