

Literature Review: Trends and issues - Part 2

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Note: To be considered as a Work-in-Progress

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Knowledge domain	Students	The forms of learning being sought	The learning strategies that were used	The learning outcomes that are claimed	Context	Name of article
Biological science	Nursing students studying cell biology	Goals: To improve learning through CAL To relieve staff shortages	Learning material divided into sections Textual information arranged around pictures Interactions added such as drag and drop, click on hotspots Material was related to nursing applications	Examination marks increased over a four year period d. Weak empirical evidence	The project arose from a dissatisfaction of students with the method of delivery of Cell Biology (photographic slides). The CAL materials were designed to offer scope for high user interaction. Students used 12 of 18 proposed CAL packages in the study for a semester.	Wharrad, H., Kent, C., & Allcock, N. (2000). Development and evaluation of a series of CAL modules on cell biology for undergraduate nursing students. <i>BJET</i> 31(3), 257-259.
Sciences	Biochemistry students (post-graduates?)	Three goals: To help students develop a deeper understanding of the biochemistry of disease To provide relevant opportunities to learn and share learning To develop a collaborative learning community	Collaborative groups Setting group goals Searching Internet for information and contact with experts Development of website to share information on, and post responses and assignments	Students learned from each other's research Students had time to reflect before posting assignments Students learned the importance of collaboration in understanding difficult scientific issues a. Weak anecdotal evidence	The study describes a biochemistry unit based on a constructivist philosophy, where students negotiate a study plan at the beginning of the semester to undertake a research project. Students work in pairs, but within a 'learning community' for the whole semester.	Muire, C., Nazarian, M.J., & Gilmer, P.J. (1999). Web-based technology in a constructivist community of learners. <i>BJET</i> , 30(1), 65-68.

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Mathematics	Fifth grade students	To examine whether anchored instruction contributed to the improvement of students' problem-solving skills	Anchored instruction learning environment: Watching story from videodisc Learning strategies for solving problems, Solving problems cooperatively	Video-based anchored instruction has potential for offering interactive, authentic instructional experiences Video-based anchored instruction was a success in promoting students' performance in both cognitive and affective domains. e. Empirical evidence	The purpose of the study was to investigate the effects of computer-assisted anchored instruction on attitudes toward mathematics and instruction, and problem solving skills among Taiwanese elementary students. Students were immersed in the environment for 8 class period in one week.	Shyu, H.y.C. (2000). Using video-based anchored instruction to enhance learning: Taiwan's experience. <i>BJET</i> , 31(1), 57-69.
Information technology	Humanities and social science undergraduate students	Students would be able to : <ul style="list-style-type: none"> • use the internet to retrieve resources, • participate in online discussions, • discuss issues about electronic networking and society 	Authentic and integrated assessment Summaries Concept maps Essays and reports Personal diary Web forms Email Usenet conference CAL application (overview of unit)	Authentic assessment methods positive Little collaborative work f. Strong empirical evidence	The study aimed to provide a constructivist learning environment characterised by personal control, authentic learning contexts, and collaboration. The whole semester course was evaluated in the study.	Bostock, S.J. (1998). Constructivism in mass higher education: a case study. <i>BJET</i> , 29(3), 225-240.

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Information technology	First year university students	Students would learn 'interfacing techniques' and communication protocol prior to commencing flexibly delivered units (Passport to Flexible Learning)	Hands-on workshops Videoconference Audioconference Audiographics Tutored video instruction (TVI) lecture Email Downloaded data from the Internet Searched online catalogues	When academic programs commenced, students were able to concentrate on subject matter rather than interface issues. Students gained a feeling of being in control of their own learning a. Weak anecdotal evidence	At entry to university, many students are much less technology-literate than anticipated. The project used the idea of an electronic passport to indicate that students had learnt key IT and communication skills prior to the beginning of semester.	Thompson, R., Winterfield, J., & Flanders, M. (1998). Into the world of electronic classrooms: a passport to flexible learning. <i>BJET</i> , 29(2), 177-179.
Information Technology	Undergraduate students of computer science	To investigate the effect of the delivery mode (fully television, partially television, traditional classroom teaching) on the learning of the fundamentals, the learning of attitudes, and the learning of problem solving?	Read study guide Read mandatory book View 13 television programmes Complete exercises	'There was no decrease of learning in regards to the fundamentals with a television distance education course'. e. Empirical evidence	The project responded to the need to make links between the course content and the reality of the workplace. The video programs consisted of interviews with specialists in the workplace. The study examined the effects of the videos and other treatments across the whole semester.	Boulet, M.M., Boudreault, S., & Guerette, L. (1998). Effects of a television distance education course in computer science. <i>BJET</i> , 29(2), 101-111.

Proceedings of EdMedia, 1999

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Engineering	First year university engineering graphics students	Positive learning experiences to motivate students Ability to cater for range of abilities in tutorial sessions	Interactive CD-ROM including: Lecture slides Computer-based tutorials True/False quizzes Multiples choice questions Puzzles and games	Minor improvements in overall performance and depth of knowledge gained for average students Bright students complete assignments quickly Slower students work at own pace and rarely ask for assistance b. Anecdotal evidence	Engineering Graphics is a first year compulsory subject, and a positive experience motivates them to complete the degree. The CD-ROM replaced the laboratory sessions of the unit for the entire semester.	Crown, S.W . (1999). The development of a multimedia instructional CD-ROM/web page for engineering graphics. In Collis, B. & Oliver, R. (Eds.) <i>Proceedings of EdMedia 99</i> (pp. 1026-1031). Charlottesville, VA: AACE.
Education	5 Pre-service teachers	Investigate: How novice teachers use an EPPS to support lesson planning Investigate the effectiveness of the EPPS	Lesson planning using the EPPS (6 lessons) (The EPPS provided support such as: information on why objectives are necessary, criteria for quality objectives, database of verbs etc.)	The EPPS provided strong cognitive support Learning and performance in lesson planning transferred, so that performance continued when EPPS removed e. Empirical evidence	The context of the study was to investigate the value in using performance support as a strategy for engaging learning, by describing how learning might occur as a result of using a specific PSS. The PSS was used with 5 students as a separate study (not part of their study program).	Wild, M. (1999). Finding an educational role for performance support systems. In Collis, B. & Oliver, R. (Eds.), <i>Proceedings of EdMedia 99</i> (pp. 1169-1174). Charlottesville, VA: AACE.

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Sciences	101 6 th grade science students	How do expert stories affect students acquisition of astronomy concepts? How do expert stories affect students' ability to transfer learning?	Hypermedia learning environment: Factual information with video stories related by an expert	Students with stories did significantly better on solving near and far transfer problems than students without stories f. Strong empirical evidence	The context of the study is related to the difficulty many students experience in applying school learning to everyday situations. The project examined the effect of expert stories on students' achievement and problem solving (as part of regular science classes).	Williams, D. (1999). The effects of expert stories on 6 th grade students achievement. In Collis, B. & Oliver, R. (Eds.), <i>Proceedings of EdMedia 99</i> (pp. 112-118). Charlottesville, VA: AACE.
Rehabilitative medicine	Post-graduate students in adaptive computer technology	How can internet courses be designed to accommodate the needs of disabled students?	Textbook Videotapes Read and respond to electronic mail Discussion on electronic distribution list Guest speakers on discussion board Writing biographies Visiting and evaluating local facilities for disabled access	Those with limited abilities can learn effectively using the internet Using the internet can reduce the necessity to provide special accommodation for disabled students but only if designed with access in mind a. Weak anecdotal evidence	Online courses should ensure that they provide access to students with a wide range of disabilities. The paper describes the implications of this for courses offered on the internet, an example of a semester unit, and anecdotal evidence of its success.	Burgstahler, S. (1999). Distance learning, the Internet and the ADA. In Collis, B. & Oliver, R. (Eds.) <i>Proceedings of EdMedia 99</i> (pp. 341-245). Charlottesville, VA: AACE.

Knowledge domain	Students	The forms of learning being sought	The learning strategies that were used	The learning outcomes that are claimed	Context	Name of article
Business	MBA students	Goals: To provide a holistic understanding of business Knowledge and the ability to apply knowledge The ability to self-manage time, stress resources, priorities Work effectively with others and technology (etc)	Study business concepts in context Teamwork Contributions to intranet homepage Investigation of 9 macro projects over 2 years using processes such as: Analyse an industry and develop forecast Design a program to develop a new product for market Develop global sourcing projects and strategies (25 examples given)	Successful creation of learning communities Experiences transfer immediately to other learning situations c. Strong anecdotal evidence	The project involves students working in blocks on problem-based tasks in teams. They use communication technologies to communicate with each other and come to campus for 4-8 days between projects for debriefing, and introduction to the next task. The program targets 9 major projects over the course of 2 years.	Milner, R.G., & Stinson, J.E. (1999). Electronic collaborative learning architecture: Spanning time and distance in professional development. In Collis, B. & Oliver, R. (Eds.), <i>Proceedings of EdMedia 99</i> (pp. 376-381). Charlottesville, VA: AACE.

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Sciences	Year 8, 9, 10, and 11 high school students studying astronomy	To investigate activity completion rates To investigate how well students linked activity completion to basic science questions	Use of CD-ROM entitled <i>Astronomy Village</i> Students investigate contemporary problems in astronomy by: Watching videotapes Completing tutorials Attending a virtual conference Joining a research team of their choice Data collection Data analysis and interpretation Presentation of results	Motivating questions and reflection helped students to draw connections between activities and the larger scientific context f. Strong empirical evidence	The context of the study is based on the premise that educational researchers and software developers can work in conjunction with teachers to optimise learning and provide an empirical basis for software revision. The design experiment used successive classroom implementations and the research spanned four one-semester studies.	McGee, S., & Howard, B.C. (1999). Using design experiments as a means of guiding software development. In Collis, B. & Oliver, R. (Eds.), <i>Proceedings of EdMedia 99</i> (pp.522527). Charlottesville, VA: AACE.

Journal of Educational Multimedia and Hypermedia

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Business – project management	Seven MBA students with prior experience of PBL Four project managers in industry	Can computing technologies enhance problem-based learning? Can IMM vignettes be used outside formal education systems to train and educate in corporate training programs?	Use of Powerpoint vignettes to encapsulate a problem Group discussion Collaborative decision making	The use of vignettes enhance PBL by requiring students to focus more effort in the problem-definition phase Deeper understanding is promoted by reflection and discussion in PBL approaches using vignettes e. Empirical evidence	The study sought to implement feedback from an earlier survey which suggested that vignettes used in PBL could be enriched by IMM. A prototype was designed and evaluated in two settings: university and industry.	Nulden, U., & Scheepers, H (1999). Interactive multimedia and problem-based learning: Experiencing project failure <i>Journal of Educational Multimedia and Hypermedia</i> , 8(2), 189-215.
Computer science	38 1 st and 2 nd year students, novices in computer networking	identify benefits and shortcoming of a case-based instructional environment	Computer-based case studies Read general and specific descriptions of characteristics Access glossary Answer synthesis questions on case studies by criss-crossing thematic commentaries	Structured case based instruction may significantly help novice students. Students in the case based group performed significantly better on tests that demanded ability to handle knowledge in a more flexible way. e. Empirical evidence	The study investigated the use of a structured (as opposed to complex, more, case-based approach suitable for novice learners. A control group was compared to an experimental case-based group based on Cognitive Flexibility Theory.	Demetriadis, S., & Pombortsis, A. (1999). Novice student learning in case based hypermedia environment: A quantitative study. <i>Journal of Educational Multimedia and Hypermedia</i> , 8(2), 189-215.

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Medicine	25 students in second year BsC Diagnostic Radiography unit, divided into three groups	To assess the effectiveness of a guided discovery approach compared to lectures and an electronic book	Access to text, medical images, sound files, videos and diagrams Answer questions, receive computer-based feedback If target skills not reached, students work through content again	Students using the CORE approach performed significantly better on essay evaluations than both control groups. Students using the CORE approach performed significantly better than the lecture group when judged on knowledge gain. CORE group took longer than both control groups. e. Empirical evidence	The study assessed the effectiveness of a guided discovery approach (The CORE method: Concept, Object, Refinement, Expression) compared to two control groups based on lectures and an electronic book. Qualitative and quantitative methods used.	Hogg, P., Boyle, T., & Lawson, R. (1999). Comparative evaluation of CORE based learning environment for nuclear medicine. <i>Journal of Educational Multimedia and Hypermedia</i> , 8(4), 457-473.
Generic skills (academic writing skills)	87 part-time adult learners at university randomly assigned to one of two groups	Can visually pleasing computer screens enhance communication? Do achievement, completion rate and lesson time vary with screen layouts that use poor design principles in computer-based instruction?	Screen designs were used based on design principles of: Unity/ harmony Focal point Balance Students work through linear computer-based lesson	No significant difference between the two groups. Those students who used the lesson with good design principles completed the lesson in less time (21%) and had a higher completion rate (74% vs 45%) e. Empirical evidence	The study examined whether artistic screens (screens that employed accepted principles of visual design) influence the learning process, as assessed in recall of learning, lesson completion time and completion rate.	Szabo, M., & Kanuka, H. (1999). Effects of violating screen design principles of balance, unity, and focus on recall learning, study time and completion rates. <i>Journal of Educational Multimedia and Hypermedia</i> , 8(1), 23-42.

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Education (telecommunication)	102 university undergraduates experienced with using computers for word processing but little other purposes	Do learning styles influence immediate and delayed posttest performance in different hypermedia learning environments	Students worked through hypercard materials with hierarchical structure (low learner control) or 'web structure' where students could move freely from node to node (high learner control)	<p>Learning styles did appear to influence performance in hypermedia learning environments.</p> <p>Individuals with active learning styles performed better with hierarchical structure (perhaps to complete tasks quickly).</p> <p>Reflective learners performed better with moderate structure.</p> <p>e. Empirical evidence</p>	The study examined how learning styles interacted with learner control at the completion of a computer-based activity, and after a delay of two weeks	Rasmussen, K.L., & Davidson-Shivers, G. V. (1998). Hypermedia and learning styles: Can performance be influenced <i>Journal of Educational Multimedia and Hypermedia</i> ; 7(4), 291-308..

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Education (special education)	23 preservice teachers in special education	Is there a relationship between prior experience, rank in school, and levels of field dependence/independence using computers with learning outcomes for preservice teachers using a hypermedia-based instructional program?	<p>Students use multimedia program in case study format on children's behavioural disorders which:</p> <p>Presents opening challenging scenario</p> <p>Access to background information, authentic records, interviews</p> <p>Students:</p> <p>Observe children in a variety of situations</p> <p>'Interview' their teachers and parents</p> <p>Seek domain specific information</p> <p>Compare theoretical views on deviance</p> <p>Hear 'expert' discussing the children</p> <p>Engage in problem solving</p>	<p>Hypermedia case studies provide an equally effective learning environment for students regardless of learner differences.</p> <p>f. Strong empirical evidence</p>	<p>The study sought to explore the relationship between learning styles and the outcomes of multimedia-based instruction. The study investigated further the relationship among learner differences, patterns of usage and learning outcomes for hypermedia assisted instruction. Completion of multimedia activities took 4 weeks semester time, was compulsory and contributed to unit grade</p>	<p>Fitzgerald, G.E., & Semrau, L.P. (1998). The effects of learner differences on usage patterns and learning outcomes with hypermedia case studies. <i>Journal of Educational Multimedia and Hypermedia</i>, 7(4), 309-331.</p>

Knowledge domain	Students	The forms of learning being sought	The learning strategies that were used	The learning outcomes that are claimed	Context	Name of article
Multimedia	15 high school students studying multimedia	<p>What is the effect of hypermedia development on students' knowledge acquisition?</p> <p>What is the effect of hypermedia development on students' general problem solving skills?</p> <p>What are the general design skills that students use when developing hypermedia projects?</p>	<p>Students learned basic features of multimedia authoring package</p> <p>Completed two minor projects incorporating multimedia elements.</p> <p>Completed an extensive autobiography in multimedia format.</p> <p>Researched and completed a topic of own choice</p>	<p>Students declarative and procedural knowledge increased in complexity.</p> <p>General problem solving skills increased and became more complex.</p> <p>Design skills developed and emulated a problem-solving process.</p> <p>f. Strong empirical evidence</p>	<p>The study rests on the premise that by having students develop their own hypermedia programs, they will be engaged in a process that requires them to externalise constructs of their own knowledge, and thus extend complex thinking skills and problem solving processes. The research spanned a full semester of the multimedia elective unit.</p>	<p>Oughton, J.M., & Reed, W.M. (1998). The effect of hypermedia development on high school students' knowledge acquisition, general problem-solving skills and general design skills. <i>Journal of Educational Multimedia and Hypermedia</i>, 7(4), 333-363.</p>
Food Science and Human Nutrition	263 undergraduate university students enrolled in two introductory nutrition classes	<p>Does the use of interactive CD-ROM improve student learning?</p> <p>What is the comparative influence of using only textbook as supplement to lecture?</p> <p>Does the time students spend using the CD-ROM correlate with improved performance on exams?</p>	<p>Use CD-ROM presenting case studies with three sections: Introduction, Explore, Apply (screens with feedback for correct answer)</p> <p>Lectures</p> <p>Textbook</p>	<p>No evidence of any correlation between use of multimedia and improvement on exams</p> <p>Students using textbook only performed better when the exam was based on the textbook (!)</p> <p>The structure of the assignment probably influenced student performance more than the features of the CD-ROM.</p> <p>e. Empirical evidence</p>	<p>The context of the study related to the influence of technologies on learning. The use of CD-ROM was compared to the 'traditional' approach. The study used quantitative methods to compare CD-ROM, lectures, and textbook with lectures and textbook. The research period was 1 week in the semester.</p>	<p>Beerman, K., Brown, G. & Evans, M. (1998). Interactive CD study modules in food science and human nutrition: Assessing technology enhanced study programs. <i>Journal of Educational Multimedia and Hypermedia</i>, 7(4), 365-374.</p>

