P600/R680 Seminar: Interactive Tools for Learning (3 Cr)
(i.e., Interactive Tools for a Learning Community)

Spring 1995, Mondays 5:45-8:25
Distance Educ. Suites: Room 2140 (IU-B) & Room ES3138E (IUPUI)

Enroll in Either: CEP (P600, Section 5885) or IST (R680, Section B587)

IU-B:  Dr. Curtis Jay Bonk, Educ: Room 4022, (812) 856-8353, CJBonk@Indiana.Edu
IUPUI: Dr. Kenneth Hay,    ES: Room 3107,     (317) 278-1110, KHay@IndyVax.IUPUI.Edu

Course Description: The use of computers as educational tutors, tools, and tutees was advocated over a decade ago by Robert Taylor. While these three metaphors continue to promote innovative ideas about technological bridges to human learning, in this seminar, the notion of the computer as an educational tool will be prominent. We will consider a range of educational tools (e.g., hypermedia, groupware, microworlds, electronic databases and retrieval mechanisms, notecards and planning aids, idea processors, scientific computer probes, grammar checkers, and animation and graphical aids) can accomplish differing learning goals. Though we advocate a student-centered learning approach, we hope to provide a roadmap to some of the key human learning and development principles underlying each of these technologies. Clearly, this course will be applicable to students interested in teaching or conducting research with computer tools. While we wrestle with cognitive, instructional, and sociocultural theory issues, we shall ground this discussion with researchable questions, actual tool development dilemmas, and school implementation possibilities. This class will incorporate an assortment of lectures, demonstrations, videos, and small and large group discussion activities, with IU students at both IU-Bloomington and IUPUI. Using these rich intercampus resources, we hope to design unique tools and curricula while discovering exciting conferences, campus resources, and success stories. After the course, students should be able to: appreciate the diverse application of learning technologies, design plans to use technology as a learning tool, understand that knowledge is not possession but access, and perceive new knowledge construction and peer collaboration prospects.

Required Texts:
3. Course Book of Readings: A copy is in each respective library.

Tentative Tasks and Grading:

<table>
<thead>
<tr>
<th>Points</th>
<th>Task Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 pts/15%</td>
<td>A. Weekly Attendance and Class Participation (15%)</td>
</tr>
<tr>
<td>50 pts/25%</td>
<td>B. Weekly Electronic Starter and Wrapper Composing <em>(Due twice: Weds by noon; Must participate each week)</em></td>
</tr>
<tr>
<td></td>
<td>Grading: (1) Insight; (2) Clarity/Logic; (3) Original; (4) Complete: Depth/Breadth (5) Fdbk/responsive.</td>
</tr>
<tr>
<td>40 pts/20%</td>
<td>C. Definitions and Taxonomy of Cognitive Tools and Sociomedia <em>(Draft due Feb 20th; Final due March 6th)</em></td>
</tr>
<tr>
<td></td>
<td>Grading: (1) Ideas/Orig; (2) Flow/Unity; (3) Rel. Drawn/Relevant; (4) Complete: Breadth/Depth.</td>
</tr>
<tr>
<td>80 pts/40%</td>
<td>D. Major Project: Eight Options <em>(Due: Draft due Feb 27th; Final due April 10th)</em></td>
</tr>
<tr>
<td></td>
<td>Grading: (1) Review Lit/Purpose; (2) Hypoth/Questions/Intent; (3) Method/Proced; (4) Activity/Design; (5) Implics/Future; (6) Richness/Unique; (7) Coherence/Logic; (8) Complete: Breadth/Depth.</td>
</tr>
</tbody>
</table>

200 Total Points

We will use a point system for each project, evenly dividing points among aspects of each assignment. Total points will determine your final grade. We will use the following grading scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>193 or more points</td>
</tr>
<tr>
<td>A</td>
<td>185-192 points</td>
</tr>
<tr>
<td>A-</td>
<td>180-184 points</td>
</tr>
<tr>
<td>B+</td>
<td>174-179 points</td>
</tr>
<tr>
<td>B</td>
<td>166-173 points</td>
</tr>
<tr>
<td>B-</td>
<td>160-164 points</td>
</tr>
<tr>
<td>C+</td>
<td>153-159 points</td>
</tr>
<tr>
<td>C</td>
<td>145-152 points</td>
</tr>
<tr>
<td>C-</td>
<td>140-144 points</td>
</tr>
<tr>
<td>F/incomplete</td>
<td>no work received or significantly inadequate/impaired</td>
</tr>
</tbody>
</table>

- - -

- - -
Projected Seminar Weekly Topics:

Week 1. (Jan 9th) Trends in Computers as Cognitive and Sociomedia Tools (Mentors: Ken/Curt)
   a. Q: What is a tool?
   b. Do: Review syllabus and expectations

Week 2. (Jan 16th) Linking Tools to Learner Centered Psychological Principles (Mentor: Curt)
   a. Q: Why is the psychology of learning important here?
   b. Do: Video on Student voices in a learner-centered school: K-8

Week 3. (Jan 23rd) Learner Centered Design (Mentor: Ken)
   a. Q: What is learner centered design?
   b. Do: Video on APA Learner-centered psych principles: high school

Week 4. (Jan 30th) Multimedia Composition and Knowledge Construction (Mentor: Curt)
   a. Q: What is a knowledge tool? What are knowledge skills?
   b. Do: Explore the "Writing Space" disk/book

Week 5. (Feb 6th) Writing Tools for Idea Generation and Cognition Enhancement (Mentor: Curt; IUPUI visit IU-B)
   a. Q: What tools do you use to write or compose?
   b. Do: Demo of Writing Tools, CUCME, discuss the Writing Space

Week 6. (Feb 13th) Distance Writing Collaboration Tools and Computer-Mediated Communication (Mentor: Curt)
   a. Q: How do you communicate? How about in 5 yrs or 5 yrs ago?
   b. Do: Video on Aspects, Intermedia, or the Knowledge Navigator

Week 7. (Feb 20th) Internet, Mosaic, World Wide Web, and Other Info Systems (Mentor: Ken; IU-B visit IUPUI)*
   a. Q: Why is info access so important? Can we teach "search" skills?
   b. Do: Demonstration of Blue Skies, WWW, Mosaic, & CSILE

Week 8. (Feb 27th) Science Tools for Collaboration in a Learning Community (Mentor: Curt)*
   a. Q: What are the teacher and student roles in a learning community?
   b. Do: Multimedia Weather Project Guests from Helmsburg, Park Tutor, School 60.

   a. Q: Why have kids conduct inquiry? Any research questions here?
   b. Do: Demonstrations and computational science?

Week 10. (Mar 20th) Math Tools for Problem Solving and Problem Representation (Mentor: Ken)
   a. Q: Any diff between tools, tutors, and multimedia word problems?
   b. Do: Video on Anderson's Geometry tutor or Rand's Algebra Tutor; Fractals???

Week 11. (Mar 27th) Computer Programming and CAD Systems for Designing Knowledge (Mentor: Ken)
   a. Q: Is programming a basic skill? Just what is programming?
   b. Do: CUCME with Elliot Soloway

   a. Q: Can we enhance thinking skills with technology?
   b. Do: Video on DVI; Pogrow's HOTs Program; Alternate Reality Kit

Week 13. (Apr 10th) Virtual Reality, Intelligent Tools, and Other Dreams of Reality (Mentors: Ken/Curt)*
   a. Q: What's next? What inventions are still needed?
   b. Do: IU-B and IUPUI faculty debate utility of tools and their dreams

Week 14. (Apr 17th) Student Self Selection Week (Mentor: Ken)
   a. Q: What did we miss?
   b. Do: Student discussion and presentation of self-selections

Week 15. (Apr 24th) Cognitive and Sociomedia Tools Recap (Mentors: All of us!!!)*
   a. Q: Ok, did we learn anything here? What specifically?
   b. Do: Student continue to discuss and present self-selections
Class Tasks:

A. Weekly Attendance and Participation. (15%--30 points = 15 points for attendance; 15 points for participation)
Because unique activities will be incorporated into each class, it is your responsibility to experience them. To maximize your learning, a combination of reading, verbal and written reactions to ideas, observing demonstration videos, and hands-on activities will be critical to your growth as a class. Participation is encouraged at all times.

B. Weekly Electronic Starter and Wrapper Composing. (25%--50 points)
We want to either create a newsgroup or have us use e-mail distribution lists for this class to reflect on the weekly reading, demonstrations, and discussions. Here, we can reflect and write thought papers on issues that are: theoretical or practical, recent or long-evolving, general or specific, relevant to class or work, etc. Each weekly thought piece or reflection activity will be about a concept or idea you found useful in thinking about your own teaching/learning/research (not mindless idea doodling). You must sign up once to be a starter of the upcoming week dialogue and one time to be a wrapper upper. During the remaining weeks you remain an active participant. Starters and wrappers are responsible for their task by Wed at 12:00 (i.e., noon) of their assigned week(s). Please turn in a copy of typed papers, logs, and newsgroup contributions during the final class period (April 24th).

As a starter, you might: (1) state reactions, questions, and suggestions for the upcoming readings; (2) point out the relationship of upcoming week topic or articles to past lectures or readings; (3) discuss the position of a pioneer the field or get everyone to write to him/her; (4) discuss a recent visit to a technology center, exhibit, school, or corporate setting using computer tools; or (5) generally relate to prior learning/discussion.

As a wrapper upper, you might: (1) react and reflect on lecture, discussion, or demonstration; (2) summarize and reflect on that weeks starter's initial points and prior week discussion; (3) point out questions and concerns that have yet to be answered; or (4) note any related current, future, or additional readings, or (5) react to a guest speaker's ideas or a unique class activity.

As a weekly participant, you might (1) get involved in the discussion; (2) answer questions and concerns; (3) question or respond to a peer at IU or IUPUI; (4) bring up a current issue, newspaper article, or governmental proposal; or (5) point to a conference coming up on this topic.

C. Definitions and Taxonomy of Cognitive Tools and Sociomedia (20%--40 points)
Two key indicators of learning here: (1) visual; and (2) verbal interpretation. How do these readings fit together? We want you to begin to indicate--through a visual representation--just what you have internalized by depicting the cognitive and sociomedia tools in your field of study. Maximum visual representation size is a folded 11 X 17 sheet of paper. First of all, give us some important terms here (perhaps 20-30 words) and provide broad tool-related definitions. Then link terms into common categories that relate to particular weekly discussions or important concepts. Above these categories provide a listing a learner-centered psychological and design principles. You might to create one overarching taxonomy of tools in your field. Or perhaps, you will prefer multiple taxonomies. Secondly, we want you to verbally describe what this visual representation of broad tool definitions, categories, and principles represents. Please summarize and interpret your visual display in a 2-3 page single-spaced paper. First drafts are due Feb 20th; final reports March 6th. (See Tidbit for Week 1 by Park and Hannifin for an example).

D. Major Project: Eight Options (40%--80 points)
With the eight options listed below, you have a chance to experiment with or observe the uses of technology tools in schools and nontraditional learning environments, propose a totally unique software tool, or provide help to your peers. We will discuss these briefly during the final class period. You have a choice of the following: (A) Naturalistic Study; (B) Research Intervention; (C) Research/Grant Proposal; (D) Tool Design Proposal; (E) Curriculum Integration Proposal; (F) Research Presentation; (G) Educational Tool Demonstration; (H) Usable Class Product. A joint pilot research project with a fellow student or faculty member is a possibility. CAUTION: For option A or B, you may need human subjects approval before proceeding. Brief 2-4 paragraph written summaries of your topic is due prior to Feb. 27, while the project is to be completed by April 10th.
Weekly Reading (typically we will read 3 of 4 articles)

Week 1. (Jan 9th) Trends in Computers as Cognitive and Sociomedia Tools
Cog Tools: Preface
Sociomedia: Intro

Week 2. (Jan 16th) Linking Tools to Learner Centered Psychological Principles
Cog Tools:
  Ch. 3: Lepper et al., Motiv techn of expert human tutors: Lessons for design of computer-tutors
  Ch. 10: Katz & Lesgold, The role of the tutor in computer-based collab lrng situations

Week 3. (Jan 23rd) Learner Centered Design

Week 4. (Jan 30th) Multimedia Composition and Knowledge Construction
Cog Tools:
  Ch. 7: Lehrer, Authors of knowledge: Patterns of hypermedia design
Sociomedia:
  Ch. 11: Landow, Bootstrapping hypertext: Student-created docs, Intermedia, & the soc cons of know
  Ch. 15: Murray, Restruct space, time, story, and text in advanced multimedia envir's.

Cog Tools:
  Ch. 6: Salomon, On the nature of pedag computer tools: The case of the Writing partner
12. Bonk et al. (in press). The social and cognitive transformation of workplace writing environments.

Week 6. (Feb 13th) Distance Writing Collaboration Tools and Computer-Mediated Communication
Sociomedia:
  Ch. 21: Adelson & Jordan, The need for negotiating in coop work
17. Schrage (1990). Ch 6: Approp tools: Ones that work; Ch 8: Collaborative tools: A first look

Week 7. (Feb 20th) Internet, Mosaic, World Wide Web, and Other Information Systems
Sociomedia:
  Ch. 2: Slatin, Is there a class in this text: Creating know in an elect classroom
  Ch. 7: Burnett, Multimedia and the library and the info studies curriculum
  Ch. 23: Boy, Computer integrated documentation.
Week 8. (Feb 27th) Science Tools for Collaboration in a Learning Community

Cog Tools:
- Ch. 11: Schauble, Raghavan, Glaser, The disc & reflec notation: A graph trace for support self-reg

Sociomedia:
- Ch. 19: Wilson, Engineering-design instructional computer system (EDICS)
- Ch. 20: Gal, Computers and design activities: Their mediating role in engineering education.
- Skim 21. Pea (1993), The collaborative visualization project


Cog Tools:
- Ch. 8: Teasley & Roshelle, Constructing a jt prob space: The computer as a tool for shar knowledge
- Ch. 9: Lajoie: Computer envir's as cog tools for enhancing learning

Sociomedia:
- Ch. 17: Anderson, Medical center: A modular hypermedia approach to prog design

Week 10. (Mar 20th) Math Tools for Problem Solving and Problem Representation

Cog Tools (read either Ch 1 or 4; must read Ch 5):
- Ch. 1: Koedinger & Anderson. Reify impl plng in geometry: Guide for model intell tutor sys des
- Ch. 4: Derry & Hawkes, Local cognitive modeling of p/s behav: An application of fuzzy theory
- Ch. 5: Ruesser, Tutoring systems and pedagog theory: Rep tools for under, planning, & refl in ps'ing

Week 11. (Mar 27th) Computer Programming and CAD Systems for Designing Knowledge


Week 12. (Apr 3rd) Music, Art, Visualization, and Animation Tools for Creativity and Critical Thinking

Sociomedia:
- Ch. 18: Davis, Prototyping multimedia: Lessons from the visual computing grp at Proj Athena Center

Week 13. (Apr 10th) Virtual Reality, Intelligent Tools, and Other Dreams of Reality

Sociomedia:
- Ch. 3: Carlson, Varieties of virtual: Expanded metaphors for computer mediated learning.

Week 14. (Apr 17th) Student Self Selection Week

Pick a Journal (or a book):
- Computers in the Schools, (1994). 10(1-4), Reed: Anniv issue on hyper/multimedia in the schools
Week 15. (Apr 24th) Cognitive and Sociomedia Tools Recap
Cog Tools:
Ch. 12: Chipman, Gazing once more into the silicon chip: Who's revolutionary now?
Ch. 13: Lesgold: Information tech and the future of education.
Sociomedia:
Ch. 25: Turkle, Paradoxical reactions & powerful ideas: Educ computing in a dept of physics.

Week 1-15 Extra Tidbits:
38. Week 1 Park & Hannifin (1993). Empirically-based guidelines for the design of interactive multimedia
40. Week 3 Edutopia (1993-94; & 94-95), Newsletter of the George Lucas Educational Foundation
42. Week 5 Salomon et al. (1989). The computer as a zone of proximal deve: Intern metacog from rdg part
44. Week 7 (a) TERC: The Global Lab Project; (b) World School for Adventure Learning: Executive Summary
47. Week 10 Optional Resp to Schwartz: Bredo (1989). Responses to 'visions for use of computers in the class
48. Week 11 Papert, S., Literacy & letteracy in media ages; Inventing the future: Schools should be more like play
Summary of Eight Major Project Options:

A. Naturalistic Study: You might perform a case study or pilot observation of workers/students using tools or teachers interacting with employees/students while they use a tool or curriculum application. For instance, you might decide to complete a case study of a child, young person, or adult using a software tool for the first time; including at least five careful observations and commentary of the person and tutor/teacher. The commentary should reflect your learning and provide insights as to how to make this tool more educationally meaningful. If you are looking at student-teacher-tool interaction patterns, teacher guidance, or simply tool use, you will need to design coding schemes and observation log sheets to help interpret tool functionality in this environment (see reverse for details).

B. Research Intervention: In Option B, you might want to try to use and analyze a specific task, tool, or theory. Based on your interests and existing theory, you should form specific research questions before your intervention. Though your study can take many forms, the research report you submit should detail the purpose and framework of the intervention (i.e., why was this particular project chosen), include a literature review, method section, a description of what occurred (were you successful?), explanation of the results, and possibilities for extending this study (see reverse for details).

C. Research/Grant Proposal: Option C can be either a grant or research proposal. In this option, students must write a paper on a possible study of thinking skills related to the use of new technologies within education which: (1) extends/modify the research, or (2) suggests a totally unique but reasonable research project/study. It may be either a quantitative intervention or qualitative (e.g., ethnographic) study. It should include an introduction, brief review of the important literature, methods section (e.g., hypotheses, subjects, materials/resources, variables, procedure, instruments, and anticipated analyses), and discussion of expected results (including the meaning and relationship to the field). Your proposal can be within any aspect of technology tools for impacting learning and thinking. You may target any age group or population (see reverse for details).

D. Tool Design Proposal: Choose Option D if you would like to design a unique educational tool or at least propose the design of a unique educational tool, instructional design model, or unique curriculum application of an existing tool. Instructional design does not need to include any programming. However, it must clearly indicate: (a) the purpose (e.g., the skills addressed); (b) how it might be implemented; (c) the advantages of using this tool, theory, or application to accomplish your educational goals; (d) possible grant sources for programming or design; (e) a mock-up sample of design documents; and (f) description of applicable learner centered design principles.

E. Curriculum Integration Proposal: Here you might contemplate the curriculum impact of one or more learning tools. How are you going to use it? What would change? What training would there be needed for successful use? How might faculty, students, administrators, and parents react to all this? Include a description of tool, how it could or should be used in traditional or nontraditional learning, and what you believe to be its strengths and weaknesses.

F. Research Presentation: Again, in the spirit of an interactive seminar, the purpose of this option is to allow for student input and also provide practice in presenting information in the style required for conferences. Here, you are to orally present a research proposal or synthesize aspects of the research or readings for the class wherein you point out a new direction that researchers or teachers might want to head. Presenters should meet with us prior to the presentation in order to discuss the topic and proposed organization of the presentation. Given time constraints, the presentation length will be no longer than 20-25 minutes (see reverse for details).

G. Educational Tool Demonstration: You might want to demonstrate a software tool that is promoted for an educational setting such as a library, corporate training center, computer lab, museum, zoo, classroom, or learning center. See the instructors about the possibilities of demonstrating a particularly interesting tool you have found.

H. Usable Class Product: Students choosing Option H will create or perform a meaningful activity for the class. For example, you might summarize the learning principles embedded in all the articles we read this semester, uniquely categorize the tools studied, summarize the weekly class e-mail comments and questions, or create a database summarize major themes and trends in a technology or psychology journal for a 3-5 year period. Your final report, however, will be your own design as there is no preconceived format.
Sample Format Option A or B. Naturalistic/Research Activities: (8-16 pages)

I. Title Page (Name, affiliation, topic title, acknowledgements)
II. Topic Literature and Method (7-14 pages)
   1. Rhetoric & materials; 2. Brief stmt of problem and why imp (1-2 pages)
   3. Brief review of the relevant literature (3-4 pages)
   4. Methods: (2-6 pages)
      a. Subjects & design (i.e., who/how selected); 2. Materials/setting (i.e., hard/software, text)
      c. Procedure (i.e., how data was obtained)
      d. Coding Schemes & Dep. meas/instr (i.e., how segment/code data); e. Analyses or comparisons
III. Results and Discussion 1. Preliminary Results; 2. Discussion of results (4-8 pages)
IV. References (APA style: see syllabus for example)
V. Appendices (e.g., pictures, charts, figures, models, tests, scoring criteria, coding procedures)

Sample Format for Option C or D. Inquiry or Tool Design Grant Proposal: (14-20 pages)

I. Title Page (Name, affiliation, topic title, acknowledgements)
II. Review of the Literature (6-12 pages)
   1. Intro to Tool or Problem (purpose, history, importance) (1 page)
   2. Review of Relevant Lit (contrast related tools and relevant literature on the topic) (6-9 pages)
   3. Stmt of Design Questions or Hypoth (what do you expect to occur) (1 page)
III. Method Section (3-7 pages)
   1. Tool Design (i.e., common features) or Subjects (i.e., sample, who and how assigned to groups)
   2. Tool Configuration (i.e., requirements) Or Setting (i.e., hardware, software, text, models, figures)
   3. Tool Options (e.g., windows, linkage features) or Dependent measures/instruments (i.e., tests)
   4. Tool Development Process (i.e., timeline) or Procedure (i.e., training);
   5. Other (e.g., related tools) or Other (e.g., coding, other materials);
   6. Pilot Tests, Anticipated Analyses or Comparisons
IV. Results and Discussion (OPTIONAL) 1. Antic/dummied results; 2. Disc. of results
V. References (APA style: see syllabus for example)
VI. Appendices (e.g., pictures, charts, figures, models, tests, scoring criteria, coding procedures)

Sample Format for Option F. Research Presentation (20-25 minutes)

I. Title of Topic
II. Purpose or Rationale for Study or Product
   1. Current dilemma in field, confusion, or need
III. Review of Existing Literature
   1. Intro to Topic/Problem (purpose, history, importance)
   2. Review of Lit (contrast relevant literature on the topic)
   3. Stmt of Hypoth/Res Q's (what do you expect to occur)
IV. Method Section
   1. Subjects and design (i.e., sample, who and how assigned to groups)
   2. Materials/setting (i.e., hardware, software, text, models, figures)
   3. Dependent measures/instruments (i.e., tests)
   4. Procedure (i.e., training); 5. Other (i.e., coding, other materials); 6. Exp analyses or comparisons
IV. Results and Discussion (OPTIONAL) 1. Antic/dummied results; 2. Disc. of results
V. Visuals (e.g., pictures, charts, figures, models, tests, scoring criteria, coding procedures)

Sample Grading of Major Project (80 Total Points or 10 pts each dimension):

1. Review of the Problem/Lit/Purpose (interesting, relevant, current, organized, thorough, grounded)
2. Hypothesis/Research Questions/Intentions (clear, related to class and theory, current, extend field)
3. Method/Procedures (subjects/age groups approp, materials relevant, timeline sufficient, controls)
4. Research Activity/Design/Topic/Tool (clear, doable/practical, detailed, important)
5. Implications/Future Directions (generalizability, options available, short term and long-term focus)
6. Overall Richness of Ideas (richness of information, elaboration, originality, unique)
7. Overall Coherence (unity, organization, logical sequence, synthesis, style, accurate)
8. Overall Completeness (adequate info presented, explicit, relevant, precise, valid pts)