Delivering on the e-learning promise: a case for a learning environment that enables Collaborative Online Problem Solving (COPS)

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ABSTRACT. Research spanning the last thirty years confirms that people learn better by active enquiry, collaboration and experimental problem solving than by passive reception and acceptance of information. Empirical evidence, as well as the pressing demands of pervasive social and technological change, requires learning and teaching approaches that combine problem-centred learning and collaborative learning, and open up possibilities for equitable participation in real-world learning.

This paper mounts a theoretical and pedagogical case for such an approach, by examining the developmental work being conducted in this area at QUT-Queensland University of Technology (QUT, 2003). It argues for a Collaborative Online Problem Solving environment (known colloquially as COPS) that will combine the problem-centred and collaborative dimensions of learning. The developmental work of COPS seeks to go beyond current online learning and teaching resources, offered by most Learning Management Systems, to provide a framework and system, in order to create and deploy environments, where teams of student learners can collaborate, engage, grapple with, and seek to make sense of, authentic problems, within an online environment. It seeks to do so by creating problem-centred "learning designs", that can be integrated with face-to-face teaching, to bridge the gap between the classroom and real world experience.

KEYWORDS: *Collaborative e-learning, Pedagogy, Problem solving*

Introduction

E-learning has been part of the teaching and learning lexicon of universities for over a decade, and the promises of e-learning

have been a ubiquitous feature of higher education initiatives in both Australia and elsewhere. The rhetoric and practice around e-learning (known also as online learning) are well attested (Carr, 2001; Rosenberg, 2001; Svetcov, 2000; Vrasidas, 2004; Yam, 2004). Current online learning environments ostensibly deliver gains in terms of mass storage of information, yet fall short in optimising positive student engagement. Research confirms that meaningful student learning requires learning environments and learning experiences that are relevant to students' lives, and to the worlds which they inhabit. It is arguable that learning experiences should be co-constructed, goal-directed and authentic, and with real possibilities for collaborative problem solving (Jonassen et al., 2003). Over thirty years ago, Bruner contended that people learn more effectively by active enquiry, experimentation and collaboration than by passive acceptance of content (Bruner, 1973). While this seminal work continues to be corroborated by more current empirical evidence, ironically, there is a technological lag in the types of e-learning resources that best support this approach. This lag, therefore, calls for the innovative application of both pedagogical and technical resources, within an online environment, capable of advancing collaborative student learning. One such innovation is the work around the Collaborative Online Problem Solving (COPS) environments, being conducted with undergraduate students, across three faculties, at Queensland University of Technology (QUT).

The goal of COPS is to further improve student learning by integrating face-to-face teaching methods with collaborative, problem-centred online learning environments. This requires the application of sound pedagogical approaches involving active learning (Phillips, 2005), collaborative learning (Kagan, 1994), constructive learning (Kolb, 1984; Laurillard, 2002), meaningful learning (Jonassen et al., 2003; Zenger, Uehlein, 2001), reflective learning (Schön, 1991), and problem-based learning (Wood, 2003). Each of these elements informs the design of an online learning environment (Oliver, Herrington, 2001). COPS stands to provide students with online learning opportunities, whereby they explore problem scenarios, experiment, practise, and reflect. In so doing, it incorporates a system of dynamic branching, whereby the learners' decisions are central to their learning, thus increasing students' ownership of their learning. COPS also stands to enable the university teachers to develop clearer understandings of students'

teamwork and problem solving, and the learning/teaching strategies that are the most effective in assisting students to improve their skill bases.

COPS is being developed at a meta-level: creating an authoring tool, suitable for multi domains, where lecturers can use this tool to develop their own COPS learning designs within their discipline, and to explore how learning designs can be reused. This aspect is unique, as Learning Management Systems, characteristically, do not have this type of inbuilt support. In addition, where possible, we will build new functionality as reusable components. Hence, components that support new features, such as role playing, dynamic branching, and authoring, will be open for reuse. This paper further explains the teaching and learning philosophy behind COPS, and our approach to developing this new online tool.

Context

I hear and I forget. I see and I remember. I do and I understand.
(Lao Tsu, Chinese philosopher, 6th century B.C.)

Seminal work, such as that of Bruner, attests that people learn more effectively by active rather than passive means (Bruner, 1973). Within a corpus of evidence, learning through observation (listening, watching or reading) is seen to be not as effective as actually performing an action, and reflecting upon its consequences (Jonassen et al., 2003; Schön, 1991; Wankat, Oreovicz, 1993; Wood, 2003). So, too, students' engaging in co-construction of their own knowledge through an action-reflection cycle (rather than obtaining knowledge directly from a teacher) leads to a deeper level of knowledge and skill (Holmboe, Scott, 2005; Nelson, 1999; Rust et al., 2005; Vygotsky, 1978).

The pervasiveness of the Internet means that learning institutions can provide mass access in cost-effective ways. Whilst e-learning promises reduced costs, and increased effectiveness, accessibility and flexibility, there remain persistent shortcomings. In many cases, there has been a focus on technology and content as opposed to learning effectiveness (Yam, 2004). Key issues include online learners' perception of not feeling engaged, finding the content boring, feeling isolated, not understanding the context, having insufficient control, and not feeling motivated (Rosenberg, 2001). Drop-out rates in e-learning have been quoted to be as high as 35%

(Svetcov, 2000). This scenario is not surprising, as many learning organisations have been found to use online facilities as reservoirs for traditional materials (Vrasidas, 2004; Yam, 2004).
Jonassen and colleagues argue for five factors required for learning to be meaningful (Jonassen et al., 2003):

- Active learning: observing or manipulating the environment.
- Constructive learning: creating meaning from experience.
- Intentional learning: goal-directed.
- Authentic learning: keeping the learning in context.
- Cooperative learning: being able to collaborate with other learners.

Recognition of these factors has, in part, propelled a shift of focus in online learning *from learning content to learning experience*. For example, Harper examined how contemporary theories of learning can be applied in an online environment (Harper, 2003). Traditionally, e-learning has focused on cognitive models of learning that are consistent with more structurally-based approaches to learning content.
Contemporary theories, such as constructivism (Caprio, 1994; Dewey, 1938; Jonassen, 1991; Piaget, Inhelder, 1966-1969; Vygotsky, 1962), are not readily accommodated in traditional Learning Management Systems, where structure is a requisite part of the learning design. Constructivist approaches are more readily facilitated in a collaborative environment, where learners can validate their perspectives through social negotiation, and interaction with an authentic task. Importantly, Jonassen states that a constructivist approach is particularly appropriate, as much of what needs to be learned involves advanced knowledge in ill-structured domains (Jonassen, 1991).
Laurillard describes how the complex process of learning can be considered as a "conversation" within a learning framework (Laurillard, 2002). This framework (Figure 1) is intended to be applicable to a range of academic learning situations, and employs the following four strategies:

1. it must operate as an iterative dialogue;
2. it must be discursive, adaptive, interactive and reflective;

3. it must operate at the level of descriptions of the topic;
4. it must operate at the level of actions within related tasks.

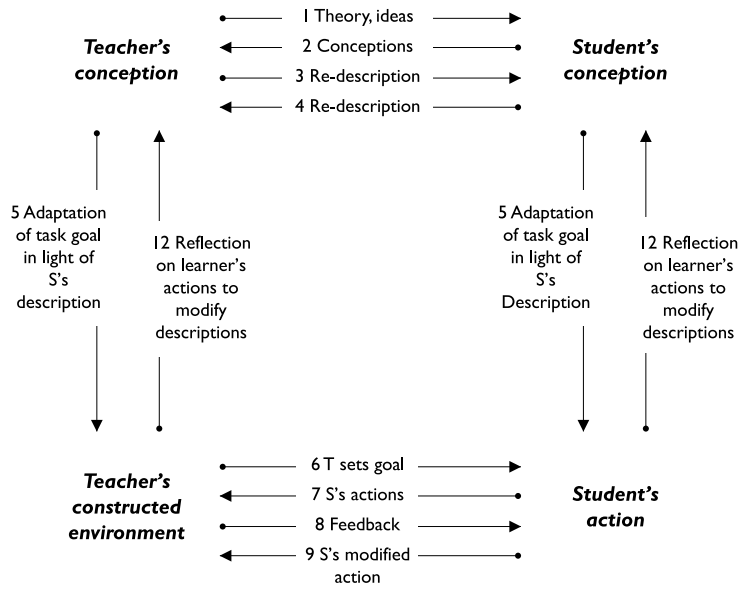

Figure 1. Laurillard's conversational framework (Laurillard, 2002, p. 87)

The iterative approach in Figure 1 is based upon an extended version of Kolb's model of experiential learning: a continuous cycle of conceptualisation, experimentation, experience, and reflection (Kolb, 1984). Both of these models (Laurillard's and Kolb's) define learning as a cycle, and endorse the need for student reflection within that cycle. They also emphasise the need for an "environment" or "problem", with which learners can experiment, and receive feedback; an environment where learners are active, grappling, seeking to make sense, experiencing, forming assumptions, testing, and creating meaning from their experience. Problem-centred learning is a well known strategy for assisting deeper, critical, active learning strategies, and thus fostering the development of higher quality learning outcomes (Ramsden, 1992).

Laurillard's framework seeks to describe the dialogue that needs to take place for learning to occur. However, it does not refer to the dialogue between learners (that is, where learners can profit from each other's different perspectives and strengths). Learner collaboration, where learners with aligned goals help each other towards some common objective, can enhance a constructivist

learning cycle, by providing an additional channel for validation and feedback (Jonassen, 1991). Located in socio-cultural theory, collaborative learning emphasises the importance of social interaction in the learning process (Vygotsky, 1978). Collaborative learning can also help to maintain an authentic context, allowing learners to understand the importance of working well together for the good of the whole. Authentic learning is often collaborative, providing students with the opportunity to reflect, and examine the task from different perspectives (Herrington et al., 2003). But as these tasks may also be ill-defined and/or relatively complex, the students are expected to define the tasks and sub-tasks needed to complete the activity.

Herrington and colleagues contend that for online authentic tasks to be effective as learning tools, then, during the first few weeks of immersion into the learning environment, students must be supported, because "isolation can be a mitigating factor against successful engagement with the course" (Herrington et al., 2003 p. 68). Their work supports the notion that the dialogue between the learners may be necessary to achieve success in e-learning.

This should not be surprising, as industry uses cooperative incentive structures, which create a situation, where the only way team or group members can attain their own personal goals is if the group is successful. Therefore, to meet their personal goals, group members must both help their group mates do whatever helps the group succeed, and, perhaps even more importantly, encourage their group mates to exert maximum efforts (Slavin, 1995). Collaborative problem solving comprises a set of skills that are considered necessary for success in today's world (O'Neil et al., 2003). Importantly, the development of such skills requires a learning/teaching approach that combines both problem-centred learning, and collaborative or cooperative learning (Nelson, 1999).

Collaborative learning environments provide a means to create more engaging and dynamic instructional settings (Kagan, 1994), and research has demonstrated the educational advantages that can be derived from such environments (Bruffee, 1999; Jonassen, 1995; Qin et al., 1995; Slavin, 1995). Collaborative problem solving emphasises cooperation in the context of a "carefully constructed scenario" (Edens, 2000; Major, Palmer, 2001), and is underpinned by pedagogical values, that include the creation of learner-centred learning environments, student ownership of the

learning experiences, analysis of learning content, exploration from multiple perspectives, and the importance of the social context for learning (Nelson, 1999). There are, therefore, important educational imperatives to employ collaborative problem solving as a constructivist learning strategy for students.

Introducing the COPS environment

The development described in this paper is the construction of a framework and system to create and deploy environments, where learners collaborate, engage, grapple with, and seek to make sense of, authentic problems, whilst online. Tentatively titled Collaborative Online Problem Solving or COPS, this new environment stands to enable teaching staff to create reusable problem-centred "learning designs", that can be integrated with face-to-face teaching, in order to bridge the gap between the classroom and real world experience. COPS specifically addresses the teaching and learning priorities of work-integrated learning, via relevant authentic problems, the generic capabilities of problem solving and teamwork, and transition from university to the workplace (COPS, 2005).

COPS development aims

Specifically, the aims of this development are to:

- provide learners with meaningful, contextualised opportunities for learning in an online environment;
- develop an online environment, where teams of learners can undertake roles, and work to solve authentic problems, that can best be solved by successful collaboration;
- emphasise communication and collaboration rather than individual activity;
- encourage students to form a personal stake in the learning process through simulation, playing and having fun;
- provide opportunities for students to make mistakes in a non-threatening environment;
- develop a range of reusable COPS learning designs (templates) to provide an affordable, consistent, high quality learning experience, based on engagement and active learning;

- develop strategies to assist teachers in the design and evaluation of their "problem" environments, and to assist integration with face-to-face teaching.

The intention is to allow teachers to develop learning environments that encourage collaboration rather than individual activity. This, in turn, should provide students with online learning opportunities, whereby they explore problem scenarios, experiment, practise, and reflect. In so doing, COPS will incorporate a system of dynamic branching, whereby the learners' decisions are central to their learning, thus increasing student ownership of their learning.

Proof of concept

This development stems from an earlier QUT Faculty of Information Technology proof of concept model, developed to support collaborative and story/problem-centred learning (CITI, 2004; Figures 3 and 5). This proof of concept has formed the basis of the initial design work in this development. There are two workflows associated with this model: one is a problem scenario workflow, and the other a pedagogical workflow.

Problem scenario workflow

The problem scenario workflow represents the problem which is imbedded into a COPS scenario (Figure 2). In the workflow figure below, we see that this problem has one starting state, a series of intermediate states, and three possible endings to the problem. It could be conceived of as choosing one's own adventure, a device used in young adult literature, where the reader makes choices from a range of possible alternatives, until they reach the end of the adventure. It is important to note that the amount of branching is entirely at the teacher's discretion: they may have as many, or as few, decisions as suits their problem.

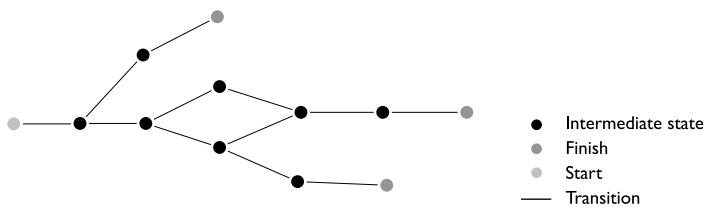

Figure 2. Problem scenario workflow

The size of the teams will be at the teacher's discretion. In the COPS case, a student team traverses the problem workflow by making a decision at each stage of the problem. This decision triggers a transition from one state of the problem to another. It is also at the teacher's discretion whether or not the students undertake roles which are unique to each person in the team. For example, one problem may involve a team of students role playing as "high school teachers", who each teach the same "high school student", in different classes. One or more of the role playing teachers notice a problem with the "high school student", and the team then discusses their options, so that a team decision can be made. Decision point triggers can be activated based upon one or more actions from one or more role players, or from random events, or even from time-outs (a specified period of elapsed time passes, so the problem progresses to the next stage). Teaching staff can "force" consequences on the team for non-collaboration by setting up a transition, so that it requires more than one role player to complete an action, before the transition to the next stage can take place. The team is primed that they have to achieve a specific goal, and that they are expected to traverse the problem together, until they reach an outcome that they believe achieves that goal. However, it should be noted that there may not be a single best outcome for problem resolution. For example, in some ethical situations, there may be no black or white answer: it is the journey that is important.

At every intermediate state, students are provided with a description of the requirements, and they can access numerous resources that facilitate investigation, decision making, outcome prediction, and personal and team reflections. These resources are added by teaching staff, and they may contain information specific to each role player, and to each state of the problem workflow. This will increase the authenticity of the problem, and facilitate collaboration, using the 'jigsaw' approach, where no individual student has all the information necessary to act appropriately (Aronson et al., 1978). It is also possible to design a learning environment, so that students from different year levels interact together, and students in final years may act as mentors for students in lower year levels, offering advice as required. The resulting COPS environment, therefore, encourages constructive collaboration by the students to explore problem scenarios,

experiment, practice, and reflect.
In the proof of concept model, the problem workflow was set up, and populated with content, using the problem workflow authoring interface (Figure 3). This interface guides the teaching staff in their establishing of their problem scenario. It is intended that this will be further enhanced in the final version of COPS.

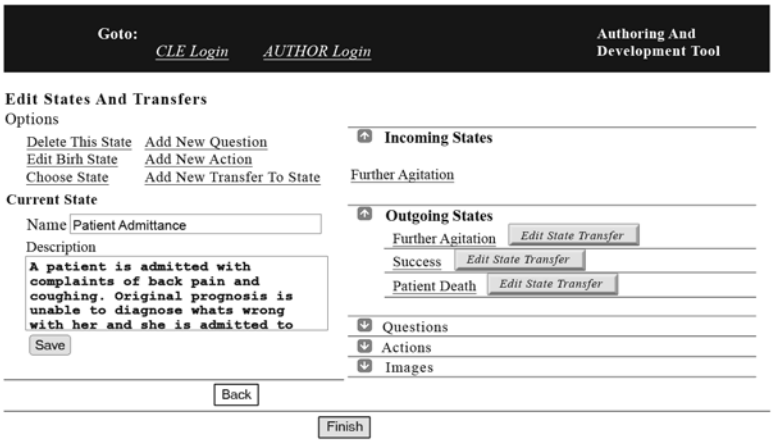

Figure 3. Proof of concept problem authoring interface (CITI, 2004)

To support student learning, COPS integrates Kolb's pedagogical cycle with the problem workflow using role play (Figure 4). This cycle is consistent with a constructivist approach, and involves students experimenting, experiencing, forming assumptions, testing, and creating meaning from experience. At any time during the life of the "problem", rudimentary elements which support students, in each of the steps in Figure 4, can be created and, therefore, seen displayed in the student interface (Figure 5), for example, the top tabs showing "Investigate", "Reflect", "Act", and side links to the "Journal", "Reflections", and "Collaborate" areas. The collaborative area provides opportunities for interaction. If the teacher chooses to design the problem, so that collaboration must occur before a decision can be reached, then it is possible to ensure that students are encouraged to interact with their team mates throughout the problem, thereby helping to reduce the likelihood of isolation during the learning process (Herrington et al., 2003).

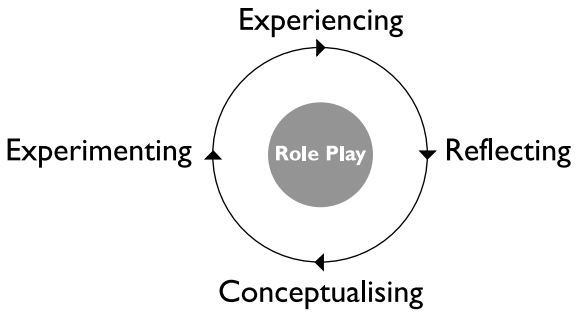

Figure 4. Our use of Kolb's pedagogical cycle (Kolb, 1984)

The student interface

The objective of the student interface (Figure 5) is to present the problem scenario to each role player, with any relevant content for their role, at that particular stage of the problem. In addition, the interface must explicitly drive the student through the pedagogical cycle in Figure 4. In this cycle, the system separates the investigation phase, the decide/predict/action phases, and the reflection phase. This approach is consistent with Kolb's model of experiential learning. The proof of concept model is of low sophistication, but will be improved by the creative process, described in the implementation plan (included below). The investigation (researching or exploration) phase is currently supported by a description of the current state, a series of strategically placed questions (that the student may ask), and relevant pictures, media, and research links. In the decide/predict/action phases, students are required to select from prescribed actions, after first predicting the likely outcome, and explaining their rationale. If the selected action triggers a change of state, the content will update, for every student, in every role of the scenario. Students will be prompted to reflect on the result of their action, or change of state, in their reflective journal.

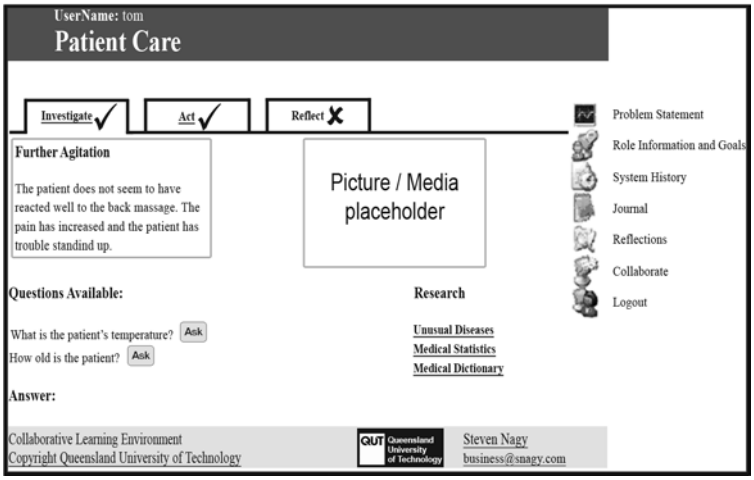

Figure 5. Proof of concept student interface

COPS project development

A broad outline of the implementation plan for each stage of the COPS project is described in Table 1. To date, COPS has completed most of the creativity and specification phases. Problem scenario definition work is underway. Preliminary paper-based trials of one of the potential problems have also been undertaken in 2006, and the results from that work are currently being analysed. We move into the building and remaining phases in early 2007. At this stage, the implementation issues of seven separate problem scenarios, in seven units (a unit is a single subject or course that runs for one semester) from four faculties at QUT, are under consideration. These units are from the Faculties of Education, Information Technology, Health, and Law. The paper-based trial has been done in the unit from Information Technology. These seven units will be culled to three units, for actual piloting in 2007. COPS will be fully integrated with the existing online environment of each of the units identified for piloting.

Table 1. Broad outline of the development of COPS

Creativity phase: in this phase, the coordinators of the units selected for the pilot phase, QUT's learning designers, and relevant experts will establish the pedagogical goals of the collaborative online Problem-Based Learning (online PBL) system, and how the system can support face-to-face teaching, engagement, and deep learning.

Specification phase and then build phase: this phase will create a specification for the system (both the student interface and the authoring interface). Upon signoff of this specification, an alpha version of the online PBL system will be developed, and user testing will be employed to facilitate development to beta stage. The system will be integrated with QUT's online Learning Management System. Academic staff will develop an approach to embed collaborative online problem-based scenarios into host units. These learning designs will then be implemented within the beta system.

Pilot phase: a pilot phase will determine the efficacy of the beta online PBL system (student side, and author side), and the learning designs implemented. Each host unit will embed a PBL learning design, hosted through QUT's online Learning Management System, into the curricula. Evaluation data will be collected.

Refinement phase: data from the pilot scheme will be evaluated, to determine the efficacy of the system, and the learning designs employed. The system and the learning designs will be refined in the light of these findings. The final version of the system and the reusable templates will then be delivered.

Dissemination phase: in the early stages of the pilot evaluation of data from student performance, both pre- and post-implementation will begin. Results from the student surveys and focus groups will be considered, at the end of each stage, and compared with data emerging from standard formal evaluations of units. Usability analysis will be undertaken, using tools such as Flashlight, and other qualitative forms of analysis. The dissemination phase will include staff development sessions, to facilitate other unit coordinators with using COPS.

To facilitate the creation of each of these problem scenarios, learning designers have developed a template (writing framework) to aid teaching staff in describing and planning their problem scenario, and to assist them in considering how they may incorporate their idea into a reality, in their classrooms. This template also helps teaching staff with describing the details of their problem scenario, in a style suitable for the purposes of the COPS project system designers. Teachers are initially asked to describe their proposed scenario, within the case study to be completed by the student groups. They are then asked to define each of the group members' roles in the scenario. They are required to identify the issue/s, potential or otherwise, that need to be resolved by the group or, in the case of projects, the specific issues, in relation to the tasks to be undertaken by each group member, in their roles. They are expected to use this identification of issues, in order to check how

the tasks align with the outcomes and criteria they have already stated.

Each teacher has been asked to describe the possible workflow pattern/s for the scenario project teams. To do this, they must consider how the activity or tasks of each role will influence the workflow pattern, and its sequencing, in terms of the group trying to resolve the problem tasks. In other words, by the time the teacher has described all of these segments, we have a simple description of what our COPS designers are going to need, so as to ensure they have designed the environment, in order to cope with these types of problems. It has already proved interesting and, often, each scenario has some unique characteristics. For instance, some of the units require a scenario activity that will be completed within one tutorial or workshop alone, other units require the system to be capable of running for the duration of a semester, and other units fit anywhere along the semester time length continuum.

Conclusion

While many institutions are implementing online learning ostensibly to increase accessibility, flexibility, effectiveness (including cost-effectiveness), it is falling short of its promise to deliver on high quality outcomes for student engagement and learning. In order to redress this situation, and to focus on the pedagogical dimensions rather than the technical dimensions of learning, a community of researchers is exploring new authoring practices and tools, which will support meaningful collaborative learning. This focus includes the creation and delivery of online activities that engage learners in constructing knowledge through experimenting, experiencing, forming assumptions, testing, and creating meaning from experience. This approach is in vivid contrast to the traditional didactic view of learners as passive recipients of knowledge (Chen et al., 2001; Jonassen, 1991; Savery, Duffy, 1995).

References

All URLs checked June 2008

Aronson Elliot, Blaney Nancy, Stephan Cookie, Sikes Jev, Snapp Mathew (1978), *The jigsaw classroom*, Beverly Hills, CA, Sage

Bruffee Kenneth A. (1999), *Collaborative learning: higher education, interdependence, and the authority of knowledge*, Baltimore, MD, John Hopkins University Press

Bruner Jerome S. (1973), *Going beyond the information given*, New York, NY, Norton

Caprio Mario W. (1994), *Easing into constructivism, connecting meaningful learning with student experience*, "Journal of College Science Teaching", V. 23, n. 4, pp. 210-212

Carr Sarah (2001), *Is anyone making money on distance education?* "The Chronicle of Higher Education", V. 47, n. 23, pp. 41-43

ChenPai-Lin, ChungDeborah S., Crane Amanda, HlavachLaura, ViallElizabeth, Pierce Jacqueline (2001), *Pedagogy under construction: learning to teach collaboratively*, "Journalism and Mass Communication Educator", V. 56, n. 2, pp. 25-42

CITI Seeding Grant, and Teaching and Learning Small Grant (2004), *Developing a prototype collaborative problem based constructivist online learning environment: project specification*, Brisbane, Australia, Queensland University of Technology

COPS - Collaborative Online Problem-Solving learning environment (2005) http://olt.qut.edu.au/it/cops/ (last retrieved 2 January 2007)

Dewey John (1938), *Experience and education*, New York, Macmillan

Edens Kellah M. (2000), *Preparing problem solvers for the 21st century through problem-based learning*, "College Teaching", V. 48, n. 2, pp. 55-60

Harper Barry (2003), *Web-based learning designs: academic access to quality issues*. Proceedings of the Online Learning and Teaching Conference (OLT '03), Brisbane, Australia, 5 November, pp. 1-10

Herrington Jan, Oliver Ron, Reeves Thomas C. (2003), *Patterns of engagement in authentic online learning environments*, "Australian Journal of Educational Technology", V. 19, n. 1, pp. 59-71

Holmboe Christian, Scott Phil H. (2005), *Characterising individual and social concept development in collaborative computer science classrooms*, "The Journal of Computers in Mathematics and Science Teaching", V. 24, n. 1, p. 89

Jonassen David H., Howland Jane, Moore Joi, Marra Rose M. (2003), *Learning to solve problems with technology*, Upper Saddle River, NJ, Merrill/Prentice-Hall

Jonassen David H. (1995), *Constructivism and computer-mediated communication in distance education,* "American Journal of Distance Education", V. 9, n. 2, pp. 7-26

Jonassen David H. (1991), *Evaluating constructivist learning*, "Educational Technology", V. 31, n. 9, pp. 28-33

Kagan Spencer (1994), *Cooperative learning*, San Juan Capistrano, CA, Resources for Teachers

Kolb David A. (1984), *Experiential learning: experience as the source of learning and development*, Englewood Cliffs, NJ, Prentice-Hall

Laurillard Diana (2002), *Rethinking university teaching: a conversational framework for the effective use of learning technologies*, London, Routledge/Falmer

Major Claire H., Palmer Betsy (2001), *Assessing the effectiveness of problem based learning in higher education: lessons from the literature*, "Academic Exchange Quarterly", V. 5, n. 1, pp. 4-8

Nelson Laurie M. (1999), *Collaborative problem solving*, in Reigeluth Charles M. (ed.), *Instructional design theories and models: a new paradigm of instructional theory*, Mahwah, NJ, Lawrence Erlbaum

O'Neil Harold F., Chuang San-Hui Sabrina, Chung Gregory K. W. K. (2003), *Issues in computer based assessment of collaborative problem solving*, "Assessment in Education", V. 10, n. 3, pp. 361-373

Oliver Ron, Herrington Jan (2001), *Teaching and learning online: a beginner's guide to e-learning and e-teaching in higher education*, Perth, Australia, Edith Cowan University

Phillips Janet M. (2005), *Strategies for active learning in online continuing education*, "Journal of Continuing Education in Nursing", V. 36, n. 2, pp. 77-83

Piaget J., Inhelder Bärbel (1966-1969), *The psychology of the child*, New York, NY, Basic Books

Qin Zhining, Johnson David W., Johnson Roger T. (1995), *Cooperative versus competitive efforts and problem solving*, "Review of Educational Research", V. 65, n. 2, pp. 129-143

QUT - Queensland University of Technology (2003), *Review of the University's online teaching activities*, Brisbane, Australia, Queensland University of Technology, http://www.appu.qut.edu.au/committee/policyd/reviewolt.doc

Ramsden Paul (1992), *Learning to teach in higher education*, London, Routledge

Rosenberg Marc J. (2001), *E-learning: strategies for delivering knowledge in the digital age*, New York, NY, McGraw-Hill

Rust Chris, O'Donovan Berry, Price Margaret (2005), *A social constructivist assessment process model: how the research literature shows us this could be best practice*, "Assessment and Evaluation in Higher Education", V. 30, n. 3, p. 231

Savery John R., Duffy Thomas M. (1995), *Problem based learning: an instructional model and its constructivist framework*, "Educational Technology", V. 35, n. 5, pp. 31-38

Schön Donald (1991), *The reflective turn: case studies in and on educational practice*, New York, NY, Teachers College Press

Slavin Robert E. (1995), *Cooperative learning: theory, research and practice*, Boston, MA, Allyn & Bacon

Slavin Robert E. (1995), *Research on cooperative learning and achievement: what we know, what we need to know*, Baltimore, MD, USA, John Hopkins University

Svetcov Danielle (2000), *The virtual classroom vs. the real one*, "Forbes", V. 166, n. 7, pp. 50-52

Vrasidas Charalambos (2004), *Issues of pedagogy and design in e-learning systems*. Proceedings of the ACM Symposium on Applied Computing, Nicosia, Cyprus, 14-17 March, pp. 911-915

Vygotsky Lev Semenovich (1978), *Mind in society: the development of higher psychological processes*, Cambridge, MA, Harvard University Press

Vygotsky Lev Semenovich (1962), *Thought and language*, Cambridge, MA, MIT Press

Wankat Phillip C., Oreovicz Frank S. (1993), *Teaching engineering*, New York, NY, McGraw-Hill

Wood Diana F. (2003), *Problem based learning*, "British Medical Journal", V. 326, n. 7384, pp. 328-330

Yam San Chee (2004), *Distance education and e-learning in the digital age: critical considerations*, in Shih Timothy K., Wang Paul P. (eds.), *Intelligent virtual world: technologies and applications in distributed world environments*, Hackensack, NJ, World Scientific Publishers, pp. 289-308

Zenger Jack, Uehlein Curt (2001), *Why blended will win*, "Training & Development", V. 55, p. 8, pp. 54-60

Sintesi

Mentre molte istituzioni implementano la formazione online per aumentarne l'accessibilità, la flessibilità e l'efficacia (anche economica), la promessa dell'e-learning di continuare ad erogare risultati di alta qualità rischia di venir meno.
Per modificare questa situazione e concentrarsi sulle dimensioni pedagogiche, piuttosto che tecniche, della formazione, una comunità di ricercatori sta mettendo a punto nuove pratiche e nuovi strumenti di authoring, il cui obiettivo è quello di supportare un apprendimento collaborativo rilevante. Questo focus comprende la creazione e l'erogazione di attività online che coinvolgano i discenti nella costruzione di conoscenza, attraverso sperimentazione, ipotesi, test e creazione di significato a partire dall'esperienza: un approccio che contrasta nettamente con la tradizionale visione dei discenti recipienti passivi di conoscenza.
Partendo dall'opera di Jerome Bruner, "Going beyond the information given" del 1973, la ricerca svoltasi negli ultimi trenta anni conferma che l'apprendimento riesce meglio attraverso ruoli attivi, problem solving in particolare, piuttosto che tramite una ricezione passiva dell'informazione. L'evidenza empirica richiede approcci didattici che combinino apprendimento centrato sul problema e apprendimento collaborativo, generando effettive opportunità di partecipazione imparziale

all'apprendimento nel mondo reale.

Un caso teorico, condotto presso la QUT-Queensland University of Technology di Brisbane, in Australia, presentato nella "Review of the University's Online Teaching Activities" del 2003, viene preso come emblematico punto di partenza a livello pedagogico. Viene proposto un ambiente di risoluzione di problemi online di tipo collaborativo, detto COPS-Collaborative Online Problem Solving, teso a combinare le dimensioni 'problem-centred' e 'collaborative learning'. Lo sviluppo del COPS tenta di andare oltre le attuali risorse didattiche online, offerte dalla maggior parte dei Learning Management Systems, per fornire un framework sistematico, tale da creare e distribuire ambienti, in cui gruppi di discenti possano collaborare, cercando di risolvere problemi autentici, all'interno di un ambiente online. A tale scopo, sono state create progettazioni didattiche, dette 'learning designs', centrate sul problema e integrabili con l'insegnamento in presenza, per colmare la lacuna tra l'esperienza del mondo reale e quella dell'aula.

Numerose ricerche confermano che, per essere significativo, l'apprendimento richiede ambienti ed esperienze didattiche rilevanti per la vita degli studenti. Le esperienze d'apprendimento devono essere co-costruite, dirette all'obiettivo, autentiche e con reali possibilità di problem solving di tipo collaborativo. Ma, mentre l'opera di Bruner continua ad essere corroborata da prove empiriche attuali, si registra un ritardo tecnologico nei tipi di risorse e-learning che supporterebbero meglio tale approccio. Tale ritardo implica un'applicazione innovativa di risorse, sia pedagogiche che tecniche, all'interno di un ambiente online.

Un'innovazione in questo senso è rappresentata proprio dal lavoro di sviluppo degli ambienti COPS, condotto, con studenti laureandi, in quattro facoltà della QUT: Formazione, Information Technology, Sanità e Giurisprudenza. Una volta presentata la filosofia didattica che sta alla base del COPS, relativa sia all'apprendimento che all'insegnamento, si è tentato un approccio originale a questo nuovo strumento online. L'obiettivo del COPS è quello di migliorare ulteriormente l'apprendimento dei discenti, integrando i metodi d'insegnamento in presenza con ambienti didattici online, centrati sul problema e di tipo collaborativo.

Il COPS tenta anche di mettere i docenti universitari in condizione di comprendere meglio il lavoro di gruppo e la risoluzione di problemi ad opera degli studenti, nonché di sviluppare strategie didattiche quanto più possibile efficaci nell'assistere i discenti a migliorare le proprie competenze e conoscenze.

Attualmente, il COPS si sta sviluppando infatti ad un meta-livello, con la creazione di uno strumento di authoring, adatto a domini multipli, utilizzabile dagli insegnanti per sviluppare le proprie progettazioni didattiche COPS, all'interno della propria disciplina, e per esplorare il modo in cui queste possano essere riutilizzate, supportate da nuove caratteristiche quali il role playing (gioco di ruolo), il branching dinamico e l'authoring.