

## Chapter 3

# THE CONTRIBUTING STUDENT: LEARNERS AS CO-DEVELOPERS OF LEARNING RESOURCES FOR REUSE IN WEB ENVIRONMENTS

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**Abstract:** Learners can and do become engaged in learning through intrinsic motivations without the need for a teacher or instructional designer. In the workplace, for example, workplace learning is typically seen as a process of such self-guided learning, based on the needs of the task at hand. In the school and higher-education setting however, it is the teacher who has a major role in shaping the conditions within which students can become engaged in their own learning. In this chapter we review several sets of conditions of good instruction that are argued to increase the engagement of learners and we describe a particular pedagogical model which we call the “contribution” model which reflects those conditions. The majority of the chapter consists of examples from both higher education and professional learning situations which illustrate how the contribution model relates to engaging learning.

**Keywords:** contributing student, pedagogy, learning activities, learning design, Web-based tools, course-management system, assessment, change, knowledge building, knowledge sharing

### 1. INTRODUCTION

Learners can and do become engaged in learning through their own intrinsic motivations, without the need for a teacher or instructional designer. In the workplace, for example, workplace learning is typically seen as a process of such self-guided learning based on the needs of the task at hand. In the school and higher-education setting however, it is the teacher who has a major role in shaping the conditions within which students can become engaged in their own learning. In this chapter we review several sets of conditions of good instruction that are argued to increase the engagement of learners and we describe a particular pedagogical model which we call the

“contribution” model which reflects those conditions. The majority of the chapter consists of examples from both higher education and professional learning situations which illustrate how the contribution model relates to engaging learning through:

Exploration and discovery  
 Knowledge creation and sharing  
 Collaboration and contribution, and  
 Authentic assessment

All of these relate to a major shift in learning activities, from learning as responding to instructions based on pre-selected study materials, toward learning via activities during which learners become co-designers of study materials for themselves and others. We will argue that this involves a number of deep changes in ideas about teaching, learning, assessment, and self-responsibility.

Through the examples, the need for network technology and Web environments with appropriate tools is an on-going theme. Without such appropriate tools the contributing-student approach to engagement is not scalable and may not be even feasible in practice.

The questions underlying this chapter are therefore:

What is a “contributing student” pedagogy, how does it stimulate learner engagement, and what is involved in carrying it out in practice?

## **2. INSTRUCTIONAL PRINCIPLES AND PEDAGOGICAL MODELS**

In this section we begin by reviewing a series of key instructional principles which we relate to two important underlying views of the learning process.

### **2.1 Instructional principles**

Based on his own work over the years and also on a deep knowledge of the learning-theory and instructional-design literature, Merrill has recently (2002) consolidated five “first principles of instruction”. Merrill’s premise is that, when applied in a course, these principles will facilitate learning in direct proportion to the degree of their implementation. The first principles of instruction are

1. “Learning is facilitated when learners are engaged in solving real-world problems.
2. Learning is facilitated when existing knowledge is activated as a foundation for new knowledge.
3. Learning is facilitated when new knowledge is demonstrated to the learner.
4. Learning is facilitated when new knowledge is applied by the learner.
5. Learning is facilitated when new knowledge is integrated into the learner's world.” (Merrill, 2002, p. 45)

These principles can be seen reflected in many other sets of principles relating to the design of quality courses, and the stimulation of learner engagement. However, other researchers add additional perspectives such as in relation to different target groups. For example, Cross (1981) and Knowles (1984) over two decades ago indicated that adult learning should:

- Use the experience of the learners
- Involve the learners in the planning of their instruction
- Involve the learners in the evaluation of their instruction
- Challenge the learners to advance

The first of these clearly relates to Merrill’s second principle and the last could be seen as implicitly underlying the principles, but the two principles relating to engaging the learners in the planning and evaluation of their instruction do not seem to be part of Merrill’s orientation. While both Cross and Knowles were focusing on adult learners in general, Chickering and Gamson (1987) discuss principles of effective course design in higher education in which at least one of their principles also relates directly to learners taking an active role in the construction of their own learning:

- Encourage contact between learners and faculty
- Develop reciprocity and cooperation among learners
- Encourage active learning
- Give prompt feedback
- Emphasize time on task
- Communicate high expectations
- Respect diverse talents and ways of learning

Of this list, “encourage active learning” underlies Merrill’s first, fourth, and fifth principles but “develop reciprocity and cooperation among learners” may go further in the direction of Cross’ and Knowles’ types of

engagement. The other points in the Chickering and Gamson list reflect a level of pedagogical detail that Merrill does not explicitly discuss. This may be only a matter of choice in terms of the amount of detail to include in a list of principles. Or it might represent a more-fundamental distinction that can underlie pedagogical models.

## 2.2 Pedagogical models<sup>1</sup>

A pedagogical *model* relates to the abstract concepts about the learning- and teaching process that underlie an instructional approach. Sfard (1998) identifies two basic types of pedagogical models, the *Acquisition Model* and the *Participation Model*. Table 1 summarises Sfard's interpretation of these two fundamental pedagogical models.

Table 1. Two metaphors for learning (adapted from Sfard, 1998, pp. 6-7)

	Acquisition	Participation
Key definition of learning:	Learning as knowledge acquisition and concept development; having obtained knowledge and made it one's own; individualized	Learning as participation, the process of becoming a member of a community, "the ability to communicate in the language of this community and act according to its norms" (p. 6); "the permanence of having gives way to the constant flux of doing" (p. 6)
Key words:	Knowledge, concept, misconception, meaning, fact, contents; acquisition, construction, internalization, transmission, attainment, accumulation;	Apprenticeship, situatedness, contextuality, cultural embeddedness, discourse, communication, social constructivism, cooperative learning
Stress on...	"The individual mind and what goes into it" (p. 6); the "inward movement of knowledge" (p. 6)	"The evolving bonds between the individual and others" (p. 6); "the dialectic nature of the learning interaction: The whole and the parts affect and inform each other" (p. 6)
Ideal	Individualized learning	Mutuality; community building
Role of instructor	Delivering, conveying, facilitating, clarifying	Facilitator, mentor, "Expert participant, preserver of practice/discourse" (p. 7)
Nature of knowing	Having, possessing	Belonging, participating, communicating

<sup>1</sup> This section is adapted from Collis & Moonen, 2001, pp. 20-23, 87-89.

With the Acquisition Model, the focus of learning activities is on the acquisition of pre-specified knowledge and the development of pre-determined concepts. In contrast, with the Participation Model, the focus of learning activities is on becoming a member of a community of practice, learning from the community but also contributing to it. With the Acquisition Model, what is to be learned is generally pre-determined. The quality control of the content selection and presentation rests with the instructor. In contrast, with the Participation Model, the interactions to which the learner contributes may serve to change the knowledge base of the community even as he or she participates in it. Learning is not so much a matter of understanding and applying, but rather degrees of insight, belonging and participating.

Instruction as discussed by Merrill may have more roots in the Acquisition than in the Participation approach although it appears to include some aspects of participation, particularly in the first and fifth principles which relate to identifying real problems and integrating learning into the “learner’s broader world”. Sfard emphasises that both models are needed in higher education. The Participation Model needs to make use of the Acquisition Model. Learners cannot communicate in a professional community if they do not share basic vocabulary and concepts; learners cannot participate in an apprenticeship without acquiring many basic skills of the domain in which the apprenticeship occurs. Thus the Participation Model is not enough in itself. But what is powerful about Sfard's analysis is her claim that the Acquisition Model is also not enough in itself. She makes her arguments for these claims in philosophical terms; we think however that support of the need for both Acquisition and Participation Models can be more directly seen in emerging conditions in society.

### 3. CONTRIBUTION-ORIENTED ACTIVITIES

The need for participation is a reflection of current developments in society. Internationalisation, the world being a global community, the fact that individuals can expect to work in different settings and as members of multifaceted teams, the need for social skills and the capacity to function effectively as a member of a team: all are commonly being described as characteristics of living and working that are rapidly gaining in importance. The Internet is stimulating the development of professional communities in which the individual interacts, not just once a year at a conference but regularly via Web portals and mailing lists.

Even participation is not enough: the participant must also *contribute* in order to make a difference. Reigeluth (1996) itemises major differences between the industrial age and the information age that affect education and

includes the bipolar pairs: Adversarial vs. cooperative relationships, bureaucratic vs. team organisation, autocratic vs. shared leadership, one-way communications vs. networking, and division of labour vs. integration of tasks. These pairings can map onto Sfard's Acquisition-Participation dimension but also extend the participation dimension to include a contribution orientation.

These principles are similar to those expressed by Jonassen, Peck and Wilson (1999) who assert that the primary goal of education at all levels should be to engage students in meaningful learning – which they define as active, constructive, intentional, authentic, and cooperative. Interaction with learning materials and with others is also important to Laurillard's interaction-oriented approach (Laurillard, 1993). However, in both these approaches, it is possible that all the activities and interactions that take place are based on pre-determined and pre-structured learning materials. In our approach to pedagogy, pre-structured learning materials are not the main focus. Instead, the contribution-oriented activities themselves are central in our pedagogical vision, combined with an appropriate Web-based system. Our model is an approach whereby the student can contribute to the learning material based upon their own experiences, experiences from others, material available in the Web-based system, in reality or in the literature. This approach is similar to the participation aspects of Sfard's two metaphors for learning; Kearsley and Shneiderman's (1998) *Engagement Theory*; and *Action Learning* (Dopper & Dijkman, 1997; Simons, 1999). Table 2 contrasts these approaches with the key ideas of the contributing-student pedagogical model.

Table 2. Learning characteristics relating to active students (from Collis & Moonen, 2001, p. 88)

"Participation-oriented" (Sfard, 1998)	"Action Learning" (Dopper & Dijkman, 1997; Simons, 1999)	"Engagement Theory" (Kearsley & Shneiderman, 1998)	"The Contributing Student" (this chapter)
Key definition of learning: Learning as participation, the process of becoming a member of a community, "the ability to	Key characteristics: (a) Practical problems are central: Learning is based on working on problems from one's own work situation	Key idea: "students must be meaningfully engaged in learning activities through interaction with others and worthwhile tasks" (p. 20)	Key ideas: Learners contribute to the learning materials via contributions made available to others in a Web-based system.

Table 2. continued.

"Participation-oriented" (Sfard, 1998)	"Action Learning" (Dopper & Dijkman, 1997; Simons, 1999)	"Engagement Theory" (Kearsley & Shneiderman, 1998)	"The Contributing Student" (this chapter)
<p>communicate in the language of this community and act according to its norms" (p. 6); "the permanence of having gives way to the constant flux of doing" (p. 6)</p> <p>Key words: Apprenticeship, situatedness, contextuality, communication, social constructivism, cooperative learning; Belonging, participating, communicating</p> <p>Stress on : ""The evolving bonds between the individual and others" (p. 6); "The whole and the parts affect and inform each other" (p. 6)</p> <p>Role of the instructor: Facilitator, mentor, expert participant</p>	<p>(b) When there are contacts among learners, these are focused on stimulating self-reflection and learning from others (c) Instead of "lectures" learners use contact times for activities</p> <p>Role of the instructor: Leader, motivator, and guide of the learning processes; giving feedback on evolving phases of the problem-oriented project, and evaluator of the final submission. Must ensure that learner contact is more that the sharing of experiences but also that experiences are related to theory</p> <p>Stress on : Learning to learn, to collaborate, to self-regulate</p>	<p>Key characteristics: Learning activities that (a) "occur in a group context (i.e., collaborative teams) (b) are project-based, and (c) have an outside (authentic focus)" (i.e., are meaningful to someone outside the classroom)</p> <p>Role of instructor: Supporting and screening the initial definition of projects and formulation of teams, provide guidance in working in teams, provision of criteria to evaluate projects</p> <p>Role of technology: "To facilitate all aspects of the engagement " (p. 23)</p>	<p>The others may be others in the same group or others at other times.</p> <p>Key characteristics: (a) the Web site is largely empty at the start of the learning experience; the learners and the instructor will fill it via the process of many activities during the course (b) Learners learn from realistic materials as well as peer-created materials as much as or more than professionally developed materials (c) Learning materials contributed by students are re-used in other learning settings</p> <p>Role of instructor: Designer of activities and of feedback and monitoring strategies for activities.</p> <p>Role of technology: To facilitate all aspects of the activities</p>

Our "Contributing Student" conception integrates many of the characteristics identified in Table 2. It differs from the approaches shown in Table 2 in that it is more flexible. It can be used in combination with acquisition-type learning (where the stress becomes activities such as

contribution to a collection of model answers, of frequently asked questions, a databank of test items, etc.), and thus can relate both of Sfard's Acquisition and Participation modes. It does not assume a particular type of activity approach, such as the group-based projects for external audiences in Engagement Theory, as one particular approach may not be feasible in various learning contexts. Also, it does not assume learners can base their learning on their own professional experiences as is at the base of Action Learning; again this depends on the nature of the course and the learner. Thus while it shares characteristics with other pedagogical approaches in the literature, it is a pedagogical basis that we have found to be applicable to students of many types and in many types of courses and in addition is highly conscious of the role of technology to support the pedagogy.

#### **4. FROM PRINCIPLES TO EXAMPLES: THE CONTRIBUTING-STUDENT APPROACH IN PRACTICE**

Learning activities are the instructional experiences that learners participate in beyond getting input through reading or listening (Brophy & Alleman, 1991). In the contributing-student approach, we put our stress on activities that involve the learner as an active contributor to the learning experiences and resources of both himself and others. The pedagogical approach that we support is one based on fewer lectures and more activities, activities where learners contribute something to the course Web site and then build on those contributions as the basis of subsequent activities. Activities can take many forms and be carried out both in an individual fashion or by a group. A sample of the sort of activities includes examples such as the following, where, in each case, the Web environment is used as the workplace for working on, contributing, and subsequently accessing the contributions<sup>2</sup>.

##### *Seeking and contributing new or supplementary information*

Students are given the activity of finding an appropriate example or article on the Web, that relates to a topic under discussion in the course, or illustrates a concept, or extends the references and examples given in the textbook. They enter the URL and name of the resource that they have obtained in a particular location in a course Web environment, and also add a brief comment to indicate why the resource is relevant. This produces a group-made "bookmark" list for the course which can be

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<sup>2</sup> Adapted from Collis & Moonen, 2001, pp. 99-101

subsequently used as a resource bank, added to, or analysed. Students can be asked to select several of the submitted resources (not ones they submitted themselves) and do something further with the resources contributed by others--discuss, reflect, categorise, or relate.

### *Case studies*

Case studies illustrating issues being studied in the course are uploaded into a course Web site. The origin of the cases can be in the instructor, but in the contributing-student approach they will more often be contributed by the students themselves, reused from contributions made by students in earlier cycles of the course, or they can be found externally (for example, on the Web). The students can work in groups to discuss the cases, using groupware tools or Web-board discussion tools in the course Web site. They are asked by the instructor to follow a certain structure in their discussions. After the deadline for the activities is passed, the discussions of each group become open to the other groups. As a follow-up activity, each group compares its main ideas to those of the other groups and comments on points of agreement and alternative interpretations. If students meet face-to-face, they can have a culmination of this activity as a group discussion; however, their comments are retained on a course Web site as a resource, for students who were not present at the face-to-face discussion or for students outside of that particular cycle of the course. The instructor may wish to retain several of the strongest points of discussion, and make those available in the course Web site for the next cycle of students, as a starting point for their analyses of the cases.

### *Creating study resources*

A major project for a course could be that students work in groups and each group choose a topic relevant to the course. The group must then prepare a report (using whatever type of technology is most appropriate--word processing, HTML, audio, video, or their combination). The intention of the activity is to extend and complement the textbook in relation to the topic in a way that is helpful to all of the students in the course. Draft versions of the report are made available via the Web site, for feedback from the instructor and other groups of students. The final version is also available via the Web site, in enough time before the end of the course so that students can read and submit comments about each other's work. The reports can be interlinked in the course Web site, to each other and to the other resources in the course, and can be available

for the following cycle of students in the course. Students in the following cycle of the course can update and revise the previous reports, as a new contribution-oriented learning activity.

### *Creating test items*

For some or each topic in a course, students are engaged in an activity in which they must construct several multiple-choice test items, along with a scoring key and appropriate feedback for each of the choices. All items are available via the course Web site as study materials for other students. As a subsequent activity, students must evaluate the questions that have been submitted. The instructor indicates that the final examination of the course will contain some of the contributed questions, so it is worth the students' time to study each others' questions as a review before the examination.

### *Discussion activities*

Students use a Web-board or computer-conferencing tool to participate in written discussions relating to issues being discussed in the course where their contributions can be made at a time convenient to themselves but within the deadline for the completion of the discussion. Students can take turns having the role of moderator of the discussion. The instructor sets expectations for how often students should contribute, and for characteristics of the contribution such as length, a requirement that it explicitly mentions the ideas of the message to which it is responding, or that the submission also includes a reference to the course text or one of the course Web-based resources. Students earn marks for their submissions and moderating tasks. Dineen, Mayes, and Lee (1999) show how via such task-directed discussions students can see their results as a new form of courseware, available via an indexed multimedia database. And discussion does not have to be an end in itself. Fischer, Troendle, and Mandl (2003) demonstrate how learning groups can use a shared document repository and whitebook to discuss and support each other during each phase of a communal problem-solving activity.

All of these kinds of contributions can involve a follow-up activity where peer assessment takes place, as well as where learners compare and contrast their own ideas with those of others. Tsai, Lin, and Yuan (2002) for example demonstrate how peer feedback helps students through each step of a complicated development process. All of the above types of activities engage the students in way consistent with a contributing-student

orientation, as long as there is explicit reuse made of each other's contributions as learning resources. Students are active in a way which directly contributes to the course as a whole, not just their own learning. Also, this sort of approach avoids the problems of lack of fit or the "not invented here" reaction that accompanies so many computer-based learning products. These study materials were "invented here", in a cost-effective way, as the course proceeds. The products developed as a result of the process of participating in the course are by definition a good fit to the course and to the local communication norms and culture.

Sets of examples illustrating these sorts of activities in the higher-education context can be found in Collis and Moonen (2001), Oliver and McLoughin (1999), and in the collection of "learning designs" available from the University of Wollongong in Australia (<http://www.learningdesigns.uow.edu.au/>; last accessed 11 November 2003). In the corporate-learning context, a contribution-oriented approach can also work well in practice (Margaryan, Collis, & Cooke, 2004). Examples of contribution-oriented activities from a corporate learning setting for engineers in the oil industry include:

- In a course on health-risk assessment in the workplace, participants arrange a visit to a site of their choice in their workplaces and diagnose the situation in terms of potential health or safety hazards. Each step of the process involves interactions in the actual workplace, summarized via the course Web environment, and used by the other participants as resource materials for analyzing their own work. The activities in this course progressively build upon one another, the final product being a health-risk assessment plan for each participant's own workplace, ready to put into action.
- In a course that involves a face-to-face component with a pre-classroom component carried out via the Web environment the pre-classroom component involves learners identifying a problem in their workplace related to the course concept and within the scope of their job roles to solve and to discuss these with their workplace managers. They must submit a description of the problem three weeks before the classroom session to the course site so that everyone can see them. The course instructor and other learners can provide feedback on the problems or help the participants modify the problem statements before they bring them to the classroom. Once physically together, the learners form small groups based on their interactions via the Web site, to

further tackle each others' submitted problems by peer-assist activities.

- In another course the activities all relate to the participants' analysis of commercial opportunities in their own workplaces. Once these analyses are submitted to the course environment, follow-up activities occur where the participants reflect on summaries of each others' submissions and compare and contrast these with their own workplace situations.

These sorts of contribution-oriented activities also are effective for learners involved in school or healthcare practica. LaMaster and Tannehill (1999) for example show how peer mentoring when pre-service teachers provide each other with support and guidance via posting questions and sharing experiences with peers as well as with teachers with practical experience can lead to contributions becoming learning resources for others.

In summary, there are many educational benefits to a contributing-student approach. These include the benefits of:

- Learning from the work of other learners. Bandura (1986) called this vicarious learning where learners can access the dialogues and discussions of other learners to gain insight into the problems they might have encountered and the strategies they used in coming to a solution.
- Using the work and experiences of other students as model answers or as a basis for peer feedback, peer reflection, or peer teaching.
- The motivation that comes when students know that their submissions are meaningful to the communal learning experience of the course and will be used by others for learning activities.
- Expanding the range of examples and resources available for the course and for reuse in subsequent versions of the course or other courses, through the judicious reuse of selected submissions of the students.
- Dialogue and interaction with others during activities that use collaboration learning and knowledge sharing (Collis & Moonen, 2004).

## 5. ROLES OF TECHNOLOGY

Technology is a critical tool in contribution-oriented activities. A contribution-oriented pedagogy can be used in a distance-education course or can be used as part of a course with face-to-face sessions. While networks and computer technology are, in principle, not necessary for the approach, the technology makes it feasible, scalable, and manageable for both instructor and students alike. Without the technology, in particular the Web technology, application of a contribution-oriented pedagogy as described in this article will be difficult to apply. A Web-based system with appropriate upload, collaborative, and communication functionalities provides the common medium into which contributions are placed, for further sharing as well as for feedback and assessment. Figure 1 shows how a course Web environment can grow in terms of materials contributed to it during the course itself. The activities mentioned in the figure are typical for a contribution-oriented approach. These activities are usually initiated by the instructors, but are essentially conducted by students individually or within a student's group in the course. Users of the contributions may also be other students in other cycles of the course or students in other courses or learners who are not in a course context at all but who could refer to the materials via a database in the same way as they now use a library or a Web search engine.

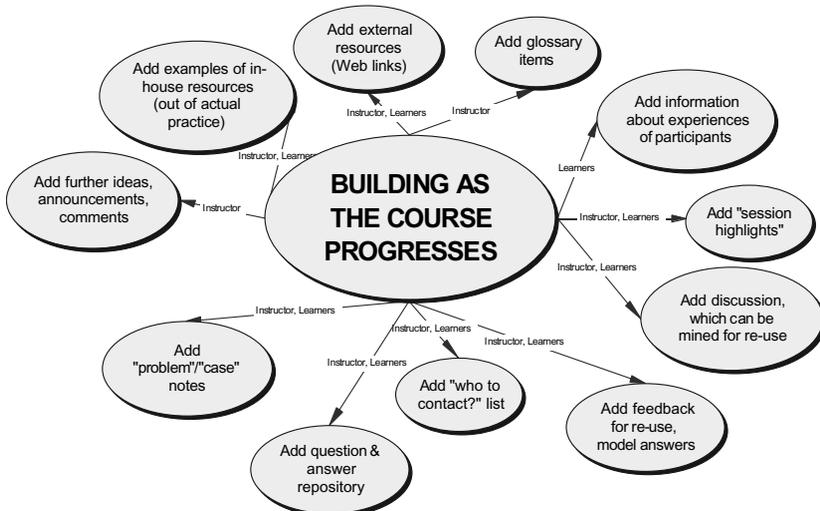


Figure 1. Building as the course progresses, through contributions (Collis & Moonen, 2004)

Table 3 presents the ideas in Figure 1 in terms of different components of a Web-based course-management system.

*Table 3.* Supporting the contribution-oriented aspects of a course with different components of a course-management system (adapted from Collis & Moonen, 2001, pp. 83-85)

Component	To support a contribution-oriented pedagogy
1. For general course organization	-Have students add links to resources related to the course, and to the work and homepages of experts related to the course
2. For support of lectures or contact sessions	-Extend the lecture after the contact time by having all students reflect on some aspect and communicate via some form of structured comment via the Web page; or students can add to the lecture materials themselves, or take responsibility for some of the lecture resources. The instructor uses the students' input as the basis for the next session or activity -Capture student debates and discussions, make available as video on demand, and use as basis for asynchronous reflection and further discussion
3. For self-study and exercises; practical sessions	-Facilitate students using each other's submissions as learning resources once these are available as part of the Web environment. Select certain submissions as model answers and reuse with subsequent groups. -Structure communication and interaction via the WWW site so that students are guided as to how to respond productively to each other's work and questions. Guide students to take responsibility for answering each other's questions (with monitoring by the instructor)
4. For multi-session projects or activities	-Make shared workspace tools along with other communication and reporting tools available in the Web site to allow group members to work collaboratively on complex projects -Use work submitted previously as the starting point for a new project, for example, to add new examples to or otherwise update or tailor a submission from the previous cycle of the course -Guide students to provide constructive on-going feedback to each other, through the use of structured communication forms and by having their partial products accessible via the course Web site
5. For assessment	-Integrate new forms of assessment, such as all students maintaining their own portfolios, within the course Web environment -Include peer-assessment activities as activities that are themselves marked and graded
6. For general communication	-Add a Web board for discussion about course topics as a major activity in the course; have students take responsibility for moderating the discussions, adding links to external resources to justify their comments when appropriate -Involve experts from outside the course in responding to the contributions of the students.

With a contribution-oriented pedagogy, the resources contributed can become new content objects in themselves, depending on how they are used in subsequent activities and other course processes. Tools for adding metadata to selected contributions to annotate and package them for reuse in other courses are important additions to course-management systems (Strijker, 2004).

## 6. CHALLENGES AND OPPORTUNITIES<sup>3</sup>

Given the rapid growth in the personal use of the World Wide Web by both students and instructors to find resources (used for contribution purposes) that can extend or supplement printed resources such as textbooks (used for acquisition-oriented learning), the trend toward students contributing URLs of resources found on the Web to a collection for shared use by their classmates is already developing. Course-management systems are in common use in universities, and these are bringing many of the types of contributions shown in Figure 1 into practice (De Boer, 2004). However, this growth brings with it some serious issues. Several of these are:

- *Issues relating to changes in the role of the instructor:* Contribution activities will involve many changes for the instructor. The instructor moves from presenter to manager of activities. His or her feedback is given to contributions from the learners which may include material new to the instructor. The instructor has to study the new material in the contributions before they can be responded to. The time needed to monitor and manage a contribution-oriented pedagogy is likely to exceed the time needed in an acquisition-oriented approach.
- *Issues relating to assessment and evaluation:* Students should be graded on their contributions. The assessment of student contributions, particularly as they involve peer interactions and inclusions of materials from non-traditional sources, require new approaches to grading and assessment. These new approaches are likely to be more time consuming for the instructor than traditional assessment methods in which all students answer the same questions and can be marked against the same answer key. This means that the aims of the contributions have to be clearly specified in pre-set grading criteria. Distinctions between individual and peer-related criteria must be specified; if an assignment, for example, requires a first student to reflect on the

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<sup>3</sup> This section is adapted from Collis & Moonen, 2004 (in press)

feedback made by a second student, but the feedback from the second student has not occurred, how will the first student be able to respond to the reflection activity? How will this affect his marks for that activity? As Macdonald (2003) notes, a discussion about assessment “leaves various uncomfortable questions in the air” (p. 390).

- *Issues related to new expectations for the students:* Not all students welcome a switch to a contribution approach. They sometimes complain that “it is the instructor’s job to ‘teach them’”, that looking for additional study materials takes too much time (“Why don’t you just give them to us?”), they want to expect study materials to be definitive (“What do I need to know for the test?”), and thus having to evaluate materials found on the Web or created by their peers is not something for which they have the desire or skills (Collis & Moonen, 2001, p.107). Contribution-type activities also call for higher-order skills on the part of the students. Bennet, Dunne, and Carre (1999) identify key skills related to management of self, management of information, management of others, and management of task and include higher-level aims relating to critical thinking as well as self regulation. These key skills emerge slowly over time and cannot be assumed to be adequately available for students confronted with a contribution task. Careful instructions and scaffolding from the instructor are necessary for a contribution approach to be manageable in practice.
- *Issues related to plagiarism and privacy:* The risk of plagiarism, intentional or indirect, increases the more that students can see each others’ work or make use of resources contributed by other students. Strict guidelines must be established to prevent submissions that closely resemble previous submissions. And as a parallel issue, students may not wish their work to be available to others in their class, for various reasons such as maintaining their own advantage in terms of grades or avoiding embarrassment. In some institutions, the student has a right to privacy and must explicitly indicate that he agrees to his work being made available to others. This can complicate the sharing and collaboration process as well as add increased managerial burdens on the instructor.

## 7. CONCLUSION

We began by looking at Merrill's five first principles of instruction. Contribution-oriented activities relate very well to Merrill's first, second, fourth, and fifth principles. The first two principles, "Learning is facilitated when learners are engaged in solving real-world problems" and "Learning is facilitated when existing knowledge is activated as a foundation for new knowledge" are directly applied when contribution-oriented activities relate to real-world problems and make use of real-world resources found by the learners, via the Web or via direct contacts with real-world settings. When activities build upon each other, the second principle of activating existing knowledge in the construction of new knowledge is applied. The fourth and fifth principles, "Learning is facilitated when new knowledge is applied by the learner" and "Learning is facilitated when new knowledge is integrated into the learner's world" are inherent in well-designed contribution-oriented activities. In addition, the extra features of good learning identified by Cross and Knowles which call for involving the learners in the planning and evaluation of their instruction, can also be strongly reflected. The contribution-oriented approach reflects Sfard's "participation" pedagogy, and also her call for a combination of both acquisition and participation. The approach is only feasible and scalable if well-designed and accessible Web-based tools are available because otherwise there is no convenient, shared repository of contributions. Reuse or access independent of time and location require a network system and Web tools. Course-management systems that limit learners in what and where they can make a contribution (perhaps only allowing submissions in a "drop box") are not well designed for a contribution approach. Learning-content management systems (LCMSs) which assume all content is supplied by external, professional sources will also not be adequate for the contribution approach.

The most interesting contribution-oriented activities are those that are combinations of discovering and creating, comparing and discussing, and building on other learners' products. The value of the contribution-oriented pedagogy lies in the creation or finding and selection of existing resources, their combination, structuring, and argumentation why a selection was made, as well as the reflection upon the thinking processes behind this. In such a way the participants really contribute to a course, not only for themselves, but, by making results of their work and learning available for others, for the whole participating community, and, given the potential of re-use of the most valuable contributions, to a much wider community.

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