Merrill Plus: Blending Corporate Strategy and Instructional Design

Betty Collis

Anoush Margaryan

Betty Collis (e-mail: b.a.collis@utwente.nl) and **Anoush Margaryan** (e-mail: a.margaryan@utwente.nl) are members of the University of Twente in The Netherlands and also of the Research Team for Shell EP Learning. Betty Collis is a Contributing Editor of this magazine.

M. David Merrill (a Contributing Editor of this journal) has done the instructional-design community a great service by synthesizing "five first principles of instruction" out of a large collection of instructional-design theories, textbooks, articles, and perspectives (Merrill, 2002). Merrill defines first principles as "necessary for effective and efficient instruction…Learning from a given program will be promoted in direct proportion to its implementation of first principles" (p. 44). As members of a research team using an Action Research approach to work together with the professionals in a corporate-learning setting (Collis, Margaryan, & Kennedy, 2004), we not only have welcomed the parsimony of the five first principles, but also Merrill's assurance (and ours too) that the "…first principles of instruction can be implemented in any delivery system or using any instructional architecture" (p. 44).
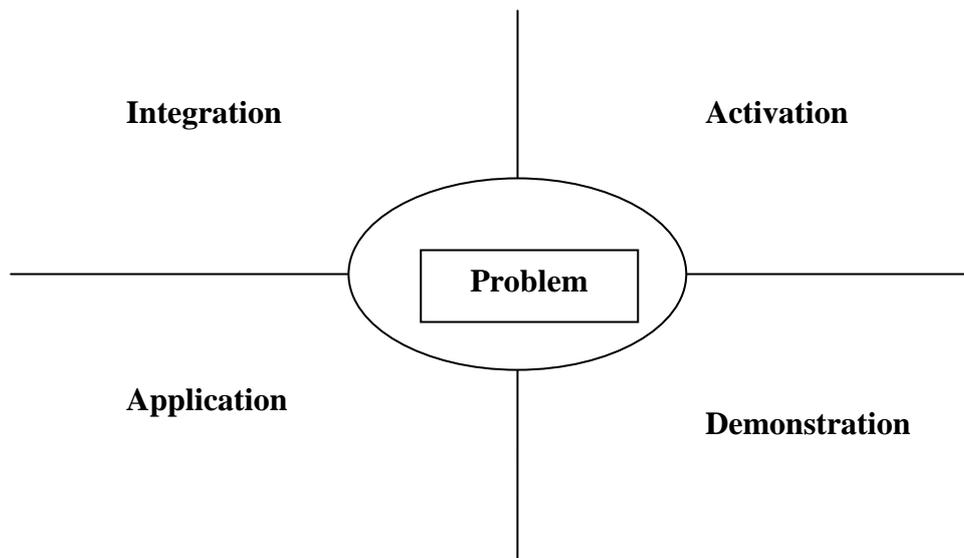
Despite this, we have felt the need to augment Merrill's principles in order to relate them to the business needs and strategies that underlie corporate learning. To reflect several of the key business needs and strategic choices in the particular corporate setting in which we work, we have added some aspects to Merrill's five principles to form what we call the "Merrill Plus" strategic design criteria. In this article we explain these business needs and strategies, what we have added to Merrill's five principles to tailor them to a particular business context, how courses designed with Merrill Plus work in practice, and what sorts of results are from a variety of investigations using Merrill Plus. We agree with Merrill that the first principles are necessary for good design regardless of setting, but to steer the realization of the design for a specific context we are finding a Merrill Plus approach adds valuable support.

Merrill's Five First Principles

First, what are Merrill's five first principles? We will review them here and comment on their interpretation in a corporate-learning setting. The principles are that "learning is promoted when:

1. Learners are engaged in solving real-world problems.

2. Existing knowledge is activated as a foundation for new knowledge.

3. New knowledge is demonstrated to the learner.

4. New knowledge is applied by the learner.

5. New knowledge in integrated into the learner's world." (Merrill, 2002, pp. 44-45)

These are visualized as shown in Figure 1:

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            Integration                    Activation

                          ┌──────────┐
                          │ Problem  │
                          └──────────┘

            Application
                                   Demonstration
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Figure 1. First principles of instruction (Merrill, 2002, p. 45)

In terms of the first principle, *solving real-world problems*, Merrill notes the importance of showing the learners the task they will be able to do or the problem they will be able to solve when completing the unit of instruction. While the definition of a problem may vary in different settings, Merrill sees key aspects as being that the learning activity involves a "whole task rather than only components of a task and that the task is representative of those the learner will encounter in the world following instruction"(p. 45). Thus, the focus is on tasks that are relevant in practice, not on topics "to understand" or "know about". For the corporate setting, we summarize the first principle as "build the course around real workplace tasks, not textbook topics"

The second principle can be paraphrased as "start where the learners are at" and help them build the bridge or structure to link new knowledge to what they already know and have experienced. It is valuable to give learners the opportunity to

demonstrate what they already know, (in practice, not via an artificial device such as a pre-test). "This [activation] activity can be used to help direct students to the yet-to-be-learned new material and thus result in more efficient instruction" (p. 47). For the corporate setting, we say "build on the work experience that the learner has already had".

Merrill summarizes the third principle as "Show me". Show me involves both demonstration and guidance. Demonstration is more than simply watching someone else do the task. It involves providing "(a) examples and nonexamples for concepts, (b) demonstrations for procedures, (c) visualizations for processes, and (d) modeling for behavior" (p. 47). Effective guidance involves steering learners to relevant information and helping them to compare a variety of demonstrations. In the corporate setting when learning involving real workplace tasks often needs to occur at least partially in the workplace, we emphasize the importance of helping workplace coaches and other "learning partners" to provide effective demonstrations and guidance.

The fourth principle is what Merrill calls the "Let me" phase. The learner needs to practice, a number of times with different types of practicing: "(a) information-about practice—recall or recognize information, (b) parts-of practice—locate, and name or describe each part, (c) kinds-of practice— identify new examples of each kind, (d) how-to practice—do the procedure and (e) what-happens practice—predict a consequence of a process given conditions, or find faulted conditions given an unexpected consequence" (p. 49). Proper coaching is needed. In the corporate context all of these types of practice can be carried out in the workplace making use of real

workplace situations and resources but appropriate coaching and guidance are necessary.

Finally, the fifth principle is that of integration into the public view or what Merrill calls "watch me". The learner needs to show others what he can now do and how he does it, "going public with their newly acquired knowledge" (Merrill, p. 50). In the corporate context if workplace learning has been focused on carrying out real tasks in the real workplace, with appropriate activation, demonstration, and application opportunities, coaching and guidance, then the "watch me" step will be built in. However being observed is not enough: reflection and synthesis also need to occur before the learning experience is complete.

Thus, Merrill's principles are easy to apply in a corporate-learning situation that emphasizes workplace problems and work-based learning activities along with coaching and guidance. This is the approach underlying courses designed for "Workplace Learning" at Shell Exploration and Production (Shell EP). Why then did we feel it valuable to extend Merrill to something we call Merrill Plus for this setting?

Work-Based Learning at Shell EP

The Shell EP business activities focus on exploring, assessing, and producing hydrocarbon reserves (www.shell.com) with ventures in over 40 countries and employing over 25,000 people. The technical professionals in Shell EP represent the areas of wells engineering, field engineering, production engineering, petroleum engineering, and geoscience disciplines. Although typically newly hired technical professionals will have an academic background in their disciplines, all complete a New Professionals program within their first five years at Shell EP and after this, engage in learning events aimed at updating and advancing their competencies. To support this learning, the Shell EP Learning & Leadership Development (EP-LLD) organization provides professional services to support both informal and formal learning. We work with the EP-LLD organization as colleague-researchers for optimalization of learning related to business needs.

Two particular issues facing Shell EP are ones that are also facing other companies worldwide. The first relates to the maintaining excellence in a rapidly changing competitive environment where new technologies are creating increased challenges. Changes are occurring too quickly for incorporation in traditional course-design processes, and sometimes are specific to certain local settings or involve only a handful of senior professionals, not enough to justify a traditional course-development effort. The second issue is the "big crew change" that will be occurring among technical professionals in the next decade. Not only will highly experienced professionals be retiring whose knowledge needs to be captured and shared, but those who replace them are representing a wide range of regional, cultural, and professional backgrounds and are likely to live in different parts of the world with little

opportunity for face-to-face interaction with the experienced seniors (we discuss this in detail in Collis, Margaryan, & Kennedy, 2004).

The LLD organization is responding to these issues through a new global learning strategy that emphasizes the blend of formal and informal learning in order to bring learning into the workplace as directly and soon as possible via work-based learning tasks that stimulate coaching and sharing of experiences between participants in a course and others in the company regardless of location. Thus the strategy indicates that learning should be characterized by creating and sharing knowledge, capturing and re-using experiences and the tacit knowledge and know-how within the organization, and being able to solve workplace problems in a process-oriented, collaborative manner (Collis & Margaryan, 2004). In addition, the more realistic and workplace focused the learning, the more flexibility is required in the learning event. Flexibility relates to tailoring for individual differences and needs, not only in the time, place and pace of learning but also for the individual diversity of the learners (e.g., differences in backgrounds, communication styles, learning styles, and preferred ways of interacting with others) which become critically important when participants are from a variety of regions and cultures (Hofstede, 1986). To integrate the demonstrations, applications, and sharing of the work-based learning activities occurring in different parts of the world, the participants need to have a common electronic learning environment that can be accessed from their workplaces. At Shell EP we use a Web-based course-management system designed to support knowledge sharing, collaboration, shared access to resources and submissions from others, and access by all involved in the learning process including those involved with coaching and guidance in the workplace settings.

Thus while Merrill's five first principles still provide the foundation for our approach to course design, we have found that it is valuable to complement them with several other sets of criteria relating specifically to the context of Shell EP and its specific business needs and learning strategies. The components of our Merrill Plus approach are shown in Figure 2.
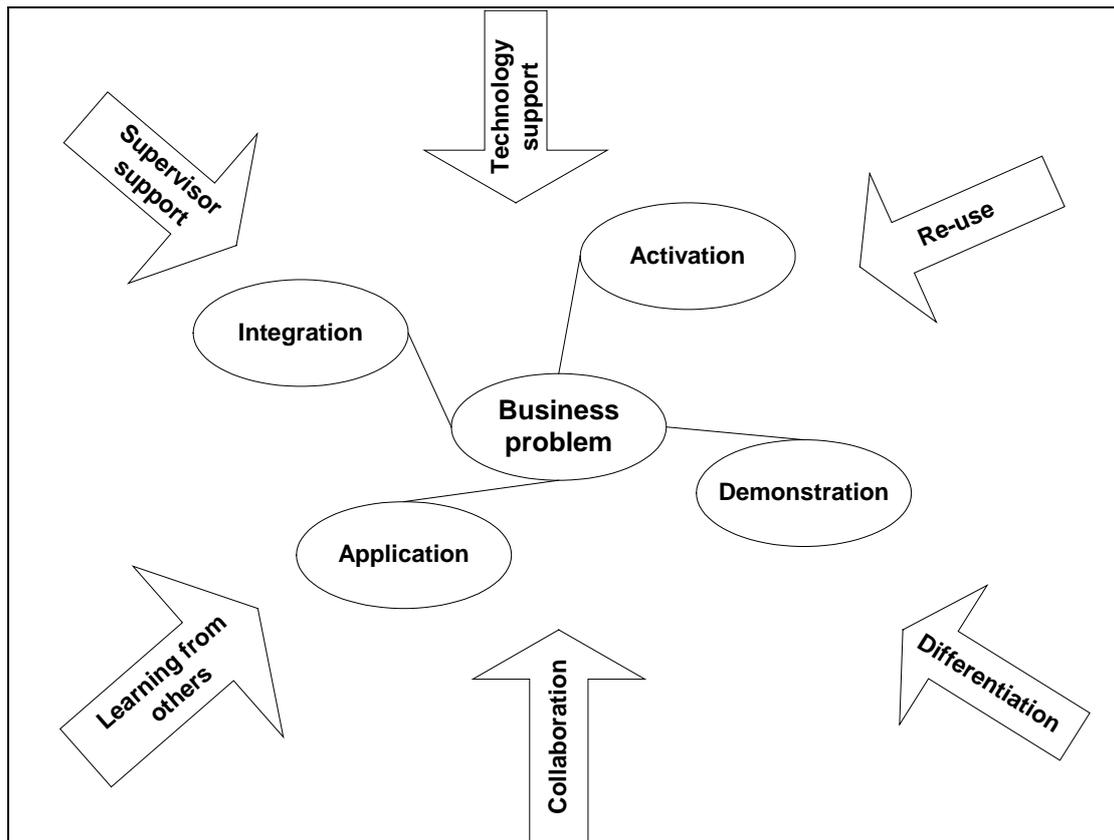
Figure 2. Merrill Plus, expanded for a particular strategic setting

The ovals within the rectangle represent Merrill's first principles. To these have been added the six aspects shown in the arrows that reflect the specific corporate context.

1. Collaboration not only among learners in a course but also with colleagues in the workplace.

2. Knowledge sharing and learning from others – not only peers in the course, but also experts and colleagues in the workplace, coaches/mentors, and others elsewhere in the organization, through integrating in-house knowledge sharing networks within the courses.

3. Involvement of the learners' supervisors, who are seen as the key stakeholders and workplace-learning partners

4. Re-use of knowledge and learning materials/artefacts that are already existent in learners' workplace and can be used to demonstrate prior experience.

5. Differentiation, by accommodating learners with diverse needs, including professional differences (experience), regional differences in the workplace situations, and ethnic (cultural) diversity.

6. Effective technology design, particularly the course environments in the Web-based course support system.

Thus Merrill Plus extends the first principles strategically, to reflect the specific business and workplace learning context of Shell EP.

Applications of Merrill Plus

We use Merrill Plus to guide course design and also for course evaluation, formative, and post-course.

Design guidelines

Over 100 different course runs, involving approximately 65 fully redesigned courses reflecting at least some aspects of Merrill Plus, have occurred at Shell EP during the time of our research partnership. Approximately half of the courses blend work-based activities with a classroom component, while the other half of the courses take place only in the workplace with no classroom component but with regular interaction among participants via the Web environment. Merrill Plus can be used as guidance to stimulate course designers and subject-matter experts to explicitly consider the different aspects during the design process.

As just one example, the course "Health Risk Assessment" that used to take place in a one-week face-to-face classroom setting now is redesigned around a real problem of the participants: to carry out, with guidance, their first health-risk assessment process in their own workplaces. (Health-risk assessment is a serious and complex process at Shell EP, as dangers to the environment or to humans because of a production incident must be avoided).

To do their real-world task, the task is broken up into a number of steps, workplace coaches with prior experience in health-risk assessment are identified to demonstrate on-site the specifics of the different sub-processes and to help guide the participants as they move step by step through their first real assessment. For each step, the participants submit a report or reflection into the course Web site, and then are guided by the instructor to compare and share their experiences with each other, increasing their range of learning partners. Examples of appropriately done health-risk assessments are reused from the business as learning resources in the course, but also the assessments prepared by the participants themselves become valuable objects for use within the course, and for reuse in subsequent cycles of the course.

Formative evaluation

We also use Merrill Plus as the basis for formative evaluation of the courses while still in the design and development stage, to spot omissions and make suggestions for strengthening the strategic aspects represented by the arrows in the Merrill Plus approach (see Figure 2). Merrill Plus provides an easy-to-use reference model, expressed in terms that are consistent with the language of the business and its strategy for learning.

Post-course evaluations

In order to code the workplace-oriented courses for post-course after-action reviews and cross-course comparisons, an instrument and a procedure called the "Course Scan" based on the Merrill Plus criteria were developed and piloted in 2002-2003. With the Course Scan, the Web-based environments of courses are studied in detail after the completion of each run of the courses and coded on a set of items (n=26)

reflecting each of the elements shown in Figure 2. (We describe this procedure in Badrul Khan's upcoming book, "Flexible Learning", to be published by Educational Technology Publications in 2005; see Collis & Margaryan, in press). The items are coded on a 1-5 Likert-type scale, where 1 indicates no evidence of the particular quality criteria, 5 indicates "best-practice" evidence of the criteria, and the values 2, 3, and 4 indicate qualitative and sometimes quantitative increases between these two endpoints. Examples of several of the items include:

- To what extent do the activities in the course relate to the participants' real workplace problems? (Merrill #1)
- To what extent do the activities provide opportunities for participants to learn from each other? (Merrill Plus)
- To what extent are the study resources re-used from the business? (Merrill +)

From these separate items, a total "Merrill Plus score" is also calculated per course run by summing the combination of items reflecting each of the attributes in Figure 2 and expressing the result per attribute as a number between 1-5. As there are 11 nodes in Merrill Plus, the overall Merrill Plus score per course can range from 11 to 55. These Merrill Plus scores are then used to compare groups of courses in different ways as well as to look for overall trends and areas for further improvement in the courses as a whole. Occasional presentations of the Merrill Plus scores with comparisons among courses are appreciated by the instructors and designers.

Validating the Merrill Plus scores

Our current work involves a variety of investigations whose aim is to validate the Merrill Plus scores against other sorts of indications of course quality. A sample of

participants who have attended courses with high, average, and low Merrill Plus scores are being interviewed six months after their courses to see if any differences appear in the longer-term impact of the courses. The Merrill Plus values of courses are being compared directly with participant-evaluation data to see if there are relationships between what participants feel about the courses in terms of satisfaction and relevance, compared to our scoring of the courses with the Merrill Plus course scan. Twelve courses are being studied in detail, including via interviews with the course instructors, to see the relationship between the Merrill Plus score of the course and the instructor's own perception of what was successful and what could use improvement in the course. From all of these investigations we hope to be able to further demonstrate that Merrill Plus not only makes sense in theory but also is correlated with the strategic relevance of courses in practice.

Using the Merrill Plus Approach in Other Settings

We agree with David Merrill's proposition that the five first principles of instruction are relevant regardless of delivery method and setting. We do suggest however that adding a local, personal touch to the way the principles are carried out in practice can help steer their application and also lead to evidence to convince decision makers in the specific setting that a course reflects the strategic needs of the setting. Thus our suggestion is that each organization work out its own version of Merrill Plus: retaining the original five first principles but adding aspects that translate the general principles into locally relevant practices. In terms of Figure 2, this means keeping the five ovals inside of the figure but replacing the text on the arrows with particular features that fit local conditions. The arrows do not suggest that the first principles are insufficient. They suggest that the first principles can be expressed via an

emphasis on certain strategies that are meaningful in the local setting. For Shell EP the strategies relate to knowledge sharing and reuse within the business as a key emphasis. For another context, the key emphases may be quite different, for example, less emphasis on collaborative learning and more on self-directed learning.

References

Collis, B., & Margaryan, A. (2004). Applying Activity Theory to CSCL and work-based activities in corporate settings. *Educational Technology Research & Development (ETR&D), 52(*4), 38-52.

Collis, B., & Margaryan, A. (in press). Evaluating flexible learning in terms of course quality. In B. Khan (Ed.), *Flexible learning*. Englewood Cliffs, NJ: Educational Technology Publications

Collis, B., Margaryan, A., & Kennedy, M. W. (2004, October). *Blending formal and informal learning offers new competence development opportunities.* Paper presented at the 11th Abu Dhabi International Petroleum Exhibition and Conference, Abu Dhabi, U.A.E.

Hofstede, G. (1986). Cultural differences in teaching and learning. *International Journal of Intercultural Relations, 10,* 301-320.

Merrill, M. D. (2002). First principles of instruction. *Educational Technology Research and Development, 50*(3), 43-59.