Two major shifts have occurred in education in recent years. One is that distributed learning has become nearly as ubiquitous as so-called traditional classroom learning. The second is a shift from the purely cognitive, domain-dependent instruction characteristic of the industrial age to problem-based/constructivist learning that is domain-independent. The challenge for those involved in the teaching-learning process is how to create problem-based learning in both traditional and distributed learning environments that engages students in active learning through the use of various technology-based tools.

The shift to problem-based learning was seen in the business environment in the early 1990s and in the public school sector throughout the decade. Most recently, the military has embarked on the concept of problem-based learning. To support this ever-increasing need to be able to solve problems and think critically in order to function well in society, we need to focus more on instructional design in our classrooms – whether they are in schools, conference rooms, on Navy ships at sea, or delivered digitally to home computers.

While Old Dominion University continues its commitment to providing high-quality undergraduate and graduate education, people from a variety of nontraditional venues, such as business and the military, increasingly come to us for our expertise. They want to learn how to become more proficient at what they do. Business leaders might ask how best to teach their employees to solve problems within the workplace or how to incorporate new equipment. The Navy might want its personnel to learn the external parts and functions of a new diesel engine, or how to build a simulation to teach the use of a complex or dangerous piece of equipment. In fact, three different designers seeking military contract work have recently requested assistance regarding how to provide marketable and effective instruction. In all cases, these designers had the technical expertise to create high-quality, digitally based multimedia software to be delivered in a variety of ways; they just didn’t know how to design the instruction itself. It’s surprising how many multimillion-dollar simulations have been created that incorporate little or no instructional design.

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BY RICHARD OVERBAUGH

Taking the Teaching-Learning Process to a Higher Level
Designing instruction is complex and time-consuming. The Instructional Design and Technology Program was developed to provide advanced instruction at the master's and doctoral level for a widely varied audience. The students majoring in ID&T are largely military instructional designers/teachers, civilian instructional designers for the military, PreK-12 school personnel and even some ODU professionals. In addition, students from many majors and occupations take ID&T courses. Customized degree programs have been created for the Navy Chaplain Corps and certificate programs for area school systems. Many courses have been designed to stand alone, enabling non-major students to learn about designing instruction for specialized learning environments.

So what exactly is instructional design? Is it as complicated as it sounds? Instructional design might best be described as bringing all the components involved in the teaching-learning process under careful consideration and creating the instruction to match as many characteristics of those components as possible. Designing instruction can be quite complex, but a brief discussion of three major domains will serve to illustrate the need for informed design. The three domains are: subject matter, learner characteristics and learning environment. All three play an integral role as educators plan learning experiences and each is essential to the teaching-learning process.

**Subject Matter**

Subject matter, often called the curriculum, refers to the content and skills learners need to know. That is what instructional designers plan and what instructors teach. In PreK-12 schools, teachers have little flexibility in what they teach because state and national boards have created specific required curricula, such as the Virginia Standards of Learning. In the business and military environments, curriculum decisions are logically based on what the organization needs its personnel to do to achieve profitability or a successful operation. These decisions take into account the actual knowledge and skills needed, the sequence in which the subject matter should be taught and the best venue for teaching it. While this sounds simplistic, making decisions about how to proceed becomes difficult when other factors and domains are considered. The curriculum is only one part of subject matter; there is also the learning hierarchy, or the level at which the curriculum is taught, and the teaching strategies that are utilized.

Should we teach learners to memorize content or teach them to think? Educators typically say they prefer that their students learn and perform at higher levels of thought but, unfortunately, the reality is that lecture-and-memorization remains the preferred method in many venues. This is primarily because it is easy to teach and easy to assess; students do not feel threatened and the instructor can give an objective test to determine whether the subject matter was memorized. The obvious problem, then, is that if employees cannot adapt existing knowledge and skills to new situations because they were never taught to think, then their curriculum and instruction were of little value. Clearly, the instruction should be raised to a much higher level, a level at which learners, whether they are traditional students, business employees or military personnel, can solve problems and wisely use available resources.

After the curriculum has been determined and the desired thinking level identified, the third aspect of subject matter is how best to accomplish the instructional goals. For higher-level learning, effective and efficient strategies need to be designed in order to turn passive learners into learners who take an active, responsible role in the learning process.

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For these students, pedagogy is needed that includes higher thinking levels and problem-solving tasks that break them away from traditional ways of learning. Instructional designers are faced with understanding different perspectives of instruction when designing pedagogy. For example, someone with a technical or engineering background may design a simulation based on his or her expert knowledge of the content, but that may be very different from the progressive, instructionally sound steps needed to lead a learner through skill acquisition to successful performance. Instructional designers, then, play a major role as they decide what and how information should be taught.

**Learner Characteristics**

Learner characteristics, the second domain, are perhaps the most important but least considered. Instructional designers have a prime responsibility to make subject matter relevant to learners and to make them feel sufficiently confident that their learning efforts will be successful. Instructional designers want to begin with what the learner knows and build upon that. Different from PreK-12 schools, where ability and motivational levels vary tremendously, businesses and the military typically provide information to groups whose abilities, attitudes and prerequisites are usually similar. For example, learners may receive instruction because a career move or promotion is at stake. In this case, the instruction may build upon prior knowledge (e.g., the learners’ prerequisite skills, knowledge and attitudes).

Learner readiness for instruction is another important aspect. The typical learner has come through a system where instruction is largely delivered via lectures and assessments are based on memorization of facts. As mentioned above, this type of instruction remains in common use because of its ease of delivery and assessment. Moving students from their comfort zone of objective learning and testing (in which an answer is either right or wrong) into the subjective realm of problem-solving and synthesis is difficult.

**Learning Environment**

The third domain is the learning environment, which can make or break good instructional design. Too often, designers building instruction for contemporary learning situations adopt less-efficient pedagogical methods because of environmental barriers. Instructors in traditional classroom settings can readily observe whether students are learning. If learning is not as expected, instructors can make pedagogical changes “on the fly” — they can change their strategies as they teach, based upon the students’ progress. Instruction designed for business and military venues, however, is usually delivered by more than one instructor and in varying learning environments. In cases such as these, the instructional design must include options that enable it to work in various learning situations. Consider, for example, designing instruction for deployed submarine personnel. These designers must keep in mind that the person teaching the course may be out of contact with them for long periods of time and that the students will not have access to the Internet. Designing for this scenario will be different from planning for Internet-based instruction to teach business professionals to evaluate the pros and cons of a new business venture. Instructional designers must make a special effort to avoid basing instruction on uninformed intuition or making false assumptions about learning environments. Even dedicated educators armed with well-designed instruction are often confronted by various challenges, such as large class sizes, electronic teaching tools that are difficult and time-consuming to use, and learners with limited prerequisite knowledge and skills.

Currently, some colleagues and I are conducting research on a group of fourth-graders at a local school dedicated to problem-based learning and on undergraduate students at Old Dominion who are enrolled in problem-based courses (both lab-based and Web-based). Our research is looking at student achievement at different levels, with an emphasis on learning high-level skills such as problem-solving and critical thinking. We are examining students’ learning, starting at the lowest level — memorization and comprehension — all the way up to advanced problem-solving and synthesis. The basis for this stratification is to determine the thinking level at which student learning begins to fail and to then tie in factors such as personality types, sense of community and learning orientation, all of which will contribute to better instructional design and lead to heightened student achievement.

Research in the field of instructional design is now more important than ever. Learners seeking to acquire higher levels of knowledge will benefit from knowing how they learn best and how they can improve their learning. Also, the more educators are aware of varied learner attributes, the better they can design and deliver instruction aimed at high-level achievement.