KEY PRINCIPLES FOR DESIGNING EFFECTIVE LEARNING ENVIRONMENTS

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Abstract: *Teaching and learning methodologies have always been a challenge for many education researchers and their teaching experiences have urged them to look for new ways of designing effective learning environments. Recent research findings on the factors encompassed by the learning process and on brain working theories are stimulating a re-examination of traditional principles of designing teaching and learning experiences. This paper is intended to help teachers and educators to improve their teaching and learning methodologies in working with students. Precisely, the principles presented here are not only meant to deepen our understanding of traditional core learning principles, but they are also intended to provide practical guidance on how to design learning experiences for our new high technology environments.*

Keywords: *pedagogical theory, teaching and learning experience, effective learning, learning environment.*

Teaching and learning methodologies have always been a challenge for different education researchers and their experiences. Recent research findings into how our brains work (Bransford, Brown, and Cocking 2000; Damasio 1999; Pinker 1997) are stimulating a re-examination of traditional principles of designing teaching and learning experiences. This paper is intended to help teachers and educators to improve their teaching and learning methodologies in working with students. Precisely, the principles presented here are not only meant to deepen our understanding of traditional core learning principles, but they are also intended to provide practical guidance on how to design learning experiences for our new high technology environments.

The following learning principles illustrate how recent research integrated with traditional principles of pedagogy and instructional design can enrich our understanding of thinking and learning processes.

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The principles outlined here can serve as a guide to the design of learning experiences in both online environments and traditional university courses.

1. Every Learning Experience includes Four Elements

The first core learning principle offers a framework that helps simplify the complexity of instructional design by distinguishing the role of each element in the learning experience. This framework has four elements—*the Learner, the Mentor/faculty member, the Knowledge, and the Environment* (Boettcher 2003).

This principle can be captured by envisioning a learning experience featuring the *learner* "on stage" actively learning under the direction of the *mentor/faculty* member using a set of resources containing the *knowledge/content/skills* to be learned within an *environment.*

There are many variations of this framework, of course, but all instructional experiences have these four elements. The first element, *the learner*, may be an individual student or a group of students. In the case of collaborative and group learning activities, for example, multiple learners may well be on stage at the same time, but every learner experiences the learning somewhat differently. The second element is the *mentor/faculty member* who provides instruction and support to the learner. The mentor/faculty member may be physically present on stage, may remain in the wings directing the learner, or may only be present implicitly by virtue of having designed the instructional event. This element may also be an inanimate learning object such as a text or video component that provides instructions and guidance from the faculty member.

The third element is the *knowledge*, the *content*, or the *problem* that is the focus of the instructional experience. In instructional design terms, the knowledge component is the answer to the question, "What is the knowledge, what is the skill, what is the attitude that the instructional event is intended to facilitate in the student?" In a psychology course, for instance, aimed at personal, social, emotional development, course, the knowledge or skill may involve student ability in identifying distinctive emotions he or she experience in a particular emotional setting/event.

The fourth element, the environment, is determined by answering the question, "*When* will the event take place, with *whom* and *where* and *with what resources*?" Providing opportunities for personalizing and customizing learning might be a difficult task if the instructors avoid taking into consideration the new technologies dominated by media tools.

Students learn not only within classroom framework. Creating a Web site, a film, or other multimedia resource could be a helpful alternative for passing knowledge to student.

Whatever the scenario, *it is the student who is at the center of the learning experience*. The student is onstage, guided by the task design created by the faculty member, accessing whatever resources might be needed, and acquiring useful knowledge from the experience. This fundamental design framework serves as a context for the principles that follow.

2. The Environment the Learner Interacts with is important for Every Learning Experience.

Every learning experience occurs within an environment in which the learner interacts with the content, knowledge, skill, or expert. The environment might be simple—for example, one learner with one resource at home, work, or some other community space (Oldenburg 1999). The environment might be complex, such as several learners with many resources in a classroom, library, media center, or café. Another type of environment might be a synchronous virtual meeting place, such as when several students collaborate online with many resources in different locations. The faculty member's involvement and presence can vary in any of these environments.

The question to be anticipated by faculty when they are designing a set of course experiences is *where, when, with whom, and with what resources will any particular instructional event be likely to occur, and what are the expected outcomes*? Will this experience be a small group meeting planning a team project using a synchronous meeting tool? Will this event be an experience where a team of two students interviews restaurant workers about their knowledge of public health regulations? Or will this experience be an individual experience where the student is working through a complex simulation? In designing an effective learning environment, faculty will face a range of options as they seek to find the best combination of learning experiences available for their students.

Whatever the specific environment, a well-planned course provides a variety of interaction choices for students. For example, a well-planned course balances three levels of interaction: faculty-to-student, student-to-student, and student-to-resources. Additionally, a well-planned course balances three types of activities: individual activities, small group activities, and large group activities. By ensuring multiple channels of communication, engagement, and collaboration within the design of a

course, faculty members provide a richly textured environment that can accommodate a full range of student needs and learning styles.

3. Choosing the Learning Tools are an important part of the learning process.

This principle arises from the fact that *learning occurs only within a context*—that is, through an interaction between a person and a learning environment, as noted above. This contextual feature of learning has its roots in the theories of Dewey (1933) and Vygotsky (1962), and it continues to inform the more recent work of Damasio (1999) and Bransford et al. (2000). The environment as envisioned in these theories includes all the tools, resources, and people that are part of any particular learning experience (Daniels 2001).

In previous generations, the faculty member lectured, the students took notes, and the learning process unfolded within a relatively limited and discrete environment of tools and technologies. Today, the learning environment has considerably been changed into a more complex one, including a network in which all students and faculty have access to powerful digital tools for communication and research. Teachers are faced now with a learning environment in which all learners and faculty have their own personal laptop computer and other mobile tools such as iPods and PDAs. Meanwhile, students have discovered the community-building and networking power of instant messaging, discussion boards, online forums, blogs, and wikis while still occasionally using e-mail. These tools are dramatically changing the communication patterns and relationships between learners and the faculty.

While such changes are manifold, they generally entail a realignment of faculty roles and student learning activities. In an environment infused with these tools, the faculty member moves from the center of the class communication pattern—as is common in the traditional transmission mode of learning—to the periphery. In turn, the anywhere/anytime access to communication tools makes it easy for students to go outside the organized course structure and content. Another significant design impact of these tools is the ease by which students can customize their own learning experiences as the content boundaries of a course dissolve.

Readily available mobile tools now support information access and flow in real time, enabling current events, global perspectives, and far-flung resources to be brought into immediate and fresh relief. Every statement by a faculty member is subject to challenge, addition, or

confirmation from a student's Google search. Many teachers have been surprised by the shifts in learning dynamics and relationships created by these tools; at the same time, many teachers are now enthusiastically embracing these changes as they recognize the many benefits of learners becoming more engaged and active in their learning.

4. The faculty member is the Director of the learning experience.

In accordance with recent scholarly trends, the learning and teaching framework places learners center stage; however, it also affirms the critical role of the mentor/faculty member. The role of the faculty is to design and structure the course experiences, direct and support learners through the instructional events, and assess the learner outcomes. In theater terms, the faculty member is the director of the learning experience, not the "sage on the stage" who transmits knowledge. When the faculty member is acting as the "sage," it is the faculty member who is reaping the benefits of working with the content, structuring the content, and communicating the content. One goal in designing effective and efficient learning environments is to get the students to work this intensively with the content. Strategies that support this shift in perspective include having the students moderate discussion forums, prepare concept summaries and examples for other students, and assume greater responsibility as front line moderators for the course. Furthermore, the role of technology in the learning environment allows for the teaching functions of the faculty member to be redistributed in other ways as well. In particular, all teaching functions no longer need to be embodied in one person but can be assumed by various members of instructional teams. During the development process, for example, the design and development of online courses may be done by an instructional designer collaborating with a senior faculty member. During course delivery another faculty member may take over the functions of directing, supporting, and assessing the learning of students. This greater flexibility in the distribution of teaching functions is accompanied by the same freedom from time and space constraints that students experience.

To apply this principle successfully, we recommend using technology to encourage peer-to-peer learning; this may enable students to make better use of the faculty member as a source of specialized guidance and feedback.

5. Learners Bring Their Own Personalized Knowledge, Skills, and Attitudes to the Learning Experience.

Learning Principle Five focuses on the learner as an individual. Most courses are designed with a set of core concepts and knowledge for the students to learn; however, if we do our job of teaching well, our students integrate those new core concepts into their unique knowledge structures, richly expanding their useful knowledge. Each of our learners' brains is as unique as an individual's fingerprints and DNA, and our students' knowledge bases inevitably become more individualized over time. This is a highly desirable outcome as our goal is not to develop standardized brains, but richly differentiated, creative brains with shared experiences.

When learners encounter not just one concept but a confluence of new and unfamiliar discrete items in rapid succession, they must work to attach this incoming knowledge to existing nodes and patterns. The more concepts, the more patterns, and the more interconnectedness in the brain structure, the more receptor nodes exist.

One of the ways faculty can tap into students' existing knowledge or mental model is simply to begin a learning experience by asking students about what they already know—or think they know. In traditional classrooms instructors have typically solicited this information at the beginning of a course through in-class discussions or through informal writing assignments that ask students to discuss their personal interests, academic goals, and educational background. In turn, currently available technological tools provide instructors with a wider range of avenues for gaining this valuable information about their students. Some of the tools that are helpful for this purpose include *discussion boards, student response systems, and online testing modules* that assess current skill sets as well as more complex forms of knowledge. For example, an English instructor can design an online test that targets specific areas of grammatical usage in order to assess student proficiencies during the first week of a freshman writing course.

6. Instructors should help students understand concepts/intricate knowledge not words.

This principle, again from Vygotsky, is simple but profound. Concept formation is not a one-time event; rather, it is a series of intellectual operations including the centering of attention, abstracting, synthesizing, and symbolizing (Vygotsky 1962). Freeman similarly describes the

assimilation of meaning as a process of "successive approximations" (2000, 15). What does this mean for designing learning experiences and courses?

When faced with a new field or discipline, students typically focus on learning the vocabulary of a discipline, but this activity is often done in isolation from an understanding of the concepts that give the words meaning. Without the underlying concepts, words are akin to isolated weeds and seeds likely to be blown away by the winds of time, usually mere hours after an exam.

A popular new teaching and learning theory advocates making students' thinking visible (Collins, Brown, and Holum 1991; Bransford, Brown, and Cocking 2000). Making thinking visible requires students to create, talk, write, explain, analyze, judge, report, and inquire. These types of activities make it clear to students themselves, to the faculty, and to fellow learners what students know or do not know, what they are puzzled about, and what they might be curious about with regard to the course material. Such activities stimulate the student's growth from concept awareness to concept acquisition, building in that series of intellectual operations that Vygotsky believes is required for concept acquisition.

Discussion forums, blogging, journals, and small group work are all excellent strategies for allowing learners to enlarge their mental models, to clarify concepts, and to establish meaningful links and relationships. Online tools are particularly valuable in this context because they provide a public forum in which the cumulative, step-by-step process of concept formation, refinement, application, and revision is fully visible to student peers as well as their mentors. By providing a comprehensive record of how concepts take form through multiple clusters of knowledge, such media can promote more complex and lasting retention of course material among students.

7. Different Types of Instruction are Required for Different Learning Outcomes.

Robert Gagne, widely considered as the father of the discipline of instructional design, observed in *Conditions of Learning* (1965) that all instruction is not equal and that different types of instruction are required for different learning outcomes. Though not a groundbreaking concept today, the idea was quite novel in 1965.

What this principle means is that *what* a faculty member *does* makes a difference in what students *do*, in what students *learn*, and in what

concepts students may or may not *develop*. This principle also reinforces the instructional design practice of planning student assessments simultaneously with the planning of instructional experiences and of embedding assessments within instructional events. This principle encourages us to answer the instructional design question of what knowledge, skills, and attitudes you want your students to develop and grow and then to design the teaching and learning events to accomplish those goals and determine what evidence will illustrate student accomplishments.

An example of this principle is the gradual reintegration of apprenticeships, internships, and complex problem-solving simulations into teaching and learning experiences. If the desired outcome is for students to be great chefs, they probably need to cook; if the desired set of skills is becoming entrepreneurs, students probably need to serve as apprentices in an internship environment or at least practice entrepreneurial activities. This principle is also at work with pilot training on simulators and students practicing lab techniques in a model environment. As faculty design their courses, they should ensure that they have explicitly defined the outcomes they seek to reach and that the learning experiences consistently support and assess these outcomes.

8. The deeper the student's cognitive involvement in the learning process, the More Learning he gets.

The traditional time-on-task principle (students spend more time interacting with information and practicing skills, the more proficient, accomplished and confident they will become) has been proved to be not only old and out of date but also not efficient in regard to getting to effective learning. Cognitive theories has shown that the time spent on the task is no longer the most important in learning and memorizing the content but the degree of cognitive involvement of learner in the process of understanding. In other words, though time-on-task may help students perceive the result as rewarding and enjoyable, the most effective factor in the process of learning is the degree of information processing. Particularly, developing more complex, networked knowledge structures and stimulating content at the right zone of proximal development are the ones which may bring the result of memorizing the learning material. As students develop more metacognitive awareness they will also naturally seek out and identify the types of resources and experiences that work for them.

Learning can be more efficient if we organize information into chunks, states cognitive psychology. And this is true if we think that chunking is just one reason games and role-playing scenarios are popular and valuable.

Conclusion

Current research about how students learn is illuminating the processes involved in teaching and learning.

Insights gained from this research and integrated with traditional learning principles can help guide our design of learning environments so that both teaching and learning can be more efficient and effective. One major insight contributing to these principles is the uniqueness of each brain in its structure and its accumulated experiences. We each do experience and remember events just a little differently. This richness of perspective and worldviews is a challenge as well as a potent creative force. The combination of the uniqueness of each learner and the richness of each learner's perspective argues persuasively for more emphasis on a pedagogy that emphasizes community, culture, and ethics as well as the acquisition of knowledge, content, and skills.

Finally, our campus environments—physical and online—are the places where structured teaching and learning takes place. Just as we evaluate and redesign the teaching and learning processes between faculty and students, so too must we redesign the environments in which such processes occur, ensuring that the design and tools we select support the growth of the unique brains we are responsible for nurturing.

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